3SPack

Satellite Survey
Software Package

REFERENCE MANUAL

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1. Installation & Prerequisites

Introduction

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The 3SPack software package is shipped on a CD-ROM (the DSNP *Scorpio* CD-ROM or the DSNP *Aquarius* CD-ROM) and a dongle is provided.

You will be interested in creating 3SPack installation diskettes if for example you wish to install the package on a PC with no CD-ROM drive. To do this, use a PC with a CD-ROM drive and copy each of the Disk 1 to Disk N sub-directories from the CD-ROM 3SPack directory to a separate diskette (on which you will not forget to write down the proper label).

In case of partial purchase of 3SPack, the applications that are no part of your acquisition will remain unavailable to you.

> **NOTE**: The applications corresponding to your purchase order are declared by way of a dongle which you should connect to your computer prior to running 3SPack.

If later you buy a new application, you will be provided a password to unprotect it (see *Enabling an application purchased later* in page *1-7*).

Computer requirements

Processor	:	DX2-66 minimum, Pentium recommended
RAM	:	16 Mbytes minimum, 24 Mbytes recommended
Operating system	:	Windows 95
Display screen	:	SVGA, 17 inches recommended
Other	:	PCMCIA card drive recommended

Installation from CD-ROM

- Insert the CD-ROM into the CD-ROM drive

  Setup should be launched automatically. If that is not the case, open the **Add/Remove Programs** icon from the Control Panel and click on the **Install** push-button

  or, from the Windows 95 task bar, click **Start,** select **Run** from the pop-up menu. In the text box which then appears, type in {**drive name**}**:\Setup.exe** and click the **OK** button.

- Choose **Install 3SPack** and then follow the instructions provided on the screen to complete setup. The main stages in the installation procedure are described below.

- **Welcome Dialog box**

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

- **Registration**

  - Specify the following in the two text boxes:

    - your name
    - your company's name

- **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.

- **Program folder**

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

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- **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).

- **End of installation**

  - The following messages are displayed successively:

    > Setup is installing DAO components...
    >
    > Setup is updating registry database...
    >
    > Setup is installing program icon to the start menu...

- The end of installation is denoted by the following message:
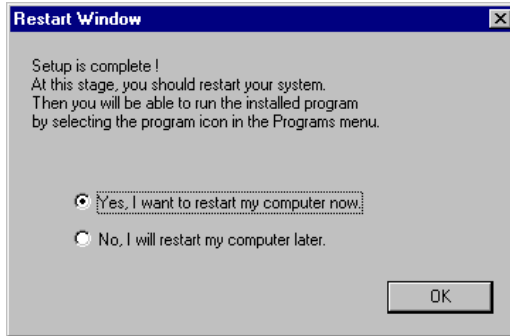
- Select the appropriate option.

Installation from diskettes

- Insert the first diskette (disk. #1) into the PC drive

   Open the **Add/Remove Programs** icon from the Control Panel and click on the **Install** pushbutton

   or, from the Windows 95 taskbar, click **Start,** select **Run** from the pop-up menu. In the text box which then appears, type in {**drive name**}**:\Setup.exe** and click the **OK** button.

- Follow the instructions provided on the screen to complete setup (same as if installed from the CD-ROM, except that the installation diskettes must be inserted one after the other, when prompted by the system).

Program folders and shortcuts

1

- After successful installation and using Windows95 explorer, the following is now visible on your disk C:

```
☐ 🗀 3SPack
     🗀 Bin
     🗀 Cmd
     🗀 Data
  ☐ 🗀 Kis
     🗀 Maps
     🗀 Pgm
     🗀 Points
     🗀 Raw
     🗀 Rtf
     🗀 Set
     🗀 Sis
```
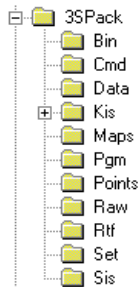
Bin : Contains all the program files (mainly *.exe, *.dll, *.hlp, *.ocx, etc.)

Cmd : Default directory used to save all Win Comm command files

Data : Reserved directory. Contains the system database. Do not edit any of the files contained in these directories as this could seriously damage the performance of your software.

NOTE: We recommend you to back up the Data directory at regular intervals as this directory contains all the data used by 3Spack.

Running a Restore operation on this directory will put 3Spack back into the state in which it was when last running the Back-up.

Kis : Directory used to store KISS projects

Maps : Default directory invoked when importing digitized maps (it is easier to move your maps to this directory before importing them into the database)

Pgm : Default directory invoked when saving Wincomm record-program files

Points : Default directory invoked when importing or exporting points (it is easier to move your points files to this directory before importing them into the database)

Raw : Default directory invoked when importing raw data files

Rtf : Default directory invoked when choosing a template for the project document

Set : Default directory invoked when saving Win Comm configuration file (containing communication parameters)

Sis : Directory used to store SISS projects

- In addition, a new folder (the "program folder") is present in C:\WIN95\Start Menu\Programs\D.S.N.P., containing the shortcuts listed below:
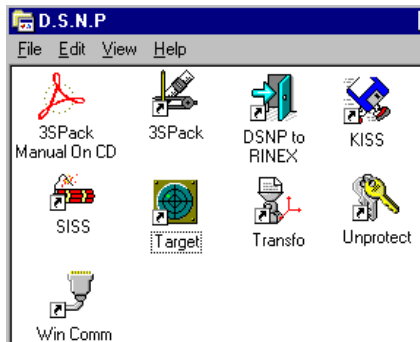
Getting started

1

- Before running 3SPack, do not forget to 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.

> **NOTE**: The applications corresponding to your purchase order are declared by way of a dongle —part of the supply— which you should therefore keep permanently connected to your computer so long as you use 3SPack.

- Double-click on the 3SPack icon to start the program.

Enabling an application purchased later

For example you purchase 3SPack without the Kinematic application. If later you need to use Kinematic and you buy it, then you just have to do the following after DSNP has provided you with a password reckoned from your personal key code :

- Run 3SPack and from the menu bar, select **Tool** and then **Unprotect**

or

Run **Unprotect** from the Windows95 Start Menu

- Type the password in the text box which then appears (see below):
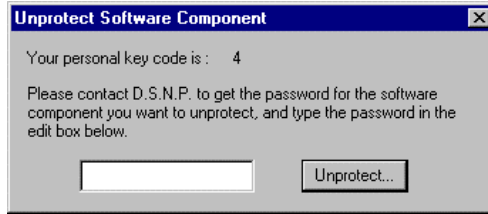
- Click the **Unprotect...** button
- The component which has so far been unavailable to you can now be run on your computer. ♣

2. Tutorial

This section introduces the basic techniques required to run a survey using 3SPack.

The average time needed for a beginner to read this section while running the tutorial project on the computer is about half an hour.

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Assumptions

- **Installation:**

Software installation : Default

Program folder : D.S.N.P

- **Survey:**

Prediction : Will be run for the current date & time. In normal use, predictions should be run for the days of surveys. In this tutorial, you should admit there won't be no real connection between the prediction and the post-processing.

Field survey : *Not described*

Receiver-to-PC
data transfer : Described just to show how it works. In fact you won't need to upload field data since you will be asked to "import" field data placed in the Raw directory by the installation software, as if it were the data recorded during your survey.

Post-processing : Will be run for a survey performed during the last quarter of 1996.

Running 3SPack

- From the Windows95 task bar, click the **Start** button and then select successively **Programs**, **D.S.N.P** and **3SPack**.

- Wait for the 3SPack window to open:

Creating the tutorial project

- From the menu bar in the 3SPack window, select successively **File** and then **New Project**

- In the **Project** dialog box which then appears, enter the following in the **General** tab:

Project : type **Tutorial**

Supervised by : *enter your name*

...

All coordinates in : choose **Lambert 2**

- Select the **Region** tab (from top of dialog box)

- Click the **Browse** button. A dialog box appears listing the registered regions.

- Choose the only known region (**TutoRegion**) by directly clicking the **OK** button. As a result the N/S and W/E coordinates of this region appear in the corresponding fields on the **Region** tab.

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- Click the **OK** button. This causes 3SPack to create the **Tutorial** project. A new window appears showing the content of this project into which 3SPack then automatically inserts the header (from the template, see *Editing a project document* in section 3), followed by the project abstract (see *Appendix*) and a map of the region (this may take a while).

Note that the insertion of the last two elements will take place only if you have maintained the default View options in Supervisor (see *View* menu, *Options* command in Supervisor).

Note also that at the end of the insertion, the Map server is in-place activated (in the 3SPack window, the Map Server bars are now displayed instead of the Supervisor bars):

.../...
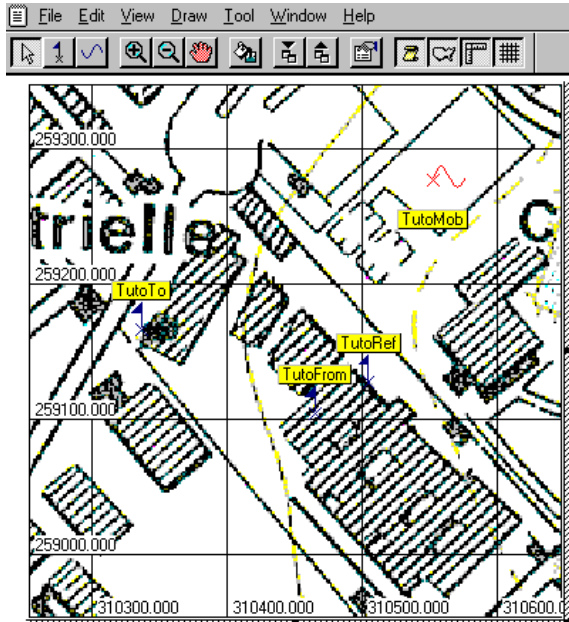
Focusing on the sites and trajectories shown on the map

- Click to remove the details of the map. The following elements (three sites and a trajectory) remain visible:

2
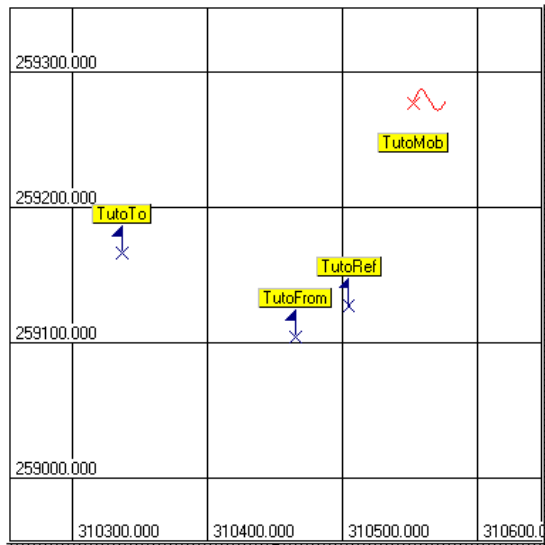
- Double-click (after moving the pointer onto the site name or the cross)

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A Site dialog box opens in which you can read the definition of this site:

Solutions tab : Only a user-estimated location is known for this site

General tab : Since only a user-solution is known, it is also defined as the default solution and last solution for this site

Observations tab : No observations available yet for this site

Curtain tab : No curtain defined for this site

- Click the **OK** (or **Cancel**) button to close this dialog box

- Do the same for the other two sites TutoFrom and TutoRef. Note that a curtain is defined for TutoRef.

- Double-click TutoMob (after moving the pointer onto the trajectory name or the cross)

A Trajectory dialog box opens in which you can read the definition of this trajectory:

General tab : Only a user-estimated location for the start point of this trajectory is known

Solutions tab : No solutions available for this trajectory

Observations tab : No observations available yet for this trajectory

- Click the **OK** (or **Cancel**) button to close this dialog box

Defining a prediction at TutoRef

- Click TutoRef

2

- From the menu bar, select **Draw** and then **Prediction**. A dialog box appears allowing you to define a satellite prediction on this site

- Do not change any of the parameters displayed in this box. Instead, just click the **OK** button.

  This causes the **Prediction** dialog box to disappear and 1:Prediction appears beside the TutoRef site on the map. To go back to the definition of the prediction, just double-click 1:Prediction

- While holding down the **Shift** key, double-click 1:Prediction to display the options of the prediction. Do not make any changes to this box. Instead, just read the parameters displayed and then click the **OK** button.

Running the prediction

- Press the **Esc** key to quit the Map server environment (in the 3SPack window, the Supervisor bars are now displayed instead of the Map server bars).

- In the toolbar, click

- In the dialog box which then appears, click the **Run** button. 3SPack starts running the prediction. At the end of the computation (this may take a while), a prediction object, such as illustrated below, is inserted into the project, at the end of the document:
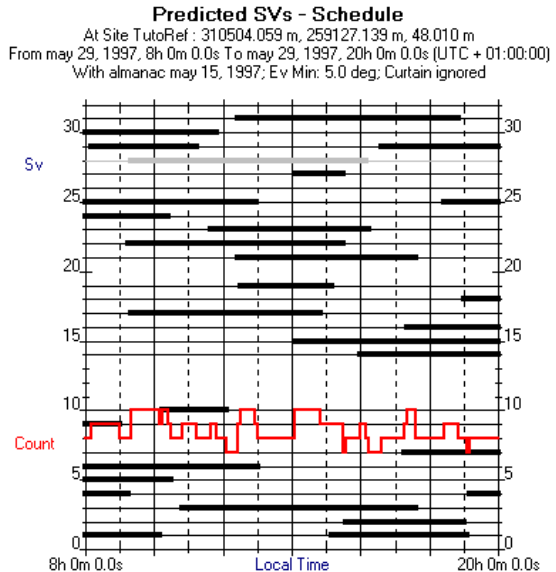
Loading a field record to your PC using WinComm

Skip this page and the next one if you do not have your receiver and communications cable in hand. You do not need to perform this load operation to continue with the tutorial. These two pages only describe the typical procedure to be followed for the loading of your field data files from the receiver to the computer if you do not use a PCMCIA card.

2

- Connect the receiver to your PC according to the instructions provided in the receiver manual. In what follows, you will need to know the port settings used on the receiver.

- From the 3SPack menu bar, select **Tool** and then **WinComm**. This causes the **Communication Settings** dialog box to appear.

- Change the following parameters so as to put the computer port used in the same configuration as the receiver port:

Comm :	Com 1
Speed :	9600
Data bits :	8
Parity :	None
Stop bits :	1

If a DSNP receiver is connected and you are not sure about the Baud rate, click the **Auto Configure** button. This will automatically set the above parameters to the required values.

- Click the **OK** button. This enables communications between the GPS receiver and the PC.

- Now that the WinComm window is active, click **Internal Memory Reader** in the **Mode** pane (top right). This causes the lower-right pane to be changed so that you can prepare the data transfer:

  Directory : Specify the directory on your PC where to transfer the field record file (default: c:/3spack/raw)

  File name : Specify the name of the file generated on the PC. If you do not want the resulting file to be split (**No Limits** is chosen as **File Max Size** option, see below), then you can specify the file extension (default: RAW)

  File Max Size : Specify whether a single file should be created on the disk (choose **No Limits**) 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.

- Click the **Transfer Current** button. WinComm then starts reading the record session selected in the Transfer text box from the receiver's memory and saves it to the file specified in the File Name and Directory text boxes.

- When the transfer is complete, click ☒ to close the Win Comm window.

Importing field data records

- Scroll up the project document, by holding down ▲, until the map object re-appears in the main window

- Double-click anywhere within the map object to enter the Map Server environment

- Click ⌷ to restore the details of the map on the screen

- From the menu bar, select **File** and then **Import GPS Data**

- In the dialog box which then appears, click the **Add** button

- In the **Browse** dialog box which then appears select all the files except ReadMe.txt:

2
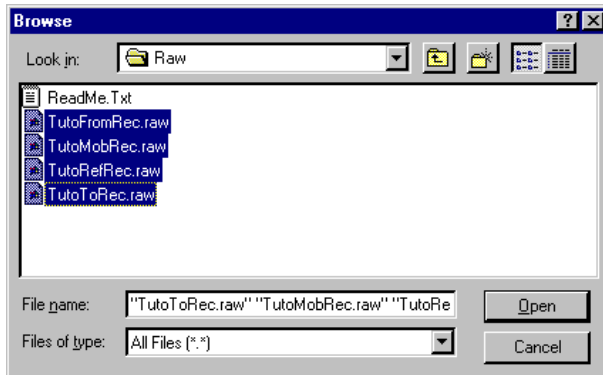
- Alternately, If your survey was performed with the field data files recorded on a PCMCIA card, then insert this PCMCIA into the PCMCIA drive of your PC and, from the **Look In** combo box (above), choose this drive and then select the files.

- **Notes about the use of the Shift and Ctrl keys to make a Multiple Selection:**

  There are two ways of making a multiple selection:

  - Click the first file that you wish to select and, while holding down the Shift key, click the last file that you wish to select. The resulting selection consists of these two files plus all the files in between.

  - Or click any file that you wish to select and, while holding down the Ctrl key, click successively the other files that you wish to select. The selection only consists of the files that you clicked. Note that while still holding down the Ctrl key, clicking a selected file will deselect it.

  - Click the **Open** button. This causes the list of selected files to appear now in the **Import GPS Data** dialog box

  - Now click successively each of these files and note how 3SPack can "guess" the destination of each of these files and therefore prompt the right associations, the recognition being based on the use of appropriate naming rules. Examples:

TutoToRec.raw file	**TutoMobRec.raw** file
↓	↓
3SPack prompts you to create an observation record called **TutoToRec** (i.e. data file name without the extension)	3SPack prompts you to create an observation record called **TutoMobRec** (i.e. data file name without the extension)
↓	↓
3SPack searches for a site or trajectory stored in the database whose name shares the longest character string with **TutoToRec** (starting from the first character in both names).	3SPack searches for a site or trajectory stored in the database whose name shares the longest character string with **TutoMobRec** (starting from the first character in both names).
↓	↓
3SPack prompts you to associate this observation record with the site called **TutoTo**. This is precisely what should be done.	3SPack prompts you to associate this observation record with the trajectory called **TutoMob**. This is precisely what should be done.

- Do not make any changes to these settings and simply click the **Go** button to start importing the data files (you don't need to re-select all the files in the **Import** list box before clicking **Go**). A message box shows the progress of the Import function (see example below).

2
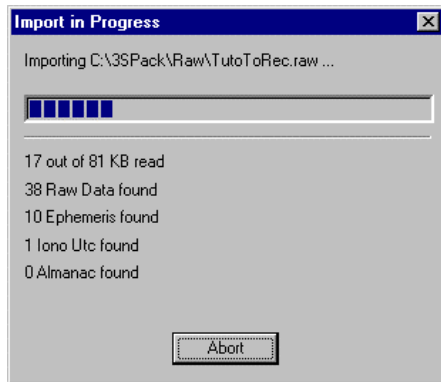
- Once all the data files have been imported, click to refresh the map (do not forget to do this whenever you make changes to an input parameter or an option connected with the map server).

  Note the presence of diskette icons on the map, meaning that observations are now available for these sites and trajectory:
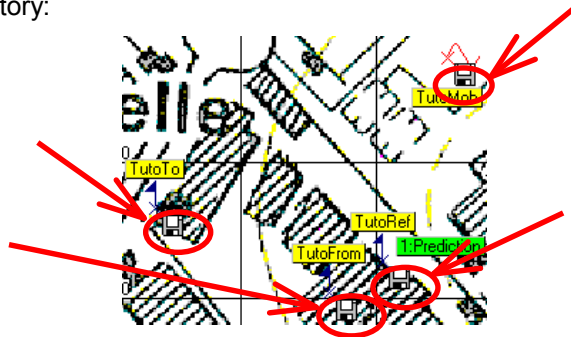
Defining "Natural" processes to determine TutoTo and TutoMob

`TutoTo`

- On the map, click

- While holding down the **Shift** key, click `TutoMob`

- From the menu bar, select **Draw** and then **Process**. A dialog box appears in which you can define a process for **TutoTo** (the first element selected on the map).

  Set this box as follows:
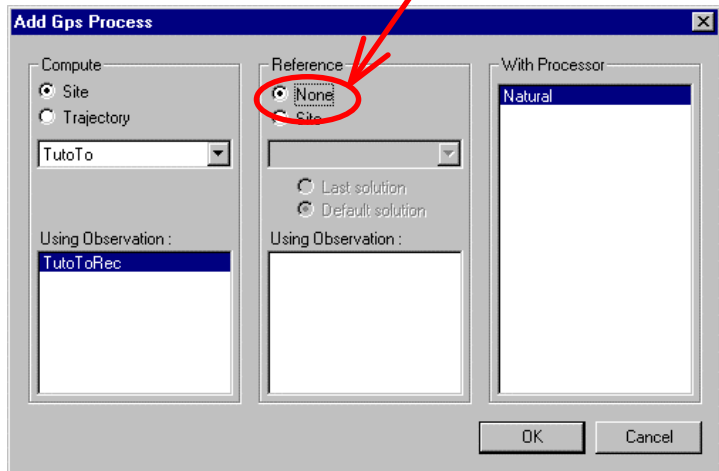
Select this option

- Click the **OK** button. The same dialog box appears, this
  time to define a process for **TutoMob** (the second element
  selected on the map).

  Set this box as follows: Select this option
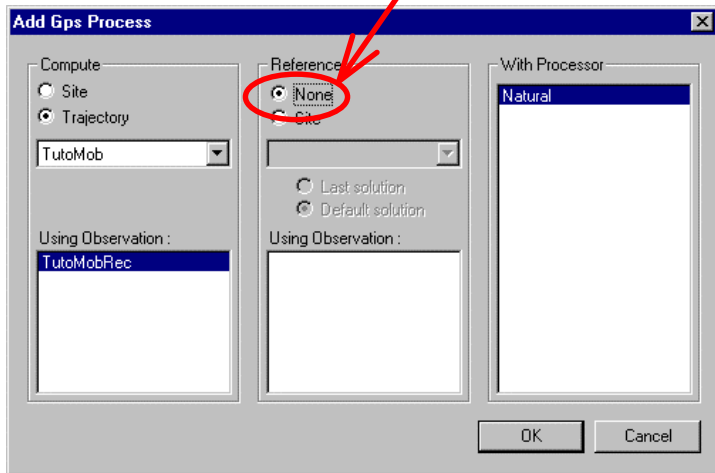
- Click the **OK** button. The Map server now shows two more
  operations:
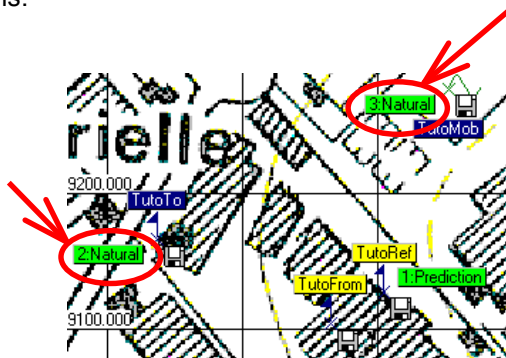
(click if these operations do not appear).

Defining a Rapid Static process to determine TutoTo

(You can do this only if the Rapid Static processor is active)

- On the map, click

- From the menu bar, select **Draw** and then **Process**. A dialog box appears in which you can define a process for **TutoTo.**

  Set this box as follows:
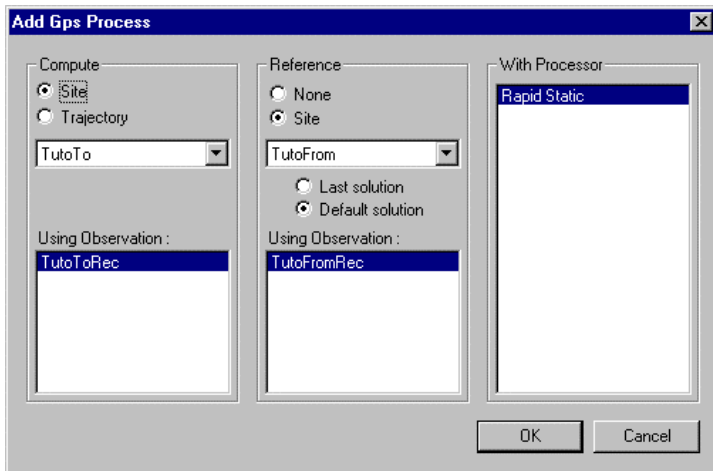
- Click the **OK** button.

Defining a Kinematic process to determine TutoMob

(You can do this only if the Kinematic processor is active)

- On the map, click TutoMob

- From the menu bar, select **Draw** and then **Process**. A dialog box appears in which you can define a process for **TutoMob.**

2

  Set this box as follows:
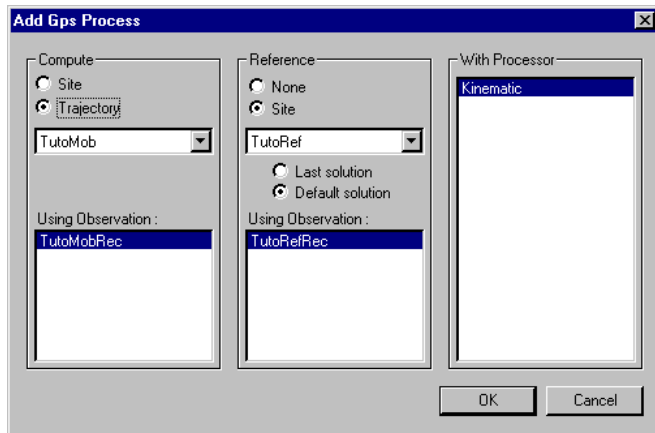
- Click the **OK** button. The map server then looks like this:
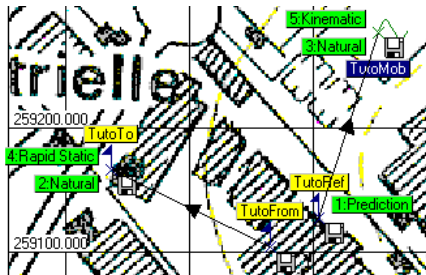
- You can check the definition of each of the four processes you have just defined by double-clicking the corresponding objects on the map (rectangles in green), which causes a dialog box summarizing the process definition to display.

Running all the processes

- Press the **Esc** key to come back to the project environment
- As a safety measure, from the menu bar, select **File** and then **Save Project**
- Click ▣↓
- In the **Project Run** dialog box which then appears, while holding down the **Ctrl** key, click the prediction operation to deselect it (this operation has already been run)
- Click the **Run** button. This causes the first process to execute. Let the program perform all the operations (this takes about 3 min with a DX4-100, 16 MHz RAM).

    Do not try to anticipate the next action, using either the mouse or the keyboard, as this could cause the following type of message to appear:
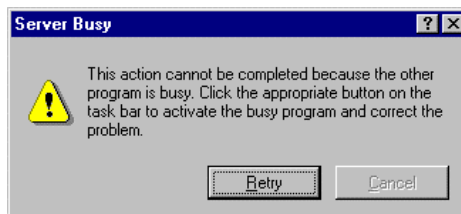
- After the last process is complete, scroll through the project document and compare the results provided by "Natural" and "Rapid Static" for the **TutoTo** site and by "Natural" and "Kinematic" for the **TutoMob** trajectory.

  Note that plot objects in the document are separated by ".../...". This character string helps you point to the location where you can insert text or graphics between plots.

2

Inserting a new map only showing the essential results of the survey

- Point to the end of the project document

- From the menu bar, select **Insert** and then **Map**

- Click [icon] to remove the scenario from the map

- From the menu bar, select **View** and then **Options**. In the dialog box which then appears, select the **Show/Hide** tab. Set this tab as follows and click **OK**:
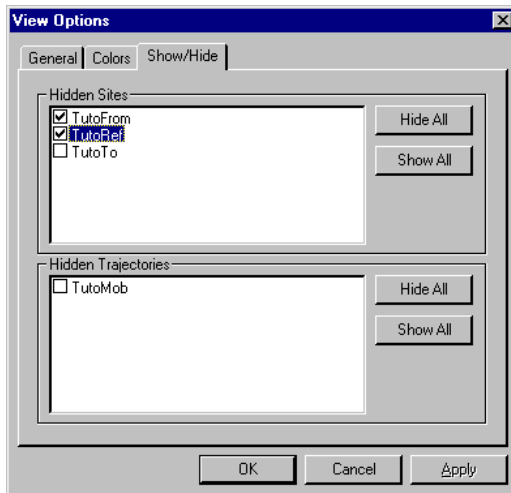
- Adjust the map so as to give the best possible view of the results using the following buttons:

   to zoom out

   to zoom in

   to move the view in any direction

For example, this may be the kind of view you would like to get:
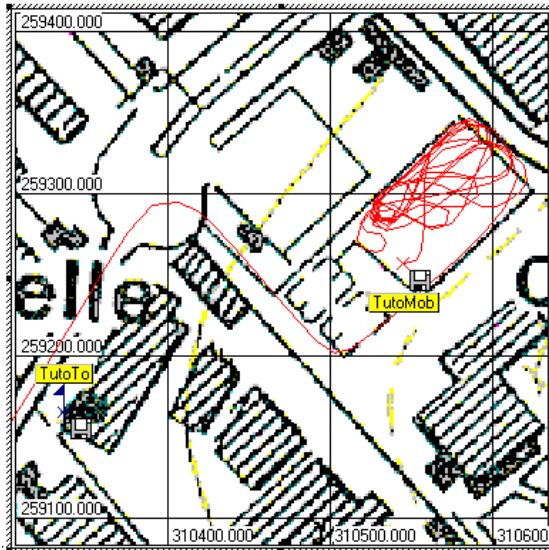
Editing the new solutions

- Click ![cursor icon]

- Double-click ✕ again.   TutoTo

2

- In the **Site** dialog box which then appears, select the **Solutions** tab. Two more solutions are now available for this site.

- Use the vertical scroll bar to edit successively each of the three solutions.

Click this button to scroll up the list of solutions

3 solutions for TutoTo

| General | Solutions | Observations | Curtain |

3/3 ▲

Date :   j un 11, 1997

Time :   8h54m 2.0s

Position

Gps :   dec 18, 1996   10h 7m 1.2s   (UTC)

Lat :   47°16' 7.2292''N   Correlation Matrix :

Long :   1°29'35.1523''W   0.00133 m   SdUW :   0.00000

Alt :   88.911 m   0.12299   0.00319 m

SdP :   0.00793 m   -0.42406   -0.01535   0.00713 m

Notes

Computed by Rapid Static, using observation TutoToRec (dH : 0 m)
Reference : TutoFrom (47°16' 5.4326''N, 1°29'28.9090''W, 89.490 m + 0 m), using observation TutoFromRec
From dec 18, 1996, 10h 3m59.4s To dec 18, 1996, 10h10m 1.2s (UTC)
Ev Min: 5.0 deg; From curtain ignored; To curtain ignored

Protected Solution ☑
Default Solution ☐

New   Delete

Click this button to scroll down the list of solutions

- Double-click TutoMob again

- In the **Trajectory** dialog box which then appears, select the **Solutions** tab. Two solutions now exist for the trajectory. The first one (from Natural) includes 993 points, the second (from Kinematic, see below) 248 points.

- Use the vertical scroll bar to edit successively each of the two solutions.

Click this button to scroll up the list of solutions

2 solutions for TutoMob

| General | Solutions | Observations |

Date : | j un 11, 1997

Time : | 9h 2m12.0s

SdP : | 0. 01142 m

View :
- All Points
- Marked Points

2/2

Positions

Gps : | oct 11, 1996 | 12h18m28.8s | (UTC)

Lat : | 47°16'10.5194''N

Long : | 1°29'25.4308''W

Alt : | 80.958 m

SdP : | 0. 00465 m

Correlation Matrix :

0. 00194 m | | SdUW : | 0. 00033

0. 15307 | 0. 00288 m

- 0. 07049 | 0. 31847 | 0. 00309 m

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Notes

Computed by Kinematic, using observation TutoMobRec
Reference : TutoRef (47°16' 6.2490'N, 1°29'27.0900'W, 93.090 m + 0 m), using observation TutoRefRec
From oct 11, 1996, 12h18m26.4s To oct 11, 1996, 12h28m21.6s (UTC)
Mode : O.T.F.; Ev Min: 5.0 deg; Curtain ignored

Delete

Default Solution

Trajectory consists of 248 points in the 2nd solution. Use the Scroll buttons to display the coordinates of each of these points.

Click this button to scroll down the list of solutions

Exporting the solutions

- On the map, click TutoTo

- While holding down the **Shift** key, click TutoMob

- Click 🔁.

- In the dialog box which then appears, just change the format to ASCII.DXF, as shown below:

2
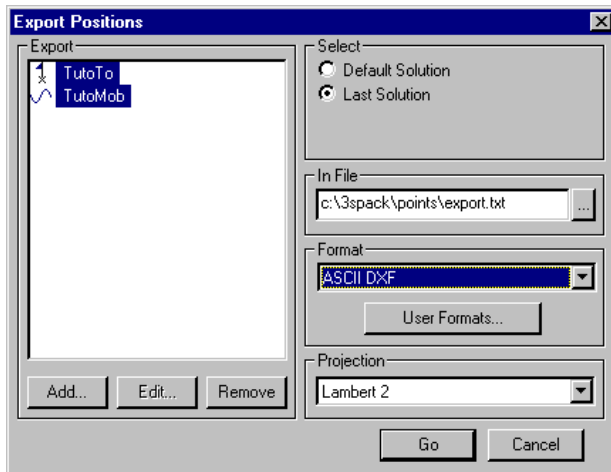
- Click **Go**. The following message appears:
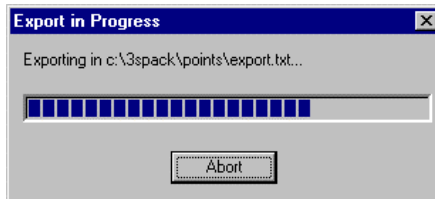
- Wait until the message disappears.

Previewing the project document

- Press the **Esc** key to quit the Map server environment (in the 3SPack window, the Supervisor bars are now displayed instead of the Map server bars).

- Click ![icon] to verify the page layout of your project document before printing it.

   Use the commands available from within the Preview window if necessary.

- If changes have to be made to the page layout, first click the **Close** button to go back to the project document (in any case, click this button to quit the Preview window).

- Print the project document using the **Print** command from either the Preview window or the **Print** command from **File** in the Supervisor menu bar.

At this stage in the survey, a printable document is now available containing the results (plots) of all the operations performed. A DXF file is also available gathering all these results for use by a GIS (Geographic Information System) for example.

Closing the Project document

- From the menu bar, select **File** and then **Close Project**.
  This causes 3SPack to save and close the Tutorial project.

- Click ![icon]. 3SPack now shows the Supervisor database:
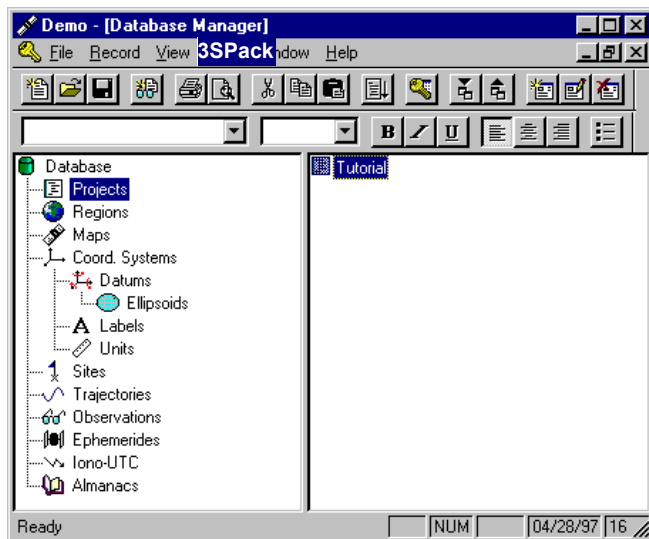
2

Using the Supervisor Database to edit the various "records" involved in the Tutorial project

When you closed the Tutorial project, 3SPack switched to the Supervisor Database and automatically selected the Projects object thus showing the Tutorial project as a "project record" (in the right-hand pane of the window).

The term "record" refers to any element, *project, region, map, etc.*, contained and viewed from within the Supervisor database; the term "object" refers to a family of records.

- Double-click the Tutorial record. This causes the **Project** 3-tab dialog box to open showing the definition of the Tutorial project (as defined earlier when creating the Tutorial project)

- Click **OK** or **Cancel**

- Click the Regions object in the left-hand pane of the Database and then double-click the TutoRegion record. A dialog box appears showing the definition of this region

- Click **OK** or **Cancel**

- Click the Sites object in the left-hand pane of the Database and then double-click the TutoTo record for example. A dialog box appears showing the definition of this site. Note the presence of the two solutions determined earlier by Natural and Rapid Static

- Click **OK** or **Cancel**

- Click the Trajectories object in the left-hand pane of the Database and then double-click the TutoMob record for example. A dialog box appears showing the definition of this trajectory. Note the presence of the two solutions determined earlier by Natural and Kinematic.

- Click **OK** or **Cancel**

- Click the Observations object in the left-hand pane of the Database and then double-click the TutoMobRec record for example. A dialog box appears describing the content of this observation.

- Click **OK** or **Cancel**

  etc.

Deleting the various records involved in the Tutorial project

(specifying in which order this must be made)

From within the Supervisor Database:

2

1- Delete Project

- Click the Projects object and select Tutorial
- From the menu bar, select **Record** and then **Delete**
- Click **OK** to confirm your choice.

2- Delete Observations

- Click the Observations object and select all the Observation records
- From the menu bar, select **Record** and then **Delete**
- Click **OK** to confirm your choice.

3- Delete Ephemerides

- Click the Ephemerides object and select all the Ephemeris records
- From the menu bar, select **Record** and then **Delete**
- Click **OK** to confirm your choice.

4- Delete Iono-UTC data

- Click the Iono-UTC object and select all the Iono-UTC records
- From the menu bar, select **Record** and then **Delete**
- Click **OK** to confirm your choice.

5- Delete Almanacs

- Click the Almanacs object and select all the Almanac records but one (anyone)

- From the menu bar, select **Record** and then **Delete**

- Click **OK** to confirm your choice.

6- Delete Site solutions

- Click the Sites object and then double-click the TutoTo record

- Select the **Solutions** tab

- Using the Scroll bar, edit the 2/3 solution and click **Delete** twice in the dialog box. Only the user solution now remains for this site.

- Click **OK.**

7- Delete trajectory solutions

- Click the Trajectories object and then double-click the TutoMob record

- Select the **Solutions** tab

- Using the Scroll bar, edit the 2/2 solution and click **Delete** twice in the dialog box. Only the estimated position for the initial point now remains for this trajectory.

- Click **OK.** ♣

3. 3SPack Supervisor

Introduction

Basically 3SPack Supervisor consists of a **Project** Editor and a **Database** Manager. Two different operating environments should therefore be distinguished: the *Project environment* and the *Database environment*.

- With the **Project** Editor you can define and run all the predictions and computations required for your survey. At the end of your work, you get a comprehensive report (the "Project document") which you can print, export, archive, etc.

- With the **Database** Manager, you can easily keep control of all the data produced at the different levels of a survey by means of the few commands attached to the database (Add, Edit, Delete, Import, Export).

3

Project Editor

From the **Project** Editor you can make your satellite predictions and run all your site and trajectory computations. In fact, when you do that, you work on a document (called the "Project document") in which you deposit all these data and results.

- The start point is to open a new "Project document" for the survey.

- Whenever you execute "operations" such as predictions, computations of sites or trajectories, etc., a new "object" is inserted into the active Project document. Each of these objects may be edited or updated (re-run) separately, directly from within the document. They *are* the results of your survey.

- An interesting feature of the project editor is the **Map Server**. The Map Server lets you **insert a map** of the region of survey into the Project document. From this map, you can graphically control all the operations performed in the framework of your survey. The Map Server also gives a view of all the operations performed earlier in that region (provided the corresponding records are still present in the database).

- As a final step in the creation of a project document, and using the integrated **edit tools** of the **Project** Editor, you can add titles, additional notes and all sorts of comments (text and graphics) so as to give the project document the aspect of a professional printable document.

Database Manager

- The database gives you a synthetic view of all the records held by 3SPack Supervisor.

- To work in the database, you need to *open the Database window*. This window is divided into a left pane showing the architecture of the database (database objects with a particular hierarchy) and a right pane showing the content (a number of records) of the object selected in the left pane.
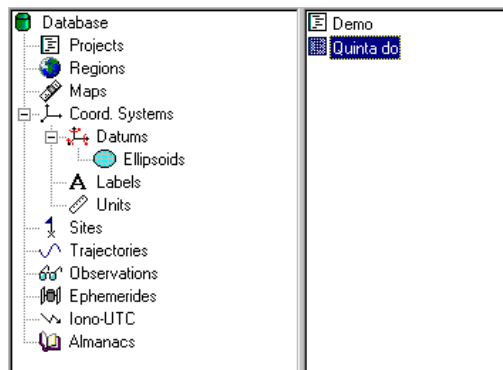
3

Opening the database window

- In the toolbar, click

  or

- From the menu bar, select the **View** command and then the **Database Manage**r command.

Database Architecture

The database consists of the 14 objects shown below.
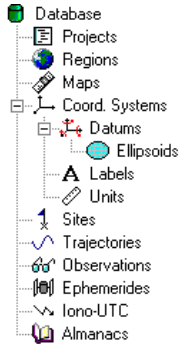
- **Projects object**

    Contains Project records. The definition of a Project record includes more particularly the time interval when the survey is assumed to take place, the type of coordinate system used (a Coord system record is mentioned), the region of survey and the operations to be performed (predictions, processes).

- **Regions object**

    Contains Region records. Each Region record depicts a rectangular area defined by the two points of one of its diagonals and a time zone.

- **Maps object**

    Contains Map records. Each Map record is identified by a name. A Map record consists of the map as such (a digitized map shown in the Map dialog box) and a user-settable grid.

- **Coord. Systems object**

     Contains Coord system records. Each Coordinate system record is mainly defined by a name, a Datum record, a Unit record and a Label record.

  - **Datums object**

     Contains Datum records. Each Datum record is mainly defined by a name, an ellipsoid, a scale factor and translation and rotation operations performed compared with the WGS84 model.

- **Ellipsoids object**

     Contains Ellipsoid records. Each Ellipsoid record is defined by the name of an ellipsoid, its semi-major axis and inverse flattening.

3

- **Labels object**

     Contains Label records. Each Label record depicts the terms used to introduce all coordinates expressed in the Coord System record which this record is associated with.

- **Units object**

     Contains Unit records. Each Unit record specifies the unit of all coordinates expressed in the Coord System record which this record is associated with.

- **Sites object**

    Contains site records. Each site record depicts the characteristics of a particular site (or location).

    The definition of a site record includes more particularly the coordinates of the site (several solutions may exist, for example that provided by the user as an estimate, or those resulting from different processes run precisely to determine the position of the site). The coordinates of each solution are expressed in the WGS84 system (if viewed from the database), or in the coordinate system used in the project (if viewed from the project document).

    Among the known solutions, one may be chosen as the default solution to be used in other processes in which the site is involved.

    The definition of a site also includes the definition of the curtain, if any, seen from the site.

- **Trajectories object**

    Contains trajectory records. Each trajectory record depicts the characteristics of a particular trajectory.

    The definition of a trajectory record includes more particularly the coordinates of the initial point (the beginning of the trajectory) and a number of solutions (several solutions may exist if several different processes have been run to determine that particular trajectory).

A trajectory solution consists of a list of points (all points or only marked points) classified in the chronological order of recording. The coordinates of each point are expressed in the WGS84 system (if viewed from the database), or in the coordinate system used in the project (if viewed from the project document).

Among the known solutions, one may be chosen as the default solution to be used in other processes in which the trajectory is involved.

- **Observations object**

    Contains observation records. Each observation record contains blocks of measurements data recorded in the field. Observation records are loaded into the database using the Import function. Ephemeris, Iono-UTC and almanac records may also be transferred to the database if the field data file includes such data.

- **Ephemerides object**

    Contains ephemeris records. Each ephemeris record contains one or more block of ephemeris data, depending on the duration of field recording. Ephemeris records are loaded into the database using the Import function.

- **Iono-UTC object**

    Contains iono-UTC records. Each Iono-UTC record contains one or more block of Iono-UTC data, depending on the duration of field recording. Iono-UTC records are loaded into the database using the Import function.

3

- **Almanacs object**

  Contains almanac records. Each almanac record contains one or more block of almanac data, depending on the duration of field recording. Almanac records are loaded into the database using the Import function.

Adding a record

Click the desired database object in the left-hand pane of the window. As a result, the list of corresponding records appears in the right-hand pane.

- From the menu bar, select the **Record** command and then the **Add** command

  or click 📧 in the tool bar

  or double-click the desired database object in the left-hand pane of the database window

Editing a record

- Click the desired database object in the left-hand pane of the window.

- Double-click the record you wish to edit

  or select this record and, from the menu bar, select the **Record** command and then the **Edit** command

  or select this record and, in the tool bar, click 📝

Deleting a record

- Click the desired database object in the left-hand pane of the window.

- Select the record(s) you wish to delete from the list of records now shown in the right-hand pane. To select a list of records, first click the first record in the list, then, while holding down the **Shift** key, click the last record in the list.

- From the menu bar, select the **Record** command and then the **Delete** command

    or, in the tool bar, click 📧

    or press the **Del** key.

    You then have to confirm your choice before the application really deletes the record(s).

3

Database Commands

Project record	Region record	Map record	Coord. syst record
	· Add		· Add
· Edit	· Edit	· Edit	· Edit
· Delete	· Delete	· Delete	· Delete
		· Import	
Datum record	**Ellipsoid record**	**Label record**	
· Add	· Add	· Add	
· Edit	· Edit	· Edit	
· Delete	· Delete	· Delete	
Unit record	**Site record**	**Trajectory record**	
· Add	· Add	· Add	
· Edit	· Edit	· Edit	
· Delete	· Delete	· Delete	
	· Import	· Import	
	· Export	· Export	
Observations	**Ephemerides**	**Iono-UTC**	**Almanacs**
· Import	· Import	· Import	· Import
· Edit	· Edit	· Edit	· Edit
· Delete	· Delete	· Delete	· Delete

Shortcut menu

A shortcut menu is available from any selection you make in the database by clicking the right mouse-button. The commands available from this shortcut menu are context-sensitive.

Creating a new project document

- In the tool bar click 📄 or, from the menu bar select the **File** menu and then the **New Project** command. A 3-tab **Project** dialog box appears.

-· Enter the parameters of your project, as requested in the following three tabs.

- **General tab**

Project	:	Enter the name of your project
Supervised by	:	Enter the name of the project supervisor (your name)
Start on	:	Enter the start time of the project
Should end on	:	Enter the presumed end time of the project

All coordinates in : Select the *Coordinate system* used from the list box.
Notes : Enter comments relative to the project (optional)

- **Region tab**

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Time zone : Choose the time zone corresponding to the region of survey (expressed in reference to UTC). From this combo box, you can choose a standard time zone — such as UTC, UTC+01:00, UTC–01:00, etc.— or specify a positive or negative time correction, expressed in hours, minutes, seconds (see above).

NW & SE coordinates : Enter the 2D coordinates (expressed in the selected coordinate system) of *the two points defining the region*
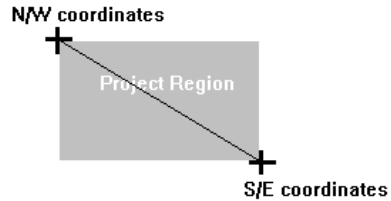
Browse button : Use this button to select the name of an already known region. As a result, the "NW & SE coordinates" fields are automatically filled in.

Save button : Use this button to name and save a new region that you create.

World Map button : Use this button to define the region from the World Map.

- **Operations tab**

This tab allows you to define the Prediction and Process objects that you would like to insert into your project.
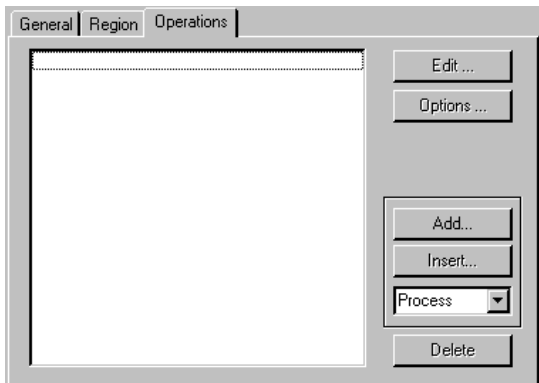
Add button : adds a new operations object in the list box. The type of object you add is the one you specify in the text box shown in the right-lower part of the tab. A new dialog box then appears, whose type depends on the type of object you want to add:

New Process (see *New Process object* in page *3-14*)

New Prediction (see *New Prediction object* in page *3-18*)

Edit button : displays the definition of the selected object you defined earlier

Delete button : deletes the selected object. You need to confirm your choice before the application really deletes the selected object.

Insert button : inserts a new object before the selected object

Options button : gives access to a new tab on which you can set the input parameters of the object:

For a process (see *Options of a process object* in page *3-16*)

For a prediction (see *Options of a prediction object* in page *3-19*)

3

- When the definition of the project document is complete, click the **OK** button. A new project document opens.

Unless a **template** other than the default one was implemented, the new document begins with the logo and address of DSNP, followed by the default project title (Mission Report) and possibly by the **abstract** and/or a **Map server object** (see Notes below).

NOTES:

- Like any Word document, your Project document is created from a template that you specify through the **Options** command (from the **View** menu).

  The default template ("template.rtf" file stored in RTF subdirectory) contains the DSNP logo and address, followed by the centered title "Mission Report".

  You may create other templates (RTF files necessarily) from Microsoft® Word for example. It is recommended to group all the templates in the RTF subdirectory.

- The project **abstract** and a **Map server object** are inserted into the document if you respectively checked the "Insert Project Abstract" and the "Insert Map" buttons (see **Options** in the **View** menu).

New Process object

Compute : Define the process object by checking either the **Site** or **Trajectory** button, depending on whether you want to determine the position of a site or the successive positions along a trajectory.

Specify the name of the site or trajectory in the text box just under the two check buttons. The list of records that appears when you click the down-arrow button are those for which observation records are available.

In the **Using Observation:** text box, select the name of the observation record from which the site or trajectory can be determined. Remember that you create links between Site or Trajectory records and Observation records when you use the **Import GPS Data function**.

3

Reference : If the database contains a site and a static observation record for this site whose acquisition time coincides partially or completely with that of the observation record under process, then the application suggests that a differential process be run using this site as a reference. In that case, check the **Site** button in the **Reference** pane and choose a site name from the text box. In the **Using Observation:** text box, select the name of the observation record you want to use.

If several position solutions exist for the selected site, specify the solution you want to use by checking either the **Last solution** button or the **Default solution** button.

If no sites are available, all check buttons in this pane (except the **None** button) are dimmed.

With Processor : The application indicates the processors that can be used to process the observation record. Choose one if two or more processors are prompted.

OK button : Click this button if you agree with the definition of the process object

Cancel button : Click this button if you want to cancel the process object.

Options of a process object

The content of this Options dialog box depends on the selected process type.

Dialog box example:

View : Use this text box to choose the type of result view you wish to insert into the project document.

Elev. Min	:	Use this text box to specify the minimum elevation angle required of any satellite present in the observation record to be declared as usable in the process.
Use {...} Curtain	:	Check (or clear) this button to insert (or remove) the user-defined curtain.
Mask button	:	Click this button to access a chart on which you can mask satellites present in the observation record on a limited period of time *(see* **Using the Mask editor***)*
Filter code with phase	:	Check (or clear) this button to enable (or disable) the code-filtering processing.
Initialisation Mode	:	(For kinematic process only) Use this text box to specify the initialisation mode you want the process to use when starting processing the observation record.

3

Deselected Svs

This pane allows you to make changes to the available GPS constellation, if necessary.

The numbers of the SVs present in the observation record(s) are shown in black.

The numbers of the SVs absent from the observation record(s) are shown in white.

{**SV number**} button	:	Depress the button corresponding to the satellite you wish to deselect, whether the SV is a present or an absent one
All button	:	Click this button to deselect all satellites.
None button	:	Click this button to re-select all the intentionally deselected satellites.
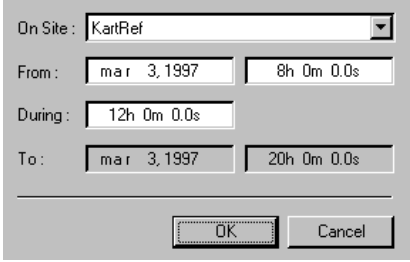
Save As Defaults button : Click this button to save the current settings as the default options for the process

Restore Defaults button : Click this button to restore the default options previously defined for the process

OK button : Click this button to validate all the changes made to the parameters displayed in this box.

Cancel button : Click this button to cancel all the changes made to the parameters displayed in this box.

New Prediction object

On Site :	KartRef	▼
From :	mar 3, 1997	8h 0m 0.0s
During :	12h 0m 0.0s	
To :	mar 3, 1997	20h 0m 0.0s

OK   Cancel

On Site : enter the label of the site of prediction

From : enter month, day and time of the beginning of prediction (default: current day at 8hr00am)

During : enter the duration of prediction (default: 12 hr).

To : (dimmed) resulting end time of prediction (default: current day at 8hr00pm)

OK button : Click this button if you agree with the definition of the prediction

Cancel button : Click this button if you want to cancel the changes you have just made in the dialog box.

Options of a prediction object

3

View : Use this text box to choose the type of result view you wish to insert into the project document.

Elev. Min : Use this text box to specify the minimum elevation angle required of any satellite seen from the prediction site to be declared as usable at this site.

Use Site Curtain : Check(or clear) this button to insert (or remove) the user-defined curtain.

GDOP type : Use this text box to specify the type of DOP you wish to view on the result plot:

GDOP : A measure of the Dilution of Precision in all three dimensions plus the time precision

PDOP : A measure of the Dilution of both Horizontal and Vertical Precisions

HDOP : A measure of the Dilution of Horizontal Precision only

VDOP : A measure of the Dilution of Vertical Precision only

TDOP : A measure of the Dilution of Time Precision only

Mode : Use this text box to specify the DOP processing mode

2D+T should be chosen if the altitude is known, otherwise 3D+T. In 2D+T the GDOP computation is only concerned with two position unknowns instead of three. This leads to better (lower) figures of GDOP

Deselected Svs

This pane allows you to make changes to the available GPS constellation, if necessary.

The numbers of the SVs visible in the prediction are shown in black.

The numbers of the SVs invisible in the prediction are shown in white.

{**SV number**} button : Depress the button corresponding to a satellite you wish to deselect, whether the SV is a visible or an invisible one

All button : Click this button to deselect all satellites.

None button : Click this button to re-select all the intentionally deselected satellites.

Save As Defaults button : Click this button to save the current settings as the default options for the prediction

Restore Defaults button : Click this button to restore the default options previously defined for the prediction

OK button : Click this button to validate all the changes made to the parameters displayed on this tab.

Cancel button : Click this button to cancel all the changes made to the parameters displayed on this tab.

Opening an existing project document

3

To open an existing project document:

- In the tool bar click ⬚ or, from the menu bar, choose the **File** command and then the **Open Project** command.

- In the **Open Project** dialog box that appears, choose a project name from the list and click the **OK button**. The existing document appears in the active window.

Editing a project document

3SPack Supervisor includes a document editor derived from the well-known Microsoft® Word Processor. The most commonly used editing commands available in 3SPack Supervisor are described below.

- **Typing text**

  - Click the mouse pointer where you want to start typing (the blinking insertion point then shows up in the document) and then type your text. The document editor automatically wraps text to the next line as you type.

  - To end a paragraph, press the ENTER key.

- **Selecting Text**

  - Point where you want the selection to begin, and then drag over the text.

  - To select a single word, double-click the word

  - To select a paragraph, double-click in the selection bar at the left of the window

- **Deleting Text**

  - Select the text and press BACKSPACE or DELETE. You can also delete the text you have just typed by selecting **Undo** from the **Edit** menu.

- **Moving Text**

  - Select the text you want to move, point to the selected text, drag the dotted insertion point to the new location and then release the mouse button

    or

  - Select the text you want to move, choose **Cut** from the **Edit** menu, point where you want the text to be moved and choose **Paste** from the **Edit** menu.

- **Copying Text**

  - Select the text you want to copy, point to the selected text, drag the dotted insertion point to the new location while holding down the **Ctrl** key and then release the mouse button.

    or

  - Select the text you want to copy, choose **Copy** from the **Edit** menu, point where you want the text to be copied and choose **Paste** from the **Edit** menu.

- **Scrolling through the Project document**

   - You can use the vertical and horizontal scroll bars to move quickly to a different part of your document.

- **Formatting Text**

   All formatting commands are grouped in the Format bar. Shortcut keys can also be used.

Choose font type and size for selected text : use these two boxes:

Font Type: AvantGarde

Font Size: 11

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Add/Remove Bold to selected text : click **B** or press Ctrl + B

Add/Remove *Italic* to selected text : click *I* or press Ctrl + I

Add/Remove Underlining to selected text : click **U** or press Ctrl + U

Left-align text in selected paragraph(s) : click or press Ctrl + L

Center text in selected paragraph(s) : click or press Ctrl + E

Right-align text in selected paragraph(s) : click or press Ctrl + R

Add/Remove **bullet(s)** to selected paragraph(s): click

- **Inserting Objects**

The 3SPack-specific objects that you can insert into a project document are:

- Map object

- Abstract

- Prediction object

- Process object

With 3SPack, you can also insert many other types of object such as:

- Bitmap image
- Microsoft Equation
- Microsoft Graph
- WordPad document, etc.

To insert any type of object into the project document:

- From the menu bar, select **Insert** and then **Object**

In the **Insert Object** dialog box that appears:

- Check the **Create New** button if the object does not exist yet and, from the **Object Type** list box, select the type of object you would like to create

  or

- Check the Create **from File** button if the object can be retrieved from an existing file. In that case, using the **Browse** button, provide the project with the path to this file.

  Two options are prompted to link this file to the project document (this is achieved by checking the **Link** button) or to insert the file as an icon (by checking the **Display as Icon** button).

- **Re-sizing objects**

    - Click anywhere on the object you would like to re-size.

    - Move the pointer to one of its handles. The pointer then changes shape (the direction of the arrows depends on the handle you choose).

    - Drag the handle to the desired location and release the button when you get the desired size for the object.

- **Document template**

Like any Word document, your Project document is created from a template that you specify through the **Options** command (from the **View** menu).

The default template ("template.rtf" file stored in RTF sub-directory) contains the DSNP logo and address, followed by the centered title "Mission Report".

You may create other templates (RTF files necessarily) from Microsoft® Word for example. It is recommended to group all the templates in the RTF sub-directory.

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Inserting the Map server into the project document

The Map server object provides a graphic representation of your region of survey. In addition, if maps of the region are present in the database, they will appear in the background.

Remember that the use of geographical (Lat-Long) coordinates in a project document may cause the map(s) available for your region of survey to be distorted. In this case, you may choose not to show the map(s) in the background by selecting the **The project system** option in the **Viewing** options of the Map Server (see section 4). The coordinate system used in a project document is defined in the General tab of the **Project** record.

How to insert the map server object:

- In the Project document, place the text insertion point where you would like the map server to appear.

- From the menu bar, select **Insert** and then **Map.** This causes a new graphic object to be inserted into the document (and the Embedded Map environment is activated).

  The object contains all the maps available for the region of the project. Initially, the object shows the whole region, which means that some maps may not display (because they are too reduced or too magnified, compared with the region size).

  The object also shows the results (if any) of operations performed earlier in this region.

Asking for a prediction

One of the first steps in preparing a GPS-based land survey is to find the best moment when to perform your survey, i.e. a time interval or time intervals during which the GPS constellation is favorable seen from the region or site of your survey.

There are three ways of asking for a prediction:

- **From the Map server**

    - Unless already done, **insert the map** of your survey into the project document.

    - Unless the Map Server is already active, double-click on the map.

    - From the menu bar, select **Draw** and then **Prediction** to add a prediction on the map.

        In the dialog box which then appears, define a prediction for the selected site, as if you were doing it **from the project document** (see in the next page starting from the 4th point).

        The interesting feature of the Map Server is that if you invoke the **Draw Prediction** function after selecting several sites on the Map server, the system will let you define a prediction for each of these sites, proceeding successively in the order of selection. This procedure is particularly fast since most of the fields are then correctly preset and so you just have to click the **OK** button repeatedly (as many times as the count of selected sites).

- **From a Project document**

    - From the menu bar, select the **Project** menu and then the **Operations** command.

    - In the lower-right text box of the **Operations** tab which then appears, select **Prediction** from the pop-up list

    - Click the **Add** button

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- In the **Add prediction** dialog box enter the following parameters:

On Site : enter the label of the site of prediction

From : enter month, day and time of the beginning of prediction (default: current day at 8hr00am)

During : enter the duration of prediction (default: 12 hr).

To : (dimmed) resulting end time of prediction (default: current day at 8hr00pm)

- Click the **OK** button to complete the prediction definition

- As a result, the **Operations** tab of the Project dialog box is displayed again, in which the prediction you have just defined is highlighted.

- Click the **Edit** button if you want to go back to the definition of the prediction

- Click the **Options** button if you want to change the **options of the prediction**.

- Click the **OK** button to validate the new prediction and to close the **Project** dialog box.

A second method exists from the Project document using the **Insert** menu. This method is faster than the first one since it allows you to define and run a prediction in a single operation:

- Click the mouse in the Project document where you would like to insert the prediction object

- From the menu bar, select **Insert** and then **Prediction**

- In the **Add prediction** dialog box which then appears, define the prediction as you would with the first method (see previous page)

- Click the **OK** button. This causes the prediction object to be directly inserted into the project document (prediction created and run in a single operation).

3

- **From the Database Manager**

- Click the **Project** database object in the left-hand pane of the window.

- In the list of projects now shown in the right-hand pane, *double-click the project record* into which a prediction needs to be inserted. As a result the corresponding project document opens (3SPack switches from the database to the Project environment)

- Then proceed as you would **from the Project document**.

Running a prediction

This can be performed only in the *Project environment* and **after defining a prediction**.

- From the menu bar, select the **Project** command and then the **Run** command

    or

    Click

- In the **Project** Run dialog box which then appears, select the prediction you want to run

- Click the **Run** button. As a result, a prediction plot appears in the project document.

NOTE: You can create and run a prediction in a single operation using the **Insert** menu (see above).

Importing GPS Data

Through the **Import GPS Data** function, you provide 3SPack with the field data that are needed to compute your site and trajectory solutions.

In fact when you use this function, you allow 3SPack to enrich its database with new records from the **field data file(s)** that you specify.

GPS Data files are the results of your field surveys. They can be loaded into a specific directory of your computer (**Raw** directory created for that purpose) to be imported as *observation* records, which 3Spack can then process.

Other records can be created from the same files, using the same procedure, such as ephemeris, iono-UTC and almanac records.

- In the toolbar, click 🔠 or, from the menu bar, select the **File** command and then the **Import GPS Data** command

- In the **Import GPS Data** Dialog box that appears, click the **Add** button

- The **Browse** dialog box which then appears shows the content of the **Raw** directory where all types of GPS raw data are supposed to be located.

- If your survey was performed with the field data files recorded on a PCMCIA card, then insert this PCMCIA into the PCMCIA drive of your PC and, from the **Look In** combo box of the **Browse** dialog box, choose this drive and then select the files.

- Double-click a file icon (corresponding to the data you wish to acquire), or click this icon and then the **Open** button. To make a multiple selection, first click the first file in your list and then, while holding down the **Shift** key, click the last file in your list.

3
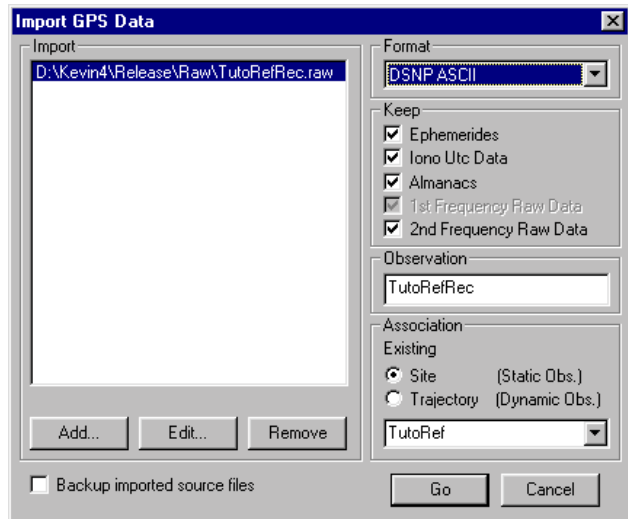
- Now that the name of the file you have just selected appears in the **Import GPS Data** Dialog box and is highlighted (as shown in the dialog box example above), you can specify the following parameters (for a multiple selection, you need to highlight each file individually):

Format : Specify the format of the selected file (DSNP ASCII or DSNP binary)

Ephemerides : Keep this button checked if you want to acquire the ephemeris data that may be contained in the selected file (otherwise clear it)

Iono-UTC : Keep this button checked if you want to acquire the iono-UTC data that may be contained in the selected file (otherwise clear it)

Almanacs : Keep this button checked if you want to acquire the almanac data that may be contained in the selected file (otherwise clear it)

1st frequency raw data : Dimmed (and forcibly checked) if the **2nd frequency raw data** button is checked.

If the **2nd frequency raw data** button is cleared, keep this button checked if you want to acquire the single-frequency raw data that may be contained in the selected file (otherwise, clear it)

2nd frequency raw data : Keep this button checked if you want to acquire the dual-frequency raw data that may be contained in the selected file (otherwise clear it). If you clear it, the **1st frequency raw data** button can be freely cleared or checked

Observation : Should contain the name of the observations record that will result from each imported file. By default, 3SPack completes this field with the name of the highlighted file without the extension (dimmed text box if several files are highlighted)

Association : This pane should be used:

- to tell 3SPack whether each of the imported files corresponds to a survey performed at a site or along a trajectory. To do this, click the corresponding radio button for each highlighted file

- to allow 3SPack to make an association between each of the imported files and the corresponding site or trajectory present in its database. **3SPack will automatically prompt the right site or trajectory name** if you take care to observe naming rules, as illustrated in the example below.

- Assuming a site named "pylon" where the operator performed a data record held in a file named "pylon270397.raw"

- If the file is imported as "pylon270397", then 3SPack will automatically associate the imported file with the "pylon" site

If in the 3SPack database there is no corresponding site or trajectory for the highlighted file, the message "New" (instead of "Existing") will appear in the upper part of the **Association** pane prompting you to create a new site or trajectory for this file. A name for this site or trajectory will be prompted in the lower combo box (which for the circumstance will be an edit box instead of a simple drop-down list). The default name will comply with the naming rule explained above.

For this case of importing where in the same time a site or trajectory is created, the newly created site or trajectory record will feature an approximate "Natural GPS" position solution computed with the first measurements read from the resulting observations record.

3

You can also create a new site or trajectory **before** importing a file by selecting <New> in the lower combo box. In this case you will have to provide a position solution for this new record.

Back up imported source files : You can ask for automatic back-up of any raw data file that you import by checking this button. Back-up files are saved to the <3SPack>\Raw\Bak directory. They are in the same format as the original files.

- Click the **Go** button to start importing the data. A message appears indicating data import in progress.

- At the end of this step, one or more new records are added to the database (observations, ephemerides, almanacs, etc.).

Creating a new site

You may need to create a new site for example to provide 3SPack with the approximate coordinates of the site you want to survey.

In a further step, and from the data recorded in the field, 3SPack will provide a more accurate solution for this site's position.

There are two ways of creating a new site:

From the Map Server

- Unless already done, **insert the map** of your survey into the project document

- Unless the Map Server is already active, double-click on the map

- From the menu bar, select **Draw** and then **Site** or in the

  toolbar, click ⬛ to add a site on the map.

In the dialog box which then appears, define a site as if you were doing it from within the database.

• **General Tab**

3

Site : Enter/modify the name of the site

**Default Solution
& Last Solution** : Displays the default solution and the last (computed) solution for the new site. If you are creating a site, no solution has been determined yet for this site. Therefore these two solutions are software-set as follows:

Date & Time : current date & time
Lat & Long : zero coordinates
Alt : 0.000 m
Sigma : 0.00000 m

Later, the application will refresh the "default solution" zone when you define your "default solution" in the **Solutions tab** and also the "last solution" zone when a process provides a position solution for this site.

Notes : Enter comments relative to the site (optional)

- **Solutions Tab**

This tab can contain several position solutions for the site.

If you are creating a site, this tab contains a single solution (with zero coordinates) defined as the "default solution". You then have to re-define this solution as your "user solution", i.e. an approximate position (or a position determined by other means) of this site.

Later, the application will add new solutions to this tab whenever a process determines a new position solution for this site.

User solutions are defined as follows:

Date & Time : Displays current date & time (software-set)

Position pane:

Lat & long : Enter Latitude and Longitude

Alt : Enter altitude (optional)

**SdP
Correlation Matrix
SdUW** : Irrelevant to a user solution (leave these fields blank). Only a solution resulting from a process can provide values for these parameters.

3

Notes pane : Origin of the site solution

If the solution was imported from a file, then this box contains the section of file from which the solution was created (file in SVAR format, see Appendix).

New button : Click this button to enter another user solution. The tab then shows a new blank sheet. The new count of site solutions is displayed in the right-hand upper part of the tab. Enter a new user solution as described above.

Vertical Scroll Bar : Click the up and down arrows of the Scroll bar to consult the list of solutions
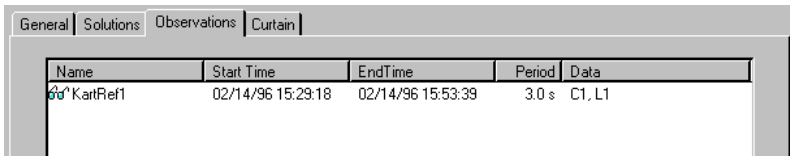
Delete button : Click this button to delete the displayed solution

Protected solution : Check this button if you wish to protect the solution displayed above from accidental typing. As a result, all text boxes in the Position pane get dimmed

Default solution : Among the solutions that you enter in the Solutions tab, one (the first by default) should be chosen to be the "default solution". You need to specify a "default solution" to tell the application which of these solutions should be used whenever the site is involved in a process. Of course the default position should present the best precision possible.

Check this button when you wish to define the displayed solution as the *"default solution"*. A single solution can be defined as the "default solution"

- **Observations Tab**

This tab shows the list of observation records associated with the site. The list is read from the database.

• **Curtain Tab**
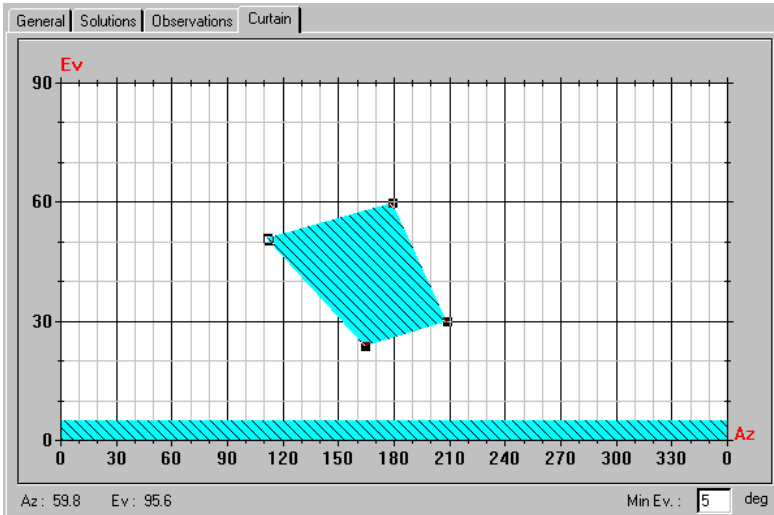
This tab allows you to draw an object representing the shape and dimensions of the curtain around the site, if any.

- Position the mouse pointer anywhere on the graph and click with the right mouse button.

- In the shortcut menu that pops up, select the **Draw** command. The mouse pointer then changes to $+$

- Position the mouse pointer to the desired location, referring to the Az and Ev indications, and click with the mouse to begin drawing the curtain.

- Move the mouse pointer to reach the next point. Note the curve that results from the pointer displacement (a straight line on the Linear View, an arc on the Polar View). Once you have reached the next point, click with the mouse again, etc.

- To complete the curtain definition, double-click on the last point. As a result, the curtain appears in blue as a close shape, even if the last point is not superimposed on the first one. On the Linear view, the curtain is always a polygon, on the Polar view it is a close shape composed of several arcs.

- When the definition of the site is complete, click the **OK** button. The new site then appears as a new record in the list of existing sites.

From the Database manager window

See **Database Manager, Adding a record.**

Creating a new trajectory

You may need to create a new trajectory for example to provide 3SPack with the approximate coordinates of a trajectory's initial point.

In a further step, and from the data recorded in the field, 3SPack will provide a more accurate solution for each of the points making up the trajectory.

There are two ways of creating a new trajectory:

From the Map Server

3

- Unless already done, **insert the map** of your survey into the project document

- Unless the Map Server is already active, double-click on the map

- From the menu bar, select **Draw** and then **Trajectory** or in the toolbar, click ⟋ to add a trajectory on the map.

    In the dialog box which then appears, define a trajectory as if you were doing it from within the database.

- **General Tab**

Trajectory : Enter/modify the name of the trajectory

Default solution : "No solutions" is displayed if you are adding a new trajectory record

Last solution : "No solutions" is displayed if you are adding a new trajectory record

Initial point : Enter the three coordinates of the start point of the trajectory.

You can type in these coordinates directly or click the **Browse** button to choose one of the known sites as the initial point (in which case the corresponding fields are automatically filled in as you choose the site).

Notes : Enter comments relative to the trajectory (optional)

- **Solutions Tab**

  If you are adding a trajectory record ("manually" from within the Database Manager or from the Map Server), no solutions are available yet and therefore nothing is displayed in this tab

  Later on, when a process is run to determine the trajectory, a number of solutions will appear (as shown in the example below).

  3
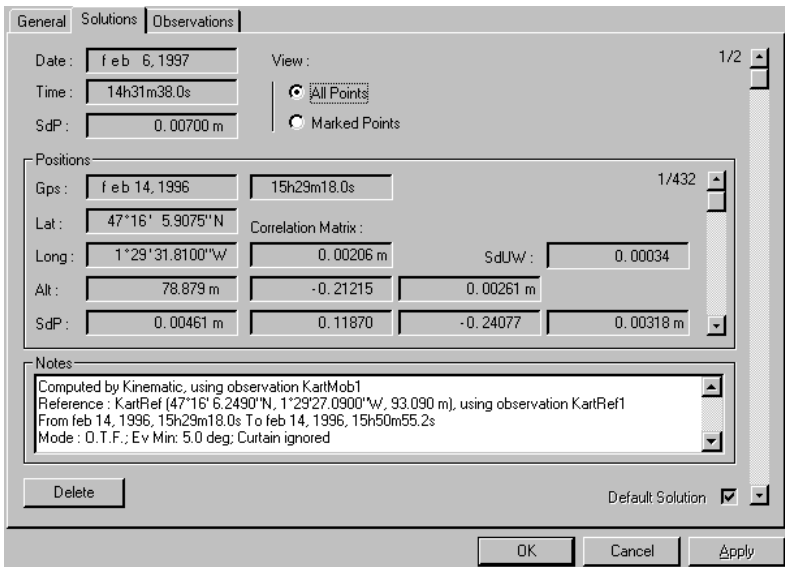
  Each solution is composed of the following parameters:

  Date : Displays the date when the solution was calculated (software-set)

  Time : Displays the time when the solution was calculated (software-set)

SdP : Standard Deviation of Position

View : Check the **All points** or **Marked points** button, depending on whether you want to view all the points of the trajectory solution or only those marked earlier

Rightmost
Vertical Scroll bar : Click the up and down arrows of this Scroll bar to display any of the solutions available.

Positions pane

Vertical Scroll Bar : Click the up and down arrows of this Scroll bar to display any of the points of the chosen solution

Gps : Date & time of the solution acquisition

Lat & long : Latitude and Longitude of the displayed point

Alt : Altitude of the displayed point

SdP : Standard Deviation of Position

Correlation Matrix : Position variations along the three axes

SdUW : Standard Deviation of Unit Weight

Notes : Origin of trajectory solution
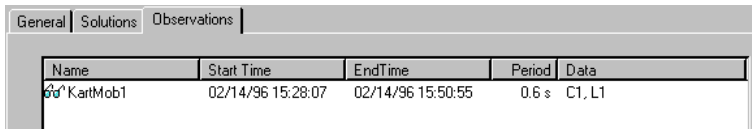
If the solution was imported from a file, then this box contains the section of file from which the solution was created (file in SVAR format, see Appendix).

          Delete button : Click this button if you want to delete all the points of the currently displayed solution

      Default solution : Check this button when you wish to define the displayed solution as the *"default solution"*. If a single solution is available, then this button is dimmed and checked.

- **Observations Tab**

This tab shows the list of observation records associated with the trajectory. The list is read from the database.

3

- Click the **OK** button once your trajectory is defined.

From the Database manager window

See **Database Manager, Adding a record.**

Importing sites and trajectories

This function allows you to insert sites and/or trajectories into the 3SPack database from a file (or from files) that you specify.

You need to tell 3SPack the name of the coordinate system in which the sites and trajectories contained in the file are expressed.

Sites and trajectories can be imported if they are defined in one of the following formats:

- **ASCII SVAR** (a DSNP standard format, *see Appendix*)

- **ASCII DXF** (from AutoCad)

- **A format created by the user** (see *Creating a User Format* in page *3-64*)

You cannot specify which of the sites or trajectories you would like to import from the chosen file(s) but instead you can only import all or none of them.

If a site (or trajectory) contained in the file already exists as a site (or trajectory) record in the database, then the Import function will add a new solution to that record.

If a site (or trajectory) is unknown to the database, then the Import function will create a new record in the database, named as specified in the file. If no name is mentioned in the file for this new record, then the imported record will be named "Site #" or "Trajectory #", where # is a number from 1 to x.

3
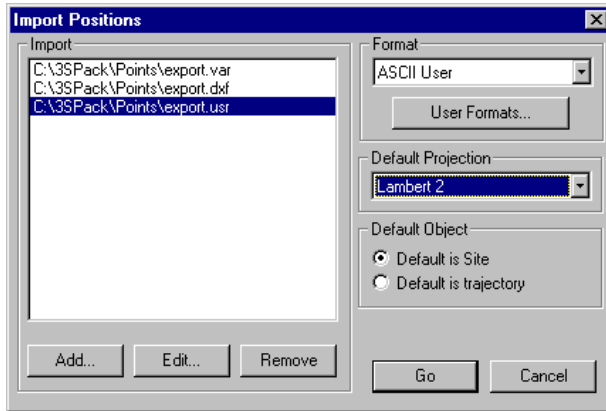
- **Import Procedure**

    - Select the **Sites** or **Trajectories** object in the left-hand pane

    - In the toolbar, click ![icon] or from the menu bar, select **Record** and then **Import**

    - In the **Import Positions** dialog box which then appears, click the **Add** button

    - In the **Browse** dialog box which then appears, choose the file containing the sitesand/or trajectories you want to import (default directory: Points)

    - Click the **Open** button. This causes the path of the selected file to appear in the **Import Positions** dialog box (**Import** text box) and the **Browse** dialog box to close.

    - In the **Import Positions** dialog box, do the following:

Format : Specify the format of the file containing the sites and/or trajectories

User formats button : Click this button if you want to add or modify a user format (see also *Creating a User Format* in page *3-64*)

Default projection : Specify the projection system in which the sites and trajectories from the chosen file are expressed. You must specify a projection system otherwise the import function won't execute and a message will appear asking you to define this parameter

If a projection is mentioned in the imported file, then this projection will be automatically chosen

Default object : If the type (site or trajectory) of an imported point is missing in its characteristics, 3Spack will allocate one on the basis of the radio button that you checked in this tab:

Default is Site checked means that all "unknown"points will be imported as sites

Default is Trajectory checked means that all "unknown"points will be imported as trajectories

- Click the **Go** button to start the Import function. A message appears providing information on the Import function in progress. On import completion, the message box disappears.

Defining and running a site process

The procedure is summarized in the diagram below.

3
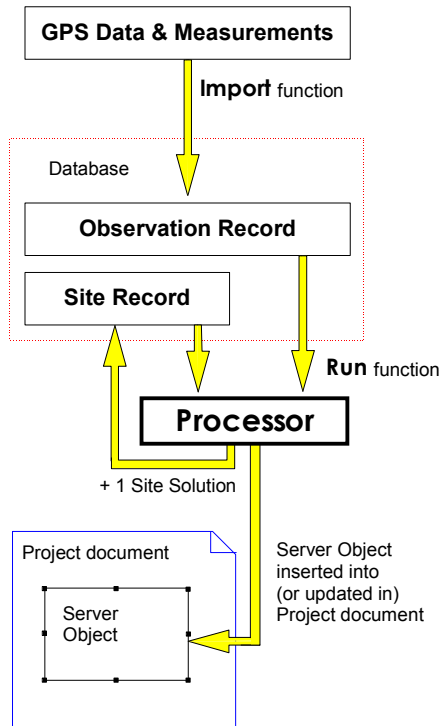
Use one of the following procedures to define a Site process:

3-49

From the Map Server

- Unless already done, **insert the map** of your survey into the project document

- Unless the Map Server is already active, double-click on the map

- Select the site you want to process

- From the menu bar, select **Draw** and then **Process**.

- In the dialog box which then appears, define a Site process as if you were doing it **from the project document** (see below).

- The interesting feature of the Map Server is that if you invoke the **Draw Process** function after selecting several sites on the Map server, the system will let you define a process for each of these sites, proceeding successively in the order of selection. This procedure is particularly fast since most of the fields are then correctly preset and so you just have to click the **OK** button repeatedly (as many times as the count of selected sites).

From the Project document

- From the menu bar, select the **Project** command and then the **Operations** command.

- In the lower-right text box of the **Operations** tab which then appears, select **Process** from the pop-up list

- Click the **Add** button. In the **Add Gps process** dialog box enter the following parameters:

Compute : Define the process object by checking the **Site** button.

Specify the name of the site in the text box just under the two check buttons. The list of records that appears when you click the down-arrow button is the list of sites for which observation records are available.

In the **Using Observation:** text box, select the name of the observation record from which the site can be determined. Remember that you create links between Site records and Observation records when you use the **Import GPS Data function**.

Reference : If the database contains a site and a <u>static</u> observation record for this site whose acquisition time coincides partially or completely with that of the observation record to be processed, then the application suggests that a differential process be run using this site as a reference.

3

In that case, check the **Site** button in the **Reference** pane and choose a site name from the text box. In the **Using Observation:** text box, select the name of the observation record you want to use.

If several position solutions exist for the selected site, specify the solution you want to use by checking either the **Last solution** button or the **Default solution** button.

If no sites are available, all check buttons in this pane are dimmed.

With Processor : The application indicates the processors that can be used to process the observation record. Choose one if two or more processors are prompted.

OK button : Click this button if you agree with the definition of the process object

Cancel button : Click this button if you want to cancel the process object.

- Click the **OK** button to complete the process definition

- As a result, the **Operations** tab of the Project dialog box is displayed again, in which the process you have just defined is highlighted.

  Click the **Edit** button if you want to go back to the definition of the process

  Click the **Options** button if you want to change the **options of the process**.

- Click the **OK** button to validate the new process and to close the **Project** dialog box.

A second method exists from the Project document using the **Insert** menu. This method is faster than the first one since it allows you to define and run a process in a single operation:

- Click the mouse in the Project document where you would like to insert the process object

- From the menu bar, select **Insert** and then **Process**

- In the **Add Gps process** dialog box which then appears, define the process as you would with the first method (see previous page)

- Click the **OK** button. This causes the process object to be directly inserted into the project document (process created and run in a single operation).

3

From the Database

- Click the **Project** database object in the left-hand pane of the window.

- In the list of projects now shown in the right-hand pane, **double-click the project record** into which a site process needs to be inserted.

If the project is already open

- 3SPack Supervisor then switches from the Database to the Project environment to show the project document: proceed as you would **from the Project document**.

If the project is not open

> The **Project** dialog box then appears.

- Select the **Operations** tab
- In the lower-right text box, select **Process** from the pop-up list
- Click the **Add** button. In the **Add Gps process** dialog box proceed as you would from the project document

Running a Site process

This can only be performed in the *Project environment* and after **defining a Site process** in the project document.

- From the menu bar, select the **Project** command and then the **Run** command

  or

  Click

- In the **Project** Run dialog box which then appears, select the process corresponding to the site solution you want to obtain.

- Click the **Run** button. As a result, a process plot appears in the project document and a new site solution is added to the corresponding site record as the "last solution" for the site.

NOTE: You can create and run a process in a single operation using the **Insert** menu (see above).

Defining and running a Trajectory process

The procedure is summarized in the diagram below.
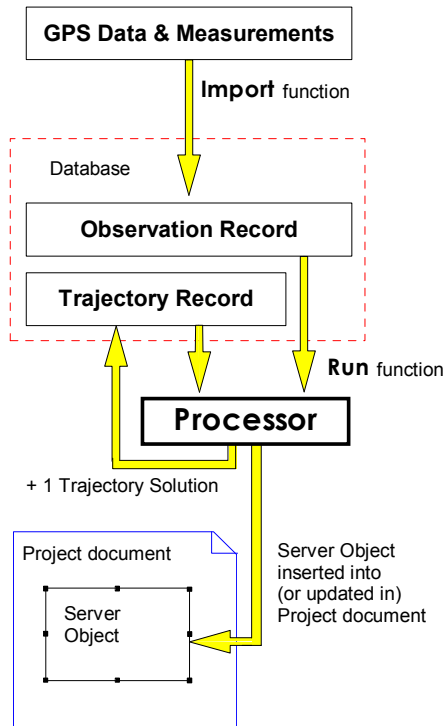
Use one of the following procedures to define a trajectory process:

From the Map Server

- Unless already done, **insert the map** of your survey into the project document

- Unless the Map Server is already active, double-click on the map

- From the menu bar, select **Draw** and then **Process**.

  In the dialog box which then appears, define a Trajectory process as if you were doing it **from the project document** (see below).

- The interesting feature of the Map Server is that if you invoke the **Draw Process** function after selecting several trajectories on the Map server, the system will let you define a process for each of these trajectories, proceeding successively in the order of selection. This procedure is particularly fast since most of the fields are then correctly preset and so you just have to click the **OK** button repeatedly (as many times as the count of selected trajectories).

From the project document

- From the menu bar, select the **Project** command and then the **Operations** command.

- In the lower-right text box of the **Operations** tab which then appears, select **Process** from the pop-up list

- Click the **Add** button. In the **Add Gps process** dialog box enter the following parameters:

    Compute : Define the process object by checking the **Trajectory** button.

    Specify the name of the trajectory in the text box just under the two check buttons. The list of records that appears when you click the down-arrow button is the list of trajectories for which observation records are available.

    In the **Using Observation:** text box, select the name of the observation record from which the trajectory can be determined. Remember that you create links between Trajectory records and Observation records when you use the **Import GPS Data function**.

    Reference : If the database contains a site and a __static__ observation record for this site whose acquisition time coincides partially or completely with that of the observation record to be processed, then the application suggests that a differential process be run using this site as a reference. In that case, check the **Site** button in the **Reference** pane and choose a site name from the text box. In the **Using Observation:** text box, select the name of the observation record you want to use.

3

If several position solutions exist for the selected site, specify the solution you want to use by checking either the **Last solution** button or the **Default solution** button.

If no sites are available, all check buttons in this pane are dimmed.

With Processor : The application indicates the processors that can be used to process the observation record. Choose one if two or more processors are prompted.

OK button : Click this button if you agree with the definition of the process object

Cancel button : Click this button if you want to cancel the process object.

- Click the **OK** button to complete the process definition

- As a result, the **Operations** tab of the Project dialog box is displayed again, in which the process you have just defined is highlighted.

  Click the **Edit** button if you want to go back to the definition of the process

  Click the **Options** button if you want to change the **options of the process**.

- Click the **OK button** to validate the new process and to close the **Project** dialog box.

A second method exists from the Project document using the **Insert** menu. This method is faster than the first one since it allows you to define and run a process in a single operation:

- Click the mouse in the Project document where you would like to insert the process object

- From the menu bar, select **Insert** and then **Process**

- In the **Add Gps process** dialog box which then appears, define the process as you would with the first method (see previous page)

- Click the **OK** button. This causes the process object to be directly inserted into the project document (process created and run in a single operation).

3

From the database

- Click the **Project** database object in the left-hand pane of the window.

- In the list of projects now shown in the right-hand pane, **double-click the project record** into which a trajectory process needs to be inserted.

If the project is already open

- 3SPack Supervisor then switches from the Database to the Project environment to show the project document: proceed as you would **from the Project document**.

If the project is not open

The **Project** dialog box then appears.

- Select the **Operations** tab

- In the lower-right text box, select **Process** from the pop-up list

- Click the **Add** button. In the **Add Gps process** dialog box proceed as you would from the project document

Running a trajectory process

This can only be performed in the *Project environment* and after **defining a Trajectory process** in the project document.

- From the menu bar, select the **Project** command and then the **Run** command

or

Click

- In the **Project** Run dialog box which then appears, select the process corresponding to the trajectory solution you want to obtain.

- Click the **Run** button. As a result, a process plot appears in the project document and a new trajectory solution is added to the corresponding trajectory record as the "last solution" for the trajectory.

NOTE: You can create and run a process in a single operation using the **Insert** menu (see above).

Exporting project results

The Export function allows you to provide the results of your survey in a format different from that used in the project document.

The Export function is very useful if for example further processings have to be made from your results, but with different tools.

Results can be exported in one of the following formats:

- **ASCII SVAR** (a DSNP standard format, see *Appendix*)

- **ASCII DXF** (from AutoCad)

- **A format created by the user** (see *Creating a User Format* in page *3-64*)

3

Exporting results can be performed from within the Database Manager or from the Map Server. Only Site and Trajectory records can be exported.

Export Procedure

To export a site or trajectory record, proceed as follows:

- Open the Database manager or the Map Server

- Select the record (or the type of object) you want to export

- From the menu bar, select the **Record** and then the **Export** command

    or

- Click 🔁

- In the dialog box that appears, prepare your export according to the instructions below.
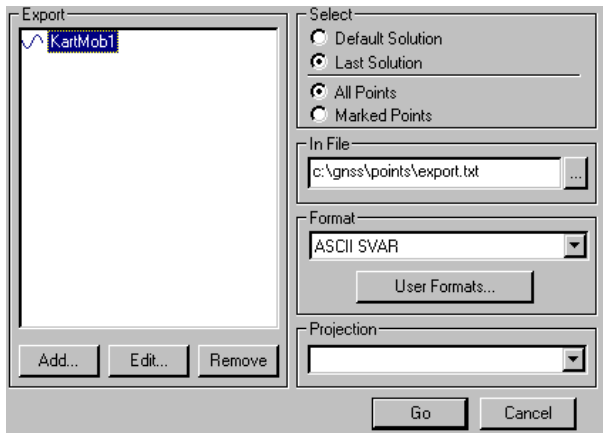
Export list box : Contains the record(s) you have selected before invoking the Export function (empty if you have selected the Trajectory or Site object). The content of this box is then controlled by the following three buttons.

Add button : Click this button to add a result record in the Export list box

Edit button : Click this button to edit the selected record

Remove button : Click this button to remove the selected record from the Export list box

Select : Check the **Default Solution** or **Last Solution** button, depending on the solution(s) you want to export for the selected record

If a Trajectory record is selected, check also the **All points** or **Marked Points** button, depending on the solution(s) you want to export.

In File : Specify the path and name of the export file

Click ⬚ to scroll through your disk

Format : Choose the format in which to export the selected records. Two basic formats are available plus those created by the user

User Formats
button : Click this button to create/edit/delete a user format. First a dialog box appears showing the names of the existing user formats. Make the appropriate selection. Then the User Format dialog box appears (see on the next page)

Projection : Choose the name of the projection (from the pop-up list) in which to express the coordinates of the exported points

Go button : Click this button to export the highlighted records (as shown in the Export list box)

Cancel button : Click this button to cancel the Export function

3

Creating a User Format

- Open the Manager window

- Select any trajectory or site record (or the trajectory or site object)

- From the menu bar, select the **Record** and then the **Export** command

    or

    Click 🔁

- In the dialog box that appears, click the **User Formats** button.

- In the new dialog box that appears, define your user format

DSNP

Format : Enter a name for your format

Export : Choose the first parameter you want to insert into your format from this list box. Then specify the following for this parameter

Field Type : Check either **Fixed** or **Variable** to define the character size of the parameter.

If you choose **Fixed**, then specify the number of characters (length) and the position (left or right) of the parameter in the field.

If you choose Variable, then just specify the character used as the separator ("," by default)

Field Format : Depending on the chosen parameter, specify additional formatting instructions (such as number of decimal places, units used, time format, etc.). For some of the available parameters, the format is dependent on the projection used.

Note the simulation of your formatting instructions for this parameter in the lower part of the dialog box (simulation box)

Add : Click this button to add a new parameter to the current user format

Insert : Click this button to insert a new parameter into the current user format, before the parameter shown in the Export text box.

3

Remove	:	Click this button to remove the parameter shown in the Export text box from the current user format.
Vertical bar	:	Use this bar to scroll through the list of parameters defined in the current user format.
Simulation box	:	This box shows a simulation of your message, as it would be obtained from your formatting instructions. Alternately, this box can be used as the Vertical Scroll bar to display the definition of each parameter in the user format. You can scroll up or down the entire list of parameters by clicking repeatedly and respectively in the left-hand part or right-hand part of the box.

Saving/closing a project document

To save the active project document:

- In the tool bar click 🖫 or, from the menu bar, choose the **File** command and then the **Save Project** command.

To close the active project document:

- Choose the **File** command from the menu bar and then the **Close Project** command. This causes the active project to be automatically saved and then closed.

Printing the project document

3SPack Supervisor allows you to print your project document on a printer. From the File menu in the *Project environment*, three print-oriented commands are available.

Page Setup

3
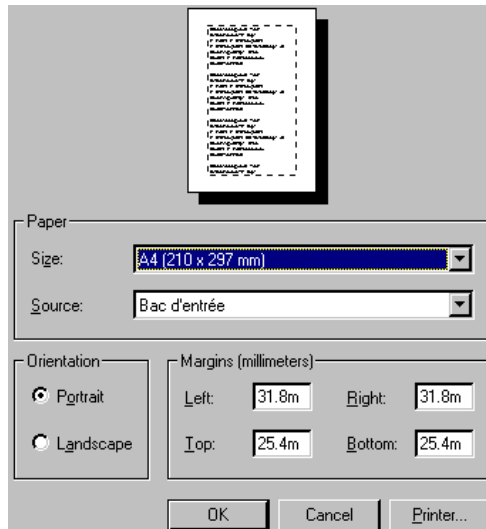
Select this command to change margins, paper source, paper size, or page orientation of your project document.

Paper pane

Size : Select a paper size available for your printer

Source : Sets options for printing pages of your project document, including the type of printer paper tray and manual feed.

Orientation pane

Select a page orientation (Portrait or Landscape). When you change the orientation of a page, 3SPack Supervisor transfers the Top and Bottom margins to the Left and Right margins, and vice versa.

The upper part of the dialog box shows the selected pattern of page orientation.

Margins pane

Left : Type the distance between the left edge of the page and the left end of each line with no left indent.

Right : Type the distance between the right edge of the page and the right end of each line with no right indent.

Top : Type or select the distance between the top of the page and the top of the first line on the page.

Bottom : Type or select the distance between the bottom of the page and the bottom of the last line on the page.

Printer button

Gives access to the printer dialog box from which you can choose another printer and change its characteristics.

Print Preview

Select this command to get a preview of your project document before printing it.

Print :	After visual inspection of your document, click this button to access the Print dialog box
Next Page :	Click this button to preview the next page
Prev Page :	Click this button to preview the previous page
One Page/Two Page :	Click this button to preview a single page or two consecutive pages
Zoom in :	Click this button to zoom in in the project document (dimmed when the maximum zoom-in ratio is reached)
Zoom out :	Click this button to zoom out in the project document (dimmed when the page is shown with normal size)
	Alternately, you can zoom in/zoom out in a document by moving the pointer anywhere on the project document and then by clicking with the left mouse button. The document is then zoomed in (or out) with the new view centered around the pointer location).
Close :	Click this button to close the Preview window

3

Print

Select this command to print your project document. First the Print
Dialog box appears.
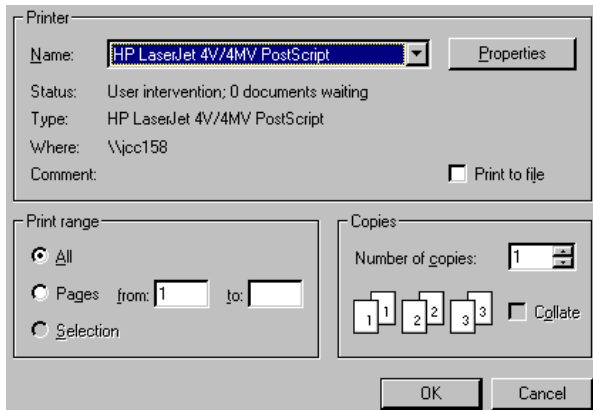
Choose the following:

Printer	:	Select a printer from the "Name" list box.
		You cannot add a printer using 3SPack Supervisor. If you need to define a new printer, do it using Windows95 select (from the task bar, select "Start", "Settings" and "Printers").
Properties	:	Provides access to a dialog box in which you can set the different properties of the selected printer
Print to file	:	Check this button to save the file formatted for printing to another file
Print Range	:	Specify the page(s) you want to print out.
Copies	:	Specify the number of copies

Using the World Map editor

The World Map editor allows you to define a region of survey. All maps stored into the database are shown
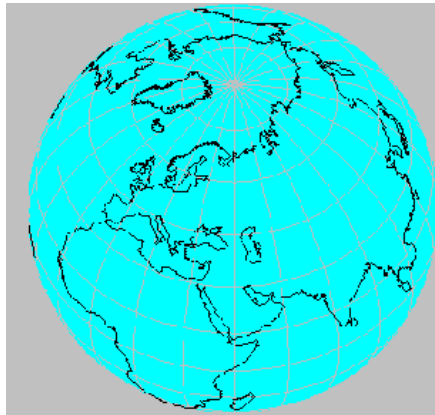
3

Displaying the World Map

- From the menu bar of the active project document, select **Project** and then **Region**. In the dialog box which then appears, click the **World Map** button.

- If you are creating a new project document (the **Project** dialog box is then displayed), select the **Region** tab in this dialog box and click the **World Map** button.

- From the Database Manager, if a **Region** record is edited or added, click the **World Map** button in the displayed dialog box.

Rotating the globe

If the current view of the globe does not display the region where you would like to prepare a survey, 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 order that the desired region can be seen on the visible side of the globe. 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 on a particular region

- 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 centered 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

The N/W & S/E coordinates of a region may be typed in directly or defined graphically from the World Map. For a "graphic" definition, do the following:

- Click the **World Map** button in the upper part of the **Region** tab
- Zoom in on the location you are interested in
- 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.
- In the **Region** tab which then displays again, note that the N/S & S/E coordinates now correspond to the region you have just defined on the World Map

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- Enter a name for the new region in the **Region** text box and specify the **Time Zone**

- Click the **OK** button to complete the definition of the new region. This new region is now available from the database.

Changing the viewing options on 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 result the Options dialog box appears. The default options are shown below.
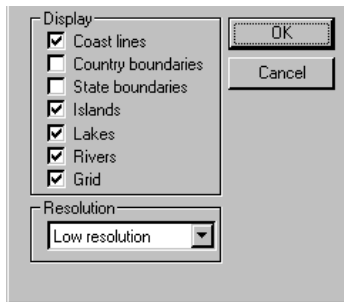
Four levels of map resolution are available:

- Low

- Medium

- High

  Very High

The higher the resolution, the more accurate the details on the map... but the longer the time required to display the map.

Using the Curtain editor

Seen from a site, some directions in space may exist in which GPS reception is known to be bad. The concept of "curtain" is introduced specifically to describe these particular directions so that they can be "curtained" by the user if he or she wishes to do so.
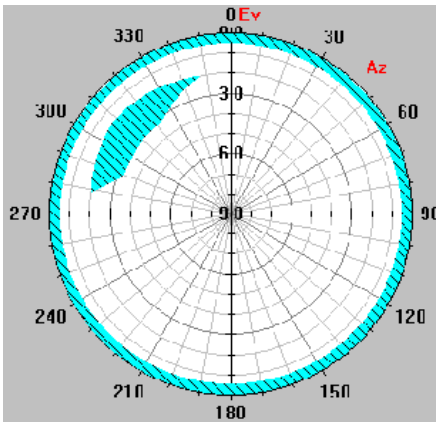
3

What a Curtain is

The curtain consists of one or more "obstruction zones" seen from the site. Each obstruction zone is defined in relation to Azimuth (Az) and Elevation (Ev).

The curtain may be drawn on a polar or linear view. Once the curtain is drawn on a view, it is also visible on the other (see example below, curtain shown in blue).

Curtain on linear view   Same curtain seen on polar view
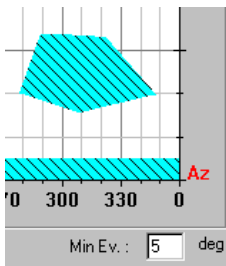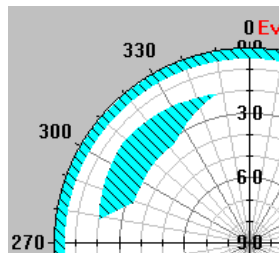
The curtain may also be defined by specifying each of the points making it up. As a result, the curtain also appears on the two views as if it had been drawn.

On the chart, the area located between Elevation Angle 0° and the user-set **Min Ev** angle (see bottom of the tab) is considered as part of the curtain (also shown in blue).

When you enable the curtain in a process or prediction object, you allow the application to behave as if there were no GPS signals received in the curtain's directions.

Accessing the Curtain Graph

- Open the Database window.

- In the left-hand pane, click the **Sites** object.

- In the right-hand pane, double-click the icon of the site for which you want to define a curtain.

- Select the **Site Curtain** tab

- In this tab, draw the curtain or edit the curtain.

Changing the curtain view

- Position the mouse pointer anywhere on the graph and click with the right mouse button.

- In the shortcut menu that pops up, select the Linear or Polar view. The corresponding view then appears on the screen.

Drawing a curtain

After accessing the Curtain Graph :

- Position the mouse pointer anywhere on the graph and click with the right mouse button.

- In the shortcut menu that pops up, select the **Draw** command. The mouse pointer then changes to $+$

- Position the mouse pointer to the desired location, referring to the Az and Ev indications, and click with the mouse to begin drawing the curtain.

- Move the mouse pointer to reach the next point. Note the curve that results from the pointer displacement (a straight line on the Linear View, an arc on the Polar View). Once you have reached the next point, click with the mouse again, etc

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- If you need to go through the 0/360° or 360/0° limits while you draw an obstruction zone, move the pointer outside the graph. This causes the horizontal scale to move accordingly so long as you keep the pointer outside the graph.

- To complete the curtain definition, double-click on the last point. As a result, the curtain appears in blue as a close shape, even if the last point is not superimposed on the first one. On the Linear view, the curtain is always a polygon, on the Polar view it is a close shape composed of several arcs.

- After completing the definition of the obstruction zone and if you want to restore a 0/360° normal non-shifted scale (if appropriate), choose the Select command from the pop-up menu and then simply double-click inside the graph area with the left-hand mouse button.

Editing the curtain

After accessing the Curtain Graph :

- Position the mouse pointer anywhere on the graph and click with the right mouse button.

- In the shortcut menu that pops up, select the **Edit Curtain** command.

- In the dialog box that appears, specify the points delimiting the obstruction zone(s).

3
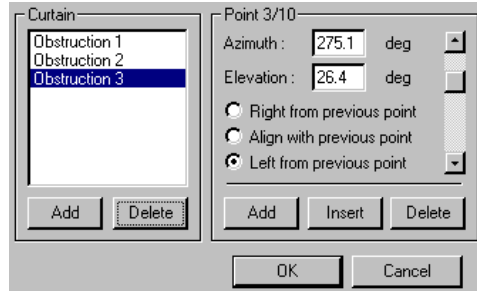
Curtain pane

List box	:	Shows the number of obstruction zones defined to form the curtain for the concerned site. Obstruction zones are numbered from 1 to n. The definition of the selected obstruction is shown in the right-hand part of the box
Add button	:	Press this button to add a new obstruction zone in the above list box.
Delete button	:	Press this button to delete the obstruction zone selected in the above list box.

{Point x/x} pane

Azimuth	:	Azimuth angle for the displayed point
Elevation	:	Elevation angle for the displayed point

Right from previous point : Check this button if you want the position you are defining to be somewhere on the right of the previous point (this choice will force the extension of the obstruction zone to the right of the previous point even if the azimuth angle of the new point is less than that of the previous one; this allows you to go through the 360/0° singular value).

Align with previous point : Check this button if you want the position you are defining to be aligned with the previous point (i.e. same azimuth).

Left from previous point : Check this button if you want the position you are defining to be somewhere on the left of the previous point (this choice will force the extension of the obstruction zone to the left of the previous point even if the azimuth angle of the new point is greater than that of the previous one; this allows you to go through the 0/360° singular value).

Add button : Click this button to add a point to the definition of the obstruction zone. As a result, the total number of points (see top of dialog box) is incremented by one.

Insert button : Click this button to add a point to the definition of the obstruction zone. The new point is inserted into the list of points **just before** the displayed point. As a result, the total number of points (see top of dialog box) is incremented by one.

Delete button : Click this button to delete the point displayed above.

OK button : Click this button to validate the entire box content

Cancel button : Click this button to cancel all the changes you have made to the box since you opened it.

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Moving, re-shaping or deleting the curtain

- Position the mouse pointer anywhere on the graph and click with the right mouse button.

- In the shortcut menu that pops up, choose the **Select** command.

- Select the curtain by clicking the mouse pointer inside the drawing object (a selected curtain displays handles) then:

    . drag this object to move the curtain

    . or drag each of its handles successively to re-shape it

    . or press the **Del** key to delete it.

Enabling/Disabling the curtain in a process or prediction object

- Open the project document containing the prediction or process object.

- From the **Project** menu, select the **Operations** command. This causes the Operations tab to display.

- Select the concerned prediction or process from the left-hand list box

- Click the **Options** button.

- In the dialog box that appears, check the **Use Site Curtain** button to enable the curtain, or clear it to disable the curtain.

- Click the **OK** button.

Using the event editor

Observation records (resulting from an **Import GPS Data** operation) may include a number of events marked by the field operator during the survey. For example, he/she may have marked the moments when he/she started or stopped walking, or when the antenna offset was changed, etc.

With the event editor you can review all the events present in an observation record. You can also enter these events manually if the field equipment could not let the operator do it (they should then have been logged through other means, or simply written down).

From these indications, 3SPack will be capable of reporting these events on a trajectory plot for example.

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To use the event editor, proceed as follows:

- Open the Database window.

- Click the **Observations** database object in the left-hand pane of the window. In the list of observations now shown in the right-hand pane:

- Double-click the Observation record you wish to view

  or

  Select this Observation record and, from the menu bar, select the **Record** command and then the **Edit** command.

- In the 3-tab **Observation** dialog box which then appears, select the **Events** tab.
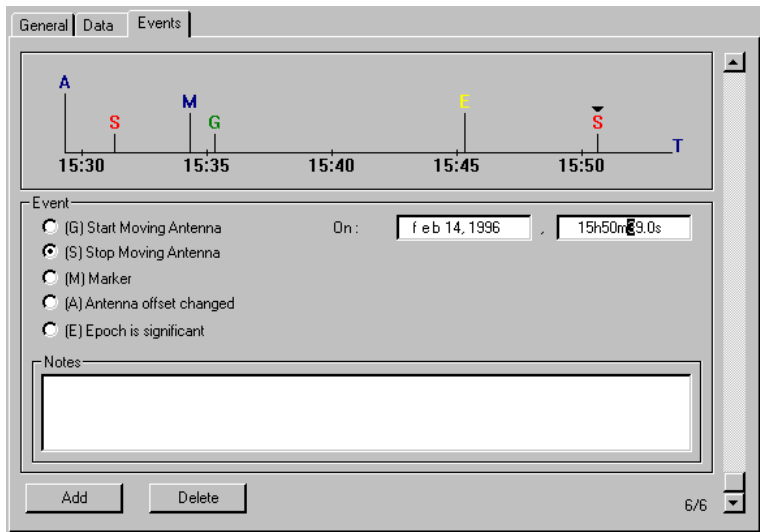
Marking events is achieved by positioning flags along a time chart shown in the upper pane of the **Events** tab, combining the use of the **Events** shortcut menu and of the different buttons available in this tab. A coloured letter is placed on top of the flag, according to the type of event you specify.

The value of antenna offset is necessarily defined as the first event (1/1) occurring at the beginning of the observation record.

Adding a new event

- On the **Events** tab, click the **Add** button.

- Check one of the buttons below, depending on the type of event you want to add.

Start Moving
Antenna : (G) marks a moment when the field operator started walking. If you check this button, specify the date & time of that event in the **ON:** field

**Stop Moving
Antenna** : (S) marks a moment when the field operator stopped walking. If you check this button, specify the date & time of that event in the **ON:** field

Marker : (M) marks a moment when the field operator reached a particular site. If you check this button, specify the date & time in the **ON:** field and also the site name in the **At Site:** field

**Antenna offset
changed** : (A) marks a moment when the value of antenna offset was changed. The value of antenna offset is necessarily defined as the first event (1/1) occurring at the beginning of the observation record (enter the antenna height, expressed in meters, in the **Delta H:** field).

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Epoch is significant : (E) marks a moment when a particular event occurred. If you check this button, specify the type of event in the **Notes** field.

- Specify the required parameters, according to the type of event. Note the displacement of the corresponding graphic symbol as soon as you enter the date & time of event.

- Click the **Add** button to define a new event and proceed as above. Note that the date & time of the preceding event is proposed as the default date & time for the new event.

- Click the **OK** button after defining all the events.

Zooming in on a particular period in the observation record

- Position the mouse pointer anywhere on the chart and click with the right mouse button.

- In the shortcut menu that appears, choose the **Zoom In** command. As a result the menu vanishes and the pointer looks like ⊕.

- Position the pointer on the point around which you want to zoom in and click with the left mouse button. As a result the time chart is magnified around this point (and the clicked point stays immobile in reference to the pane).

- You can zoom in repeatedly by clicking several times with the left mouse button (until a bleep can be heard).

Zooming Out

- Position the mouse pointer anywhere on the chart and click with the right mouse button.

- In the shortcut menu that appears, choose the **Zoom Out** command. As a result the menu vanishes and the pointer then looks like ⊖.

- Position the pointer along the time axis on the point from which you want to zoom out and click with the left mouse button. As a result the window displays a larger-scale view centered around the clicked point

- You can zoom out repeatedly by clicking several times with the left mouse button until you reach the view of the entire observation time span (denoted by a bleep).

Moving the view along the time axis

This function is active only on a magnified chart.

- Position the mouse pointer anywhere on the chart and click with the right mouse button.

- In the shortcut menu that appears, choose the **Panoramic** command. The menu vanishes and the pointer then looks like ✋

- Depress the left mouse button and drag the pointer leftward or rightward, depending on where the particular period you want to view is. Note that the time scale will move as you drag the pointer. Release the mouse button once you have reached the desired time.

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Scrolling through the list of events

There are two ways of doing this:

- Use the up- and down-arrows of the vertical scroll bar on the right-hand part of the **Events** tab. After each click the definition of an event is displayed on the tab. On the time chart, the displayed event is denoted by a down- arrow pointing to the corresponding letter
  or
- Click the letter above the corresponding graphic symbol with the left mouse button. Proper selection of the event is denoted by the display of a down-arrow pointing to the letter. In this case the definition of the event is shown in the rest of the tab.

  In both cases, the X/Y expression under the scroll bar should be interpreted as follows:

    X : position of displayed event in the list of events
    Y : total number of events

Using the Mask editor

For any reason you may want to discard the data from a satellite (i.e. "mask" a satellite) only for a particular moment (or particular moments) in an observation record. You can mask a satellite at two different levels of the process, depending on the reason why the data from this satellite must be rejected.

- **Masking attached to an observation record**

  Masking applies to the observation record in whatever process this observation record is involved. In this case, use the following procedure to mask a satellite:

  - Open the Database window.

  - In the left-hand pane, click the **Observations** object.

  - In the right-hand pane, double-click the icon of the observation for which you want to mask a satellite

  - Unless already done, select the **General** tab and then click the **Scan** button. This provides access to the **Mask** tab showing a chart on which you can define your mask(s) (see *Mask tab* in page *3-90*).

- **Masking attached to a process object**

  Masking applies to the observation record mentioned in the process object definition only when this process object is run. In this case, use the following procedure to mask a satellite:

  - Open the project document containing the concerned process object.

  - From the **Project** menu, select the **Operations** command. This causes the Operations tab to display.

- Select the concerned process from the left-hand list box

- Click the **Options** button.

- In the dialog box that appears, click the **Mask** button. This provides access to the **Mask** tab showing a chart on which you can define your mask(s). (see *Mask tab* in page *3-90*)

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Mask tab

This tab shows a chart on which you can define masks. The observation time is represented on the horizontal axis, the PRN number of each satellite received at that time on the vertical axis. In the example below, satellite No. 20 is masked from about 15:43 until the end of the observation. Satellite No. 14 is not masked but is invisible from about 15:38 until the end of the observation.

- **Masking a satellite**

  Masking a satellite is achieved by drawing a rectangle over each period of time during which the satellite must be masked.

  - Position the mouse pointer anywhere on the chart. The mouse pointer then looks like ⌖

  - Click with the right mouse button. The **Mask** shortcut menu pops up.

  - Choose the **Mask** command from the menu.

  - Draw a rectangle over the concerned line section by dragging the mouse pointer along a virtual line representing a diagonal of that rectangle.

You can define the two ends of the rectangle diagonal by referring to the information displayed at the foot of the dialog box (UTC time or point numbers; point numbers shown in blue). This information is continually updated as you move the cursor horizontally on the diagram.

```
454
10/11/96 13:22:58 (UTC + 01:00:00)
```

Adjust the horizontal size of the rectangle so that it covers the period of time you want to mask and then release the mouse button. This causes the covered line section to appear in black, meaning that the satellite is now masked for that particular period of time.

- Resume the above step as many times as necessary.

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- **Unmasking a satellite**

  - Position the mouse pointer anywhere on the chart. The mouse pointer then looks like $+^{\boxtimes}$

  - Click with the right mouse button. The **Mask** shortcut menu pops up.

  - Choose the **Unmask** command from the menu.

  - Draw a rectangle around the concerned line section (shown in black) and then release the mouse button. This causes the covered line section to re-appear in blue, meaning that the mask is now removed.

- **Zooming in on a particular period in the observation record**

    - Position the mouse pointer anywhere on the chart and click with the right mouse button.

    - In the shortcut menu that appears, choose the **Zoom In** command. As a result the menu vanishes and the pointer looks like ⊕.

    - Position the pointer on the point around which you want to zoom in and click with the left mouse button. As a result the time chart is magnified around this point (and the clicked point stays immobile in reference to the pane).

    - You can zoom in repeatedly by clicking several times with the left mouse button (until a bleep can be heard).

- **Zooming Out**

    - Position the mouse pointer anywhere on the chart and click with the right mouse button.

    - In the shortcut menu that appears, choose the **Zoom Out** command. As a result the menu vanishes and the pointer then looks like ⊖.

    - Position the pointer along the time axis on the point from which you want to zoom out and click with the left mouse button. As a result the window displays a larger-scale view centered around the clicked point

    - You can zoom out repeatedly by clicking several times with the left mouse button until you reach the view of the entire observation time span (denoted by a bleep).

- **Moving the view along the time axis**

This function is active only on a magnified chart.

- Position the mouse pointer anywhere on the chart and click with the right mouse button.

- In the shortcut menu that appears, choose the **Panoramic** command. The menu vanishes and the pointer then looks like $\mathcal{O}$

- Depress the left mouse button and drag the pointer leftward or rightward, depending on where the particular period you want to view is. Note that the time scale will move as you drag the pointer. Release the mouse button once you have reached the desired time.

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- **Masking/Unmasking all SVs**

From the **Mask** shortcut menu, simply select the **Mask All** or **Unmask All** command and then release the mouse button. As a result all the lines appear in the same color (black or blue respectively).

Importing Maps

To import a map to the 3SPack database, you have first to digitize the map of your working region using a scanner. The map should be saved in the bitmap format (BMP).

When digitizing a map, the orientation is assumed to be as follows:

- North/South direction along the vertical axis (North to the top)

- East/West direction along the horizontal axis (East to the left)
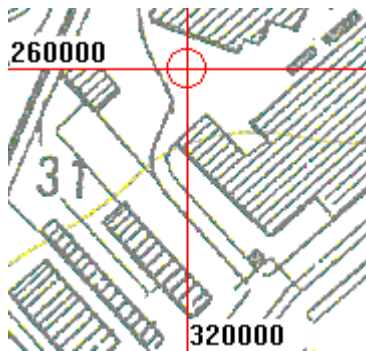
Import Procedure

- Open the database Manager window

- Select the **Maps** object

- In the menu bar, select **Record** and then **Import**. A dialog box opens showing the content of the \3SPack\Maps directory (the default directory for maps in bmp format).

- Select the BMP file containing your map and then click the **Open** button. A new dialog box opens showing all or part of your map (depending on its size). Use this box to give geographical dimensions to the map. Refer to explanations below.

- Choose a projection from the **Projection** list box. You must choose a projection system otherwise 3SPack won't validate the map record.

Defining the grid origin

On a 3SPack Map record, the origin of the grid is represented by:

Any point on the map whose coordinates are accurately known can be chosen to be the origin. Generally, the map from which the digitized Map record originates also provides reference points one of which can be used as the origin.

The origin is defined in two steps:

- Specify the location of the origin on the map.

On the X button, drag the red dot as if you were "turning" the button until the vertical red line (on the map) holding the grid origin coincides with the desired point (vertical lines move in the horizontal direction, space between lines is left unchanged). Turning the button clockwise causes the lines to move to the right.

On the Y button, drag the red dot as if you were "turning" the button until the horizontal red line (on the map) holding the grid origin coincides with the desired point (horizontal lines move in the vertical direction, space between lines is left unchanged). Turning the button clockwise causes the lines to move downward.

Alternately, use the "tab" key to switch from a setting to the next. For each setting, use the "+" and "-" keys for a fine adjustment.

- Enter its exact coordinates, expressed in the coordinate system used:

    - X coordinate in the text box below the X button
    - Y coordinate in the text box below the Y button

    The graduations shown on the vertical and horizontal lines are then automatically refreshed.

Defining the grid step

The grid step represents the distance (d) between two adjacent lines both in the vertical and horizontal directions (the grid is then a network of squares on the map):
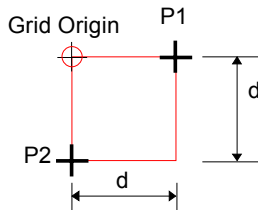
Generally, the map from which the digitized Map record originates provides reference points allowing you to define P1 and P2.

- Indicate the locations of points P1 and P2 on the map:

On the CX button, drag the red dot as if you were "turning" the button until the vertical red line adjacent to that holding the origin coincides with the desired point (vertical line holding the grid origin remains immobile). Turning the button clockwise increases space between adjacent vertical lines.

On the CY button, drag the red dot as if you were "turning" the button until the horizontal red line adjacent to that holding the origin coincides with the desired point (horizontal line holding the grid origin remains immobile). Turning the button clockwise increases space between adjacent horizontal lines.

- Alternately, use the "tab" key to switch from a setting to the next. For each setting, use the "+" and "-" keys for a fine adjustment.

- Enter the distance d in the two text boxes below the CX and CY buttons. The graduations shown on the vertical and horizontal lines are then automatically refreshed.

Menus and commands

File menu commands (in *Database environment*)

3

New Project :	Creates a new project
Open Project :	Opens an existing project
Print :	*Dimmed*
Print Preview :	*Dimmed*
Print Setup :	Defines the Printing properties
Import GPS data :	From GPS data files, creates observation records in the database
Exit Application :	Exits 3SPack

File menu commands (in *Project environment*)

New Project	:	Creates a new project
Open Project:		Opens an existing project
Close Project	:	Closes the active project
Save Project	:	Saves the active project
Print	:	Prints the active project
Print Preview	:	Displays the active project as it would appear printed
Page Setup	:	Defines the orientation and size of the printed document
Import GPS data	:	From GPS data files, creates observation records in the database
Exit Application	:	Exits 3SPack

Edit menu commands (in *Project environment*)

Undo:		Undoes the most recent action you have made in the project document
Cut	:	Moves the current selection (text and/or graphics) to the clipboard
Copy	:	Copies the current selection (text and/or graphics) to the clipboard
Paste	:	Pastes the clipboard contents into the active document, where the insertion point is positioned

Paste Special : Pastes the clipboard contents into the active document, where the insertion point is positioned. Before using this command, a picture (Metafile), a word6 document, RTF formatted text or unformatted text was placed on the clipboard. You are requested to specify the format of the data stored in the clipboard before pasting.

Select All : Selects the entire project document (selects all the elements, text and graphics, present in the document)

Object Properties : Displays the properties of the selected object

{Type of} Object : Allows you to open or edit the selected object, if any

3

Insert menu commands

Map : Inserts a map of the region as a graphic object into the active project

Prediction : Inserts a Prediction object into the project

Process : Inserts a Process object into the project

Abstract : Inserts the **abstract** as text into the project document

Object : Inserts an object into the active project

View menu commands (in *Project environment*)

Toolbar : Shows/hides the Toolbar

Format Bar : Shows/hides the Format Bar

Status Bar : Shows/hides the Status Bar

Ruler : Shows/hides the Ruler

Database Manager : Provides access to the database. The 3SPack Supervisor window then enters the *Database environment*.

Options : From the **Report** tab, you can choose a **document template** for your project and specify the length unit used in the ruler (Measurement Units).

From this tab, you can also specify whether Map server objects and project abstracts must systematically be inserted into your project documents on creating them. To do so, check respectively the "Insert Map" button and the "Insert Project Abstract" button.

From the **Operations** tab, you can specify the default size of the objects inserted into the document (initial width and height).

If you clear the "Use operations default options" button, then 3SPack Supervisor will systematically open the **Options dialog box of a prediction** or the **Options dialog box of a process** whenever you create (add) either of these objects, thus prompting you to define these options

From the **GPS** tab, you can tell 3SPack whether the receivers you use in your surveys are single-or dual-frequency. If they are dual-frequency, check the button on this tab. This will preset the **Import GPS data** dialog box in order to "keep 2nd frequency raw data" (see *Importing GPS Data*, page *3-30*).

View menu commands *(in Database environment)*

3

List : Simply lists the names of the records in the selected database object

Details : Lists more complete information on the records in the selected database object

Toolbar : Shows/hides the Toolbar

Format Bar : Shows/hides the Format Bar

Status Bar : hows/hides the Status Bar

Options : From the **Report** tab, you can choose a **document template** for your project and specify the length unit used in the ruler (Measurement Units).

From this tab, you can also specify whether Map server objects and project abstracts must systematically be inserted into your project documents on creating them. To do so, check respectively the "Insert Map" button and the "Insert Project Abstract" button.

From the Operations tab, you can specify the default size of the objects inserted into the document (initial width and height).

If you clear the "Use operations default options" button, then 3SPack Supervisor will systematically open the **Options dialog box of a prediction** or the **Options dialog box of a process** whenever you create (add) either of these objects, thus prompting you to define these options

From the **GPS** tab, you can tell 3SPack whether the receivers you use in your surveys are single-or dual-frequency. If they are dual-frequency, check the button on this tab. This will preset the **Import GPS data** dialog box in order to "keep 2nd frequency raw data" (see *Importing GPS Data*, page*3-30*).

Record menu commands

Add : Creates a new record in the selected database object (other than project)

Edit : Edits the dialog box corresponding to the selected record

Delete : Deletes the selected record(s) from the database object

Import : Edits Import dialog box

Export : Edits Export dialog box

Project menu commands

Run	:	Runs an operation defined in the Operations tab of the Project dialog box (and creates or updates the corresponding object in the document)
Run All	:	Runs all the operations defined in the Operations tab of the Project dialog box (and creates or updates the corresponding objects in the document)
Description	:	Edits the General tab of the Project dialog box
Region	:	Edits the Region tab of the Project dialog box
Operations	:	Edits the Operations tab of the Project dialog box

3

Tool Menu commands (default)

Unprotect	:	Allows you to activate an application you buy later (password provided by DSNP)
Transfo	:	Starts the Transfo software module
Win Comm	:	Starts the Win Comm software module
Tracer	:	Starts the Tracer software module. This tool allows real-time monitoring of the position of a DSNP mobile receiver on a map of the working area
KISS	:	Starts the KISS module
SISS	:	Starts the SISS module
DSNP to RINEX	:	Opens a dialog box from which you can convert raw data from DSNP to RINEX format
Customize...	:	Allows you to customize this menu. Any application can be added to or removed from this menu

Window menu commands (in *Project environment*)

Cascade	:	Arranges all the open windows in cascade configuration
Tile	:	Arranges all the open windows in tile configuration
Arrange icons	:	Places all the minimized windows side by side, from left to right, and from the lower part of the 3SPack Supervisor window.
{List of active windows}	:	Allows you to change the active window in 3SPack Supervisor

Window menu commands (in *Database environment*)

New Window	:	Causes the Database window to become the active window in 3SPack Supervisor
Cascade	:	Arranges all the open windows in cascade configuration
Tile	:	Arranges all the open windows in tile configuration
Arrange icons	:	Places all the minimized windows side by side, from left to right, and from the lower part of the 3SPack Supervisor window.
{List of active windows}	:	Allows you to change the active window in 3SPack Supervisor

3

Help menu commands

Index	:	Displays the opening screen of Help
Using Help	:	Displays instructions for using Help
About 3SPack Supervisor	:	Displays the version number of this application. ♣

4. Map Server

Introduction

- Using the Map server, you can get a graphic view of your region of survey before you start your own survey:

    - If a map of the region is available from the 3SPack Supervisor database, it may be shown in the background. The map may be added/removed at your convenience.

        For a map to be effectively shown in the background, first it must coincide partially or entirely with the considered region. Second, it must be defined in the same coordinate system as the one specified for the project document. This second requirement will be met if **The project system** option is chosen in the **View options** dialog box (see *Select pane* in page *4-8*),.

    - The region view may be enriched with a grid. The horizontal and vertical lines of the grid may be represented by their coordinates expressed in the geodetic system used, or by visible lines, or by both.

    - Using the "**grab**" function, you can move the Map Server on the surface of the map so that other details of the map can be viewed. The map can be "grabbed" in all directions.

    - All sites and trajectories located within the region, resulting from previous operations and still present in the 3SPack Supervisor Database, are also shown on the map.

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- Using the Map server, you can **create a site** or **create a trajectory** by a simple click on the mouse.

- Using the Map server, you can prepare the scenario of your survey

    - For any site, you can easily **associate a prediction** that you will run later from the project document

    - For any site or trajectory, you can **associate a process**, provided field data are available for this site or trajectory. You will run the process later from the project document

- The results of all the operations you perform during a survey are shown on the map right after they are made available to the Map server, which significantly enhances interaction with the software.

- Using the Map server, you can directly **export** your trajectory or site solutions in the desired format.

NOTES:

- The Map Server is said to be "embedded" (or "in-place activated") if it is run in the main window of 3SPack Supervisor. This is the case when you double-click a map object in an open project, or if you select this object and choose successively **Edit** (in the menu bar of Supervisor) then **MapSrv object** then **Edit.**

- The Map Server is said to be "separate" or "open" if it is run in a separate main window. This is the case if you select this object and you choose successively **Edit** (in the menu bar of Supervisor) then **MapSrv object** then **Open**.

How the Map Server shows your region of survey

- The Map server shows the region of your survey inside a rectangular object. Since the region of survey graphically is a rectangular area of any proportion, the entire region cannot generally fit in the original rectangular object.

  For this reason, the rectangular object is then defined so that its smaller side be equal to the smaller side of the region.

  Consequently, a portion of the region may not appear when you insert the Map Server into the project document.
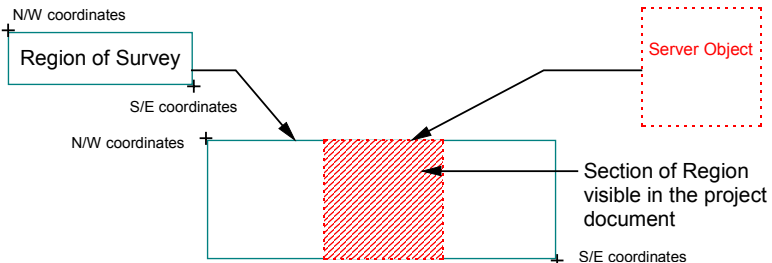
- If a map record is available from the database which coincides completely or partially with the region of survey, it is then shown in the Map Server object. Its placement and size are deduced respectively from its grid origin and grid step:

N/W coordinates

Grid Origin

Grid Step

Map

S/E coordinates
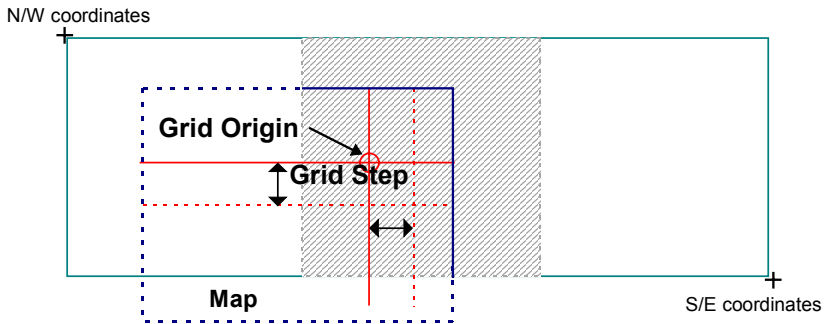
Graphic conventions

- When you use the grabber or the zoom, a limit of the validity area may be reached. This limit will then appear <u>as a red continuous line</u> on the Map.

- In the *Separate Map* environment, where the window can
  be of any size, a dotted area is represented on the map to
  remind you of the section of map that will be visible from
  the project document (as the Map Server object).

In Separate Map environment,
this square reminds you of the
section of map that is visible
from the project document.

This rectangle (or square)
indicates the limits of the
validity area for the
coordinate system used.

4
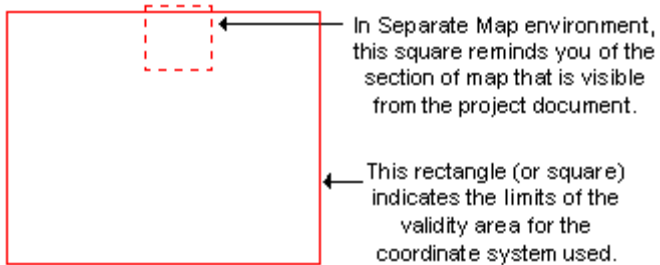
- When observations are available for a site or a trajectory, a
  "diskette" icon is shown nearby.

- When you define a process in which a reference site is
  involved, a line is represented on the map connecting that
  reference site to the surveyed site or trajectory. An arrow is
  placed on the line at mid-distance from the two places,
  pointing toward the surveyed site or trajectory.

About the region displayed by the Map Server

Following the insertion of the Map Server into your project document, the region shown in the Map Server is necessarily the one you defined for your survey.

Later, after performing a number of zoom and "grab" operations on the map, the displayed region will probably be different from the initial one. You may at any time read the coordinates (N/W & S/E) of the two points defining the currently viewed region. To do this:

- In the tool bar, click 🖺.

   or

   from the menu bar, select **View** and then **Region.**

   The **Viewed Region** dialog box which then appears contains the coordinates of the two points defining the region.

Map Server options

-   From the menu bar, select **View** and then **Customize**. The dialog box which then appears looks like this:
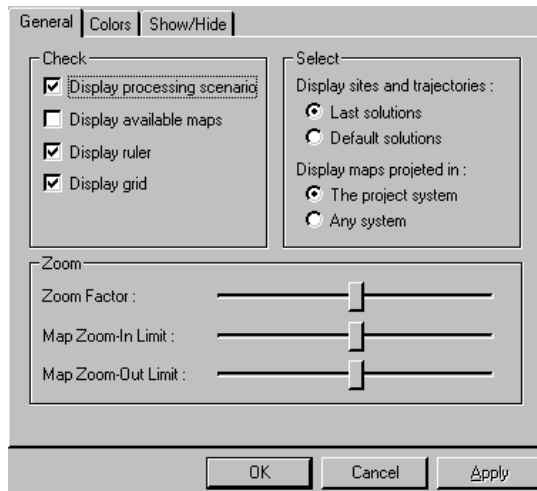
The Map Server options are described in the next pages. After making all the necessary changes, do not forget to click the **OK** button to validate the new options.

Default Viewing options (**check** pane)

-   The Map Server is configured according to the following settings when you run this server:

Display processing

scenario : Check this button to display the operations to be run, or already run, in the displayed region

Display available maps : Check this button to display the map, if any, of the region of survey

Display ruler : Check this button to display the coordinates of the grid lines

Display grid : Check this button to display the map grid.

- You may need to change these options while you use the Map Server. An easy way to do this is to use some of the buttons in the tool bar or some of the commands from the **View** menu.

Other (Select pane)

Display sites and trajectories:

Last solutions : Select this button if you want the Map Server to place each site or trajectory on the map according to the latest solution known for this site or trajectory

Default solutions : Select this button if you want the Map Server to place each site or trajectory on the map according to the default solution defined for this site or trajectory

Display maps projected in:

The project system : Only maps in the same coordinate system as the project document can be displayed

Any system : All maps can be displayed whatever the coordinate system used in the project document

Note that if you do not use a projection for the project document (all coordinates expressed in lat &long), then maps can only provide an erroneous view of the region with respect to the grid used.

Zoom options (**zoom** pane)

4

Zoom factor : Defines the elementary skip of map scale when zooming in or out by one click of the mouse.

To decrease the zoom factor, drag the slide to the left (and vice versa) (default: slide in central position)

Map Zoom-In Limit : Defines a scale limit for the map for which you want the map to disappear from the window (because it's too magnified).

To reach this limit, zoom in repeatedly until the map disappears. To reduce the zoom-in limit, drag the slide to the left (and vice versa) (default: slide in central position).

Map Zoom-Out Limit : Defines a scale limit for the map for which you want the map to disappear from the window (because it's too small).

To reach this limit, zoom out repeatedly until the map disappears. To reduce the zoom-out limit, drag the slide to the left (and vice versa) (default: slide in central position).

Color options

- Click the **Colors** tab.

    This tab shows the current colors of all the configurable items (icons, text, text background). Each of these items is shown in the deselected state (top diagram) and in the selected state (bottom diagram).

- Select the item whose color has to be changed by clicking this item in the corresponding diagram or by choosing this item from the **item** list box.

- In the lower part of the tab, set the following parameters:

    Size : relevant to site and trajectory elements only. Choose between "thin" or "thick"

    Color : choose a new color for the selected item from this pop-up menu

- Make as many changes as necessary. Note that all the changes you make appear immediately on the items shown above.

Show/Hide Options

- Click the **Show/Hide** tab.

   This tab allows you to specify sites and trajectories that you do not want to view on the map.

   You may need to use this option if for example the map shows too many of these objects —making the map uneasy to read— and you do not want to remove the corresponding records from the 3SPack Supervisor database.

   Remember that the Hide options that you set in this dialog box only applies to the map object you are working on (another map object in the same project document can use different Hide options).

4

Hidden Sites pane

{Sites list box**}**	:	Lists all the sites from the 3SPack Supervisor database whose solutions (default or last, depending on your choice) are within the limits of the map currently viewed.
		Check the button(s) corresponding to the site(s) you want to hide
Hide All button	:	Click this button to hide all the sites listed in this pane
Show All button	:	Click this button to show all the sites listed in this pane

Hidden Trajectories pane

{Trajectories list box**}** : Lists all the trajectories from the 3SPack Supervisor database whose solutions (default or last, depending on your choice) are partially or entirely within the limits of the map currently viewed.

Check the button(s) corresponding to the trajectory(ies) you want to hide

Hide All button : Click this button to hide all the trajectories listed in this pane

Show All button : Click this button to show all the trajectories listed in this pane

Placing a new site on the map

- Click in the toolbar

    or

    From the menu bar, select **Draw** and then **Site**

- Move the mouse pointer onto the map. This causes the pointer to change to a

- Click the mouse button on the map where you would like to create a new site. This causes the Site dialog box to open, as if you were creating a Site record from within the database

- Just type the Site name. The Site coordinates are automatically deduced from the point where you have clicked on the map. Since a single solution is known for this site (the one resulting from the mouse click), these coordinates are defined as both the default and last solutions. The current date & time also appear as the date & time of these solutions.

- Click the OK button. As a result, an icon appears on the map representing the new site. The name of the site is shown beside the icon.

- To create several sites in succession, hold down the Shift key while clicking on $\frac{1}{*}$.

  When you are finished, click on for example to stop creating new sites.

Placing a new trajectory on the map

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- Click in the toolbar

  or

  From the menu bar, select **Draw** and then **Trajectories**

- Move the mouse pointer onto the map. This causes the pointer to change to a $\sqrt{}$

- Click the mouse button on the map where you would like to create a new trajectory. This causes the Trajectory dialog box to open, as if you were creating a Trajectory record from within the database

- Just type the Trajectory name. The coordinates of the initial point are automatically deduced from the point where you have clicked on the map.

- Click the OK button. As a result, an icon appears on the map representing the new trajectory (icon located on initial point). The name of the trajectory is shown beside the icon.

- To create several trajectories in succession, hold down the Shift key while clicking on ∿ .

  When you are finished, click on 🔲 for example to stop creating new trajectories.

Placing a new prediction on the map

- Select the sites on the map for which you would like predictions to be run. To make a multiple selection, hold down the Shift key while clicking the 2nd site, the 3rd site, etc.

- From the menu bar, select **Draw** and then **Prediction**

- In the **Add Prediction** dialog box which then appears, enter the definition of the first prediction, as you would from a project document or from within the database.

  On Site : enter the label of the site of prediction

  From : enter month, day and time of the beginning of prediction (default: current day at 8hr00am)

During : enter the duration of prediction (default: 12 hr).

To : (dimmed) indicates the resulting end time of prediction (default: current day at 8hr00pm)

- When the definition is complete, click the **OK** button. As a result a text frame containing the term "prediction", preceded by an order number, appears on the map, beside the site for which the prediction must be performed. The order number indicates the position of the prediction in the list of operations to be performed in the project document

The reason why the text frame does not appear may be one of the following:

- The button is depressed
- The displayed part of the map does not contain the site for which the prediction must be performed.
- The map is too reduced or too magnified to show the site and the associated predictions and/or processes

- If you made a multiple selection, the **Add Prediction** dialog box displays again from which you can define a prediction for the 2nd site. This dialog box will appear as many times as the number of selected sites.

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Placing a new process on the map

- Select the sites and trajectories on the map for which you would like processes to be run. To make a multiple selection, hold down the Shift key while clicking the 2nd element, the 3rd element, etc.

- From the menu bar, select **Draw** and then **Process**

- In the **Add Gps Process** dialog box which then appears, enter the definition of the first process, as you would from a project document or from within the database.

Compute : Define the process object by checking the Site or Trajectory button.

Specify the name of the site or trajectory in the text box just under the two check buttons. The list of records that appears when you click the down-arrow button are those for which observation records are available.

In the Using Observation: text box, select the name of the observation record from which the site or trajectory can be determined. Remember that you create links between Site/Trajectory records and Observation records when you use the Import GPS Data function.

Reference : If the database contains a site and a static observation record for this site whose acquisition time coincides partially or completely with that of the observation record under process, then the application suggests that a differential process be run using this site as a reference. In that case, check the Site button in the Reference pane and choose a site name from the text box. In the Using Observation: text box, select the name of the observation record you want to use.

If several position solutions exist for the selected site, specify the solution you want to use by checking either the Last solution button or the Default solution button.

If no sites are available, all check buttons in this pane are dimmed.

With module : The application indicates the processing modules that can be used to process the observation record. Choose one if two or more modules are prompted.

- When the definition is complete, click the **OK** button

If the "Use Operations default options" check button was cleared in the **options** dialog box, a dialog box then appears in which you have to define the processing options for that particular process (otherwise, this dialog box is bypassed).

4

Then a text frame containing the term "process", preceded by an order number, appears on the map, beside the icon for which the process must be performed. The order number indicates the position of the process in the list of predictions and processes to be performed in the project document

The reason why the text frame does not appear may be one of the following:

- The button is depressed

- The displayed part of the map does not contain the site or trajectory for which the process must be performed.

- The map is too reduced or too magnified to show the site or trajectory and the associated predictions and/or processes

- If you made a multiple selection, the **Add Gps Process** dialog box displays again from which you can define a process for the 2nd element. This dialog box will appear as many times as the number of selected elements.

Using the zoom

Zooming in

- Click 🔍 in the toolbar or from the menu bar, select **View** and then **Zoom in**

- Move the pointer to the point around which you would like to zoom in (the pointer then changes to a ⊕) and then click with the left mouse button. As a result the window displays a view of the region centered around the clicked point, and magnified according to the value of *zoom factor*.

Zooming out

- Click 🔍 in the toolbar or from the menu bar, select **View** and then **Zoom out**

- Move the pointer to the point from which you would like to zoom out (the pointer then changes to a ⊖) and then click with the left mouse button. As a result the window displays a view of the region centered around the clicked point, and reduced according to the *zoom factor*.

4

Measuring a segment on the map

- Move the pointer to the toolbar and click 📏. This causes the pointer to change to ⤢

Move the pointer to an end of the segment and start dragging the pointer toward the other end.

From that moment, the Map Server will provide the value of distance (with red background) between the initial point and the one currently pointed by the mouse until you release the mouse button:
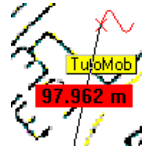
- Once the pointer accurately coincides with the second point, read the distance measured and then release the mouse.

After releasing the mouse button, the pointer shape is still ✎ meaning that the Map Server is ready to measure a new segment.

Displaying the properties (& options) of objects or operations

- Click 🔨

- Double-click the desired object or operation or, select this object or operation and, from the menu bar, select **Edit** and then **Properties**. A dialog box appears whose content is dependent on the selected element:

    - For a site or trajectory, this action is equivalent to editing the corresponding record from the database.
    - For a prediction or process, this action is equivalent to clicking the **Edit** button from the **Operations** tab of your project document after selecting the corresponding prediction or process from that tab.

- To display the options of a prediction or of a process, double-click the icon while holding down the Shift key or select the icon and, from the menu bar, select **Edit** and then **Options**.

  This action is equivalent to clicking the **Options** button from the **Operations** tab of your project document after selecting the corresponding prediction or process from that tab.

Deleting objects or operations

- In the toolbar, click

- Move the mouse pointer onto the map and click the element you would like to delete (a site, a trajectory, a prediction or a process)

- For a multiple selection, hold down the shift key while clicking other elements. All kinds of elements may be part of a multiple selection

- From the menu bar select **Edit** and then **Delete**

  or

  press the Del key.

- You then have to confirm your choice before the application really deletes the object(s) and operation(s). If an object is involved in a process or a prediction, a message will appear

4

Exporting sites and trajectories

Procedure

- Click

- Click the corresponding element(s) on the map. To make a multiple selection, hold down the Shift key while clicking the 2nd element, the 3rd element, etc.

- Click in the tool bar or, from the menu bar select **Edit** and then **Export**.

  A dialog box appears, whose content depends on the selection you have just made on the map. Set the dialog box as you would from 3SPack Supervisor:

Export list box :	Contains the element(s) you have selected before invoking the Export function. The content of this box is then controlled by the following three buttons.
Add button :	Click this button to add a site or trajectory to the Export list box
Edit button :	Click this button to edit the selected element
Remove button :	Click this button to remove the selected element(s) from the Export list box
Select :	Check the Default Solution or Last Solution button, depending on the solution(s) you want to export for the selected element

If a Trajectory is selected, check also the All points or Marked Points button, depending on the point(s) you want to export.

In File : Specify the path and name of the export file

Click to scroll through your disk

Format : Choose the format in which to export the selected elements. Two basic formats are available plus those created by the user

User Formats
button : Click this button to create/edit/delete a user format. First a dialog box appears showing the names of the existing user formats. Make the appropriate selection. Then the User Format dialog box appears (see below).

Projection : Choose the name of the projection (from the pop-up list) in which to express the projected coordinates of the exported points

Go button : Click this button to export the selected elements (as shown in the Export list box)

Cancel button : Click this button to cancel the Export function.

4

Defining a user format

In the User Format Dialog box:

Format : Enter a name for your format

Export : Choose the first parameter you want to insert into your format from this list box. Then specify the following for this parameter:

Field Type : Check either **Fixed** or **Variable** to define the character size of the parameter.

If you choose **Fixed**, then specify the number of characters (length) and the position (left or right) of the parameter in the field.

If you choose Variable, then just specify the character used as the separator ("," by default)

Field Format : Depending on the chosen parameter, specify additional formatting instructions (such as number of decimal places, units used, time format, etc.).

Note the simulation of your formatting instructions for this parameter in the lower part of the dialog box (simulation box)

Add : Click this button to add a new parameter to the current user format

Insert : Click this button to insert a new parameter into the current user format, before the parameter shown in the Export text box.

Remove : Click this button to remove the parameter shown in the Export text box from the current user format.

Vertical
bar : Use this bar to scroll through the list of fields defined in the current user format.

Simulation
box : This box shows a simulation of your message, as it would be obtained from your formatting instructions. Alternately, this box can be used as the Vertical Scroll bar to display the definition of each parameter in the user format. You can scroll up or down the entire list of parameters by clicking repeatedly and respectively in the left-hand part or right-hand part of the box.

4

Changing the Viewing options

- To show/hide the horizontal and vertical lines of the map grid, from the menu bar select **View** and then **Grid**

  or click ⊞

- To show/hide the map, from the menu bar select **View** and then **Map**

  or click ▱

- To show/hide the operations to be run or already run in the displayed region, from the menu bar select **View** and then **Scenario**

  or click ▨

- To show/hide the coordinates of the map grid, from the menu bar select **View** and then **Ruler**

  or click ▥

- To hide a site or trajectory, select the corresponding icon on the map (for a multiple selection, use the Shift key) and, from the menu bar, select **Edit** and then **Hide**.

  To show it back on the map, from the menu bar, select **View** and then **Options**. In the **Show/Hide** tab, make the appropriate settings.

Using the Grab tool

- Click in the toolbar

  or

  From the menu bar, select **View** and then **Grabber**

- Move the mouse pointer onto the map. This causes the pointer to change to a

- Depress the left mouse button and drag the pointer in the desired direction. Note that the map will move only when you release the mouse button. Note also that the displacement is defined by the distance covered by the pointer when you drag it.

Menus and commands

4

File menu (embedded)

New Project	:	Creates a new project
Open Project	:	Opens an existing project
Close Project	:	Closes the active project
Save Project	:	Saves the active project
Print	:	Prints the active project
Print Preview	:	Displays the active project as it would appear printed
Page Setup	:	Defines the orientation and size of the printed document
Import GPS data	:	From GPS data files, creates observation records in the database
Exit	:	Exits 3SPack

File menu (separate)

Update	:	Updates the Map server in the open project
Print	:	Prints the active project
Print Preview	:	Displays the active project as it would appear printed
Print Setup	:	Defines the orientation and size of the printed document
Exit & Return to	:	Exits MapSrv and returns to the open project

Edit menu

Copy	:	Copies the current view to the clipboard
Delete	:	Deletes the current view
Select All	:	Selects all records shown on the map
Hide	:	Hides the selected sites and trajectories (and associated icons)
Import	:	*Dimmed*
Export	:	Exports the selected site or trajectory in a user-chosen format
Properties	:	Edits the properties of the selected element
Options	:	Displays the **Options** dialog box of the prediction selected on the map

View menu (separate)

Zoom In	:	Selects the zoom-in function
Zoom Out	:	Selects the zoom-out function
Grabber	:	Selects the Grabber function
Refresh	:	Updates the content of the Map Server Window
Region	:	Provides access to the Region dialog box
Scenario	:	Shows/hides the scenario
Map	:	Shows/hides the map
Ruler	:	Shows/hides the ruler
Grid	:	Shows/hides the grid
Names	:	Shows/hides the names of the objects visible on the map
Observations	:	Shows/hides the diskette icons by those objects for which data records are available
Toolbar	:	Shows/hides the Tool Bar
Status Bar	:	Shows/hides the Status Bar
Customize	:	Provides access to the Map Server **Options** dialog box

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View menu (embedded)

Zoom in	:	Selects the zoom-in function
Zoom out	:	Selects the zoom-out function
Grabber	:	Selects the Grabber function
Region	:	Provides access to Region dialog box
Scenario	:	Shows/hides the scenario
Map	:	Shows/hides the map
Ruler	:	Shows/hides the ruler
Grid	:	Shows/hides the grid
Names	:	Shows/hides the names of the objects visible on the map
Observations	:	Shows/hides the diskette icons by those objects for which data records are available
Toolbar	:	Shows/hides the Status Bar
Customize	:	Provides access to the Map Server **Options** dialog box

Draw menu

Prediction	:	Allows you to associate a prediction with the selected site or trajectory
Process	:	Allows you to associate a process to the selected site or trajectory (only if field data available for this site or trajectory)
Select	:	Allows you to select an object on the map
Sites	:	Allows you to place a new site on the map
Trajectories	:	Allows you to place a new trajectory on the map

Tool menu

(Exists in Embedded Map Server only)
Same as 3SPack Supervisor'sTools menu, which can be customized.

Window menu

New Window	:	Causes a new window showing the open project document to appear
Cascade	:	Arranges all the open windows in cascade configuration
Tile	:	ranges all the open windows in tile configuration
Arrange icons	:	Places all the minimized windows side by side, from left to right, and from the lower part of the 3SPack Supervisor window.
{List of active windows}	:	Allows you to change the active window in 3SPack Supervisor

4

Help menu

Index	:	Displays the opening screen of Help
Using Help	:	Displays instructions for using Help
About MapSrv	:	Displays the version number of this application. ♣

5. Prediction processor

Introduction

- The Prediction Processor (PRED) allows you to work on a prediction you've inserted into your project document. A prediction is a set of information in the form of text and/or graphics depicting the GPS constellation visible from a specified site for a specified period of time (prediction time span).
- PRED allows you to change the view of your prediction. Five different views are possible: **Schedule**, **Elevation**, **Azimuth**, **Polar** and **GDOP**.
- PRED also allows you to change the **input parameters** and **options** of the prediction to customize your project.
- Once you get the right information for your prediction, you can **update** your project with the corresponding view. This view then becomes the new prediction object in your project document.

NOTES:

PRED is said to be "embedded" (or "in-place activated") if it is run in the main window of 3SPack Supervisor. This is the case when you double-click a prediction object in an open project, or if you select this object and choose successively **Edit** (in the menu bar of 3SPack Supervisor) then **Pred Object** then **Edit**.

PRED is said to be "separate" or "open" if it is run in a separate main window. This is the case when you select a prediction object and you choose successively **Edit** (in the menu bar of 3SPack Supervisor) then **Pred Object** then **Open**.

5

How to choose a view for your prediction

- In the menu bar, select **View** and then the desired view

  or

  Position the mouse pointer anywhere on the active view and click the right mouse button. In the shortcut menu that appears, choose the desired view.

  Five different views are possible:

  > Schedule
  > Elevation
  > Azimuth
  > Polar
  > GDOP

How to change the input parameters of a prediction

- In the menu bar, select **Edit** and then **Operations**. A dialog box appears allowing you to change the input parameters of the open prediction. The input parameters of a prediction are:

  On Site : enter label of prediction site

  From : enter month, day and time of the beginning of prediction (default: current day at 8hr00am)

  During : enter duration of prediction (default: 12 hr).

  To : (dimmed) resulting end time of prediction (default: current day at 8hr00pm)

  OK button : Click this button if you agree with the definition of the prediction

  Cancel button : Click this button if you want to cancel the changes you've just made in the dialog box.

The options of a prediction

The options of a prediction may be modified in two different ways:

- Globally from the **Options** dialog box. There are three ways of accessing this dialog box:

  - In the menu bar, select **Process** and then **Options**

    or

  - In the toolbar, click 🖺

    or

  - Move the pointer over the displayed view (any type), click with the right mouse button. In the shortcut menu that appears, select **Options**

- Separately for three of them. From the toolbar:

  - Click 🔲 to access the **Svs** dialog box (see description in the next pages)

  - Click Ev to access the *Elev Min* dialog box

  - Click 🔘 to superimpose or remove the *Use Curtain* option.

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The following six parameters can be defined in the Options dialog box:

View	:	Choose a view for your prediction among the five possible: **Schedule** , **Elevation** , **Azimuth** , **Polar** , **GDOP**
Elev Min	:	Enter the value of minimum *elevation*
Use Site Curtain	:	Check this button if you want to enable the *curtain*
GDOP Type	:	Enter the *DOP type* : *GDOP* , *PDOP* , *HDOP* or *TDOP*
GDOP Mode	:	Enter the *DOP Processing* mode (3D+T or 2D+T)
Selected Svs	:	Define the *list of Svs* actually used from the available constellation (see description of the SVs dialog box in the next pages)

These options are detailed below.

Elev Min

This option allows you to change the minimum elevation angle required of any satellite seen from the prediction site to be declared as usable at this site.

Use Site Curtain

This option lets you superimpose/remove the curtain at your convenience. The curtain, which is part of the definition of the prediction site, depicts an angular zone (seen from the prediction site) in which GPS signals are known to be bad.

Due to the superimposition of the curtain, whose shape and size can be seen in the Polar view, some of the plots in the Azimuth and Elevation views may be disrupted and the Schedule and GDOP views may also be affected.

GDOP Type

GDOP is a measure of the Dilution of Precision in all three dimensions plus the time precision

PDOP is a measure of the Dilution of both Horizontal and Vertical Precisions

HDOP is a measure of the Dilution of Horizontal Precision only

TDOP is a measure of the Dilution of Time Precision only

GDOP Mode

This option is used to change the DOP processing mode. 2D+T should be chosen if the altitude is known, otherwise 3D+T. In 2D+T the GDOP computation is only concerned with two position unknowns instead of three. This leads to better (lower) figures of GDOP.

5

Svs dialog box

This dialog box allows you to modify the set of SVs used effectively in the prediction.

The first time you display this box for a prediction, it is preset so that the whole set of satellites can be involved in the prediction processing. Black PRN numbers denote visible satellites, white PRN numbers denote invisible satellites. All buttons are OFF (released).

- To deselect a satellite, depress the corresponding button

- To deselect the whole set of satellites, click the **All** button

- To re-select a satellite (if previously deselected), release the corresponding button

- To re-select the whole set of satellites, click the **None** button
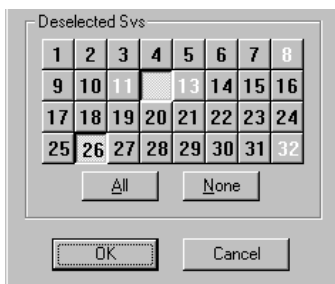
In this example:

- Satellites Nos 8, 11, 12, 13 and 32 not visible

- Satellite No. 26 visible but deselected

- Satellite No. 12 not visible and deselected

- All other satellites visible and used

Schedule View

This view shows the visible satellites for the considered prediction, taking into account the minimum elevation angle, the presence or absence of the curtain and the fact that you may have intentionally rejected some of the visible satellites.

- Y axis (linear scale): SV PRN No. (1 to 32) **and** count of visible SVs (in red)

- X axis (linear scale): time (unit:1/12th of the whole prediction).

Predicted SVs - Schedule
At Site TutoRef : 310504.059 m, 259127.139 m, 48.010 m
From may 29, 1997, 8h 0m 0.0s To may 29, 1997, 20h 0m 0.0s (UTC + 01:00:00)
With almanac may 15, 1997; Ev Min: 5.0 deg; Curtain ignored

5
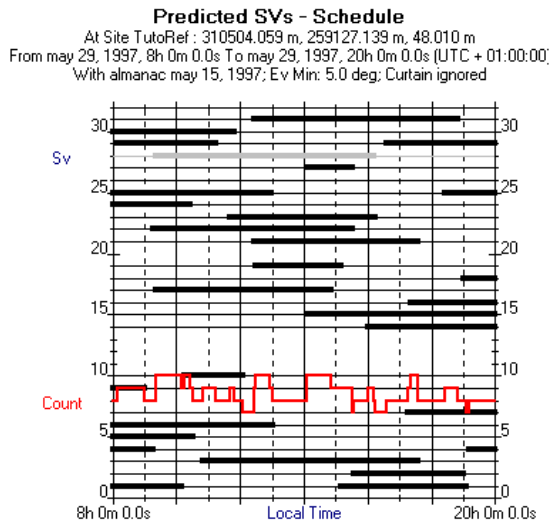
The period of time for which a satellite is visible is represented by a thick horizontal line. The red curve indicates the count of visible satellites at any moment in the prediction. Gray lines, if any, identify unhealthy satellites.

The View sub-title includes:

- the label and XYZ coordinates of the prediction site (1st line)

- the beginning and end times of the prediction (2nd line)

- the validity date of the almanac data used in the prediction, the minimum elevation angle and the presence or absence of curtain (3rd line)

Elevation View

This view shows the elevation plot of each visible satellite for the considered prediction, taking into account the minimum elevation angle, the presence or absence of the curtain and the fact that you may have intentionally rejected some of the visible satellites.

- Y axis (linear scale): Elevation angle (0 to 90°)

- X axis (linear scale): time (unit:1/12th of the whole prediction).
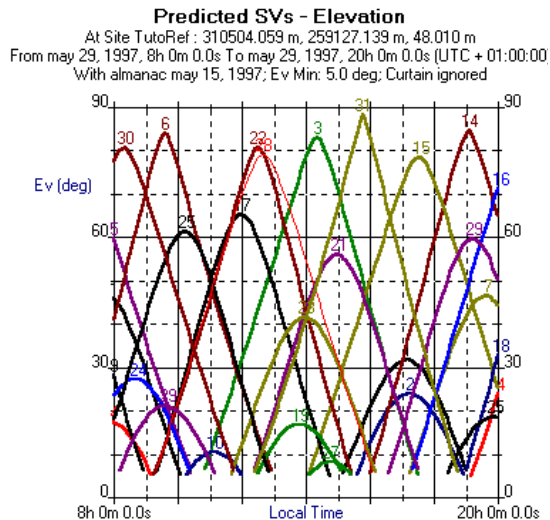
Predicted SVs – Elevation
At Site TutoRef : 310504.059 m, 259127.139 m, 48.010 m
From may 29, 1997, 8h 0m 0.0s To may 29, 1997, 20h 0m 0.0s (UTC + 01:00:00
With almanac may 15, 1997; Ev Min: 5.0 deg; Curtain ignored

The View sub-title includes:

- the label and XYZ coordinates of the prediction site (1st line)

- the beginning and end times of the prediction (2nd line)

- the validity date of the almanac data used in the prediction, the minimum elevation angle and the presence or absence of curtain (3rd line)

Azimuth View

This view shows the azimuth plot of each visible satellite for the considered prediction, taking into account the minimum elevation angle, the presence or absence of the curtain and the fact that you may have intentionally rejected some of the visible satellites.

- Y axis (linear scale): Azimuth angle (0 to 360°)

- X axis (linear scale): time (unit:1/12th of the whole prediction).
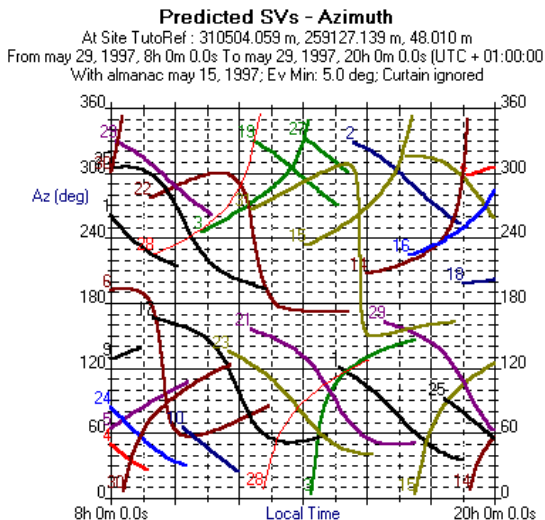
Predicted SVs – Azimuth
At Site TutoRef : 310504.059 m, 259127.139 m, 48.010 m
From may 29, 1997, 8h 0m 0.0s To may 29, 1997, 20h 0m 0.0s (UTC + 01:00:00
With almanac may 15, 1997; Ev Min: 5.0 deg; Curtain ignored

The View sub-title includes:

- the label and XYZ coordinates of the prediction site (1st line)

- the beginning and end times of the prediction (2nd line)

- the validity date of the almanac data used in the prediction, the minimum elevation angle and the presence or absence of curtain (3rd line).

Polar View

This view shows the orbit of each visible satellite for the considered prediction, taking into account the minimum elevation angle, the presence or absence of the curtain and the fact that you may have intentionally rejected some of the visible satellites. The view uses polar coordinates:

- Center of concentric circles: location of prediction site
- From center to larger circle: elevation angle, from 90° to 0° respectively (each new circle represents 10° in elevation)
- The angular space between any two adjacent lines represents 30° in azimuth; graduated clockwise from 0 to 360°.

Predicted SVs – Azimuth/Elevation
At Site TutoRef : 310504.059 m, 259127.139 m, 48.010 m
From may 29, 1997, 8h 0m 0.0s To may 29, 1997, 20h 0m 0.0s (UTC + 01:00:00
With almanac may 15, 1997; Ev Min : 5.0 deg; Curtain ignored

On may 29, 1997, 8h 0m 0.0s

GDOP (3D+T) : 2.2
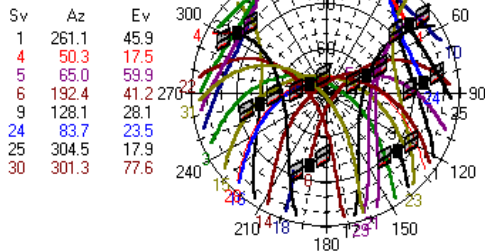
Sv	Az	Ev
1	261.1	45.9
4	50.3	17.5
5	65.0	59.9
6	192.4	41.2
9	128.1	28.1
24	83.7	23.5
25	304.5	17.9
30	301.3	77.6

5

The View sub-title includes:

- the label and XYZ coordinates of the prediction site (1st line)

- the beginning and end times of the prediction (2nd line)

- the validity date of the almanac data used in the prediction, the minimum elevation angle and the presence or absence of curtain (3rd line).

GDOP View

The GDOP view can take different forms depending on the type of DOP you wish to plot (*GDOP* , *PDOP* , *HDOP* or *TDOP*). You can choose the DOP type directly from the **Process** menu or via the **Options** dialog box.

- Y axis (logarithmic scale): DOP (0.1 to 100)

- X axis (linear scale): time (unit:1/12th of the whole prediction).
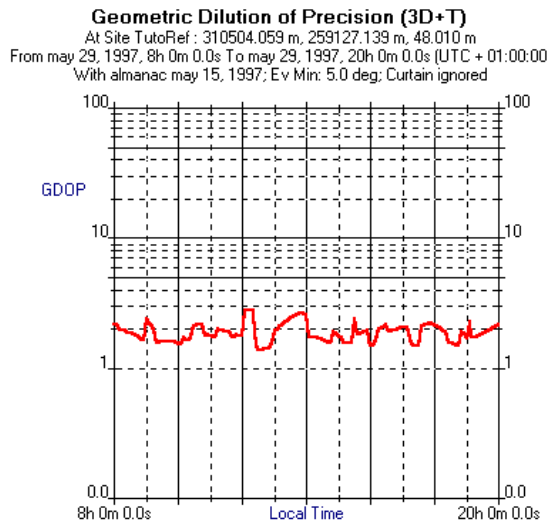
The View sub-title includes:

- the label and XYZ coordinates of the prediction site (1st line)

- the beginning and end times of the prediction (2nd line)

- the validity date of the almanac data used in the prediction, the minimum elevation angle and the presence or absence of curtain (3rd line).

Using the movable time tag on the Polar view

The time tag is defined as a particular time in the observation period. It is used to focus the **Polar view** on that particular time, for example to know the exact number and positions of the visible satellites at that time. The time tag is invisible on the graph but its position is indicated in the sub-title of the Polar view.

You can move the time tag forward or backward within the limits of the prediction, by a time step depending on the value of the prediction time span. For example, the time step is 6 minutes if you define a 24-hour prediction. The default position of the time tag is the start time of the prediction.

The time tag may be moved in two different ways:

1. Using the toolbar

    -   Click ▶▶ to take the time tag one step forward.

        or

    -   Click ◀◀ to take the time tag one step backward.

2. Using the keyboard

    -   Depressing the "+" key (numeric keypad) causes the time tag to move one step forward.

    -   Depressing the "-" key (numeric keypad) causes the time tag to move one step backward.

    -   Holding down the "+" key (numeric keypad) causes the time tag to move one step forward repeatedly, at a fast rate, until you release the key.

    -   Holding down the "-" key (numeric keypad) causes the time tag to move one step backward repeatedly, at a fast rate, until you release the key.

Copying a plot to the *clipboard*

The clipboard is a temporary storage area for text and graphics that you are copying or moving from one location to another. The Clipboard is a common holding area among Windows applications.

After choosing the desired view in the active window:

- Click

    or

- From the menu bar, select **Edit** and then **Copy**

    or

- Position the mouse pointer anywhere on the plot, click the right mouse button. In the shortcut menu that appears, select **Copy**.

How to update your project document with the displayed view of your prediction

5

If you are in *Separate PRED* environment

- In the menu bar, select **File** and then the **Update** command.

If you are in *Embedded PRED* environment

- Updating is inherent since in this case you work directly on the prediction object of the project document.

How to quit PRED

If you are in *Embedded PRED* environment

- Simply click in the active window, outside the prediction object or press the **Esc** key. The project document is systematically updated with the last displayed view of the prediction.

If you are in *Separate PRED* environment

- In the menu bar, select **File** and then the **Exit & Return to** command. The project document is systematically updated with the last displayed view of the prediction.

Menus and commands

File menu (embedded)

New Project	Creates a new project
Open Project	Opens an existing project
Close Project	Closes the open project
Save Project	Saves the open project
Print	Prints the open project
Print Preview	Displays the project as it would appear printed
Page Setup	Defines the orientation and size of the printed document
Import GPS data	From GPS data stored in the Raw directory, creates observation records in the database
Exit	Exits 3SPack

File menu (separate)

Update	Updates the prediction object in the open project
Print	Prints the active prediction
Print Preview	Displays the prediction as it would appear printed
Print Setup	Selects a printer and printer connection
Exit & Return to	Exits PRED and returns to the open project

Edit menu

Copy	Copies the prediction object to the *clipboard*
Dec time	Moves the **time tag** one step backward (active on Polar view only)
Inc time	Moves the **time tag** one step forward (active on Polar view only)
Operations	Edits the **input** parameters of the prediction

5

View menu (separate)

Schedule	Displays the "Schedule" view of the prediction
Elevation	Displays the "Elevation" view of the prediction
Azimuth	Displays the "Azimuth" view of the prediction
Polar	Displays the "Polar" view of the prediction
GDOP	Displays the "GDOP" view of the prediction
Toolbar	Shows or hides the toolbar

View menu (embedded)

Schedule	Displays the "Schedule" view of the prediction
Elevation	Displays the "Elevation" view of the prediction
Azimuth	Displays the "Azimuth" view of the prediction
Polar	Displays the "Polar" view of the prediction
GDOP	Displays the "GDOP" view of the prediction
Toolbar	Shows or hides the toolbar
Status Bar	Shows or hides the *status bar*
Split	Dimmed

Process menu

Svs	Shows the set of visible satellites in the **Svs dialog box**
Elev Min	Displays the Elev Min dialog box
Use Curtain	Superimposes/removes the curtain, if any, on the **Polar view**
GDOP	Plots the *GDOP* on the GDOP **view**
PDOP	Plots the *PDOP* on the GDOP **view**
HDOP	Plots the *HDOP* on the GDOP **view**
VDOP	(not operational)
TDOP	Plots the TDOP on the **GDOP view**
3D+T	Selects the *3D+T mode* (affects the GDOP view only)
2D+T	Selects the *2D+T mode* (affects the GDOP view only)
Options	Displays the Prediction Options dialog box

5

Tools menu

(Exists in Embedded Pred only)
Same as 3SPack Supervisor'sTools menu, which can be customized.

Window menu

New Window	Creates a new window
Cascade	Arranges all the open windows in cascade configuration
Tile	Arranges all the open windows in tile configuration
Arrange Icons	Places all the minimized windows side by side, from left to right, and from the lower part of the PRED window.
{Project name}	Causes this project's window to become active

Help menu

Index	Displays the opening screen of Help
Using Help	Displays instructions for using Help
About Pred	Displays the version number of this application. ♣

6. Natural processor

Introduction

- The Natural Processor allows you to determine a Trajectory or a Site solution.

- Since Natural does not involve the use of observations made by a stationary receiver on a reference site, it is not so accurate as Rapid Static or Kinematic. For example, the effect of the SA is noticeable on the Target view of a site determined with Natural.

- At the end of a Natural processing, the site or trajectory solution is routed to the database to be stored into the corresponding record, thus enriching this record with a new solution.

- Natural can produce two different views for a process:

    - The **Gps view**, which shows the GPS constellation for a particular moment during the observation which the user specifies using the **time tag**. The view takes into account the **intentionally deselected satellites**, if any, and/or the **user-set maskings**, if any.

    - The **Target view**, which shows a map of the site or trajectory solution.

The chosen view will then be visible from the project document when you go back to this environment.

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NOTE:

- Natural is said to be "embedded" (or "in-place activated") if it is run in the main window of 3SPack Supervisor. This is the case when you double-click a process object in an open project, or if you select this object and choose successively **Edit** (in the menu bar of Supervisor) then **Natural Object** then **Edit**.

- Natural is said to be "separate" or "open" if it is run in a separate main window. This is the case when you select a natural object and you choose successively **Edit** then **Natural Object** and **Open**.

How to choose a view for your natural object

- In the menu bar, select **View** and then the desired view:

Target
Gps
or

Position the mouse pointer anywhere on the active view and click with the right mouse button. In the shortcut menu that appears, choose the desired view:

Target
Gps

Changing the options of a Natural process

> **WARNING!**
>
> Changing any of these options requires
> that you re-run the process to get the
> updated view of the natural object.

- From the menu bar, select **Process** and then **Options**

  or

  In the toolbar, click 🖻

  or

  Move the mouse pointer anywhere on the Natural view,
  click with the right mouse button and, in the shortcut menu
  which then appears, select **Options**.

  A dialog box appears in which you can set the options of
  the process:

View	:	Choose a view for your Natural process (**Target** or **Gps**)
Elev. min.	:	Choose the minimum elevation angle required of any satellite present in the observation record to be involved in the process
Use Site curtain	:	Check this button if the curtain defined for the site must be involved in the processing (option not displayed if a trajectory is being processed)

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Mask button : Provides access to the **Mask editor** through which you can add masking moments on the set of usable satellites (prior masking can have been made on the observation record from the 3SPack Supervisor environment).

Filter Code With Phase : Check this button to enable code/phase filtering (otherwise clear it).

Deselected Svs pane : If required, depress the button(s) corresponding to the satellite(s) present in the observation record that you want to deselect

All button : Click this button to deselect all the satellites present in the observation record

None button : Click this button to re-select all the deselected satellites

Save As Defaults button : Click this button to save the current settings as the default options for the process

Restore Defaults button : Click this button to restore the default options previously defined for the process

OK button : Click this button if you agree with all the options shown in the dialog box

Cancel button : Click this button if you want to cancel the changes you have made in this dialog box

Target view

This view shows the result of your process. The solution is shown on two distinct plots for a trajectory, on a single plot for a site:

- The top diagram shows a map of the site or trajectory (the axis system is graduated North vs. East).

   For a site, the axis system is centered at the averaged solution (coordinates displayed with yellow background, site location indicated by a flag) and the 95% probability ellipse is shown in green. The SdE, SdN and SdH standard deviations are also displayed with yellow background.

   For a trajectory, the axis system is graduated so as to show all the points issued from the process. The bottom diagram shows an "altitude vs. time" view of the trajectory solution.

- The horizontal axis shows the entire non-masked observation time (From... : start date & time; To... : end date & time)

Note the presence of a green spot (**time tag**) on each of the two diagrams allowing you to establish a time relationship between the two diagrams.

When a trajectory is processed with Natural, flags may appear resulting from "markers" placed by the operator during the survey. When the Natural processor detects a marker in an observation record, an accurate determination of the position is performed for that particular time when the marker was inserted.

6

Depending on whether the operator was walking (dynamic) or immobile (static) at that time, the position solution will result from one of the following two processings:

- position interpolation (dynamic)

- position averaging (static)

The position solution is then saved as the solution of the site associated with the marker.

- **Note:**

    A marker is assumed to be static if it is placed between a "Stop Moving Antenna" event and a "Start Moving Antenna" event (see **3SPack Supervisor** section, *using the event editor*).

    The plot below is an example of a site processed with Natural:

Natural Target (TutoTo)
Site : TutoTo, using obs. TutoToRec (dH : 0 m)
From dec 18, 1996, 12h 3m59.4s To dec 18, 1996, 12h10m 1.2s (UTC + 02:00:00)
Ev Min: 5.0 deg; Curtain ignored
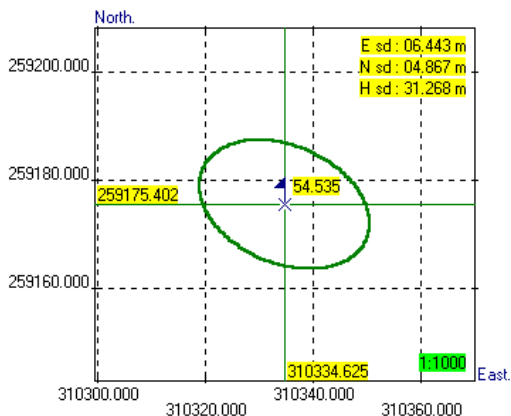
3SPack automatically chooses the appropriate scale for the map, depending on the size of the dispersion ellipse. When the 1:1000 scale is used, it is indicated in the right-lower part of the map, with green background.

The 1:1000 scale is the largest scale possible for a Natural processing.

The Target view subtitle provides the following information:

              1st line : Name of the site under process, observation record involved in the natural process, antenna height offset.

              2nd line : Non-masked observation time (From... : start date & time; To... : end date & time).

              3rd line : Process Options, i.e. minimum elevation angle requested, curtain involved/not involved in the process.

6

Gps view

This view shows the orbit of each visible satellite for the considered observation, taking into account the minimum elevation angle, the presence or absence of the curtain and the fact that you may have intentionally rejected some of the visible satellites. The view uses polar coordinates:

- Center of concentric circles: site location

- From center to larger circle: elevation angle, from 90° to 0° respectively (each new circle represents 10° in elevation)

- The angular space between any two adjacent lines represents 30° in azimuth; graduated clockwise from 0 to 360°

Natural, SVs used, Azimuth/Elevation
From dec 18, 1996, 11h 3m59.4s To dec 18, 1996, 11h10m 1.2s (UTC + 01:00:00)
Ev Min: 5.0 deg; Curtain ignored

On dec 18, 1996, 11h 3m59.4s

Sv	Az	Ev
10	302.0	58.5
18	74.0	31.8
19	79.8	60.5
24	237.3	45.5
27	169.6	62.3
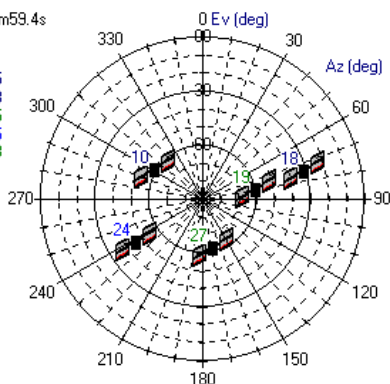
The Gps view subtitle provides the following information:

1st line : Non-masked observation time (From... :
start date & time; To... : end date & time).

2nd line : Process Options, i.e. minimum elevation
angle required, curtain involved/not
involved in the process.

In its left-hand part, the GPS view provides the instantaneous values
of azimuth and elevation for the satellites present in the observation
record for the current position of the time tag (indicated just above).

On the polar diagram, orbits are shown for the satellites visible
during all or part of the observation (SV No. indicated for each orbit
plot). The presence of a satellite icon on an orbit plot means that the
satellite is present for the current position of the time tag.

Running the Natural process
from within the Natural object

- From the menu bar and whatever the displayed view,
select **Process** and then **Run**

or

Click in the toolbar.

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- A message box appears providing information about the time required to complete the computation in progress. The following two steps are reported successively:

  - Computing...

  - Events processing...

On completion of the Natural process, the result is available on the **target view** (select this view, unless already done)

The Natural process needs to be re-run after you change a process option.

Mask editor

The mask editor is also made available from within the Natural Processor as additional masking may be needed if for example satellite data are found suspect in view of the results provided by the process.

Remember that satellites can be masked at two different levels:

- in the observation record
- or in process object.

Using the Mask editor

- From the menu bar, select **Process** and then **Options** or
  Position the mouse pointer anywhere on the active view and click with the right mouse button. In the shortcut menu that appears, choose **Options.**

- In the dialog box which then appears, click the **Mask** button. This causes the Mask editor box to appear. Note that the content of this box is exactly the same as the one you would get from 3SPack Supervisor for the considered process object.

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In blue : Satellites in view during the observation record (masking, if any, shown as one or more black segment).

Masking a satellite

Masking a satellite is achieved by drawing a rectangle over each period of time during which the satellite must be masked.

- Position the mouse pointer anywhere on the chart. The mouse pointer then looks like ⊹⊠

- Click with the right mouse button. The **Mask** shortcut menu pops up.

- Choose the **Mask** command from the menu.

- Draw a rectangle over the concerned line section by dragging the mouse pointer along a virtual line representing a diagonal of that rectangle.

  You can define the two ends of the rectangle diagonal by referring to the information displayed at the foot of the dialog box (UTC time or point numbers; point numbers shown in blue). This information is continually updated as you move the cursor horizontally on the diagram.

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  10/11/96 13:22:58 (UTC + 01:00:00)

  Adjust the horizontal size of the rectangle so that it covers the period of time you want to mask and then release the mouse button. This causes the covered line section to appear in black, meaning that the satellite is now masked for that particular period of time.

- Resume the above step as many times as necessary.

Unmasking a satellite

- Position the mouse pointer anywhere on the chart. The mouse pointer then looks like ⌖⊠

- Click with the right mouse button. The **Mask** shortcut menu pops up.

- Choose the **Unmask** command from the menu.

- Draw a rectangle around the concerned line section (shown in black) and then release the mouse button. This causes the covered line section to re-appear in blue and green, meaning that the mask is now removed.

Zooming in

- Position the mouse pointer anywhere on the chart and click with the right mouse button.

- In the shortcut menu that appears, choose the **Zoom In** command. As a result the menu vanishes and the pointer looks like ⊕

- Position the pointer on the point around which you want to zoom in and click with the left mouse button. As a result the time chart is magnified around this point (and the clicked point stays immobile in reference to the pane).

- You can zoom in repeatedly by clicking several times with the left mouse button (until a bleep is heard).

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Zooming out

- Position the mouse pointer anywhere on the chart and click with the right mouse button.

- In the shortcut menu that appears, choose the **Zoom Out** command. As a result the menu vanishes and the pointer then looks like $^\mathcal{Q}$.

- Position the pointer along the time axis on the point from which you want to zoom out and click with the left mouse button. As a result the window displays a larger-scale view centered around the clicked point

- You can zoom out repeatedly by clicking several times with the left mouse button until you reach the view of the entire observation time span (denoted by a bleep).

Moving the view along the time axis

This function is active only on a magnified chart.

- Position the mouse pointer anywhere on the chart and click with the right mouse button.

- In the shortcut menu that appears, choose the **Panoramic** command. The menu vanishes and the pointer then looks like $^\mathcal{\textcircled{}}$

- Depress the left mouse button and drag the pointer leftward or rightward, depending on where the particular period you want to view is. Note that the time scale will move as you drag the pointer. Release the mouse button once you have reached the desired time.

Using the movable time tag on the Target or Gps view

The time tag is defined as a particular time in the observation period. It is used to focus the **Target** or **Gps** view on that particular time, for example to know the exact number and positions of the visible satellites at that time. The time tag is shown as a green spot on the **Target** view.

You can move the time tag forward or backward within the limits of the observation, by a time step depending on the sampling interval of the observation. The default position of the time tag is the beginning of the observation.

The time tag may be moved in three different ways:

1. Using the toolbar

- Click ⏭ to take the time tag one step forward.
  or
- Click ⏮ to take the time tag one step backward.

2. Using the keyboard

- Depressing the "+" key (numeric keypad) causes the time tag to move one step forward.

- Depressing the "-" key (numeric keypad) causes the time tag to move one step backward.

- Holding down the "+" key (numeric keypad) causes the time tag to move one step forward repeatedly, at a fast rate, until you release the key.

- Holding down the "-" key (numeric keypad) causes the time tag to move one step backward repeatedly, at a fast rate, until you release the key.

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3. Using the mouse

- Position the mouse pointer in the lower diagram (altitude vs. time) where you would like the time tag to be moved and click with the left-mouse button. This causes the time tag to be moved to the pointed location and the upper view to be updated accordingly.

Copying a plot to the *clipboard*

The clipboard is a temporary storage area for text and graphics that you are copying or moving from one location to another. The Clipboard is a common holding area among Windows applications.

After choosing the desired view in the active window:

- Click 📋

  or

- From the menu bar, select **Edit** and then **Copy**

  or

- Position the mouse pointer anywhere on the plot, click the right mouse button. In the shortcut menu that appears, select **Copy**.

How to update your project document with the displayed view of your Natural object

If you are in *Separate Natural* environment

- In the menu bar, select the **File** menu and then the **Update** command.

If you are in *Embedded Natural* environment

- Updating is inherent since in this case you work directly on the process object of the project document.

How to quit Natural

If you are in *Embedded Natural* environment

- Simply click in the active window, outside the process object or press the **Esc** key. The project document is systematically updated with the last displayed view of the Natural process.

If you are in *Separate Natural* environment

- In the menu bar, select **File** and then the **Exit & Return to** command. The project document is systematically updated with the last displayed view of the Natural process.

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Menus and commands

File menu commands (in separate Natural)

Update...	Updates the process object in the open project
Print	Prints the active process
Print Preview	Displays the process as it would appear printed
Print Setup	Selects a printer and printer connection
Exit & Return to...	Exits Natural and returns to the open project

File menu (in embedded Natural)

New Project	Creates a new project
Open Project	Opens an existing project
Close Project	Closes the open project
Save Project	Saves the open project
Print	Prints the open project
Print Preview	Displays the project as it would appear printed
Page Setup	Defines the orientation and size of the printed document
Import GPS data	From GPS data stored in the Raw directory, creates observation records in the database
Exit	Exits 3SPack

Edit menu

Copy	Copies the process object to the *clipboard*
Dec time	Moves the time tag one step backward
Inc time	Moves the time tag one step forward
Operations	Edits the definition of the Natural process

View menu (in separate Natural)

Target	Displays the active Natural process in the Target view
Gps	Displays the active Natural process in the Gps view
Toolbar	Shows/hides the toolbar
Status bar	Shows/hides the status bar

View menu (in embedded Natural)

Target	Displays the active Natural object in the Target view
Gps	Displays the active Natural object in the Gps view
Toolbar	Shows/hides the toolbar

Process menu

Run	Runs the active Natural process
Options	Displays the options of the active Natural process

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Tools menu

(Exists in Embedded Natural only)
Same as 3SPack Supervisor'sTools menu, which can be customized.

Window menu

New Window	Creates a new window
Cascade	Arranges all the open windows in cascade configuration
Tile	Arranges all the open windows in tile configuration
Arrange Icons	Places all the minimized windows side by side, from left to right, and from the lower part of the Natural window.
{...}	Causes this open window, if any, to become active

Help menu

Index	Displays the opening screen of Help
Using Help	Displays instructions for using Help
About Natural	Displays the version number of this application.

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7. DGNSS Processor

Introduction

- The DGNSS Processor allows you to determine a Trajectory or a Site solution.

- At the end of a DGNSS processing, the site or trajectory solution is routed to the database to be stored into the corresponding record, thus enriching this record with a new solution.

- The DGNSS processor makes use of a reference site to determine the surveyed site or trajectory. The condition required to perform a DGNSS process is that observations should have been performed concurrently at both the reference site and the surveyed site. The coordinates of the reference site should be known with the best possible accuracy

- DGNSS can produce two different views for a process:

    - The **Gps view**, which shows the GPS constellation for a particular moment during the observation which the user specifies using the **time tag**. The view takes into account the **intentionally deselected satellites**, if any, and/or the **user-set maskings**, if any.

    - The **Target view**, which shows a map of the site or trajectory solution.

The chosen view will then be visible from the project document when you go back to this environment.

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NOTE:

- DGNSS is said to be "embedded" (or "in-place activated") if it is run in the main window of 3SPack Supervisor. This is the case when you double-click a process object in an open project, or if you select this object and choose successively **Edit** (in the menu bar of Supervisor) then **DGNSS Object** then **Edit**.

- DGNSS is said to be "separate" or "open" if it is run in a separate main window. This is the case when you select a DGNSS object and you choose successively **Edit** then **DGNSS Object** and **Open**.

How to choose a view for your DGNSS object

- In the menu bar, select **View** and then the desired view:

  Target
  Gps
  or

  Position the mouse pointer anywhere on the active view and click with the right mouse button. In the shortcut menu that appears, choose the desired view:

  Target
  Gps

Changing the options of a DGNSS process

<div style="border:1px solid black; padding:1em;">

WARNING!

Changing any of these options requires that you re-run the process to get the updated view of the DGNSS object.

</div>

- From the menu bar, select **Process** and then **Options**

    or

    In the toolbar, click

    or

    Move the mouse pointer anywhere on the **DGNSS** view, click with the right mouse button and, in the shortcut menu which then appears, select **Options**.

    A dialog box appears in which you can set the options of the process:

View	:	Choose a view for your DGNSS process (**Target** or **Gps**)
Elev. min.	:	Choose the minimum elevation angle required of any satellite present in the observation record to be involved in the process
Use Ref curtain	:	Check this button if the curtain defined for the reference site must be involved in the processing

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Mask button : Provides access to the **Mask editor** through which you can add masking moments on the set of usable satellites (prior masking can have been made on the observation record from the 3SPack Supervisor environment).

Filter Code With Phase : Check this button to enable code/phase filtering (otherwise clear it).

Deselected Svs pane : If required, depress the button(s) corresponding to the satellite(s) present in the observation record that you want to deselect

All button : Click this button to deselect all the satellites present in the observation record

None button : Click this button to re-select all the deselected satellites

Save As Defaults button : Click this button to save the current settings as the default options for the process

Restore Defaults button : Click this button to restore the default options previously defined for the process

OK button : Click this button if you agree with all the options shown in the dialog box

Cancel button : Click this button if you want to cancel the changes you have made in this dialog box.

Target view

This view shows the result of your process. The solution is shown on two distinct plots for a trajectory, on a single plot for a site:

- The diagram (top diagram for a trajectory) shows a map of the site or trajectory. The axis system is graduated North vs. East.

  For a site, the axis system is centered at the averaged solution (coordinates displayed with yellow background, site location indicated by a flag) and the 95% probability ellipse is shown in green. The SdE, SdN and SdH standard deviations are also displayed with yellow background. The plot also includes the numeric results of the baseline solution (top left, in yellow background).

  For a trajectory, the axis system is graduated so as to show all the points issued from the process.

- For a trajectory, the bottom diagram shows an "altitude vs. time" view of the trajectory solution. The horizontal axis of this type of diagram shows the entire non-masked observation time (From... : start date & time; To... : end date & time).

  When a trajectory is processed with DGNSS, flags may appear resulting from "markers" placed by the operator during the survey. When the DGNSS processor detects a marker in an observation record, an accurate determination of the position is performed for that particular time when the marker was inserted. Depending on whether the operator was walking (dynamic) or immobile (static) at that time, the position solution will result from one of the following two processings:

  - position interpolation (dynamic)

  - position averaging (static)

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The position solution is then saved as the solution of the site associated with the marker.

Note the presence of a green spot (**time tag**) on each of the two diagrams allowing you to establish a time relationship between the two diagrams.

- **Note:**

    A marker is assumed to be static if it is placed between a "Stop Moving Antenna" event and a "Start Moving Antenna" event (see **3SPack Supervisor** section, *using the event editor*).

    The plot below is an example of a site processed with DGNSS:
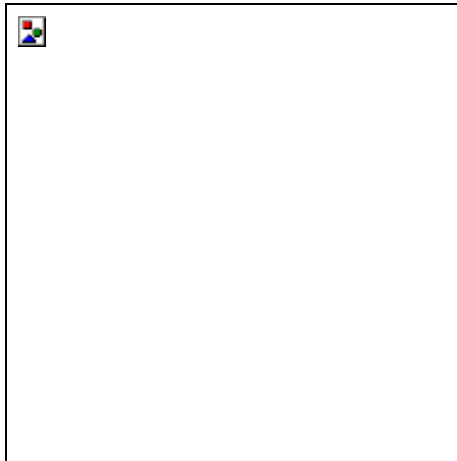
3SPack automatically chooses the appropriate scale for the map, depending on the size of the dispersion ellipse. When the 1:100 scale is used, it is indicated in the right-lower part of the map, with green background.

The 1:100 scale is the largest scale possible for a DGNSS processing.

The Target view subtitle provides the following information:

1st line	:	Name of the site or trajectory under process, observation record involved in the DGNSS process, antenna height offset.
2nd line	:	Name and coordinates of the reference site involved in the DGNSS process, observation record from which the coordinates of this site were determined.
3rd line	:	Non-masked observation time (From... : start date & time; To... : end date & time).
4th line	:	Process Options, i.e. minimum elevation angle requested, curtain involved/not involved in the process.

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Gps view

This view shows the orbit of each visible satellite for the considered observation, taking into account the minimum elevation angle, the presence or absence of the curtain and the fact that you may have intentionally rejected some of the visible satellites. The view uses polar coordinates:

- Center of concentric circles: site location

- From center to larger circle: elevation angle, from 90° to 0° respectively (each new circle represents 10° in elevation)

- The angular space between any two adjacent lines represents 30° in azimuth; graduated clockwise from 0 to 360°

DGNSS, SVs used, Azimuth/Elevation
At Site TutoRefRec : 310498.987 m, 259124.900 m, 13.251 m + 0 m
From oct 11, 1996, 12h18m26.4s To oct 11, 1996, 12h28m21.6s (UTC)
Ev Min: 5.0 deg; Curtain ignored

On oct 11, 1996, 12h18m31.2s

Sv	Az	Ev
4	279.4	66.9
7	218.3	12.7
14	89.3	28.3
16	283.6	33.6
18	171.3	84.2
19	165.0	21.4
24	311.9	29.2
29	55.8	37.8
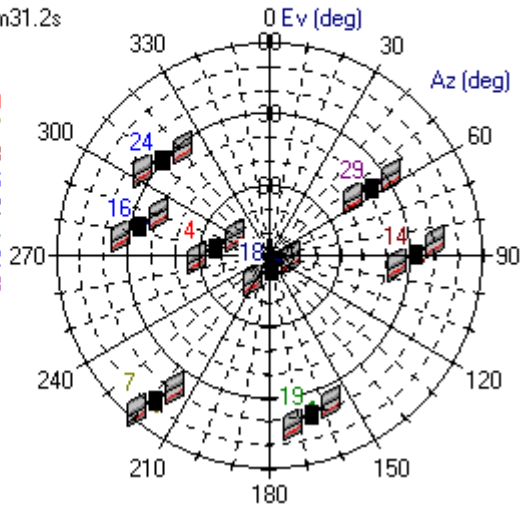
The Gps view subtitle provides the following information:

1st line : Name and coordinates of the reference site from which the constellation was observed.

2nd line : Non-masked observation time (From... : start date & time; To... : end date & time).

3rd line : Process Options, i.e. minimum elevation angle required, curtain involved/not involved in the process.

In its left-hand part, the GPS view provides the instantaneous values of azimuth and elevation for the satellites present in both observation records for the current position of the time tag (indicated just above).

On the polar diagram, orbits are shown for the satellites visible during all or part of the observations (SV No. indicated for each orbit plot). The presence of a satellite icon on an orbit plot means that the satellite is present for the current position of the time tag.

Running the DGNSS process
from within the DGNSS object

- From the menu bar and whatever the displayed view, select **Process** and then **Run**

    or

    Click 🖳 in the toolbar.

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- A message box appears providing information about the time required to complete the computation in progress. The following two steps are reported successively:

    - Computing...

    - Events processing...

On completion of the DGNSS process, the result is available on the **target view** (select this view, unless already done)

The DGNSS process needs to be re-run after you change a process option.

Mask editor

The mask editor is also made available from within the DGNSS Processor as additional masking may be needed if for example satellite data are found suspect in view of the results provided by the process.

Remember that satellites can be masked at two different levels:

- in the observation record
- or in process object.

Using the Mask editor

- From the menu bar, select **Process** and then **Options**
  or
  Position the mouse pointer anywhere on the active view and click with the right mouse button. In the shortcut menu that appears, choose **Options.**

- In the dialog box which then appears, click the **Mask** button. This causes the Mask editor box to appear.

- The Mask editor of a DGNSS process presents the following difference compared to the one available from within 3SPack Supervisor: masking is shown concurrently for both the observation record made at the surveyed trajectory's initial point or site and that made at the reference site:
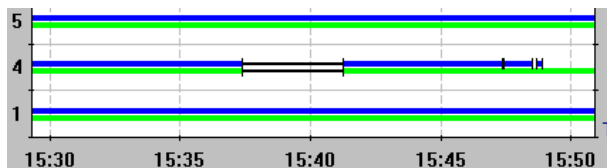
    In blue : Satellites in view during the observation record (masking, if any, shown as one or more black segment).

    In green : Satellites in view at reference site during observation record (masking, if any, shown as a black segment).

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Masking a satellite

Masking a satellite is achieved by drawing a rectangle over each period of time during which the satellite must be masked.

- Position the mouse pointer anywhere on the chart. The mouse pointer then looks like ⊹⊠

- Click with the right mouse button. The **Mask** shortcut menu pops up.

- Choose the **Mask** command from the menu.

- Draw a rectangle over the concerned blue and green line sections by dragging the mouse pointer along a virtual line representing a diagonal of that rectangle.

  You can define the two ends of the rectangle diagonal by referring to the information displayed at the foot of the dialog box (UTC time or point numbers; point numbers shown in blue). This information is continually updated as you move the cursor horizontally on the diagram.

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  10/11/96 13:22:58 (UTC + 01:00:00)

  Adjust the horizontal size of the rectangle so that it covers the period of time you want to mask and then release the mouse button. This causes the covered part to appear in black, meaning that the satellite is now masked for that particular period of time.

- Resume the above step as many times as necessary.

Unmasking a satellite

- Position the mouse pointer anywhere on the chart. The mouse pointer then looks like $\overline{\underset{}{\top}}\boxtimes$

- Click with the right mouse button. The **Mask** shortcut menu pops up.

- Choose the **Unmask** command from the menu.

- Draw a rectangle around the concerned line section (shown in black) and then release the mouse button. This causes the covered line section to re-appear in blue and green, meaning that the mask is now removed.

Zooming in

- Position the mouse pointer anywhere on the chart and click with the right mouse button.

- In the shortcut menu that appears, choose the **Zoom In** command. As a result the menu vanishes and the pointer looks like $\oplus$

- Position the pointer on the point around which you want to zoom in and click with the left mouse button. As a result the time chart is magnified around this point (and the clicked point stays immobile in reference to the pane).

- You can zoom in repeatedly by clicking several times with the left mouse button (until a bleep is heard).

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Zooming out

- Position the mouse pointer anywhere on the chart and click with the right mouse button.

- In the shortcut menu that appears, choose the **Zoom Out** command. As a result the menu vanishes and the pointer then looks like $^\mathcal{Q}$.

- Position the pointer along the time axis on the point from which you want to zoom out and click with the left mouse button. As a result the window displays a larger-scale view centered around the clicked point

- You can zoom out repeatedly by clicking several times with the left mouse button until you reach the view of the entire observation time span (denoted by a bleep).

Moving the view along the time axis

This function is active only on a magnified chart.

- Position the mouse pointer anywhere on the chart and click with the right mouse button.

- In the shortcut menu that appears, choose the **Panoramic** command. The menu vanishes and the pointer then looks like $^\text{\textcircled{}}$

- Depress the left mouse button and drag the pointer leftward or rightward, depending on where the particular period you want to view is. Note that the time scale will move as you drag the pointer. Release the mouse button once you have reached the desired time.

Using the movable time tag on the Target or Gps view

The time tag is defined as a particular time in the observation period. It is used to focus the **Target** or **Gps** view on that particular time, for example to know the exact number and positions of the visible satellites at that time. The time tag is shown as a green spot on the **Target** view.

You can move the time tag forward or backward within the limits of the observation, by a time step depending on the sampling interval of the observation. The default position of the time tag is the beginning of the observation.

The time tag may be moved in three different ways:

    1. Using the toolbar

- Click ▶▶ to take the time tag one step forward.
  or
- Click ◀◀ to take the time tag one step backward.

    2. Using the keyboard

- Depressing the "+" key (numeric keypad) causes the time tag to move one step forward.

- Depressing the "-" key (numeric keypad) causes the time tag to move one step backward.

- Holding down the "+" key (numeric keypad) causes the time tag to move one step forward repeatedly, at a fast rate, until you release the key.

- Holding down the "-" key (numeric keypad) causes the time tag to move one step backward repeatedly, at a fast rate, until you release the key.

7

3. Using the mouse

- Position the mouse pointer in the lower diagram (altitude vs. time) where you would like the time tag to be moved and click with the left-mouse button. This causes the time tag to be moved to the pointed location and the upper view to be updated accordingly.

Copying a plot to the *clipboard*

The clipboard is a temporary storage area for text and graphics that you are copying or moving from one location to another. The Clipboard is a common holding area among Windows applications.

After choosing the desired view in the active window:

- Click

    or

- From the menu bar, select **Edit** and then **Copy**

    or

- Position the mouse pointer anywhere on the plot, click the right mouse button. In the shortcut menu that appears, select **Copy**.

How to update your project document with the displayed view of your DGNSS object

If you are in *Separate DGNSS* environment

- In the menu bar, select the **File** menu and then the **Update** command.

If you are in *Embedded DGNSS* environment

- Updating is inherent since in this case you work directly on the process object of the project document.

How to quit DGNSS

If you are in *Embedded DGNSS* environment

- Simply click in the active window, outside the process object or press the **Esc** key. The project document is systematically updated with the last displayed view of the DGNSS process.

If you are in *Separate DGNSS* environment

- In the menu bar, select **File** and then the **Exit & Return to** command. The project document is systematically updated with the last displayed view of the DGNSS process.

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Menus and commands

File menu commands (in separate DGNSS)

Update...	Updates the process object in the open project
Print	Prints the active process
Print Preview	Displays the process as it would appear printed
Print Setup	Selects a printer and printer connection
Exit & Return to...	Exits DGNSS and returns to the open project

File menu (in embedded DGNSS)

New Project	Creates a new project
Open Project	Opens an existing project
Close Project	Closes the open project
Save Project	Saves the open project
Print	Prints the open project
Print Preview	Displays the project as it would appear printed
Page Setup	Defines the orientation and size of the printed document
Import GPS data	From GPS data stored in the Raw directory, creates observation records in the database
Exit	Exits 3SPack

Edit menu

Copy	Copies the process object to the *clipboard*
Dec time	Moves the time tag one step backward
Inc time	Moves the time tag one step forward
Operations	Edits the definition of the DGNSS process

View menu (in separate DGNSS)

Target	Displays the active DGNSS process in the Target view
Gps	Displays the active DGNSS process in the Gps view
Toolbar	Shows/hides the toolbar
Status bar	Shows/hides the status bar

View menu (in embedded DGNSS)

Target	Displays the active DGNSS object in the Target view
Gps	Displays the active DGNSS object in the Gps view
Toolbar	Shows/hides the toolbar

Process menu

Run	Runs the active DGNSS process
Options	Displays the options of the active DGNSS process

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Tools menu

(Exists in Embedded DGNSS only)
Same as 3SPack Supervisor'sTools menu, which can be
customized.

Window menu

New Window	Creates a new window
Cascade	Arranges all the open windows in cascade configuration
Tile	Arranges all the open windows in tile configuration
Arrange Icons	Places all the minimized windows side by side, from left to right, and from the lower part of the DGNSS window.
{...}	Causes this open window, if any, to become active

Help menu

Index	Displays the opening screen of Help
Using Help	Displays instructions for using Help
About DGNSS	Displays the version number of this application.

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8. Kinematic & LR Kinematic Processors

Introduction

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- The Kinematic & LR Kinematic Processors allow you to determine a trajectory solution (i.e. all the points making up a trajectory). At the end of the processing, the trajectory solution is routed to the 3SPack Supervisor database to be stored into the corresponding trajectory record, thus enriching this trajectory record with a new solution.

- The Kinematic & LR Kinematic Processors make use of a reference site to determine a trajectory. The condition required to perform a Kinematic or LR Kinematic process is that observations should have been performed concurrently at both the reference site and the roving unit. In addition, observations have to be dual-frequency for a LR Kinematic process. The coordinates of the reference site should be known with the best possible accuracy.

- A Kinematic or LR Kinematic process can be started in one of the following four initialization modes:

Known point : The kinematic processing is initialized with the coordinates of the initial point as defined by the user in the corresponding trajectory record.

Rapid Static : The kinematic processing is started assuming the observation record involved starts with a significant time interval of static observation.

Stamove : The kinematic processing is started assuming the height coordinate of the trajectory remains a constant.

OTF : The kinematic processing is started without any reference to an initial point (**OTF** means "**O**n **T**he **F**ly"). OTF is the default initialization mode.

During the process and in the event of a phase loss, OTF will be selected systematically for re-initialization purpose whatever the mode you chose before running the processing.

- The Kinematic and LR Kinematic Processors can produce two different views of a trajectory process:

    - The **Gps view** shows the GPS constellation for a particular moment during the observation which the user specifies using the **time tag**. The view takes into account the **intentionally deselected satellites**, if any, and/or the **user-set maskings**, if any.

    - The **Target view** shows a map of the trajectory.

        If markers are present in the observation, they are shown on the two views in the form of flag icons placed along the trajectory.

The chosen view will then be visible from the project document when you go back to this environment.

NOTES:

- Kinemat is said to be "embedded" (or "in-place activated") if it is run in the main window of 3SPack Supervisor. This is the case when you double-click a process object in an open project, or if you select this object and choose successively **Edit** (in the menu bar of Supervisor) then **Kinemat Object** then **Edit**.

- Kinemat is said to be "separate" or "open" if it is run in a separate main window. This is the case when you select a kinematic object and you choose successively **Edit** then **Kinemat Object** and **Open**.

8

How to choose a view for your (LR) kinematic object

- In the menu bar, select **View** and then the desired view:

  Target
  Gps
  or

  Position the mouse pointer anywhere on the active view and click with the right mouse button. In the shortcut menu that appears, choose the desired view:

  Target
  Gps

Changing the options of a (LR) kinematic process

> **WARNING!**
>
> Changing any of these options requires that you re-run the process to get the updated view of the object.

- From the menu bar, select **Process** and then **Options**

  or

  In the toolbar, click

  or

  Move the mouse pointer anywhere on the kinematic view, click with the right mouse button and, in the shortcut menu which then appears, select **Options**.

  A dialog box appears in which you can set the options of the process:

View	:	Choose a view for your kinematic process (**Target** or **Gps**)
Elev. min.	:	Choose the minimum elevation angle required of any satellite present in the observation record to be involved in the process
Use Ref curtain	:	Check this button if the curtain defined at the reference site must be involved in the processing

8

Mode : Choose one of the following initialization modes:

> Known point
> Rapid Static
> Stamove
> OTF

See definitions in the introduction to this section.

Mask button : Provides access to the **Mask editor** through which you can add masking moments on the set of usable satellites (prior masking can have been made on the observation record from the Supervisor environment).

Deselected Svs pane : If required, depress the button(s) corresponding to the satellite(s) present in the observation records that you want to deselect

All button : Click this button to deselect all the satellites present in the observation record

None button : Click this button to re-select all the deselected satellites

L1/L2 Iono Processing : Deals with the dual-frequency model used to correct iono errors (in LR Kinematic only). Choose one of the following three options:

> **On**: model always used
>
> **Off**: model never used
>
> **Automatic**: model used only for those points distant by more than 10 km from the reference station

Save As Defaults
           button : Click this button to save the current settings as the default options for the process

Restore Defaults
           button : Click this button to restore the default options previously defined for the process

OK button : Click this button if you agree with all the options shown in the dialog box

Cancel button : Click this button if you want to cancel the changes you have made in this dialog box

Target view

This view shows the result of your process. The trajectory is shown on two different diagrams (see in the next page):

- The top diagram shows a map of the trajectory (the axis system is graduated North vs. East)

- The bottom diagram shows an "altitude vs. time" view of the trajectory. The horizontal axis shows the non-masked observation time common to the roving unit and the reference station.

Note the presence of a green spot (**time tag**) on each of the two diagrams allowing you to establish a time relationship between the two diagrams.

Note also the possible presence of flags resulting from "markers" placed by the operator during the survey. When the Kinematic processor detects a marker in an observation record, an accurate determination of the position is performed for that particular time when the marker was inserted.

8

Depending on whether the operator was walking (dynamic) or immobile (static) at that time, the position solution will result from one of the following two processings:

- position interpolation (dynamic)
- position averaging (static)

The position solution is then saved as the solution of the site associated with the marker.

Note: A marker is assumed to be static if it is placed between a "Stop Moving Antenna" event and a "Start Moving Antenna" event (see **3SPack Supervisor** section, *using the event editor*).

Kinematic Target (TutoMob)
Trajectory : TutoMob, using obs. TutoMobRec
. : TutoRef (310504.059 m, 259127.139 m, 48.010 m + 0 m), using obs. TutoRefl
rom oct 11, 1996, 13h18m26.4s To oct 11, 1996, 13h28m21.6s (UTC + 01:00:0(
Mode : O.T.F.; Ev Min: 5.0 deg; Curtain ignored
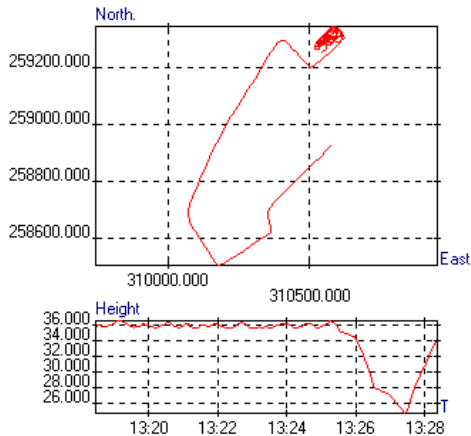
The Target view subtitle provides the following information:

1st line : Name of the trajectory under process, observation record involved in the kinematic process

2nd line : Name and coordinates of the reference site involved in the kinematic process, observation record from which the coordinates of this site were determined

3rd line : Non-masked observation time common to roving unit and reference station (From... : start date & time; To... : end date & time)

4th line : Process Options, i.e. initialization mode used, minimum elevation angle required, curtain involved/not involved in the process.

Gps view

This view shows the orbit of each visible satellite for the considered observation, taking into account the minimum elevation angle, the presence or absence of the curtain and the fact that you may have intentionally rejected some of the visible satellites. The view uses polar coordinates:

- Center of concentric circles: location of reference site

- From center to larger circle: elevation angle, from 90° to 0° respectively (each new circle represents 10° in elevation)

- The angular space between any two adjacent lines represents 30° in azimuth; graduated clockwise from 0 to 360°

Kinematic, SVs used, Azimuth/Elevation
At Site TutoRef : 310504.059 m, 259127.139 m, 48.010 m + 0 m
From oct 11, 1996, 13h18m26.4s To oct 11, 1996, 13h28m21.6s (UTC + 01:00:00)
Ev Min: 5.0 deg; Curtain ignored

The Gps view subtitle provides the following information:

> 1st line : Name and coordinates of the reference site from which the constellation was observed.

> 2nd line : Non-masked observation time common to roving unit and reference station (From... : start date & time; To... : end date & time).

> 3rd line : Process Options, i.e. minimum elevation angle required, curtain involved/not involved in the process.

In its left-hand part, the GPS view provides the instantaneous values of azimuth and elevation for the satellites present in the observation record for the current position of the time tag (indicated just above).

On the polar diagram, orbits are shown for the satellites visible during all or part of the observation (SV No. indicated for each orbit plot). The presence of a satellite icon on an orbit plot means that the satellite is present for the current position of the time tag.

Running the (LR) kinemat process from within the (LR) kinematic object

8

- From the menu bar and whatever the displayed view, select **Process** and then **Run**

  or

  Click 📲 in the toolbar.

- A message box appears providing information about the time required to complete the computation in progress. The following four steps are reported successively:

  - Locking...
  - Backward processing...
  - Forward processing...
  - Event processing...

  On completion of the kinematic process, the result of the trajectory is available on the **target view** (select this view, unless already done)

  The kinematic process needs to be re-run after you change a process option.

Mask editor

The mask editor is also made available from within the (LR) Kinematic Processor as additional masking may be needed if for example satellite data are found suspect in view of the results provided by the process.

Remember that satellites can be masked at two different levels:

- in the observation record
- or in process object.

Using the Mask editor

- From the menu bar, select **Process** and then **Options**

  or

  Position the mouse pointer anywhere on the active view
  and click with the right mouse button. In the shortcut menu
  that appears, choose **Options.**

- In the dialog box which then appears, click the **Mask**
  button. This causes the Mask editor box to appear. Note
  that the content of this box is exactly the same as the one
  you would get from 3SPack Supervisor for the considered
  process object.

  Compared to those of other processors, the Mask editor of
  a (LR) kinematic process presents the following difference:
  masking is shown concurrently for both the observation
  record made at the trajectory's initial point and that made
  at the reference site:
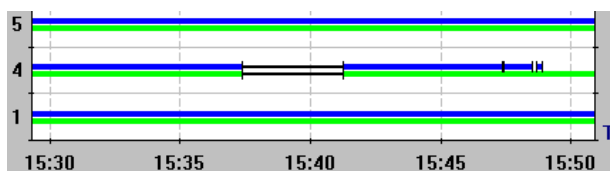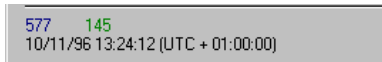
  In blue : Satellites in view from the start point of the
  trajectory during observation record
  (masking, if any, shown as a black
  segment).

  In green : Satellites in view at reference site during
  observation record (masking, if any, shown
  as a black segment).

Masking a satellite

Masking a satellite is achieved by drawing a rectangle over each period of time during which the satellite must be masked.

8

- Position the mouse pointer anywhere on the chart. The mouse pointer then looks like $\overset{\boxtimes}{+}$

- Click with the right mouse button. The **Mask** shortcut menu pops up.

- Choose the **Mask** command from the menu.

- Draw a rectangle over the concerned line section by dragging the mouse pointer along a virtual line representing a diagonal of that rectangle.

- You can define the two ends of the diagonal by referring to the information displayed at the foot of the dialog box (UTC time or point numbers; point numbers shown in blue for the roving unit, in green for the reference station) This information is continually updated as you move the cursor horizontally on the diagram.

> 577   145
> 10/11/96 13:24:12 (UTC + 01:00:00)

- Adjust the horizontal size of the rectangle so that it covers the period of time, or the range of point numbers, you would like to mask and then release the mouse button. This causes the covered line section to appear in black, meaning that the satellite is now masked for that particular period of time. Note that the mask is equally applied to both the roving unit and the reference site.

- Resume the above step as many times as necessary.

Unmasking a satellite

- Position the mouse pointer anywhere on the chart. The mouse pointer then looks like $\boxtimes$

- Click with the right mouse button. The **Mask** shortcut menu pops up.

- Choose the **Unmask** command from the menu.

- Draw a rectangle around the concerned line section (shown in black) and then release the mouse button. This causes the covered line section to re-appear in blue and green, meaning that the mask is now removed.

Zooming in

- Position the mouse pointer anywhere on the chart and click with the right mouse button.

- In the shortcut menu that appears, choose the **Zoom In** command. As a result the menu vanishes and the pointer looks like $\oplus$

- Position the pointer on the point around which you want to zoom in and click with the left mouse button. As a result the time chart is magnified around this point (and the clicked point stays immobile in reference to the pane).

- You can zoom in repeatedly by clicking several times with the left mouse button (until a bleep is heard).

Zooming out

- Position the mouse pointer anywhere on the chart and click with the right mouse button.

- In the shortcut menu that appears, choose the **Zoom Out** command. As a result the menu vanishes and the pointer then looks like $^\mathbb{Q}$.

- Position the pointer along the time axis on the point from which you want to zoom out and click with the left mouse button. As a result the window displays a larger-scale view centered around the clicked point

- You can zoom out repeatedly by clicking several times with the left mouse button until you reach the view of the entire observation time span (denoted by a bleep).

Moving the view along the time axis

This function is active only on a magnified chart.

- Position the mouse pointer anywhere on the chart and click with the right mouse button.

- In the shortcut menu that appears, choose the **Panoramic** command. The menu vanishes and the pointer then looks like $^\math{m}$

- Depress the left mouse button and drag the pointer leftward or rightward, depending on where the particular period you want to view is. Note that the time scale will move as you drag the pointer. Release the mouse button once you have reached the desired time.

8

Using the movable time tag on the Target or Gps view

The time tag is defined as a particular time in the observation period. It is used to focus the **Target** or **Gps** view on that particular time, for example to know the exact number and positions of the visible satellites at that time. The time tag is shown as a green spot on the **Target** view.

You can move the time tag forward or backward within the limits of the observation, by a time step depending on the sampling interval of the observation. The default position of the time tag is the beginning of the observation.

The time tag may be moved in three different ways:

1. Using the toolbar

   - Click to take the time tag one step forward.
     or
   - Click to take the time tag one step backward.

2. Using the keyboard

   - Depressing the "+" key (numeric keypad) causes the time tag to move one step forward.
   - Depressing the "-" key (numeric keypad) causes the time tag to move one step backward.
   - Holding down the "+" key (numeric keypad) causes the time tag to move one step forward repeatedly, at a fast rate, until you release the key.
   - Holding down the "-" key (numeric keypad) causes the time tag to move one step backward repeatedly, at a fast rate, until you release the key.

3. Using the mouse

- Position the mouse pointer in the lower diagram (altitude vs. time) where you would like the time tag to be moved and click with the left-mouse button. This causes the time tag to be moved to the pointed location and the upper view to be updated accordingly.

8

Copying a plot to the *clipboard*

The clipboard is a temporary storage area for text and graphics that you are copying or moving from one location to another. The Clipboard is a common holding area among Windows applications.

After choosing the desired view in the active window:

- Click

   or

- From the menu bar, select **Edit** and then **Copy**

   or

- Position the mouse pointer anywhere on the plot, click the right mouse button. In the shortcut menu that appears, select **Copy**.

8

Kinematic & LR Kinematic Processors
How to update your project document with the displayed view of your kinematic object

How to update your project document with the displayed view of your kinematic object

If you are in *Separate Kinemat* environment

- In the menu bar, select the **File** menu and then the **Update** command.

If you are in *Embedded Kinemat* environment

- Updating is inherent since in this case you work directly on the process object of the project document.

How to quit Kinemat

If you are in *Embedded Kinemat* environment

- Simply click in the active window, outside the process object or press the **Esc** key. The project document is systematically updated with the last displayed view of the (LR) kinematic process.

If you are in *Separate Kinemat* environment

- In the menu bar, select **File** and then the **Exit & Return to** command. The project document is systematically updated with the last displayed view of the (LR) kinematic process.

Menus and commands

8

File menu commands (in separate Kinemat)

Update...	Updates the process object in the open project
Print	Prints the active process
Print Preview	Displays the process as it would appear printed
Print Setup	Selects a printer and printer connection
Exit & Return to...	Exits Kinemat and returns to the open project

File menu (in embedded Kinemat)

New Project	Creates a new project
Open Project	Opens an existing project
Close Project	Closes the open project
Save Project	Saves the open project
Print	Prints the open project
Print Preview	Displays the project as it would appear printed
Page Setup	Defines the orientation and size of the printed document
Import GPS data	From GPS data stored in the Raw directory, creates observation records in the 3SPack Supervisor database
Exit	Exits 3SPack

Edit menu

Copy	Copies the process object to the *clipboard*
Dec time	Moves the time tag one step backward
Inc time	Moves the time tag one step forward
Operations	Edits the definition of the (LR) kinematic process

View menu (in separate Kinemat)

Target	Displays the active process in the Target view
Gps	Displays the active process in the Gps view
Toolbar	Shows/hides the toolbar
Status bar	Shows/hides the status bar

View menu (in embedded Kinemat)

Target	Displays the active object in the Target view
Gps	Displays the active object in the Gps view
Toolbar	Shows/hides the toolbar

Process menu

Run	Runs the active (LR) kinematic process
Options	Displays the options of the active process

8

Tools menu

(Exists in Embedded Kinemat only)
Same as 3SPack Supervisor'sTools menu, which can be customized.

Window menu

New Window	Creates a new window
Cascade	Arranges all the open windows in cascade configuration
Tile	Arranges all the open windows in tile configuration
Arrange Icons	Places all the minimized windows side by side, from left to right, and from the lower part of the Kinemat window.
{...}	Causes this open window, if any, to become active

Help menu

Index	Displays the opening screen of Help
Using Help	Displays instructions for using Help
About Kinemat	Displays the version number of this application. ♣

9. Rapid Static & LR Rapid Static processors

Introduction

9

- The Rapid Static & LR Rapid Static processors allow you to determine a Site solution. At the end of the processing, the Site solution is routed to the database to be stored into the corresponding record, thus enriching this record with a new solution.

- The Rapid Static & LR Rapid Static processors make use of a reference site to determine the surveyed site. The condition required to perform a (LR) Rapid Static process is that observations should have been performed concurrently at both the reference site and the surveyed site. For an LR Rapid Static process, observations have to be dual-frequency. The coordinates of the reference site should be known with the best possible accuracy.

- Rapid Static can produce two different views for the process:

  - The **Gps view** shows the GPS constellation for a particular moment during the observation which the user specifies using the **time tag**. The view takes into account the **intentionally deselected satellites**, if any, and/or the **user-set maskings**, if any.

  - The **Target view** shows a map of the site.

  The chosen view will then be visible from the project document when you go back to this environment.

NOTES:

- Rapid Static is said to be "embedded" (or "in-place activated") if it is run in the main window of 3SPack Supervisor. This is the case when you double-click a process object in an open project, or if you select this object and choose successively **Edit** (in the menu bar of 3SPack Supervisor) then **Static Object** then **Edit**.

- Rapid Static is said to be "separate" or "open" if it is run in a separate main window. This is the case when you select a static object and you choose successively **Edit** then **Static Object** and **Open**.

How to choose a view for your (LR) Rapid Static object

- In the menu bar, select **View** and then the desired view:

    Target
    Gps
    or

    Position the mouse pointer anywhere on the active view and click with the right mouse button. In the shortcut menu that appears, choose the desired view:

    Target
    Gps

Changing the options of a (LR) Rapid Static process

9

WARNING!

Changing any of these options requires that you re-run the process to get the updated view of the object.

- From the menu bar, select **Process** and then **Options**

  or

  In the toolbar, click 📰

  or

  Move the mouse pointer anywhere on the static view, click with the right mouse button and, in the shortcut menu which then appears, select **Options**.

  A dialog box appears in which you can set the options of the process:

View :	Choose a view for your static process (**Target** or **Gps**)
Elev. min. :	Choose the minimum elevation angle required of any satellite present in the observation record to be involved in the process
Use "Site from" curtain :	Check this button if the curtain defined at the reference site must be involved in the processing

Use "Site to" curtain : Check this button if the curtain defined
at the surveyed site must be involved in
the processing

Mask button : Provides access to the **Mask editor**
through which you can add masking
moments on the set of usable satellites
(prior masking can have been made on
the observation record from the 3SPack
Supervisor environment).

Deselected Svs pane   If required, depress the button(s)
corresponding to the satellite(s) present
in the observation records that you
want to deselect

All button : Click this button to deselect all the
satellites present in the observation
record

None button : Click this button to re-select all the
deselected satellites

L1/L2 Iono Processing : Deals with the dual-frequency model
used to correct iono errors (in LR Rapid
Static only). Choose one of the
following three options:

On: model always used

Off: model never used

Automatic: model used only for
baselines exceeding 10 km in length

Save As Defaults button : Click this button to save the current
settings as the default options for the
process

Restore Defaults button : Click this button to restore the default options previously defined for the process

OK button : Click this button if you agree with all the options shown in the dialog box

Cancel button : Click this button if you want to cancel the changes you have made in this dialog box.

9

Target view

This view shows a map of the site (the axis system is graduated North vs. East), centered around the average solution of the site, as deduced from all the points issued from the process.

The 95% dispersion ellipse is shown in green, centered around the site solution (location denoted by a flag). The X-Y-Z coordinates of the solution, the baseline and the E sd, N sd and H sd standard deviations, are indicated with yellow background.

3SPack automatically chooses the appropriate scale for the map, depending on the size of the dispersion ellipse. When the 1:1 scale is used, it is indicated in the right-lower part of the map, with green background.

The 1:1 scale is the largest scale possible.
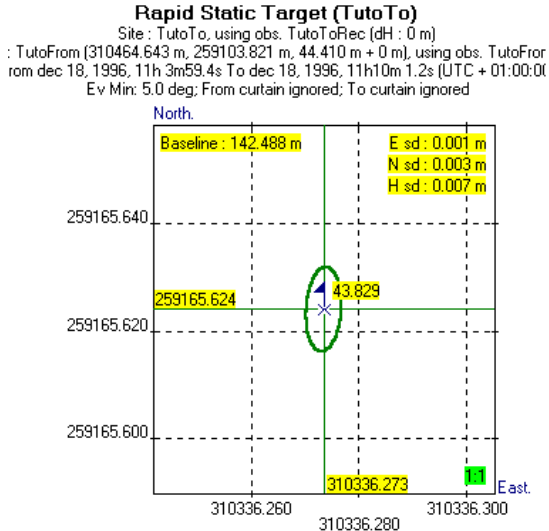
Rapid Static Target (TutoTo)
Site : TutoTo, using obs. TutoToRec (dH : 0 m)
: TutoFrom (310464.643 m, 259103.821 m, 44.410 m + 0 m), using obs. TutoFror
rom dec 18, 1996, 11h 3m59.4s To dec 18, 1996, 11h10m 1.2s (UTC + 01:00:0(
Ev Min: 5.0 deg; From curtain ignored; To curtain ignored

The Target view subtitle provides the following information:

1st line	:	Name of the site under process, observation record involved in the Rapid Static process.
2nd line	:	Name and coordinates of the reference site involved in the Rapid Static process, observation record from which the coordinates of this site were determined.
3rd line	:	Non-masked observation time common to roving unit and reference station (From... : start date & time; To... : end date & time).
4th line	:	Process Options, i.e. minimum elevation angle required, curtains involved/not involved in the process.

Gps view

This view shows the orbit of each visible satellite for the considered observation, taking into account the minimum elevation angle, the presence or absence of the curtain(s) and the fact that you may have intentionally rejected some of the visible satellites. The view uses polar coordinates:

- Center of concentric circles: location of reference site

- From center to larger circle: elevation angle, from 90° to 0° respectively (each new circle represents 10° in elevation)

- The angular space between any two adjacent lines represents 30° in azimuth; graduated clockwise from 0 to 360°

Rapid Static, SVs used, Azimuth/Elevation
At Site TutoFrom : 310464.643 m, 259103.821 m, 44.410 m + 0 m
From dec 18, 1996, 11h 3m59.4s To dec 18, 1996, 11h10m 1.2s (UTC + 01:00:00)
Ev Min: 5.0 deg; Curtain ignored
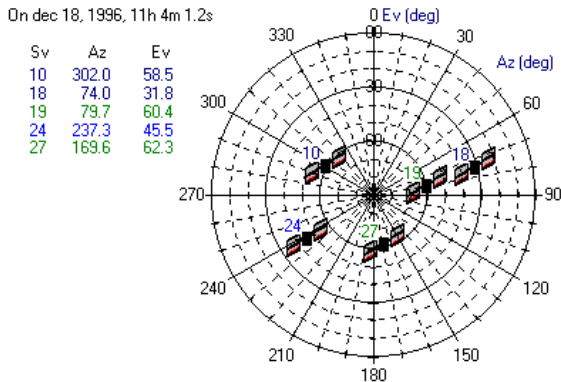
On dec 18, 1996, 11h 4m 1.2s

Sv	Az	Ev
10	302.0	58.5
18	74.0	31.8
19	79.7	60.4
24	237.3	45.5
27	169.6	62.3

The Gps view subtitle provides the following information:

1st line	:	Name and coordinates of the surveyed site from which the constellation was observed.
2nd line	:	Non-masked observation time common to roving unit and reference station (From... : start date & time; To... : end date & time).
3rd line	:	Process Options, i.e. minimum elevation angle required, curtain involved/not involved in the process.

In its left-hand part, the GPS view provides the instantaneous values of azimuth and elevation for the satellites present in the observation record for the current position of the time tag (indicated just above).

On the polar diagram, orbits are shown for the satellites visible during all or part of the observation (SV No. indicated for each orbit plot). The presence of a satellite icon on an orbit plot means that the satellite is present for the current position of the time tag.

Running the (LR) Rapid Static process from within the Static object

- From the menu bar and whatever the displayed view, select **Process** and then **Run**

  or

  Click 🖽 in the toolbar.

- A message box appears providing information about the time required to complete the computation in progress. The following three steps are reported successively:

  - Locking...

  - Quality Control... (possibly)

  - Computing...

  - Event processing...

NOTE: The Quality Control message will appear only if the processor has determined several probable integer sets.

On completion of the Rapid Static process, the result of the site is available on the **target view** (select this view, unless already done)

The Rapid Static process needs to be re-run whenever you change a process option.

9

As you probably know, the present solar activity, which has increased during the last months, will reach a maximum in the early year 2000. As solar activity has a direct influence on the ionospheric layer, which introduces propagation delays for L1 and L2, ambiguity resolution will become more difficult both for single- and dual-frequency systems.

The operational consequences of this phenomenon is a longer initialisation phase in real-time systems and, in post-processing systems, the need for accurately choosing the duration of recording as a function of the baseline length.

To be on the safe side, we give you hereunder some field guidelines which should avoid potential future problems when post-processing data with the (LR) Rapid Static processor:

Recording Rate	
Single-frequency	**Dual-frequency**
6 seconds max. (3 seconds recommended)	

Recording Duration	
Single-frequency	**Dual-frequency**
10 minutes + 1.5 minutes per km	5 minutes + 0.5 minutes per km

Please notice that all suppliers of GPS equipment will suffer from this situation while DSNP will still keep its technical advantage in terms of high initialisation speed and reliability, even if these features will be slightly degraded compared to what we experience now.

Mask editor

The mask editor is also made available from within the Static Processor as additional masking may be needed if for example satellite data are found suspect in view of the results provided by the process.

Remember that satellites can be masked at two different levels:

- in the observation record
- or in process object.

Using the Mask editor

9

- From the menu bar, select **Process** and then **Options**

    or

    Position the mouse pointer anywhere on the active view and click with the right mouse button. In the shortcut menu that appears, choose **Options.**

- In the dialog box which then appears, click the **Mask** button. This causes the Mask editor box to appear.

    Compared to that of Supervisor, the Mask editor of a Rapid Static process presents the following difference: masking is shown concurrently for both the observation record made at the surveyed site and that made at the reference site:
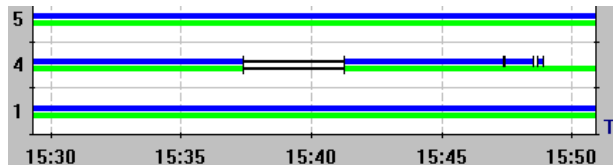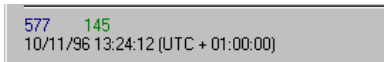
In blue : Satellites in view at the surveyed site during observation record (masking, if any, shown as black segment).

In green : Satellites in view at reference site during observation record (masking, if any, shown as black segment).

Masking a satellite

Masking a satellite is achieved by drawing a rectangle over each period of time during which the satellite must be masked.

- Position the mouse pointer anywhere on the chart. The mouse pointer then looks like

- Click with the right mouse button. The **Mask** shortcut menu pops up.

- Choose the **Mask** command from the menu.

- Draw a rectangle over the concerned line section by dragging the mouse pointer along a virtual line representing a diagonal of that rectangle.

- You can define the two ends of the diagonal by referring to the information displayed at the foot of the dialog box (UTC time or point numbers; point numbers shown in blue for the roving unit, in green for the reference station) This information is continually updated as you move the cursor horizontally on the diagram.

    577   145
    10/11/96 13:24:12 (UTC + 01:00:00)

    Adjust the horizontal size of the rectangle so that it covers the period of time you want to mask and then release the mouse button. This causes the covered line section to appear in black, meaning that the satellite is now masked for that particular period of time. Note that the mask is equally applied to both the surveyed site and the reference site.

- Resume the above step as many times as necessary.

Unmasking a satellite

- Position the mouse pointer anywhere on the chart. The mouse pointer then looks like ⌖

- Click with the right mouse button. The **Mask** shortcut menu pops up.

- Choose the **Unmask** command from the menu.

- Draw a rectangle around the concerned line section (shown in black) and then release the mouse button. This causes the covered line section to re-appear in blue and green, meaning that the mask is now removed.

9

Zooming in

- Position the mouse pointer anywhere on the chart and click with the right mouse button.

- In the shortcut menu that appears, choose the **Zoom In** command. As a result the menu vanishes and the pointer looks like ⊕

- Position the pointer on the point around which you want to zoom in and click with the left mouse button. As a result the time chart is magnified around this point (and the clicked point stays immobile in reference to the pane).

- You can zoom in repeatedly by clicking several times with the left mouse button (until a bleep is heard).

Zooming out

- Position the mouse pointer anywhere on the chart and click with the right mouse button.

- In the shortcut menu that appears, choose the **Zoom Out** command. As a result the menu vanishes and the pointer then looks like Q .

- Position the pointer along the time axis on the point from which you want to zoom out and click with the left mouse button. As a result the window displays a larger-scale view centered around the clicked point

- You can zoom out repeatedly by clicking several times with the left mouse button until you reach the view of the entire observation time span (denoted by a bleep).

Moving the view along the time axis

This function is active only on a magnified chart.

- Position the mouse pointer anywhere on the chart and click with the right mouse button.

- In the shortcut menu that appears, choose the **Panoramic** command. The menu vanishes and the pointer then looks like $\overset{\text{♙}}{\text{🖑}}$

- Depress the left mouse button and drag the pointer leftward or rightward, depending on where the particular period you want to view is. Note that the time scale will move as you drag the pointer. Release the mouse button once you have reached the desired time.

Using the movable time tag on the Gps view

The time tag is defined as a particular time in the observation period. It is used to focus the **Gps** view on that particular time, for example to know the exact number and positions of the visible satellites at that time. The exact time-position of the tag is indicated in the left-upper part of the view.

You can move the time tag forward or backward within the limits of the observation, by a time step depending on the sampling interval of the observation. The default position of the time tag is the beginning of the observation.

The time tag may be moved in two different ways:

1. Using the toolbar

- Click ▶▶ to take the time tag one step forward.

  or

- Click ◀◀ to take the time tag one step backward.

2. Using the keyboard

- Depressing the "+" key (numeric keypad) causes the time tag to move one step forward.

- Depressing the "-" key (numeric keypad) causes the time tag to move one step backward.

- Holding down the "+" key (numeric keypad) causes the time tag to move one step forward repeatedly, at a fast rate, until you release the key.

- Holding down the "-" key (numeric keypad) causes the time tag to move one step backward repeatedly, at a fast rate, until you release the key.

9

Copying a plot to the *clipboard*

The clipboard is a temporary storage area for text and graphics that you are copying or moving from one location to another. The Clipboard is a common holding area among Windows applications.

9

Rapid Static & LR Rapid Static processors
How to update your project document with the displayed view of your Static object

After choosing the desired view in the active window:

- Click

  or

- From the menu bar, select **Edit** and then **Copy**

  or

- Position the mouse pointer anywhere on the plot, click the right mouse button. In the shortcut menu that appears, select **Copy**.

How to update your project document with the displayed view of your Static object

If you are in *Separate Rapid Static* environment

- In the menu bar, select the **File** menu and then the **Update** command.

If you are in *Embedded Rapid Static* environment

- Updating is inherent since in this case you work directly on the process object of the project document.

How to quit Rapid Static

If you are in *Embedded Rapid Static* environment

- Simply click in the active window, outside the process object or press the **Esc** key. The project document is systematically updated with the last displayed view of the static process.

If you are in *Separate Rapid Static* environment

-   In the menu bar, select **File** and then the **Exit & Return to** command. The project document is systematically updated with the last displayed view of the Rapid Static process.

Menus and commands

9

File menu commands (in separate Rapid Static)

Update...	Updates the process object in the open project
Print	Prints the active process
Print Preview	Displays the process as it would appear printed
Print Setup	Selects a printer and printer connection
Exit & Return to...	Exits Static and returns to the open project

File menu (in embedded Rapid Static)

New Project	Creates a new project
Open Project	Opens an existing project
Close Project	Closes the open project
Save Project	Saves the open project
Print	Prints the open project
Print Preview	Displays the project as it would appear printed

Page Setup	Defines the orientation and size of the printed document
Import GPS data	From GPS data stored in the Raw directory, creates observation records in the database
Unprotect component	Allows you to activate an application you buy later (password provided by DSNP)
Exit	Exits 3SPack

Edit menu

Copy	Copies the process object to the *clipboard*
Dec time	Moves the time tag one step backward
Inc time	Moves the time tag one step forward
Operations	Edits the definition of the static process

View menu (in separate Rapid Static)

Target	Displays the active static process in the Target view
Gps	Displays the active static process in the Gps view
Toolbar	Shows/hides the toolbar
Status bar	Shows/hides the status bar

View menu (in embedded Rapid Static)

Target	Displays the active static object in the Target view
Gps	Displays the active static object in the Gps view
Toolbar	Shows/hides the toolbar

9

Process menu

Run	Runs the active Rapid Static process
Options	Displays the options of the active static process

Tools menu

(Exists in Embedded Rapid Static only)
Same as 3SPack Supervisor'sTools menu, which can be customized.

Window menu

New Window	Creates a new window
Cascade	Arranges all the open windows in cascade configuration
Tile	Arranges all the open windows in tile configuration
Arrange Icons	Places all the minimized windows side by side, from left to right, and from the lower part of the Static window.
{...}	Causes this window, if any, to become active

Help menu

Index	Displays the opening screen of Help
Using Help	Displays instructions for using Help
About Rapid Static	Displays the version number of this application. ♣

10. Transfo

Introduction

The TRANSFO module is used to convert coordinates from a format and Datum to another format and Datum. The formats handled by TRANSFO are:

- Latitude - Longitude - Height,
- X - Y - Z : Earth-Centered, Earth-Fixed,
- NEH : Projected Northing, Easting and Height.

10

The TRANSFO window displays two presentations of the same position: on the left is the position to be transformed ('From' coordinates) and on the right is the result of the transformation by TRANSFO ('To' coordinates). You only need to select the 'From' system and the 'To' system from the combo boxes and enter the original position into the left-hand text boxes.

The position to be transformed can be entered manually (by typing it into the text boxes) or pasted from another WINDOWS application. The position (whether original or transformed) can be copied to another WINDOWS application. The list of positions in the TRANSFO window can be saved to a disk so that it can be loaded from it at a later date.
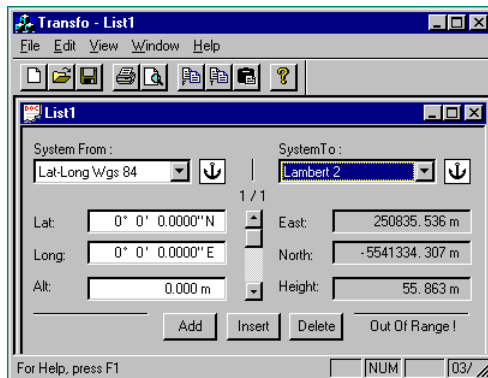
Entering one or more positions to be transformed

After you open the TRANSFO application, the TRANSFO main window displays with a transformation list window open in it. You can use each window's title bar and/or control menu to move and/or resize the windows.

Prior to entering the position to be transformed, you must select the initial coordinate system from the System From combo box.

There are three ways of entering a position to be transformed:

- Typing
- Pasting
- Drag and Drop

You can generate a list of positions using the following buttons:

Add   Enters a **blank position** at the end of the list.

Insert   Enters a **blank position** between the displayed position and the preceding one.

Delete   Removes the displayed position from the list.

If you entered two or more positions into the System From boxes, use the scroll bar to browse through the list and view the desired position.

Blank position

Blank entry fields on **Lat-Lon WGS 84** system:

Lat   0° 0' 0.0000" N

Lon   0° 0' 0.0000" E

Alt   0.000 m

Typing a position

To type a position into the **From** entry boxes,

- click in the desired entry field

- type the desired value.

The coordinates are automatically converted (in the **System To** boxes) as you type new values.

Pasting a position

You can import a copy of a position from the clipboard to the active transformation list. (The position must be placed beforehand in the clipboard, e.g. by selecting the Copy Pos From or Copy Pos To command from the Edit menu or from the pop-up menu accessible with the mouse right button).

10

Pasting a position into TRANSFO will replace the position previously displayed in the active transformation list. Use the scrollbar to select a position you do not mind erasing, or use the Add or Insert button to select a **blank position** in the list.

The initial system selected in the **System From** combo box must be in the same format as the position in the clipboard.

Once you are ready to paste a position, do one of the following :

- From the **Edit** menu, select **Past Pos**

  or

- Click the shortcut button

  or

- With the mouse right button, click in the Transformation list window. In the menu that pops up, select **Past Pos**.

Drag and Drop

You can copy a position from a list window to the entry boxes of another list window using the Drag and Drop function as follows :

- Arrange the two list windows so both are visible simultaneously.

- Be sure the system selected for the entry boxes is in the same format as the position to be copied into them.

- In the list window containing the position to be copied, click the anchor to the right of the System combo box specifying the system on which the position is expressed.

- Hold down the mouse button. The mouse pointer should change to a "No Parking" traffic sign.

- Move the mouse pointer to the entry boxes into which you wish to copy the position, until the mouse pointer changes to a + sighting pointer.

- Release the mouse button. As a result the position is copied into the entry boxes.

You open transformation list windows using the **New** or **Open** command in the **File** menu, or the **New Window** command in the **Window** menu. Note that copying a position into a transformation list will replace the position previously displayed in it. Use the scrollbar to select a position you do not mind erasing, or use the Add or Insert button to select a **blank position** in the list.

Performing coordinate transformations

After you open the TRANSFO application, the TRANSFO main window displays with a transformation list window open in it. You can use each window's title bar and/or control menu to move and/or resize the windows.

To convert a position from a coordinate system to another, do the following:

- Select the initial coordinate system from the System From combo box.

- Type or paste or drop the initial coordinates into the three 'From' coordinates entry boxes.

- Select the target coordinate system from the System To combo box. TRANSFO automatically computes the transformation and displays the transformed coordinates in the System To coordinate boxes.

10

If you entered two or more positions into the System From boxes, use the scroll bar to browse through the list and view the desired position.

Saving or copying positions

You can copy the original or transformed position to another WINDOWS application, using the **Copy Pos_From** or **Copy Pos_To** command in the **Edit** menu.

You can save a position list opened in the TRANSFO main window, using the **Save** or **Save As** command in the **File** menu.

Save (File menu)

Use this command to save the active transformation list to its current name and directory. When you save a transformation list for the first time, TRANSFO displays the **Save As dialog box** so you can name your transformation list. If you want to change the name and directory of an existing transformation list before you save it, choose the **Save As command**.

- **Shortcuts**

  Toolbar:　　　🖫

  Keys:　　　CTRL+S

Save As (File menu)

Use this command to save and name the active transformation list. TRANSFO displays the **Save As dialog box** so you can name your transformation list.

To save a transformation list with its existing name and directory, use the **Save command**.

File Save As dialog box

The following options allow you to specify the name and location of the file you're about to save:

Save in : Select the drive and directory in which you want to store the transformation list. Use the buttons to the right to move up in the directory tree (Up One Level button) and/or to create a new folder (Create New Folder button) if required. To select a directory, double-click the desired directory name in the Save In box.

File Name : Type a new file name to save a transformation list with a different name. A filename can contain up to eight characters and an extension of up to three characters. TRANSFO adds the extension you specify in the Save As Type box.

Save as type : Select the type of file to which you want to store the transformation list:

Point list file (*.pts)

All file types

10

Copy Pos_From (Edit menu)

Use this command to copy the coordinates displayed in the "From" boxes onto the clipboard. This command is unavailable if there is no transformation list currently open.

Copying data to the clipboard replaces the contents previously stored there.

• **Shortcuts**

Mouse   Click in the list window with the right-hand button and select Copy Pos From in the menu that pops up.

Toolbar :

Copy Pos_To (Edit menu)

Use this command to copy the coordinates displayed in the "To" boxes onto the clipboard. This command is unavailable if there is no transformation list currently open.

Copying data to the clipboard replaces the contents previously stored there.

- **Shortcuts**

    Mouse   Click in the list window with the right-hand button and select Copy Pos To in the menu that pops up.

    Toolbar :

Opening a position list

To open a position transformation list, use the **New** or **Open** or **1, 2...** (Recent File) command in the **File** menu or **New** command in the **Window** menu

New (File menu)

Use this command to create a new transformation list in TRANSFO.

You can open an existing transformation list with the **Open** command.

Use the Window menu to switch among the multiple open transformation lists. **Window 1, 2,** ... command.

- **Shortcuts**

    Toolbar:

    Keys: CTRL+N

Open (File menu)

Use this command to open an existing transformation list in a new window. The following options allow you to specify which file to open:

Look in : Select the drive and directory in which TRANSFO stores the file that you want to open. Use the button to the right (Up One Level button) to move up in the directory tree if required. To select a directory, double-click the desired directory name in the Look In box.

File Name : Type or select the filename you want to open. This box lists files with the extension you select in the Files of Type box.

Files of Type : Select the type of file you want to open:

Point list file (*.pts)

All file types

You can open multiple transformation lists at once. Use the Window menu to switch among the multiple open transformation lists. See Window 1, 2, ... command.

You can create new transformation lists with the New command.

10

- **Shortcuts**

  Toolbar : 🖼️

  Keys : CTRL+O

1, 2, 3, 4 (File menu)

Use the numbers and filenames listed at the bottom of the File menu to open one of the last four transformation lists you saved. Choose the number that corresponds with the transformation list you want to open.

New (Window menu)

Use this command to open a new window with the same contents as the active window. You can open multiple transformation list windows to display different parts or views of a transformation list at the same time. If you change the contents in one window, all other windows containing the same transformation list reflect those changes. When you open a new window, it becomes the active window and is displayed on top of all other open windows.

Importing/exporting positions

Importing a points file

- **Import conditions**

    - The format of the imported file must be compatible with the selection you make in the **System From** combo box. **Transfo** will only check the type of coordinates (geocentric, projected or geographic) provided in the file. If this requirement is not met, no point will be imported and an "Empty List" message will appear in the **Transfo** window.

        As **Transfo** only checks the *type* of coordinates provided in the file, it is the user's responsibility to insure that the coordinates of the imported points are effectively expressed in the same system as the one specified in the **System From** field.

    - If the coordinates of the imported positions are expressed in two different ways (geographic + projected for example), then Transfo will import only the ones compatible with the selected input system (System From)

    - All parameters accompanying the coordinates of a point and not processed by **Transfo** will be kept unchanged as being part of the expression of the point.

    - If a position list is open when you import a file, **Transfo** will close the open list before showing the imported list.

10

- **Import procedure**

    - From the **Edit** menu, select the **Import Pos From** command. A dialog box opens showing the content of the Points directory (typically points files in user format)

    - Select a file from this directory (or from another one) and click the **Open** button. A new dialog opens asking you to specify the type of user format under which this file was saved

- Select the format type and then click the **Go** button to start importing all the points contained in the file. Unless you have specified a wrong format, the **Transfo** window will then show the coordinates of the first of these points (expressed both in the selected input and output systems). The number of imported points appears on top of the vertical scroll bar.

Exporting positions to a file

- **Export conditions**

    - The format of the file resulting from an export operation must be compatible with the selection you made in the **System To** combo box (same type of coordinates: geocentric, projected or geographic). If this requirement is not met, no point will be exported.

    - All parameters accompanying the coordinates of a previously imported point and not processed by **Transfo** will be exported unchanged.

- **Export procedure**

    - From the **Edit** menu, select the **Export Pos To** command. A dialog box opens showing the content of the Points directory

    - In the **File Name** text box, specify a name for the file to be exported (extension is "usr" by default) and then click the **Save** button. A new dialog opens asking you to specify the type of user format under which the file should be saved.

    - Select a format type compatible with the **System To** selection and then click the **Go** button to run the export operation.

Accessing the Transformation Parameters

If you wish to view and/or modify the parameters TRANSFO uses when it takes coordinates from a system to another, click in the transformation list window with the right button of the mouse, and select the desired command in the menu that pops up.

The list of commands available in the pop-up menu varies depending on the window which you click in with the mouse right button:

| Copy Pos From |
| Copy Pos To |
| Past Pos |
| Delete All |
| Edit System From |
| Edit System To |
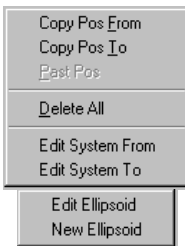
(After clicking in the list window)

| Edit Ellipsoid |
| New Ellipsoid |

(After clicking in the Datum parameter window)

| Edit Datum |
| New Datum |
| Edit Unit |
| New Unit |
| Edit Labels |
| New Labels |

(After clicking in the coordinate system parameter window)

10

Terminology:

Datum You generate a Datum when you take an ellipsoid and move its center so the ellipsoid matches the geoid very closely in your area of interest. For example in Europe the ED50 (European Datum 1950) results from taking the International ellipsoid and shifting it so it fits the geoid in Europe.

Ellipsoid: An ellipse which has been rotated about an axis, providing a mathematical surface approximating the surface of the geoid. The shape of the ellipsoid is chosen to match the geoidal surface as closely as possible.

> **Geoid:** *An equipotential surface (meaning that the pull of gravity is equal everywhere on the surface) which influences measurements and satellite orbits. It approximately corresponds to the mean sea level. A plumb bob always points perpendicular to the geoid, not to the center of the earth.*
>
> **Geocenter:** *Center of an Ellipsoid.*
>
> **Projection:** *A projection is a representation of a 3-dimensional surface (a portion of an ellipsoid) on a 2-dimensional plane. In order to make a section of an ellipsoid into a flat surface, you have to stretch some parts of the surface and compress other parts. The amount of stretching/compressing is described by a point scale factor.*
>
> *For example, UTM (Universal Transverse Mercator) is a cylindrical projection which divides the world into 6° zones of longitude. The central meridian runs through the centre of each zone. UTM is good from 80°N to 80°S but has huge distortion about the poles.*

- **Edit System From**

  Use this command to display the parameters of the coordinate system selected in the System From combo box.

- **Edit System To**

  Use this command to display the parameters of the coordinate system selected in the System To combo box.

The parameters TRANSFO uses when it takes a position from a coordinate system to another are contained in the database. In the database a coordinate system is defined by:

a system name
a **Projection** kind
a Datum
a Unit
Labels

10

Projection [Lambert 2]

System :	Lambert 2	
Kind :	1P-Lambert	False Eastings : 600000.000 m
Datum :	Ntf	False Northings : 200000.000 m
Unit :	Meter	Central Meridian : 2°20'14.0240'' E
Labels :	Projection	Central Latitude : 46°48' 0.0000''N
		Scale : 0.999877420000
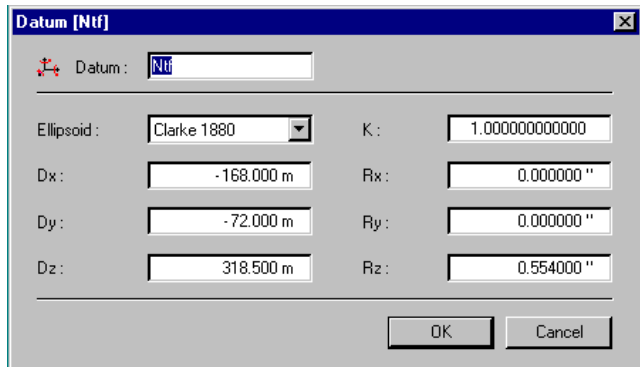
Extent...

OK   Cancel

- **New datum**

    Use this command to create a new Datum and save it to the database. In the database a Datum is defined by :

    - a Name

    - an Ellipsoid

    - plus seven parameters :

    DX   Distance between ellipsoid geocenters

    DY   Distance between ellipsoid geocenters

    DZ   Distance between ellipsoid geocenters

    k   Change in scale between geodetic systems

    Rx   Rotational change about the X axis

    Ry   Rotational change about the Y axis

    Rz   Rotational change about the Z axis

- **New ellipsoid**

Use this command to create a new
Ellipsoid and save it to the
database.
In the database, ellipsoids are
defined by :
- a Name
- the semi-major axis
- the inverse flattening
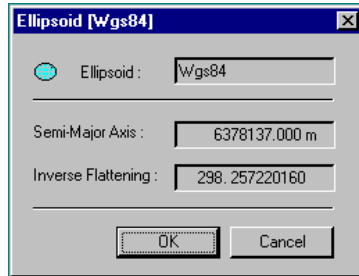
- **New unit**

Use this command to create a new
Unit and save it to the database. The
parameters of each coordinate system
are expressed in one of the units
selectable from the database, for
example :
- Borneo Chain
- Imperial Foot
- Meter
- US foot
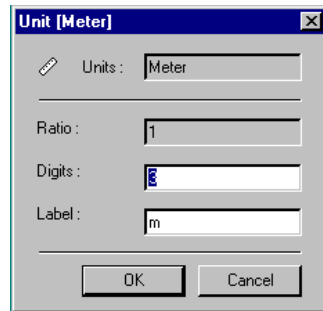
- **New label**

Use this command to create a new Label
and save it to the database.
You can customize the labels you wish to
appear ahead of the coordinate boxes in
your transformation list windows and
printouts, for each type of coordinates
selectable from the database.
Examples :
- **X, Y, Z** for a *Geocentric* coordinate system
- **Lat, Lon, Alt** for a *Lat-Long* coordinate
system
- **North, East, Height** for a *Projection*
coordinate system

10
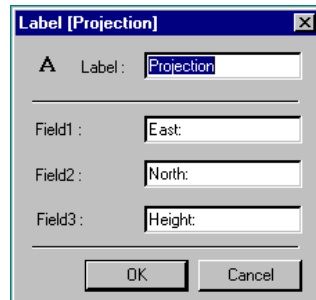
Menus and Commands

File menu

The File menu offers the following commands:

New	:	Creates a new transformation list.
Open	:	Opens an existing transformation list.
Close	:	Closes an opened transformation list.
Save	:	Saves an opened transformation list using the same file name.
Save As	:	Saves an opened transformation list to a specified file name.
Print	:	Prints a transformation list.
Print Preview	:	Displays the transformation list on the screen as it would appear printed.
Print Setup	:	Selects a printer and printer connection.
1, 2, 3...(Recent File)	:	Opens one of the last four lists you saved.
Exit	:	Exits TRANSFO.

Edit menu

The Edit menu offers the following commands:

Copy Pos_From	:	Copies coordinates from the "**From**" boxes to the clipboard.
Copy Pos_To	:	Copies coordinates from the "**To**" boxes to the clipboard.
Paste Pos	:	Pastes coordinates from the clipboard into the transformation list.

10

Import Pos From : Imports a list of positions from a points file in User format

Export Pos To : Exports a list of positions to a points file in User format.

Delete All : Deletes all points contained in the active transformation list.

The Edit menu is unavailable if there is no transformation list open.

View menu

The View menu offers the following commands:

Toolbar : Shows or hides the toolbar

Status Bar : Shows or hides the status bar.

Window menu

The Window menu offers the following commands, which enable you to arrange multiple views of multiple transformation lists in the application window:

New Window : Creates a new window that views the same transformation list.

Cascade : Arranges windows in an overlapped fashion.

Tile : Arranges windows in non-overlapped tiles.

Arrange Icons : Arranges icons of closed windows.

List 1, 2, . : Goes to specified window.

Help menu

The Help menu offers the following commands, which provide you assistance with this application:

Index :	Displays the opening screen of Help.
Using Help :	Displays instructions for using Help
About TRANSFO :	Displays the version number of this application. ♣

11. WinComm Module

Introduction

WinComm is a communication software package for DSNP GPS receivers. It features the following main functions :

- Automatic search for the communication Baud rate (on operator's request, only with DSNP receivers).
- Identification of the DSNP GPS receiver connected (on operator's request, only with DSNP receivers).
- Viewing the data stream on the serial port.
- Sending commands to a GPS receiver.
- Manual request for recording data from a GPS receiver.
- Programmable requests for recording data from a GPS receiver.
- Reading from a GPS receiver's data memory.
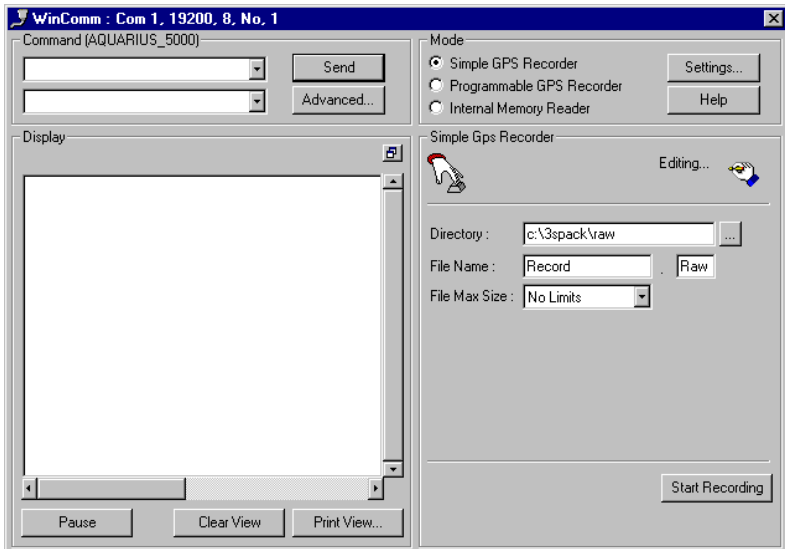
11

Enabling communications with a GPS receiver

After you start WinComm or click the **Settings** push-button in the WinComm main window, a dialog box (titled Communication Settings) shows up that allows you to view and change the serial port parameters of your computer and enable communications with the GPS receiver connected to it.
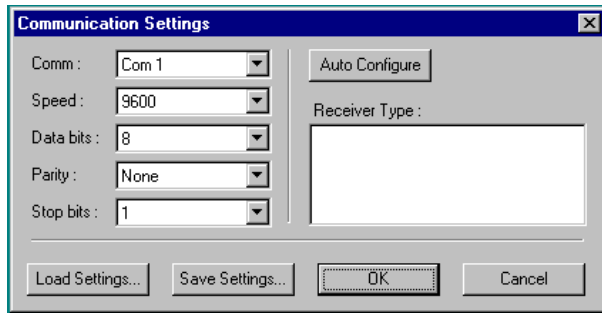
You can save your customary communications settings to a configuration file (using the Save Settings button) and specify the configuration file name in the command line of any *shortcut* created to start WinComm. As a result the configuration file will automatically be loaded and enabled when you double-click the WinComm icon to start WinComm (in that case the Communication Settings dialog box will not be prompted).

Use the combo boxes to set the communication parameters. The parameters are preset to default values. Select the desired port ("Comm" parameter, that is the computer port connected to the desired GPS receiver) and the appropriate serial communication parameters (Baud Rate, etc.) to match those of the receiver.

With DSNP receivers, the Baud rate will be adjusted automatically if you use the **Auto Configure** push-button.

OK

Clicking the *OK* button activates the current serial port parameter settings and closes the *Communication Settings* dialog box. This enables communications between the computer and the GPS receiver, unless the serial port parameter settings do not match those of the receiver connected.

Cancel

Clicking the *Cancel* button closes the *Communication Settings* dialog box. Any changes you made in the Communication Settings dialog box are ignored.

Auto Configure

Auto Configure initiates an automatic search for the Baud rate and receiver type. Use this push-button if you are not sure about the Baud rate or if you wish to view the type of the receiver connected.

An automatic search for the Baud rate and receiver type is only allowed with DSNP receivers as this requires that the receiver be capable of returning a consistent reply to a "TEST 1" or "IDENT" command.

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After choosing "Auto Configure" you are allowed to :

- disable the communication by clicking "**Cancel**" ,

- or, if the identification is successful, close the *Communication Setting* dialog box, by clicking "**OK**". This enables communications between the computer and the GPS receiver and allows you to use any of the functions of WinComm.

Receiver Type

After a communication is successfully established (e. g. using the Auto Configure push-button), the identification of the connected receiver appears in this box.

The example below results from a communication established with a DSNP receiver.

After the Communication Settings dialog box is closed, you can ask for the receiver type by sending the TEST 1 or IDENT command to the connected receiver, using the **Command** pane.

Load settings

 Load settings opens a dialog box that allows you to select any serial port configuration file saved earlier using the **Save Settings** push-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* takes you back to the *Communication Settings* dialog box without loading any settings).

Save settings

Save settings 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. It can be loaded automatically if you specify its name in the command line of any **shortcut** icon created to start Wincomm.

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In the *File Name* text box, enter a name (e.g. the type of the receiver connected) for the file to which the serial port configuration should be saved (typically with '.set' as extension). Typically, serial port configuration parameters are saved to the 'set' directory.

Clicking the *Save* push-button saves the following communication parameters

- serial port No.
- Baud rate
- number of bits per character
- parity check option
- number of stop bits

(Clicking *Cancel* takes you back to the *Communication Settings* dialog box without saving any settings).

System menu

- In the left corner of the WinComm window's title bar, click on the connector icon. The system menu appears from which you can define the options below.
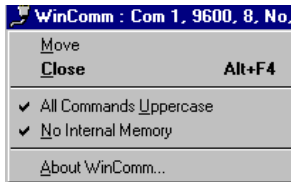
All Commands Uppercase : Unless you are satisfied with the current setting, select this command to toggle the setting.

Checked: lower-case characters in the command are changed to upper-case characters before being sent to the receiver

Cleared: characters, whether lower-case or upper-case, are sent unchanged.

No Internal Memory : Unless you are satisfied with the current setting, select this command to toggle the setting.

Checked: there is no internal memory in the attached receiver (**Internal Memory Reader** option disappears from the Win Comm window)

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Cleared: there is an internal memory in the attached receiver (**Internal Memory Reader** option available in the Win Comm window).

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 Wincomm.

If you wish to enlarge the *Display* pane, click [icon] in this pane (top right). This causes the pane to be transformed into a separate window which you can move/re-size using the usual commands assigned to windows in the Windows95 environment. To restore the *Display* pane at the initial location, click [icon] or [icon] (top right).
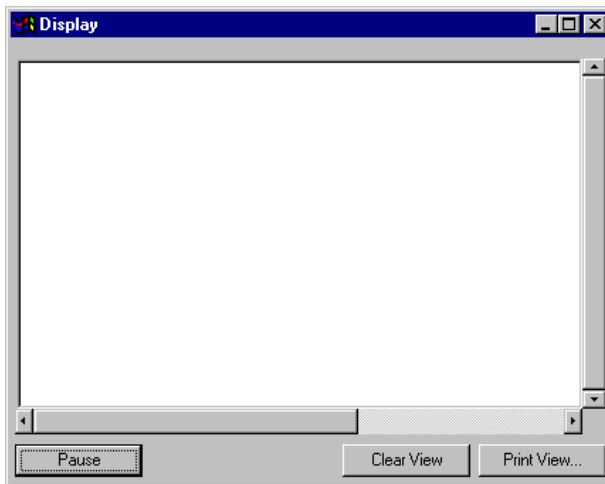
As the data may be refreshed every 0.1 seconds, it is not possible to log all that is relayed through the port so that it can be displayed at a later date, or this would require a huge memory size. For that reason, only the latest 100 data lines are stored and can be viewed using the vertical scroll bar available.

Each data line ends with a CR LF code and/or when it reaches the maximum length (80 characters).

Clear View : Clicking the *Clear View* push-button deletes any data displayed in the *Display* pane / window.

Print View : Clicking the *Print View* push-button opens a **Print** dialog box that allows you to print any data displayed in the *Display* pane / window.

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 (now changed to a **Resume** button) will re-activate the Display pane.

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Sending a Command to a GPS receiver

After communication is enabled between the computer and a GPS receiver, the *Command* pane can be used to send commands to the receiver (label of selected command group recalled in the command pane, see below).

Command combo box ——— Label combo box ———
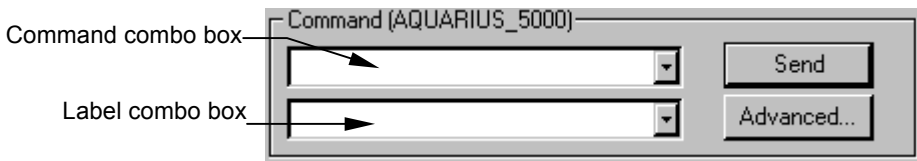
To send a command, do the following:

- Type the command in the Command combo box or select it from the Command or Label combo box.

- Click the **Send** push-button.

The list of commands prompted in the Label combo box can be changed using the **Advanced** push-button.

Commands editor dialog box

This dialog box (appearing after you click the **Advanced** button) allows 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).

After you install WinComm, a number of default command groups are available on your computer. Each command group is contained in a file whose name is the **Group Label** (see this parameter in the next page), with **.cmd** as extension.

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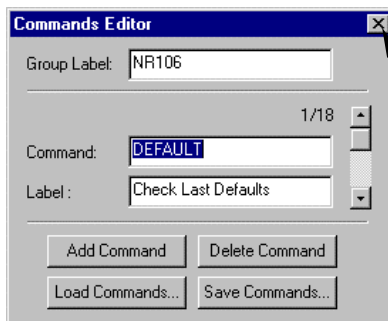
Click here to close the Commands Editor dialog box. This loads the selected command group to the main window.

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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).

Simple GPS recorder

All data output from the receiver's port is viewed in the main window's *Display* 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 push-button.

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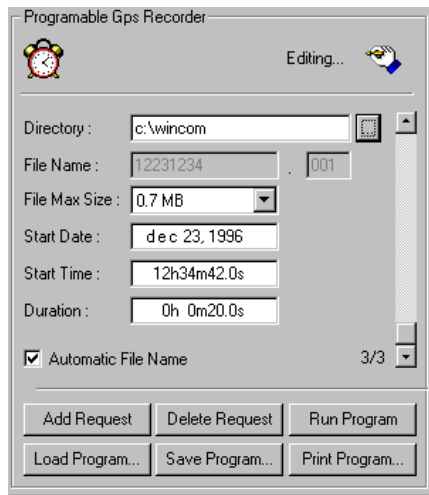
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Directory : The Directory text box is used to specify the directory to which you wish to record the data from the receiver. Clicking the button to the right opens a dialog box that allows you to navigate through the directory tree on your hard disk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

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

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

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

Automatic File Name : 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.

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Add Request : The Add Request 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 : The Delete Request 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 : The Run Program button activates the Programmable GPS Recorder mode. This causes WinComm 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 : The Load Program 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 : The Save Program 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 : The Print Program button opens a Print dialog box that allows you to print the descriptions of planned recording sessions currently loaded.

Reading from a GPS receiver's memory

After communication is enabled with a receiver, the *Internal Memory Reader* option allows you to view the contents of its data memory and choose one or all of its data files to copy them to a disk file.

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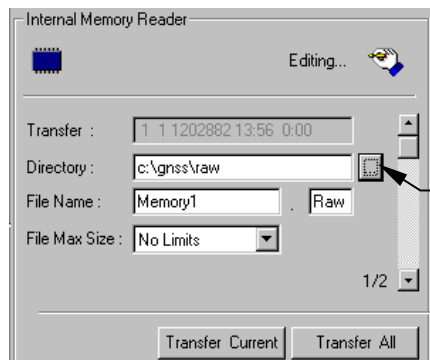
Click here to select the desired directory.

Transfer : The Transfer text box displays the identification of the data record session that will be read from the receiver's memory when you click the Transfer Current button. If two or more sessions are available in the receiver, use the scrollbar to the right to select the desired session.

All data record sessions contained in the receiver's memory are listed in the Display pane to the left.

Directory : The Directory text box is used to specify the directory to which you wish to record the data read from the receiver's internal memory. 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 : The File Name text box is used to specify the name of the file to which you wish to record the data read from the receiver's internal memory.

If you select No Limits as File Max Size option, then you are allowed to specify an extension to the file name in the associated text box. (You may choose an extension that reflects the type of data to be recorded to the file , e. g. RAW for raw data).

If you select 0.7 MB or 1.4 MB as File Max Size option, then the system will automatically add 001 as extension. This will automatically be incremented for each file segment generated, if the file exceeds the Max File Size selected.

File Max Size : The File Max Size 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.

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Transfer Current : Clicking the Transfer Current button reads the record session selected in the Transfer text box from the receiver's memory and saves it to the file specified in the File Name and Directory text boxes.

If you fail to enter a file name, then the system will automatically create a disk file named *Memory1* if you are reading the first session, or *Memory2* for the second session, etc.

Transfer All : Clicking the Transfer All button reads each record session from the receiver's memory and saves it to the associated file specified in the File Name and Directory text boxes.

If you fail to enter a file name the system will automatically save the first session to a disk file named *Memory1*, the second session to a disk file named *Memory2*, an so on...

WinComm Shortcut

You can save your customary communications settings to a configuration file and specify the configuration file name in the command line of any shortcut created to start WinComm. As a result the configuration file will automatically be loaded and enabled when you double-click the WinComm icon to start WinComm (in that case the Communication Settings dialog box will not be prompted).

To create a WinComm shortcut icon that will automatically load one of your customary communications configuration files, do the following:

- With the **mouse right button**, click outside any window in the workspace. From the menu that pops up, select New then Shortcut. This opens the Create Shortcut dialog box.

- Click the **Browse** button. This opens a dialog box that prompts all the directories existing on your disk. Open (by double-clicking) the directory containing WinComm.

- Click **WinComm.exe** and click the **Open** button (or simply double-click WinComm.exe). This closes the Browse dialog box and automatically enters WinComm.exe (with its path) into the Command line text box in the Create Shortcut dialog box.

- In the Command line text box, enter the name of your configuration file after WinComm.exe, with a space in between.

- Click the **Next** button. Enter a name for your shortcut icon. Click the **Finish** button. This closes the Create Shortcut dialog box.

As a result, a new WinComm icon appears in the workspace, with the name you specified.

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12. KISS Module

Preamble

Introduction

- KISS comes as one of the optional modules of 3SPack. It is required in those land surveys where Scorpio 6x0x MK mobiles and 6x0x SK base stations are used. This series of equipment is specifically designed to operate in the DSNP LRK® real-time & long-range processing method.

- KISS is used at the beginning of a survey to prepare field operations. First you will have to choose a coordinate system.

- KISS will then provide a view of your work area. It is a good idea to have the map of this area scanned and the resulting bitmap file moved to the 3SPack Supervisor database (Maps object). This will give you the ability to show/hide the details of the area.

- In the next stage, KISS will let you transfer jobs to PC cards (600x) or to rover palmtops (6x0x).

- After field operations, KISS will be used to **retrieve the results** of the jobs performed in the field. At this stage, the **Quick Info** window will be very useful to read at a glance the interesting results of the survey.

- If raw data was recorded during the survey at the station and the rover (this is an option in the 650x-to 630x series), KISS will allow you to transfer this data to 3SPack, or to any other Post-processing software, so that you can compare the real-time results against those obtained using a post-processing method.

- A number of import/export functions are available in different formats (DXF, User). Points and results can easily be exchanged with the 3SPack database.

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Terminology used

In this section, the term "target" is used in two different contexts:

1. To designate a point whose location is known in theory and which has to be materialized in the field. In this case the term "target" is always associated with the term "point"

2. To designate the supposed (or planned) position of any point, whether a target point or a reference point. In this case, the term "target" is used alone. The main contexts in which "target" appears with this meaning are:

   - In the **General** tab of any dialog box describing a reference point
   - In the **General** tab of any dialog box describing a target point
   - In the **Edit** menu, **Import Target** and **Export Target** commands

Key words

Reference points : Precisely known points previously materialized in the field.

Target points : Points whose locations are known in theory and which have to be materialized in the field (staking out)

Planned points : Points specified in a job file to be surveyed by a field operator. There are two types of planned points: reference points and target points.

Logged points : In contrast with planned points, logged points are unplanned points. Any time, field operators can log the position of a point, give a name to this point and save it in the results file.

Offset procedure : Special procedure through which a planned or logged point can be surveyed whereas the GPS cannot be received properly at the desired location. In this case the location of the desired point will be deduced:

- from two properly surveyed points P1 and P2 located nearby and forming either a triangle or a line with the desired point. Triangle $\Rightarrow$ lateral offset; line $\Rightarrow$ linear offset

- or from two pairs of properly surveyed points P1-P2 and P3-P4 located nearby and forming two lines whose intersection provides the location of the desired point ("intersection" offset)

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Graphic conventions used for points

The color of any icon changes when you select it with the mouse pointer:

> Selected : icon green, point name with dark-blue background
>
> Deselected : icon dark-blue, point name with yellow background

- **Before surveying**

Target points: Reference points:

- **After surveying**

  - With known horizontal system:

Logged points: Target points: Reference points:

| Within acceptable deviation | Outside acceptable deviation |
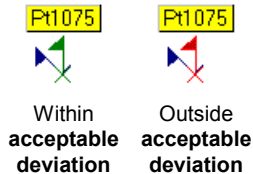
- With unknown horizontal system :

Logged points:

Target points:

Reference points:

The horizontal system may still be unknown at the end of a survey either because the operator did not let the rover unit determine a suitable one from the specified reference points, or merely because the rover unit was unable to find one. In this case, note that all logged points will be grouped under the same icon in the top-right corner of the map as KISS will not be able to locate them on the map. On the other hand, reference and target points will be placed on the map at their planned locations.

- Other cases where some reference points may be involved in the following computations. These points will be represented as follows after you validate the results of the computation:

After computing datum shifts:

After computing local grid:

After computing vertical correction:
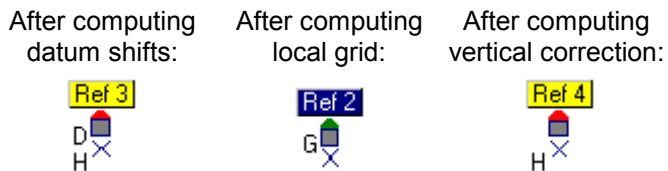
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Project file structure

If you create a project called "EDC", then this project will be represented as shown below, beside the Project Wizard icon in the Projects window. The following folder and file are then present in the **KIS** directory.
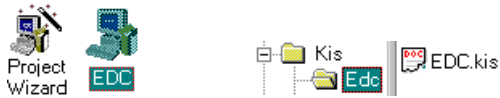
Later, the **EDC** folder will be completed with results files (<job>.RES), and possibly raw data files if during jobs, recording sessions were performed.

While working on a project, you may need to create **QRY** files. This type of file, which contains a number of criteria used to select points, is invoked when using the "**Select Where** " function. By default, **QRY** files are saved in the **KIS** directory:
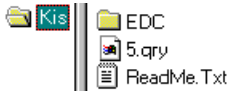
Using KISS before field surveying

Creating a new project

1. In the tool bar, click or from the menu bar, select **File** and then **New** or double-click on the following icon in the Projects window:

Project Wizard

2. Start defining your project by completing the **Project Wizard-Welcome** Dialog Box which then appears:

Project	Enter the project name
Region	Enter the region name (optional)
Center Easting	Enter the easting of the center point
Center Northing	Enter the northing of the center point
Scale	Choose a pre-defined value from the combo box or type another value in the text box
Distances in	Choose the distance unit from this combo box (meters, US feet or imperial feet)
Angles In	Choose the angle unit from this combo box (degrees or grades)
Notes text box	Add comments or recommendations of any kind which you want to associate to this project (optional).

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3. Then, click the **Next>** button.

4. Complete the **Project Wizard-Horizontal System** Dialog Box which then appears. This tab allows you to define the horizontal coordinate system which you would like to use for your survey. In usual cases, you just have to select a projection from the **Projection** combo box, which lists all the projections available from the 3SPack database.

If you do not know which projection should be used, select <Unknown> in the PROJECTION combo box. As a result, KISS will also set the ON DATUM combo box to <Unknown>. You can however change this setting if you know the datum. The inverse statement is also possible: you can choose a projection and leave the datum "<Unknown>".

As you can see, all the combinations are possible. However the most typical ones remain "projection and datum known" or "projection and datum unknown".

When you select a projection or datum, in fact you load it from the 3SPack database. All the parameters of this projection or datum then appear in the dialog box.

If necessary, you can adjust the values of some of these parameters. If you do so, we recommend you to change the name of the projection or datum as well (the PROJECTION and ON DATUM combo boxes are also editable fields). In this way, you will never forget that you derived your horizontal coordinate system from a standard one. **WARNING!** This new system will be stored in your project only, not in the 3SPack database.

NOTE: The **Project Properties** dialog box includes a pop-up menu (right mouse button) accessible from the **Horizontal System** and **Vertical System** tabs. This menu contains the following commands:

Copy	Copies the system parameters to the clipboard (binary & ASCII formats)
Paste	Pastes the system parameters from the clipboard (binary format)
Save	Saves the system parameters as a file (binary format)
Load	Loads the system parameters from a file (binary format)
Update 3SPack Database	Transfers the horizontal system to the 3SPack database

The different parameters of projections and datums shown in this tab are described below.

PROJECTION   Combo box listing the projections stored in the 3Spack database. Select the name of the projection used. As a result, the rest of the dialog box is updated to match your selection. This combo box is also an editable text box (see above)

Proj Kind   From this combo box, select the kind of projection used. Generally this selection is correct after you choose the PROJECTION name (above)

False East.   Easting of projection center

False North.   Northing of projection center

Central Merid.   Longitude of projection center

Central Lat.   Latitude of projection center (except for 2P Lambert)

Scale   Scale factor (except for 2P Lambert)

North Lat.   Latitude of 1st parallel (for 2P Lambert only)

Ref. Lat.   Latitude of projection center (for 2P Lambert only)

South Lat.   Latitude of 2nd parallel (for 2P Lambert only)

Skew   Azimuth of initial line (for Rect Skew Ortho and Skew Ortho only)

ON DATUM   Combo box listing the datums stored in the 3Spack database. Select the name of the datum used. As a result, the rest of the dialog box is updated to match your selection. This combo box is also an editable text box (see above)

K   Scale factor

Dx   X deviation from ellipsoid (signed value in m)

Dy   Y deviation from ellipsoid (signed value in m)

Dz   Z deviation from ellipsoid (signed value in m)

A   Semi-major axis of the ellipsoid, in m

1 / F   Inverse flattening coefficient (ellipsoid)

Rx   Angular deviation around X axis of ellipsoid (in seconds)

Ry   Angular deviation around Y axis of ellipsoid (in seconds)

Rz   Angular deviation around Z axis of ellipsoid (in seconds)

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The lower part of the **Horizontal System** Dialog Box allows you to specify the characteristics of the local grid, if you use one in your project (see instructions below).

WITH LOCAL GRID
check button   Button cleared: no local grid

Button checked: enter the parameters of the local grid:

E0	Easting of origin
N0	Northing of origin
K	Scale factor
DE	Easting shift
DN	Northing shift
Beta	Rotation angle

See also *Choosing the appropriate coordinate system*, page *12-41*.

5. Then, click the **Next>** button.

6. Complete the **Project Wizard-Vertical System** Dialog Box which then appears. In this box, tell KISS whether the altitude of the surveyed points should be expressed in relation to a geoid or a datum (WGS84, or the one selected for the project).See below:

HEIGHT EXPRESSED ON   Choose the reference upon which the altitudes of the surveyed points will be determined.

If you click the **GEOID** radio button, then the reference can be the ICD200 model or any local model available on your system (RAF98, EGM96, etc.; this may be the complete model or just an excerpt corresponding to the area where you have to work).

If you click the **DATUM** radio button, then the reference can be either the datum used in the horizontal system, or the WGS84 (selection in same combo box nearby)

**WITH LOCAL
CORRECTION...** check button   Check this button if corrections have to be made to the
selected reference (otherwise keep it cleared):

    dH Vertical deviation between vertical system and
WGS84 at the origin

    Gl Latitude gain (a coefficient)

    Gg Longitude gain (a coefficient)

    L0 Latitude of the origin

    G0 Longitude of the origin

See also *Choosing the appropriate coordinate system*,
page *12-41*.

Before you end the definition of the project, you can still go
back to the previous tabs by clicking the **<Back** button if
changes have to be made in these tabs. Then use the
Next> button again until the **Finish** button appears.

7. Once you agree with the definition of the project, click the
Finish button. KISS then creates the new project. A map
of the region of survey appears in the KISS window. In the
same time, the project is saved in the KIS directory.

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NOTE: The **Project Properties** dialog box includes a
pop-up menu (right mouse button) accessible from the
Horizontal System and **Vertical System** tabs. This menu
contains the following commands:

    Copy Copies the system parameters to the clipboard (binary
& ASCII formats)

    Paste Pastes the system parameters from the clipboard
(binary format)

    Save Saves the system parameters as a file (binary format)

    Load Loads the system parameters from a file (binary
format)

Update 3SPack Database Transfers the horizontal system to the 3SPack
database

Changing the properties of a project

The properties of a project are the set of parameters that you defined when you created it. These parameters are arranged in three distinct tabs:

- **General** tab

- **Horizontal System** tab

- **Vertical System** tab

Once a project is created, you can still change some of its properties.

To change the properties of a project, use one of the following procedures:

- With the project open in the KISS window, with no point selected and whatever the pointer shape, position the pointer anywhere within the project window and click with the right-mouse button. In the shortcut menu which then appears, select **Properties**.

- With the project open in the KISS window, with no point selected and whatever the pointer shape, from the menu bar, select **Edit** and then **Properties**

- From the Projects window, position the pointer on the icon of the project and click with the right-mouse button. In the shortcut menu which then appears, select **Properties**. If the project is currently open, you can change any property (except the project name). If it is currently close, you can only change the properties on the **General** tab (except the project name).

WARNING! As long as there is no results available for a project, there is no harm in changing a project's properties. This is no longer true when a project contains results. In this case, a warning message will appear informing you of the consequences whenever you try to validate a change made to any of the project's properties.

Changing the project name

- Position the mouse on the icon of the project you want to rename

- Click the right mouse button and, from the shortcut menu which then appears, select **Rename**

- Type the new name and press ENTER.

Placing target points on the map

After creating a project, target points can be placed directly on the map of the project.

- In the toolbar, click or from the **Draw** menu, select the **Target Points** command.

- Position the mouse pointer (now a) where you want to create a new target point. In the right-lower part of the KISS window, the status bar helps you locate the point accurately on the map by giving the current coordinates of the mouse pointer as you move it within the window:

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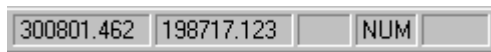
- When the mouse pointer is at the desired location, click with the left mouse button. This causes a new Target Point icon to appear on the map.

- Position the mouse pointer where you want to create a second target point and click again, etc. To stop creating target points, click any other button in the toolbar.
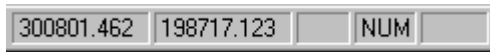
Editing the properties of a target point before field operations

- Click

- Double-click on the icon corresponding to the target point you want to edit. A dialog box appears showing the properties of the target point. At this stage, the dialog box consists of a single tab (General).

Name	Keep the default name of the target point or type another name
Code 1... code 4	Optional. Enter or select a geocode from each of these combo boxes. The list of available geocodes is the one you can define from the **KISS Options** dialog box, **General tab**
	Note that if you place the pointer on the down-arrow of any of these combo boxes, the meaning of the selected geocode will appear in a tip box.
Target/Result/Error radio buttons	At this stage, only the **Target** radio button can be checked as the field survey is still to come
E N H check buttons	They define the type of the target point. Two types are possible:
	. 2D point: Simply obtained by clearing the **H** button.
	. 3D point: Simply obtained by checking the **H** button.
E N H text boxes	Planned coordinates of the target point resulting from where you clicked on the map. If you change **E** or **N**, the icon will appear at a location different from where you clicked. Any change in these boxes should be consistent with the type of point (2D, 3D) you choose (see **E N H** check buttons just above).
Notes pane:	Add comments or recommendations of any kind which you want to associate to this point (optional).
"Target" diagram (on right)	The "target" (planned location) is shown at the center of an oriented circle whose radius is the **Acceptable deviation between target and surveyed coordinates** defined in the **General tab** of the KISS options

Placing reference points on the map

After creating a project, reference points can be placed directly on the map of the project.

- In the toolbar, click ![icon] or from the **Draw** menu, select the **Reference Points** command.

- Position the mouse pointer (now a ![icon]) where you want to create a new reference point. In the right-lower part of the KISS window, the status bar helps you locate the point accurately on the map by giving the current coordinates of the mouse pointer as you move it within the window:

- When the mouse pointer is at the desired location, click with the left mouse button. This causes a dialog box to open in which you can complete the definition of the reference point. The following parameters can be specified or changed:

Name	Keep the default name of the reference point or type another name
Code 1... code 4	Optional. Enter or select a geocode from each of these combo boxes. The list of available geocodes is the one you can define from the **KISS Options** dialog box, **General tab**
	Note that if you place the pointer on the down-arrow of any of these combo boxes, the meaning of the selected geocode will appear in a tip box.
Target/Result/Error radio buttons	At this stage, only the **Target** radio button can be checked as the field survey is still to come

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E N H check buttons	They define the type of the reference point. Three types are possible:
	. 1D point: Obtained by checking the **H** button and clearing either of the other two buttons.
	. 2D point: Obtained by clearing the **H** button and checking either of the other two buttons. The **E** and **N** buttons are then checked.
	. 3D point: Obtained by checking the **H** button and either of the other two buttons. All three buttons are then checked.
E N H text boxes	Planned coordinates of the reference point resulting from where you clicked on the map. If you change **E** or **N**, the icon will appear at a location different from where you clicked. Any change in these boxes should be consistent with the type of point (1D, 2D, 3D) you choose (see **E N H** check buttons just above).
Notes pane:	Add comments or recommendations of any kind which you want to associate to this point (optional).

- After completing the definition of the reference point, click the **OK** button. The dialog box disappears and a new Reference Point icon appears on the map.

- Position the mouse pointer where you want to create a second reference point and resume the same operations as above. To stop creating reference points, click any other button in the toolbar.

Changing a target point into a reference point or vice versa

- In the KISS toolbar, click

- On the map, select the point that you want to transform into a different type

- From the contextual menu (right-mouse button) or from the **Edit** menu in the menu bar, select **Change Into**. The **Change Into** dialog box appears asking you to specify the new type to be assigned to this point

- Choose the new type and click **OK**. The selected point is immediately changed into the desired type.

  Note that if you use default names for target and reference points (i.e. target # and ref #), you will probably have to change the names of the points on which you run the **Change Into** command. Otherwise, this could introduce some confusion in your project. For example you should not keep naming a point "target 5" after changing it into a reference point.

  Note also that you can select several points before running the **Change Into** command. In this case, all selected points will be changed into the selected type.

  When results are available for reference and target points (after the field survey), these points can also be changed into "Logged points". If you select this option, a message box will appear asking you to confirm this choice. If you do so, you will lose the target coordinates associated with these points (only the coordinates measured in the field will be preserved).

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Importing targets

When preparing a project, you can add points on the map by importing them from a file or from 3SPack.

-   From the **Edit** menu or from the Map shortcut menu, select the **Import Target...** command. This opens the **Import Target Positions** dialog box

-   From the **Mode** combo box located at the foot of this dialog box, select **Import From File** or **Import From 3SPack** depending on whether you want to import targets from a file (1st option) or from the 3Spack database (2nd option). Then do one of the following:

• **Import From File**

-   Click the **Add** button to choose the file(s) from which to import points (default directory: ... /Points)

-   Select the desired file(s) and click the **Open** button. The selected files then appear in the **Import** list box.

    When appropriate, use the other two buttons associated with the **Import** list box (**Edit** and **Remove**) after selecting a file name from this box. Use the **Edit** button to edit the selected file (default editor: Wordpad). Click the **Remove** button to remove the selected file name from the **Import** list box (no targets will then be imported from this file).

-   Tell KISS whether the imported targets should be defined as reference or target points in the active project. To make this choice, check the appropriate radio button in the **Default Object** pane (upper right)

- In the **Format** pane, specify the format of the file (ASCII DXF or User). To create new user formats, click the **User formats** button and then the **New** button. Then refer to page *3-64*.

- Click the **Go** button to start importing the points. The points will appear on the map after successful import operation (the map is adjusted through a zoom-to-fit-and-grab operation so that all the points can be viewed.

- **Import From 3SPack**

  - Same as from a file, except that clicking the **Add** button will display directly all the sites available from the 3SPack Database. Another difference is that you should specify which solution of the site should be imported (the **default** or **last** one).To make this choice, from the **Get 3SPack** pane, click the appropriate radio button.

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Importing results

The **Import Results** command can be used in the following cases:

1. You want to associate some points of your current project with results (solutions) that were obtained earlier for these points. For example these results were obtained using one of the 3SPack post-processing modules. In this case you will have to choose the **Import from 3SPack** mode when running the **Import Results...** command.

    Note that importing a solution for a point which already has one will result in overwriting the existing solution with the imported one.

2. You want to mark or illustrate the map of the active project with characteristic points surveyed previously. For example the results for these points were exported to files in the framework of earlier projects. In this case you will have to choose the **Import from File** mode when running the **Import Results...** command.

Do the following to import results:

-   From the **Edit** menu or from the Map shortcut menu, select the **Import Results...** command. This opens the **Import Result Positions** dialog box

-   From the **Mode** combo box located at the foot of this dialog box, select **Import From File** or **Import From 3SPack** depending on whether you want to import results from a file or files (1st option) or from the 3Spack database (2nd option). Then do one of the following:

- **Import From File**

  -   Click the **Add** button to choose the file(s) from which to import results (default directory: ... /Points)

- Select the desired file(s) and click the **Open** button. The selected files then appear in the **Import** list box.

   When appropriate, use the other two buttons associated with the **Import** list box (**Edit** and **Remove**) after selecting a file name from this box. Use the **Edit** button to edit the selected file (default editor: Wordpad). Click the **Remove** button to remove the selected file name from the **Import** list box (no results will then be imported from this file).

- Tell KISS whether the imported results should be defined as logged points or trajectories in the active project. To make this choice, check the appropriate radio button in the **Default Object** pane (upper right)

- In the **Format** pane, specify the format of the file (ASCII DXF or User). To create new user formats, click the **User formats** button and then the **New** button (then refer to page *3-64*).

- Click the **Go** button to start importing the results. The points will appear on the map after successful import operation (the map is adjusted through a zoom-to-fit-and-grab operation so that all the points can be viewed.

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- **Import From 3SPack**

   - Same as from a file, except that clicking the **Add** button will display directly all the sites available from the 3SPack Database. Another difference is that you should specify which solution of the site should be imported (the **default** or **last** one).To make this choice, from the **Get 3SPack** pane, click the appropriate radio button.

Transferring jobs to a palmtop (6x0x series only)

- Connect the palmtop to the computer through a serial line.
- Select the **Tools>Options>Transfer** tab and check that the choices on this tab are appropriate (Scorpio 630x series selected, right choice for the port used on the PC to communicate with the Husky). Then click **OK**.
- Open the project in the KISS window
- If you want to focus on particular points, then select the corresponding icons. Otherwise, do not select anything.
- In the toolbar, click 🖻 or, from the **Transfer** menu, select the **Write Job** command.
- In the **Write Job…** dialog box which then appears, enter a name for the file which is going to be written to the palmtop (8 characters max.) or select an existing one from the list box which you will overwrite with the new job.
- Specify the content of the job by checking one of the following buttons:

Selected Points	This option should logically be checked if you have made a prior selection of points on the map (option dimmed otherwise)
Remaining Points	Check this option if you want the field operator to deal only with the points not surveyed yet (which supposes that a part of the project has already been made). With this option you do not need to make a prior selection.
All Points	Check this option if you want to make a job of the entire project.

- Specify the order in which the points will be written by making a selection in the following combo box:

In Order of	Choose one of the possible ways of arranging the points in the job

- From the **For Operator** combo box, enter or select the name of the operator in charge of the job in the field. The list of known operators is defined in the **Options** dialog box, **General tab**.
- Click the **OK** button to write the job to the palmtop. The file extension of a job file is "JOB".

Transferring jobs to a PC card (600x series only)

- Insert a card into the PC card reader of your PC.

- Select the **Tools>Options>Transfer** tab, then, in the **PC card drive:** field, indicate the location of the PC card drive on your computer. Clear or check the **Remind me of...** check button relevant to the PC card. Click **OK** to enter your choices. This closes the dialog box.

- Open the project in the KISS window

- If you want to focus on particular points, then select the corresponding icons. Otherwise, do not select anything.

- In the toolbar, click ▣ or, from the **Transfer** menu, select the **Write Job** command.

- In the **Write Job…** dialog box which then appears, enter a name for the file which is going to be written to the PC card (8 characters max.) or select an existing one from the list box which you will overwrite with the new job.

- Specify the content of the job:

Selected Points	This option should logically be checked if you have made a prior selection of points on the map (option dimmed otherwise)
Remaining Points	Check this option if you want the field operator to deal only with the points not surveyed yet (which supposes that a part of the project has already been made). With this option you do not need to make a prior point selection.
All Points	Check this option if you want to make a job of the entire project.

- Specify the order in which the points will be written to the PC card by making a selection in the following combo box:

In Order of	Choose one of the possible ways of arranging the points in the job

- From the **For Operator** combo box, enter or select the name of the operator in charge of the job in the field. The list of known operators is defined in the **Options** dialog box, **General tab**.

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- Click the **OK** button to write the job to the PC card. The file extension of a job file is "JOB".

Deleting a project

Projects are deleted from the projects window. Only close projects can be deleted.

- In the projects window, select the corresponding icon and then press the Del key (or choose the **Delete** command from the **Edit** menu.

- Click **Yes** to confirm this choice.

When you delete a project, in fact you delete all the files stored in the corresponding project folder, and this folder. A project folder generally contains a KIS file, one or more RES files and possibly raw data BIN files.

It might be interesting to backup the project folder before deleting it from the KIS directory.

How to quit KISS

· From the menu bar, select **File** and then **Exit**. Unless an unsaved project is still open, this causes the **KISS** main window to be closed immediately.

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

Geoids module

This module allows you to import geoids, extract data from a geoid to create a smaller file containing just the necessary data for your working area, and load geoid models (partial or complete) directly into a Scorpio receiver (only if it is from the 650x-to-630x series).

Two geoid models are available in the Geoids module: RAF98 and EGM96

Starting the Geoids module:

- On the **KISS 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.

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Loading a geoid model into a receiver:

- A geoid model must be open in the window (a complete or partial geoid). 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.

Using KISS after field surveying

Retrieving the results of a job (600x series)

You do not need to work with the PC containing a project to read the results of a job prepared for this project. The only requirement is, of course, that 3SPack+KISS be installed and operating on this PC. If you work with the same PC, you can start the retrieve procedure by first opening the project from which the job was created.

- Insert the PC card from the field into the drive of your computer

· In the KISS toolbar, click or from the **Transfer** menu, select the **Read Results...** command. This action is also possible if there is no project open in the KISS window, which will be the case if you work on a PC other than the one used to create the project

- In the **Read Results** dialog box which then appears, select the job.

- Click the **OK** button. Once KISS has successfully retrieved the results of the job, these results appear directly on the map. All the points for which solutions are now available are selected . See page *12-4* to understand the meaning of the icons used.

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If no project is open in the KISS window, or if the open project is incompatible with the results of the job, the PC card will restore the job as it was written earlier (this JOB file is still present on the PC card) and you will be asked to save this data as a new project. Then KISS will restore the solutions of the points surveyed during the job.

On transfer completion, a warning message will appear if particular events occurred during the transfer in relation with the **transfer options** chosen for KISS (see page *12-58*):
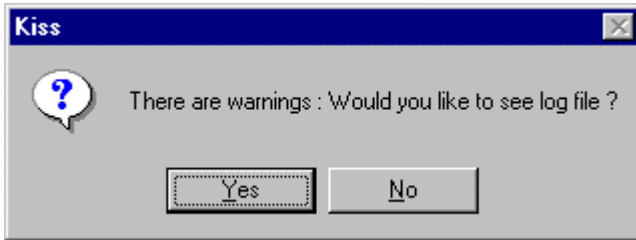
The message will prompt you to open the log file so that you can be informed of the nature of these events. If you click the **Yes** button, the log file will be opened using the WordPad text editor of Windows95.

Outside this particular context, you cannot open the log file from KISS. If you need to open it at another moment, use Windows explorer (the log file is stored in ...\3SPack\bin under the name "KISS.log").

Retrieving the results of a job (650x-to-630x series)

− Run **KISS** and open the project corresponding to the job completed in the field

− In the toolbar, click or from the **Transfer** menu, select the **Read Results...** command. The **Read Results From...** dialog box then appears listing a number of job names.

(This action is also possible if there is no project open in the KISS window, which will be the case if you work on a PC other than the one used to prepare the job.)

(If a project is open, this dialog box will list all the job files present in the palmtop for which result files exist. If no project is open, ALL the job files will be listed, regardless of whether result files exist for these jobs or not.)

– In the dialog box, select the job you have just completed in the field.

– Click the **OK** button.

(If no project is open and you select a job, or if the open project is incompatible with the job, then KISS will ask you to create a new project on the basis of the selected job. If a result file exists for this job, then the results of this job will be retrieved.)

Note that during file transfer, format conversion is performed from binary to SVAR (ASCII).

Once **KISS** has successfully retrieved the results of the job, these results appear directly on the map. All the points for which solutions are now available are selected.

– On transfer completion, a warning message will appear if particular events occurred during the transfer in relation with the transfer options chosen for KISS.

The message will prompt you to open the log file so that you can be informed of the nature of these events. If you click the **Yes** button, the log file will be opened using the WordPad text editor of Windows 95.

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Outside this particular context, you cannot open the log file from KISS. If you need to open it at another moment, use Windows Explorer (the log file is stored in ...\3SPack\bin under the name "kiss.log")

Retrieving raw data recorded on PC card (650x-to-630x series)

- Insert the PC card containing the raw data files into the drive of your computer

- Open the project relevant to the station or rover where raw data files were recorded

- In the KISS toolbar, click [icon] or [icon], or from the **Transfer** menu, select **Read Station** or **Read Mobile** respectively. A dialog box appears listing all the raw data files present on PC card (*.Dxx). All files are selected by default for transfer.

- Change the current selection if necessary

- In the **Recorded...** text box, enter the identification of the station or rover where recording took place

- Click **OK** to start transferring the files. Once transfer is complete the raw data files are visible in the project folder, and renamed as follows

>   STATION_*.Dxx (raw data from stations)
>
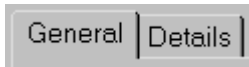>   JOB_*.Dxx (raw data from rovers)

where:

>   xx: session number-1 (00 for 1st session, 01 for 2nd session, etc.).

Raw data can then be imported to 3SPack for post-processing. Station raw data files should be associated with a site, and rover raw data files to a trajectory.

Warning! Raw data files recorded at a station or by a rover are exactly of the same type. It is therefore the user's responsibility to establish the origin of the raw data files.

Editing a point surveyed at the planned location

General | Details

In the toolbar, select [cursor icon] and then double-click on the surveyed point (whether a reference point or a target point). The dialog box which then appears includes the following additional information, compared with the same dialog box before surveying the point:

In the **General** tab

- While only the **Target** radio button could be checked before the survey, you can now check the **Result** or **Error** radio button:

  . Checking the **Result** radio button will cause the coordinates of the position solution to appear just below as **E**, **N** and **H**. Note that these coordinates are dimmed (no changes allowed)

  . Checking the **Error** radio button will cause the components of the deviation between the planned and measured position to appear just below as **DE**, **DN** and **DH**. The **Delta** figure just below stands for the modulus of the deviation vector. This figure will be re-computed if you change the type of the point (1D, 2D or 3D for a reference point, 2D or 3D for a target point), which you can easily do by simply checking/clearing the check buttons associated with **DE**, **DN** and **DH**.

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. In this tab, opposite these results, a diagram illustrates the position solution. As shown in the examples below, the radius of the circle represents the 2D projection of the specified **acceptable deviation**:

A. Target point whose solution is located within the acceptable deviation limit (vertical flag and segment in green):
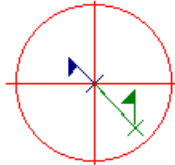
B. Target point whose solution is located outside the acceptable deviation limit (vertical flag and segment in red):
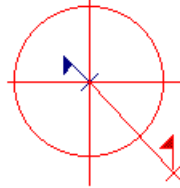
C. 3D target point whose solution is located outside the acceptable deviation limit due to the vertical component of the deviation (vertical flag and segment in red although they remain within the circle):
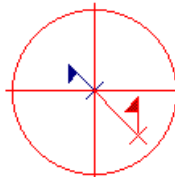
A new (read-only) tab is added (**Details**) containing the complete
description of the position solution:

Date	Date & time of survey
Origin	Name of the job during which the point was surveyed
Operator	Name of the operator who made the job
Process	Name of the processing method used (LRK A, LRK R, etc.)
GNSS radio button	Check this button to display the WGS84 coordinates of the position solution. This causes the lower part of the dialog box to show all the components of this solution. The definition of the vertical components (H84 and DH) are recalled graphically on the diagram in the right-hand part of the dialog box
L84, G84, H84	WGS84 coordinates of the antenna
DH	GPS antenna height above the ground when surveying the point
Correlation Matrix	Components of the correlation matrix
DGNSS radio button	Check this button to display the WGS84 coordinates of the reference station used in the surveying of the point. This causes the lower part of the dialog box to show the identification and coordinates of this station, as received by the roving unit through the data link. The distance and direction to the target point are illustrated on the diagram in the right-hand part of the dialog box. The illustration includes scale information. The station identification is also recalled in this diagram.
L84, G84, H84	WGS84 coordinates of the reference station, as received by the roving unit
Baseline	Measured distance between target point and reference station
Correlation Matrix	As the correlation matrix in fact qualifies the baseline measurement rather the position solution alone, it is maintained in the lower part of the dialog box, whether the GNSS or the DGNSS button is checked.

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Editing a logged point

Same as a planned point except that neither a target nor a deviation error is reported in the **General** tab

Editing a planned point surveyed through offset procedure

General	Offsets	P1	P2	

or

General	Offsets	P1	P2	P3	P4	

In the toolbar, select [cursor icon] and then double-click on the surveyed point (whether a reference point or a target point). The dialog box which then appears includes the following additional information, compared with the same dialog box before surveying the point:

In the **General** tab

- While only the **Target** radio button could be checked before the survey, you can now check the **Result** or **Error** radio button:

    . Checking the **Result** radio button will cause the coordinates of the position solution to appear just below as **E**, **N** and **H**. Note that these coordinates are dimmed (no changes allowed)

    . Checking the **Error** radio button will cause the components of the deviation between the planned and measured position to appear just below as **DE**, **DN** and **DH** (necessarily all "0.000 m). The **Delta** figure just below stands for the modulus of the deviation vector (also "0.000 m).

- In this tab, opposite these results, a diagram illustrates the position solution (the target and the measured point necessarily coincide).

Additional tabs are shown: **Offsets** , **P1** , **P2** and possibly **P3** and **P4** in the case of "intersection" offset:

- The **Offsets** tab identifies the type of offset procedure that was performed in the field, provides the coordinates of the points involved in that procedure and locates precisely the planned point with respect to these points:

Mode	Lateral, linear or intersection
P1 P2 (P3 P4) radio buttons	Check the radio button corresponding to the point you want to display
E, N, H	Coordinates of the selected point (Pn)
P1P	(Lateral or linear offset only) Distance from P1 to the target (P)
P2P	(Lateral offset only) Distance from P2 to the target (P)
P is	(Lateral or linear offset only) Gives the location of the target with respect to the "oriented" segment [P2P1]. This means that if an observer is located at P2 and watches P1, then P will be seen either on the left or on the right side of this segment (as explained in the lower pane).

In this tab, opposite these results, a diagram illustrates the position solution:

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Lateral offset   Linear offset   Intersection offset
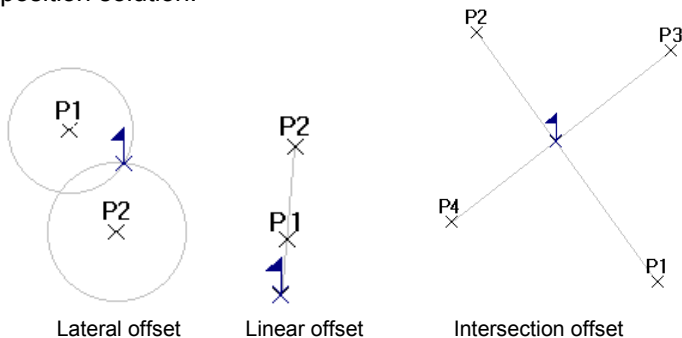
- Each of the **P1**, **P2**, **P3** and **P4 tabs** is much similar to the **Details** tab obtained for a point surveyed at its planned location:

Date	Date & time of survey
Origin	Name of the job during which P1, P2, (P3 or P4) was surveyed
Operator	Name of the operator who made the job
Process	Name of the processing method used (LRK A, LRK R, etc.)
GNSS radio button	Check this button to display the WGS84 coordinates of P1, P2, P3 or P4. This causes the lower part of the dialog box to show all the components of this solution. The definition of the vertical components (H84 and DH) are recalled graphically on the diagram in the right-hand part of the dialog box
L84, G84, H84	WGS84 coordinates of antenna at P1, P2, P3 or P4
DH	GPS antenna height above the ground when surveying the point
Correlation Matrix	Components of the correlation matrix
DGNSS radio button	Check this button to display the WGS84 coordinates of the reference station used in the surveying of P1 or P2. This causes the lower part of the dialog box to show the identification and coordinates of this station, as received by the roving unit through the data link. The distance and direction to P1, P2, P3 or P4 are illustrated on the diagram in the right-hand part of the dialog box. The illustration includes scale information. The station identification is also recalled in this diagram.
L84, G84, H84	WGS84 coordinates of the reference station, as received by the roving unit
Baseline	Measured distance between target point and reference station
Correlation Matrix	As the correlation matrix in fact qualifies the baseline measurement rather the position solution alone, it is maintained in the lower part of the dialog box, whether the GNSS or the DGNSS button is checked.

Editing a logged point surveyed through offset procedure

Same as a planned point surveyed in the same context, except that neither a target nor a deviation error is reported in the **General** tab

Exporting targets

This command allows you to generate a file containing the theoretical coordinates (targets) of points created in your project, or to create site records in the 3SPack database. This operation can be performed before or after field surveying. The format of the generated file (if this option is chosen) can be DXF or any user format.

- From the **Edit** menu or from the Map shortcut menu, select **Export Target...**

- In the **Export Target Positions** dialog box which then appears, click the **Add** button. A new box appears (**Browse** box) listing all the points present in the project.

- Select the desired points (multiple selection is possible using the Ctrl and Shift keys if necessary) and then click **OK**. The list of selected points now appears in the **Export** zone of the **Export Target Positions** dialog box.

  Note that this selection phase can be avoided if you select the desired points directly on the map *before* selecting the **Export Target...** command.

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- In the **Mode** combo box, specify whether you want to export the targets to a file or to 3SPack:

- **Exporting to 3SPack**
  - Simply click the **GO** button to let KISS export the targets of the selected points to the 3SPack database

- **Exporting to a file**

  - In the **In File** edit box, specify the path and name of the export file to be generated. To specify a path and name different from the default ones, directly type in the edit box or click ⬚ to quickly access the desired directory on the disk

  - In the **Format** combo box, select the desired file format. You can create or edit a user format through the **User Formats...** button. To create a new format, click the **New...** button. Then, for more information on how to create a user format, see *3-64*.

  - Click the **GO** button to let KISS generate the file and save it at the specified location

Exporting Results

This command allows you to generate a file containing the surveyed coordinates of points present in your project, or to create site records in the 3SPack database. This operation can be performed only if results are available for points present in your project. The format of the generated file (if this option is chosen) can be DXF or any user format.

  - From the **Edit** menu or from the Map shortcut menu, select **Export Results...**

  - In the **Export Result Positions** dialog box which then appears, click the **Add** button. A new box appears (**Browse** box) listing all the points present in the project.

  - Select the desired points (multiple selection is possible using the Ctrl and Shift keys if necessary) and then click **OK**. The list of selected points now appears in the **Export** zone of the **Export result Positions** dialog box.

Note that this selection phase can be avoided if you select the desired points directly on the map *before* selecting the **Export Results...** command.

- In the **Mode** combo box, specify whether you want to export the results to a file or to 3SPack:

- **Exporting to 3SPack**

    - Simply click the **GO** button to let KISS export the results of the selected points to the 3SPack database.

- **Exporting to a file**

    - In the **In File** edit box, specify the path and name of the export file to be generated. To specify a path and name different from the default ones, directly type in the edit box

      or click ⬚ to quickly access the desired directory on the disk

    - In the **Format** combo box, select the desired file format. You can create or edit a user format through the **User Formats...** button. To create a new format, click the **New...** button. Then, for more information on how to create a user format, see page *3-64*.

    - Click the **GO** button to let KISS generate the file and save it at the specified location

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Running computations relative to the coordinate system used

The corresponding commands, which are grouped in the **Tools menu**, should be used after surveying reference points materialized in the field.

The three main cases of use are described in page *12-41*.

Printing the report of a project

Use the usual buttons to print the report of a project:

- Select a printer and the few other print options through the **Print Setup** command from the **File** menu

- Print preview : use

- Print : use

The content of the report depends on the setting of the **include project points in to project report** check button in the **Report tab** of the KISS options.

If it was cleared, the report will print out in its shortest version:

- The first page shows a map of the work area, as currently viewed in the KISS window (same grab setting and scale)

- The second page lists the project details and indicates the counts of points according to type

- The third page provides a complete description of the coordinate system used

    If the **include project points in to project report** button was checked, the report will also include the user-set results table, as defined in the **Report tab** of the KISS options.

Saving a project

- In the toolbar, click 💾 or from the **File** menu, select the **Save** command.

Choosing the appropriate coordinate system

When creating a new project, you may be confronted with the problem of not knowing how to define the coordinate system to be used. The three cases described below are typical examples of applications where this choice may not be easy. The accompanying explanations will tell you what to do.

- **Guidelines:**

    - If the local system cannot be linked with the WGS84 system and you are mainly interested in the vertical coordinate of your points, then you should use the commands **Compute Local Grid** and **Compute Vertical Correction**

    - If you want to compute the datum shifts, use the corresponding command **Compute Datum Shifts**, and possibly the **Compute Vertical Correction** command if you want to change the altitude reference (for example you want to apply a correction on the STANAG geoid rather than on the WGS84 ellipsoid).

    - If you use a local grid, the **Compute Datum Shifts** command is made unavailable to you as it is irrelevant in this case.

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1st case: You cannot link your local horizontal system with the WGS84

- **Problem:**

  You want to work on a local horizontal system (a plane) but you do not know how to link this system with the WGS84.

  You know the exact coordinates, expressed in this local system, of a few reference points located within the work area. These points are materialized in the field.

- **What you should do:**

  - When creating your project, in the second tab (**Project Wizard - Horizontal System**), select <Unknown> for both the datum and the projection, or select a datum and a projection which might work in the area

  - On the view of the work region, place the known reference points with their local coordinates and create a job containing these points

  - Survey these 2D or 3D points in the field

  - Then, either from the field palmtop or using KISS (**Compute Horizontal Grid** command from the **Tools** menu), allow the system to determine a local grid after you select a number of these points to be involved in the processing.

  - If you chose an <Unknown> datum, then the WGS84 will be used in that processing

  - If you chose an <Unknown> projection, then a stereographic projection will be used in that processing, centered on the barycentre of the selected points.

  - After determining a local grid, KISS will provide the deviations between the local coordinates you defined (El, Nl) and the corresponding surveyed coordinates (after successively converting them into the intermediate projection and the local grid)

- If you think the results are satisfactory, you can validate the local grid. The icons of the reference points involved in the grid processing will then appear on the map, each of them marked with a "G" (see **graphic conventions**)

- **The theory behind this procedure...**

    - The user provides an intermediate transformation (or KISS finds an appropriate one if none is specified) making it possible to transform WGS84 coordinates (L84, G84, H84) into projected coordinates (Ei, Ni)

    - As some 2D or 3D reference points are known both in local coordinates (El, Nl, provided by user) and in WGS84 coordinates (after surveying), the intermediate transformation is used to convert the WGS84 coordinates of these points into projected coordinates (Ei, Ni), then through least-square processing, a transformation is found (linear shifts+angular shifts+scale change) allowing the (Ei, Ni) coordinates to be converted into (El, Nl) coordinates (on the local grid)

    - The following equations provide a mathematical model for the local grid:

    $$El = 1/k \, [\, (Ei+DE) \cos \beta - (Ni+DN) \sin \beta \,]$$

    $$Nl = 1/k \, [\, (Ei+DE) \sin \beta + (Ni+DN) \cos \beta \,]$$

    However, the values of Ei and Ni are generally large and k is of the order of 1. This means that Ei+DE and Ni+DN wil also be large. As a consequence, any error on β, however small it can be, will induce a significantly more important error on the local coordinates.

    - That is why a different mathematical model is now used, in this version of KISS, for local grids:

    $$El = E0 + 1/k \, [\, (Ei+DE) \cos \beta - (Ni+DN) \sin \beta \,]$$

    $$Nl = N0 + 1/k \, [\, (Ei+DE) \sin \beta + (Ni+DN) \cos \beta \,]$$

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As this model minimizes the values of Ei+DE and Ni+DN, the impact, on the local coordinates, of the possible error on β, is also minimized.

- Note that the following parameters can be user-set:

    (E0, N0): for example (0, 0) complies with a grid in the former KISS version

    and/or (DE, DN): for example (0, 0) for no linear shifts

    and/or k: for example "1" for no scale change

    and/or β: for example "0" for no angular shift

    The algorithm used will depend on the number of parameters fixed by the user

- Note also that a minimum of two reference points is required to determine a local grid (unless most of the parameters have been fixed)

2nd case: You cannot link your local vertical system with the WGS84

- **Problem:**

    - You want to work on a local vertical system (altimetric system) but you do not know how to link this system with the WGS84, or you want to use a global vertical system which you want to refine locally through a survey

    - You know the exact heights, expressed in this local system, of a few reference points located within the work area. These points are materialized in the field.

    - You would like the receiver to provide altitudes expressed on your local system

- **What you should do:**

    - When creating your project, in the third tab (**Project Wizard - Vertical System**), select any system

    - On the view of the work region, place the known reference points with their local coordinates and create a job containing these points

    - Survey these 1D or 3D points in the field

    - Then, either from the field palmtop or using KISS (**Compute Vertical Correction** command from the **Tools** menu), allow the system to determine a vertical correction after you select a number of these points to be involved in the processing

    - After determining a vertical correction, KISS will provide the deviations between the local heights you defined (Hl) and the corresponding surveyed heights (after successively converting them into the intermediate system and the local correction)

    - If you think the results are satisfactory, you can validate the local correction. The icons of the reference points involved in the vertical correction processing will then appear on the map, each of them marked with an "H".

    - Note that 3 reference points minimum have to be surveyed to determine a plane correction. KISS will however be able to determine an average vertical correction from one or two of these points.

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- **The theory behind the procedure...**

    - The user chooses a vertical system (datum or geoid model) that is suitable for the work area, allowing the system to compute an intermediate altitude Hi, not very different from the local altitude Hl

- As some 1D or 3D reference points are known both in local coordinates (Hl, and possibly El and Nl, provided by user) and in WGS84 coordinates (after surveying), the intermediate transformation is used to compute Hi from the WGS84 coordinates of these points, then through least-square processing, a plane correction (DH) is found —a function of both L84 and G84— which will be used to determine Hl from Hi.

The local correction is a plane correction. We have:

$$Hl = Hi + Delta$$

The expression of Delta is:

$$Delta = dH + Gl\ (L84 - L0) + Gg\ (G84 - G0)$$

Where:

> *(L0, G0)* are the WGS84 coordinates of the central point (the barycentre of the selected reference points)
>
> *dH* is the correction at the central point
>
> *Gl* and *Gg* are the gains defining the amount of correction to be applied along the latitude and longitude axes (plane slopes)

NOTICE: Applying a plane correction does not necessarily mean that the resulting vertical system is also a plane. Remember that the correction operates on an intermediate system which is not a plane.

3rd case: You are working with a standard coordinate system but the datum shifts are not accurately known

- **Problem:**

    - You want to work on a standard coordinate system (ellipsoid and projection are known) but you do not know how to link the ellipsoid of this system with that of the WGS84 (i.e. datum shifts unknown)

    - You know the exact coordinates, expressed in this local system, of a few reference points located within the work area. These points are materialized in the field.

    - You would like to determine the datum shifts in order to complete the definition of your coordinate system. A transformation system would then be available allowing the points surveyed in WGS84 coordinates to be converted into local coordinates.

- **What you should do:**

    - When creating your project, in the second tab (**Project Wizard - Horizontal System**), specify the projection used in the local system, then edit the datum. In the present case, only the two parameters 1/F and A are known.

    - On the view of the work region, place the known reference points with their local coordinates and and create a job containing these points

    - Survey these 1D, 2D or/and 3D points in the field

    - Then, from KISS, using the **Compute Datum Shifts** command from the **Tools** menu, allow the system to determine the datum shifts after you select a number of these points to be involved in the processing. Note that this computation cannot be performed from the field palmtop.

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2D and 3D reference points are used to determine the datum shifts

1D and 3D reference points are used to determine the vertical correction to be applied to any altitude expressed on the WGS84 ellipsoid.

- At the end of the processing, KISS will provide: 1) the horizontal deviations between the local coordinates you defined (El, Nl) and the corresponding coordinates surveyed in WGS84 after converting them using the newly determined transformation including the new datum shifts; 2) the vertical deviations between the local altitudes you defined (Hl) and the altitudes surveyed in WGS84 after correcting them for the local correction

- If you think the results are satisfactory, you can validate the datum shifts. The icons of the reference points involved in the processing will then appear on the map, each of them marked with a "D" and an "H". (see page *12-4*).

- **The theory behind this procedure...**

  - The user chooses a projection and a datum for which only A and 1/F are known

  - As some 1D, 2D and/or 3D reference points are known both in local coordinates (provided by user) and in WGS84 coordinates (after surveying), the projection and datum are used to determine the geocentric coordinates of these points on the user datum. Then, through least-square processing, the datum shifts are computed by comparing the obtained coordinates with the WGS84 geocentric coordinates surveyed in the field.

    NOTE: Experimentation has proven that planimetric results are much better if the angular shifts RX, RY and RZ are forced to zero thus limiting the processing to determining only the linear shifts DX, DY, DZ, and the scale factor k. However, altimetric results obtained through this processing are not as good as in planimetry

For this reason, our ultimate choice in terms of processing now consists of a datum shifts computation based on the determination of 4 parameters (DX, DY, DZ, k), followed by the computation of a vertical correction to be applied to altitudes measured above the WGS84 ellipsoid.

Computing datum shifts

One of the following two methods can be used when asking for the computation of the datum shifts:

1st choice: (check the upper-right button)

A new horizontal system (DX, DY, DZ and K) will be determined from the specified 2D and 3D reference points. A new vertical system (a linear correction model to be applied to WGS84 altitude) will be determined as well from the specified 3D and 1D reference points.

The reference points used will be annotated "D" for those involved in the determination of the datum shifts and / or "H" for those involved in the altimetry computation.

2nd choice: (check the lower-right button)

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The following parameters will be determined from the specified 3D reference points: DX, DY, DZ, K, RX, RY, RZ. Then, the new datum will be validated in both the horizontal and vertical systems (altitudes will be expressed on the new datum, without any corrections). The reference points used will then be annotated "D".

Warning! Although this 2nd method is very attractive —the resulting system is a standard one— it is however more sensitive than the 1st one to errors introduced when logging the reference points in the field (the resulting errors on the computed rotation parameters, however small they may be, will produce significantly larger errors on coordinates when converting them into the new system).
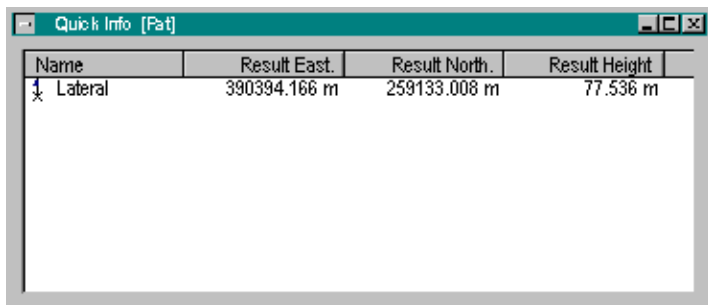
Quick Info window

The **Quick Info** window is as a very useful complement to the map view. Basically, the **Quick Info** window displays a row of interesting variables, such as planned, surveyed coordinates, etc., for any point you select on the map.

The **Quick Info** window is entirely user-configurable, which means that you can choose which variables you would like to display for the selected point(s). Moreover, the **Quick Info** window is fully independent of the map view: you use it only when needed.

Opening the Quick Info window

-   From the menu bar, select **View** and then **Quick Info**

    or, from anywhere within the window of an open project, click with the right-mouse button and select **Quick Info** from the shortcut menu which then appears.

    The **Quick Info** window then appears with the current settings. If points are currently selected, the **Quick Info** window will display rows of data relative to these points.

-   You can sort the data rows (in order of **name** for example) by clicking the title bar of the corresponding column (i.e. the **Name** column in our example).

Setting the Quick Info window

1. Open the **Quick Info** window

2. Position the pointer anywhere in the **Quick Info** window

3. Click with the right-mouse button and select **Settings...**
    from the menu which then appears.

    A dialog box appears in which you can configure
    everything you would like the **Quick Info** window to show
    when you select a point on the map. Configuring this
    window is much similar to configuring the information
    supplement to be added to the **project report**. The content
    of the dialog box is described below:

Categories combo box	Allows you to select one of the 3 main categories of variables which are: General, Offsets, Details
Variables list box	Lists the available variables for the selected category (see combo box above)
Columns list box	Each variable contained in this list defines a column in the results table (top of the list: leftmost column)
List trajectory points check button	If checked, all the points in existing trajectories will appear in the Quick Info window, as are all the isolated points. If cleared, each trajectory will occupy a single row in the window (only the trajectory name will be reported).

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- **Adding a parameter column to the Quick Info window**

  Unless already done:

  1. Open the **Quick Info** window

     - From the menu bar, select **View** and then **Quick Info**

       or, from anywhere within the window of an open project, click with the right-mouse button and select **Quick Info** from the shortcut menu which then appears.

  2. Position the pointer in the title bar of the **Quick Info** window

  3. Click with the right-mouse button and select **Settings...** from the menu which then appears.

  Then:

  4. In the **Variables** list box, select the variable for which you want to create a new column in the Quick Info window. Use the vertical scroll bar, or after clicking any visible variable press the vertical direction keys, to access the desired variable

  5. Click located between the **Variables** list box and the **Columns** list box. This causes the selected variable to appear at the end of the **Columns** list box (hence as the rightmost column of the Quick Info window).

- **Changing the order of columns within the Quick Info window**

  The Variables-to-Columns assignment is as follows

  > First variable in the **Columns** list box → printed in leftmost column of Quick Info window
  >
  > ...
  >
  > Last variable in the **Columns** list box → printed in rightmost column of Quick Info window

  Changing the order of columns in the Quick Info window is obtained by changing the order of variables in the **Columns** list box:

  Unless already done:

  1. Open the **Quick Info** window

     - From the menu bar, select **View** and then **Quick Info**

       or, from anywhere within the window of an open project, click with the right-mouse button and select **Quick Info** from the shortcut menu which then appears.

  2. Position the pointer in the title bar of the **Quick Info** window

  3. Click with the right-mouse button and select **Settings...** from the menu which then appears.

  Then:

  4. In the **Columns** list box, select the variable you want to move to another location within the list

  5. Click the **Move Up** or **Move Down** button to move the variable to the desired place.

     Note that the "Name" variable is necessarily the first variable in the list (hence appearing in the leftmost column of the Quick Info window).

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- **Removing a column from the Quick Info window**

  Unless already done:

    1. Open the **Quick Info** window

       - From the menu bar, select **View** and then **Quick Info**

         or, from anywhere within the window of an open project, click with the right-mouse button and select **Quick Info** from the shortcut menu which then appears.

    2. Position the pointer in the title bar of the **Quick Info** window

    3. Click with the right-mouse button and select **Settings...** from the menu which then appears.

  Then:

    4. In the **Columns** list box, select the variable you want to remove from the Quick Info window

    5. Click the **Remove** button. The column corresponding to that variable immediately disappears from the Quick Info window

       Note that you cannot remove the "Name" variable.

- **Adjusting column width**

  Unless already done:

    1. Open the **Quick Info** window

       - From the menu bar, select **View** and then **Quick Info**

         or, from anywhere within the window of an open project, click with the right-mouse button and select **Quick Info** from the shortcut menu which then appears.

Then:

    2. Position the pointer on the right of the desired column (pointer shape: ✛):

        - Drag to the right to increase the column width, or to the left to decrease it

        or double-click to adjust the column width to the longest word in the column

- **Sorting the data rows into alphabetical or numerical order**

  (according to the content of a column)

  Unless already done:

    1. Open the **Quick Info** window

        - From the menu bar, select **View** and then **Quick Info**

        or, from anywhere within the window of an open project, click with the right-mouse button and select **Quick Info** from the shortcut menu which then appears.

Then:

    2. Click in any of the column headings (gray areas) to sort the data rows according to the data in the corresponding column

    If you click on the "Name" heading for example, data rows will be listed in alphabetical order (ascending or descending) according to "Name". If you click on "Name" again, data rows will be listed in reverse order.

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Changing the options of KISS

- In the toolbar, click or from the menu bar, select **Tools** and then **Options**. A dialog box appears in which you can set the options of the KISS module. The dialog box contains the following three tabs.

General Tab

Acceptable deviation between target and surveyed coordinates text box

Enter the maximum distance allowed between the planned (target) and the measured position. The **Delta** figure, obtained after retrieving the results of the survey, will be compared to this maximum distance. If it is less, then the point will be shown in green on the map, otherwise it will be shown in red (thus signaling that the measured position is different from the planned position by more than the acceptable deviation).

The acceptable deviation is shown graphically in the properties of any target point as a circle centered at the planned location. It should be noted that this circle only represents the acceptable deviation **in the horizontal plane**. This means for example that if the solution of a 3D point is represented by a red icon although it is located within the circle, you should infer that the cause of this can only be a too high vertical deviation in the solution of this point.

Maximum count of points allowed in a job file text box

Limiting the number of points in a job is recommended as the memory space in the palmtop is not unlimited, and besides preserves the processing speed of the palmtop (default value: 1000).

Operators pane

> Allows you to create the list of operators usually in charge of performing your field surveys. KISS will ask you to choose an operator from this list when writing a job to PCMCIA.

Geocodes pane

> Allows you to create a list of geocodes. The pane contains two columns: the first one lists the geocodes you define, the second one the meaning of each of these geocodes.

> Contextual menu:

> From anywhere within the above two panes, a contextual menu exists allowing you to work on the Operators and Geocodes lists. To display this menu, click with the right-mouse button after positioning the mouse pointer anywhere within any of the two panes:

New Operator...	
New Geocode...	
Delete	Del
Properties	
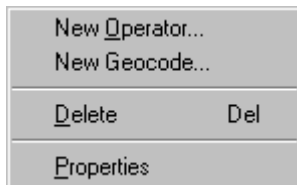
> (See page *12-63* for more information on how to work on the Operators and Geocodes lists).

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Transfer tab

> **Scorpio receiver series used :** Tick the button corresponding to the series of Scorpio receiver used (6500-to-6300 series, or former 6000 series)

Then depending on the above selection:

> **PC Card Drive :** Type the path of the PC card (default: E:\)

PC port to Husky : Select the port on your PC that you want to use to communicate with the Husky (via its serial port)

Transfer procedure reminder: Check or clear the **Remind me of...** check button, depending on whether you wish to be guided during the job transfer procedures or not.

When reading results... pane

This pane deals with all the anomalous events detected by KISS when reading results files after the field operator has completed a job. The pane gives access to four different options. A single option is displayed at a time. To proceed with the next choice, use the vertical scroll bar. For each option, check the button corresponding to your choice. You *must* choose an option in each of the four cases:

1 : If the coordinates of a reference point read from the results file are different from those of the same point in the active project:

○ Discard point read from the results file

○ Create a new point in the active project

○ Replace the initial coordinates with those read from the results file

2 : If the results file contains a reference position not defined in the active project:

○ Discard point read from the results file

○ Create a new point in the active project

3 : **If the coordinates of a planned target point read from the results file are different from those of the same point in the active project:**

⚪ Discard point read from the results file

⚪ Create a new point in the active project

⚪ Replace the initial coordinates with those read from the results file

4 : **If the results file contains a planned target point not defined in the active project:**

⚪ Discard point read from the results file

⚪ Create a new point in the active project

Report tab

This tab allows you to define the content of the document you can print from the active project.

Include Project Points into project Report check button

If you clear this button, the printout will only contain:

· A map of the region of survey, as currently shown in the KISS window

· A summary of the project (area, points, trajectories, etc.)

· the definition of the horizontal and vertical systems used

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If you check this button, the **With Next Settings** pane will appear in the lower part of the tab allowing you to complete the printout as defined above with a results table containing the information present in the **Print** list box below.

If the width of the results table you define cannot fit in a page, then the table will be split into several pages, each page containing the maximum number of columns, starting from the leftmost column, which can fit in the page.

Print	Combo box allowing you to tell KISS whether the results table in the report should contain all the points in the project (choose **All points**) or only the selected points (choose **Selected points**).
In Order of	Combo box allowing you classify the points in the results table according to a criterion that you specify here (up to 50 different criteria available).
With Next	
Settings pane	Allows you to define the content of the results table: see below.

Managing the table of variables appended to the project report

Categories combo box	Allows you to select one of the 3 main categories of variables which are: General, Offsets, Details
Variables list box	Lists the available variables for the selected category (see combo box above)
Columns list box	Each variable contained in this list defines a column in the results table (top of the list: leftmost column)
List trajectory points check button	If checked, all the points in existing trajectories are described in the results table, as are all the isolated points. If cleared, the trajectory will occupy a single row in the results table (only its name will be reported).

- **Adding a parameter column to the results table**

    - In the **Variables** list box, select the variable for which you want to create a new column in the results table. Use the vertical scroll bar, or after clicking any visible variable press the vertical direction keys, to access the desired variable

    - Click ⟩⟩ located between the **Variables** list box and the **Columns** list box. This causes the selected variable to appear at the end of the **Columns** list box (hence as the rightmost column of the results table when next printing it).

- **Changing the order of columns within the results table**

    The Variables-to-Columns assignment is as follows:

    > First variable in the **Columns** list box → printed in leftmost column of results table
    >
    > ...
    >
    > Last variable in the **Columns** list box → printed in rightmost column of results table

    Changing the order of columns in the results table is obtained by changing the order of variables in the **Columns** list box:

    - In the **Columns** list box, select the variable you want to move to another location within the list

    - Click the **Move Up** or **Move Down** button to move the variable to the desired place.

        Note that the "Name" variable is necessarily the first variable in the list (hence printed in the leftmost column of the results table).

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- **Removing a column from the results table**

    - In the **Columns** list box, select the variable you want to remove from the results table

    - Click the **Remove** button. When next printing the results table, the column corresponding to that variable will no longer print

    Note that you cannot remove the "Name" variable.

Managing Operators & Geocodes list

Unless already done, in the toolbar click 🖻 and select the **General** tab to access these two lists.

Use the procedures below to update your Geocodes list. The same procedures can be used when working on the Operators list.

- **Creating a new geocode**

    - Click the **New Geocode...** button or from the shortcut menu, select **New Geocode...**

    - Type the code and meaning of the new geocode in the dialog box which then appears

    - Click the **OK** button. The new geocode appears in the geocode list. Its position in the list results from the last sorting criterion (see below).

- **Correcting the definition of a geocode**

    - Select the geocode you want to correct

    - From the **contextual menu** , select **Properties**

    - In the dialog box which appears, correct the definition of the geocode (code and/or meaning) and then click **OK.**

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- **Sorting geocodes into alphabetical order**

    - Click in any of the two column headings (gray areas containing the words "Code" and "Meaning").

    If you click on the "Code" heading for example, geocodes will be listed in alphabetical order (ascending or descending) according to "Code". If you click on "Code" again, geocodes will be listed in reverse order (same behavior if you click on "Meaning").

- **Adjusting column width**

    - Position the pointer on the right of the desired column
      (pointer shape: ✛):
        . Drag to the right to increase the column width, or to
          the left to decrease it

        . Or double-click to adjust the column width to the
          longest word in the column.

- **Removing a geocode from the list**

    - Select the geocode you want to remove

    - From the **contextual menu** , select **Delete**.

Map commands

You will probably need to use the following commands when you work on a project.

Map window status bar

For the active project, the status bar of the KISS window permanently indicates the total number of points in the project, the number of currently selected points and the number of hidden points.

Showing/hiding the Map grid

Click ▦ in the toolbar to show/hide the map grid. This button operates as a toggle. You can also select the **Grid** command from the **View** menu. This command also operates as a toggle.

Showing/hiding the ruler

Click 🗒 in the toolbar to show/hide the ruler. This button operates as a toggle. You can also select the **Ruler** command from the **View** menu. This command also operates as a toggle.

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Showing/hiding map details

Click ▱ in the toolbar to show/hide the map details. You can also select the **Map** command from the **View** menu. This command also operates as a toggle.

Maps are bitmap files obtained with scanners. They must be stored in the **Maps** object of the 3SPack database to be used by KISS.

Hiding/Focusing on/Showing... Points

To make it even easier for you to handle your surveys, KISS offers three different viewing commands relative to the points shown on the map. The three commands are accessible either from the Map shortcut menu or from the **View** menu. These three commands are:

Hide	Hides the selected point (or points)
Focus	Performs Zoom To Fit action based on the current selection of points. In the same time, hides all other points.
Show...	Gives access to a points list in which you can check the points you want to hide or clear the points you want to show. The number of currently hidden points is indicated in the status bar of the KISS window. Asking for a point to be hidden means that both the icon and the name, if shown, will be hidden.

Use Notes:

While both **Hide** and **Focus** directly act upon the current selection of points, **Show...** on the contrary makes an inventory of the hidden and non-hidden points. From this list you can decide on what changes should be made concerning the presence or not of points on the map. Changes can be made either individually, by checking/clearing the corresponding check buttons, or globally using the **Hide All** or **Show All** button.

Note that the **Show...** command is not contextual (no selection of points required to access this command).

Selecting all points

After clicking to view all the points, drag to create a rectangle that encloses all the points, or from the **Edit** menu, select the **Select All** command.

Selecting a point on the map

In the toolbar, click [ ] and then click on the point you want to select. If shown, the point name turns white with dark-blue background

To add another point to the selection, hold down the Shift or Ctrl key while clicking on the second point. If necessary, add other points to the selection by repeating this action.

To select several points at the same time, drag to create a rectangle that encloses all of the points you want to select. Selection is effective after you release the mouse button.

To remove a point from the selection, hold down the Ctrl key while clicking this point.

To cancel a selection, click in the map where there is no point.

Moving the map within the KISS window

- In the toolbar, click [ ] or from the **View** menu, select the **Grabber** command

- Move the mouse pointer onto the map. This causes the pointer shape to change to a [ ]

- 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.

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Deleting points

Select these points (using the **Select** or "**Select Where**" function) and then press the **Del** key. A message will then ask you to confirm the Delete operation. The points will definitively disappear from the map if you click the **Yes** button.

Selecting points according to a number of preset criteria: "Select where"

The "Select Where" function is very useful when you need to select a large number of points meeting one or more criteria. After you specify this criterion (or these criteria), KISS will be capable of selecting these points for you in no time.

In addition, you can restrict the selection of points meeting the criteria by drawing a rectangle on the map (after specifying your criteria). By doing this, only the points meeting the criteria and located inside this rectangle will be effectively selected.

- In the toolbar, click or, from the menu bar, select **Draw** and then **Select Where**. A new dialog box appears in which you can do the following:

Criteria pane

Add button	Click this button to add a new criterion. A new dialog box appears ("Add criterion" dialog box) in which you can build the expression of the new criterion
	Click **OK** when the expression of the criterion is complete. The criterion then appears in the list box of the "Select Where" dialog box.
	Resume this operation until all the required criteria are shown in the list box.
Edit button	Click this button after selecting a criterion which you want to modify. A new dialog box appears ("Add criterion" dialog box) in which you can change the expression of this criterion. Click OK when you agree with the new expression of the criterion. The list box in the "Select Where" dialog box is then updated accordingly
Delete button	Click this button after selecting a criterion which you want to delete. The criterion will then disappear from the list box

Query pane

You can save the set of criteria created in the list box as a file (a QRY file) so that it will be easy for you to use it again at a later date. You can also load a QRY file created earlier for this project (or for another project) in order to use the criteria contained in this file.

By default, QRY files are saved in the KIS directory, at the same level as the project folders.

Load button	Click this button to load a QRY file created earlier (default directory: KIS). After selecting a file, click the **Open** button. As a result, all the criteria held by this file appear in the list box of the "Select Where" dialog box
Save button	Click this button to save the displayed criteria as a QRY file (default directory: KIS). After naming the file, click the **Save** button. As a result, all the displayed criteria are saved into this file.

Select points that match… Check one of the following options:

"**At least one of the following criteria**" : any tested point meeting any of these criteria will be selected

or "**All the following criteria**" : only the tested points meeting *all* the criteria will be selected

- At the foot of the dialog box, check one of the following options

"**and match cursor selection as well**" : only the points in the area that you will drag with the mouse pointer will be tested to see if they match the criteria.

or "**without cursor selection**" : all points in the project will be tested to see if they match the criteria.

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Zoom In/Out/to Fit

- **Zoom in**

    - In the toolbar, click [🔍+] or from the **View** menu, select the **Zoom In** command

    - Move the mouse pointer onto the map. This causes the pointer shape to change to a ⊕

    - Position the pointer in the area from which to zoom in and click with the left mouse button. As a result the window displays a magnified view of the area, centered around the clicked point

    - You can zoom in repeatedly (i.e. so long as the mouse pointer looks like a ⊕).

- **Zoom out**

    - In the toolbar, click [🔍−] or from the **View** menu, select the **Zoom Out** command

    - Move the mouse pointer onto the map.

        This causes the pointer shape to change to a ⊖

    - Position the pointer in the area from which you want to zoom out and click with the left mouse button. As a result the window displays a larger-scale view centered around the area

    - You can zoom out repeatedly (i.e. so long as the mouse pointer looks like ⊖).

- **Zoom To Fit**

    - In the toolbar, click [🔍] or from the **View** menu, select the **Zoom To Fit** command.

        This causes the map to be re-adjusted (through a zoom-and-grab operation) so that it can view all the objects you have defined for the project.

Measuring a segment on the map

- Move the pointer to the toolbar and click [icon] or from the **View** menu, select the **Distance** command.

  This causes the pointer to change to [icon]

- Move the pointer to an end of the segment and start dragging the pointer toward the other end. From that moment, KISS will provide the value of distance (with red background) between the initial point and the one currently pointed by the mouse until you release the mouse button:

- Once the pointer accurately coincides with the second point, read the distance measured and then release the mouse.

  After releasing the mouse, the pointer shape is still [icon] meaning that KISS is ready to measure a new segment.

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A review of the KISS commands

File menu commands

New	Creates a new project
Open...	Opens an existing project
Close	Closes the active project (or the Projects window if it's the only open window)
Save	Saves the active project
Save As...	Saves the active project under a new name thus creating a new project
Print...	Prints the active project
Print Preview	Displays the active project as it would appear printed
Print Setup...	Selects a printer and printer connection
Report Setup...	Shows the **Report** tab from the KISS options dialog box. Allows you to define the content of the printout for the active document
{Recent files}	Names of the projects last opened using KISS
Exit	Exits KISS

Edit menu commands

Copy	Copies the map to the clipboard
Delete	Deletes the current selection
Select All	Selects all the objects placed on the map
Change Into	Allows a target point to be changed into a reference point (or logged point) or vice versa
Reset Results	Deletes the available results of survey for the current selection of points
Import Target...	Imports targets from one or more files, or from 3Spack data base
Export Target...	Exports the target of each selected point to 3Spack or to a file

Import Results... Imports position solutions either from a file or from 3SPack

Export Results... Exports the position solutions of the selected points to 3Spack or to a file

Properties… Shows the **Project properties** dialog box as was defined for the active project, or shows the properties of the selected point (only if there is a single point selected).

View menu commands

Zoom In Magnifies the map, by one zoom-in step, around the clicked point

Zoom Out Shrinks the map, by one zoom-out step, around the clicked point

Zoom To Fit Adjusts the zoom so that all the points defined on the map can be viewed

Grabber Moves the map in the direction in which you drag the mouse pointer. The move is effective only after releasing the mouse button.

Distance Activates a meter tool allowing you to know the distance between any two points: click the first point and drag the mouse pointer to the second one. Read the distance before releasing the mouse button.

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Hide Hides the selected point (or points)

Focus Performs Zoom To Fit action based on the current selection of points. In the same time, hides all other points.

Show... Gives access to a points list in which you can check the points you want to hide or clear the points you want to show. The number of currently hidden points is indicated in the status bar of the KISS window. Asking for a point to be hidden means that both the icon and the name, if shown, will be hidden.

Map	Shows/Hides all the geographical details other than the objects you have placed on the map using KISS
Ruler	Shows/hides the grid coordinates
Grid	Shows/hides the map grid lines
Names	Shows/hides the names of the points on the map
Toolbar	Shows/hides the toolbar
Status Bar	Shows/hides the status bar
Projects	Opens/closes the Projects window
Quick Info	Opens/closes the **Quick Info** window
84 Logged...	Active if results of a job include points logged on WGS84 because the horizontal system could not be determined. In this case, selecting this command opens a dialog box containing the names of all these points.
Results...	Edits the RES file that you select in a separate window, using a text editor much similar to WordPad. Each new record session is identified in the left-hand pane and the corresponding records are viewed in the right-hand pane.

Draw menu

Select	Allows you to select any point on the map
Select Where	Allows you to select the points meeting the active criteria. The criteria may be applied to all the points on the map, or only to the selection you make after selecting this function
Reference Points	Lets you create a reference point at the location that you click with the left-mouse button.
Target Points	Lets you create a target point at the location that you click with the left-mouse button.

Transfer menu commands

Write Job... Writes all or part of the active open project, to PC card or palmtop as a job, under a name that you specify

Read Results... Reads the results of a job directly from palmtop (6x0x) or from PC card (600x)

Read Station Reads raw data files from PC card (recorded at a station)

Read Mobile Reads raw data files from PC card (recorded by a rover)

Read Notes Reads notes from palmtop (6x0x only)

Tools menu

Geoids... Runs the Geoids module

Compute Datum Shifts... Computes or refines the datum shifts of a standard coordinate system after surveying a few known reference points in this system

Compute Horizontal Grid... Computes or refines a local grid after surveying a few known reference points on this grid

Compute Vertical Correction... Computes or refines a local vertical system after surveying a few known reference points in this system

For the above three commands, see page *12-41*.

Test Transfo... Opens a dialog box allowing you to test the coordinate system used

Options Opens the Kiss Options dialog box.

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Window menu

Cascade	Arranges all the open files in cascade configuration
Tile	Places all the open files side by side according to a vertical arrangement
Arrange Icons	Auto-arranges all iconized files (icons are moved to the lower part of the KISS window and arranged horizontally starting from the left)
Close All	Closes all the open project files
{File list}	The names of the currently open project files are listed here to let the user choose a new active file directly from this menu.

Help menu

The Help menu offers the following commands, which provide you assistance with this application:

Index	Displays the opening screen of Help
Using Help	Displays instructions for using Help
About KISS	Displays the version number of KISS

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13. SISS Module

Preamble

Introduction

- **SISS** (Seismic Information Support Software) comes as one of the optional modules of 3SPack. It is specifically intended for **seismic** land surveys performed with DSNP DGNSS equipment using the DSNP LRK® real-time & long-range processing method.
- SISS is used at the beginning of field operations to create a project. There are three different ways of creating a project: from a points file with or without auto link statement , from the Grid Generator, or creating an empty project for logging-only operations.
- SISS then provides a view of your work area. It is a good idea to have the map of this area scanned and the resulting bitmap file moved to the 3SPack Supervisor database (Maps object). This will give you the ability to show/hide the details of the area as you create your target points.
- In the next stage, SISS will let you write jobs directly on palm computers (6x0x) or on PC cards (former 600x). Field operators will just have to follow the instructions provided on their screens.
- After field operations, SISS will be used to retrieve the results of the jobs performed in the field.
- If raw data was recorded during the survey at the station and the rover (this is an option in the 650x-to 630x series), SISS will allow you to transfer this data to 3SPack, or to any other Post-processing software, so that you can compare the real-time results against those obtained using a post-processing method.
- SISS allows you to work on the results of your projects . For example you can validate the real-time or post-processed solution of a target point using various selection criteria. A number of import/export functions are available in different formats (SPS, DXF, Seismic, User). Points and results can easily be exchanged with the 3SPack database.

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Staking-out Modes

Select one of the following modes, depending on the type of survey you have to perform:

- **2D Mode: Staking out a line**

  The field operator will be allowed to mark a target point only after entering the acceptance strip (see diagram below). The direction of the acceptance strip is perpendicular to the line and centered around the theoretical location of the target. The half-width of the acceptance strip is defined when preparing the survey. It represents the distance of the perpendicular from the theoretical point to either edge of the strip. Typically the 2D mode is used to survey a single series of points (along a straight line or a polyline).

- **3D Mode: Staking out a grid**

  The field operator will be allowed to mark a target point only after entering the acceptance circle (see diagram below). The acceptance circle is centered at the theoretical location of the target. Its radius is defined when preparing the survey. Typically the 3D mode is used to survey a grid, i.e. several parallel lines (or a single line).
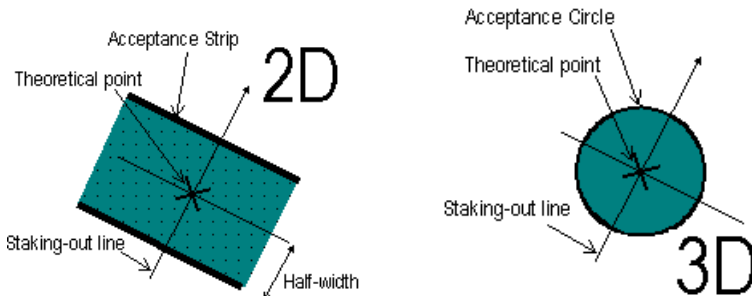
Graphic conventions used for target points

- **Before surveying**

    1. Each receiver point is represented by an empty square: □
    2. Each source point is represented by an empty circle: O
    3. The thickness of the icon tells you whether the point is still waiting to be transferred as part of a job, or this operation has already been made:

        Bold: still waiting to be transferred

        Thin: transfer has already been made
    4. The color of the icon changes when you select it with the mouse pointer:

        Selected: icon green, point name with dark-blue background

        Deselected: icon dark-blue, point name with yellow background
    5. A red line connected to this icon means that the point is "linked", i.e. it is part of a line. If it is not, it is said to be isolated, or "unlinked".

- **After surveying**

    6. A surveyed receiver point is represented by a full square: ■, which means that a solution is now available for this point.
    7. A surveyed source point is represented by a full circle: ●, which means that a solution is now available for this point.
    8. A logged point is represented by a flag: ⚑
    9. The color of any icon changes when you select it with the mouse pointer (same as 4. above)
    10. Validating a solution for a point results in the following icon:

        ✓● or ✓■
    11. ■ or ● denotes a point staked out at some distance from its theoretical location. The direction of the line in the icon is indicative of the deviation vector.

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- **Examples of icons for receiver points**
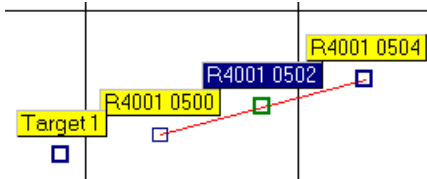
Target 1:   Isolated or unlinked point (no red line connected to this point)

Currently non-selected (square is dark-blue in color)

Not transferred yet as part of a job (square sides are bold)

R4001 0500:   Linked point (a red line starts from this point)

Currently non-selected (square is dark-blue in color)

Was earlier transferred as part of a job (square sides are thin)

R4001 0502:   Linked point (a red line passes through this point)

Currently selected (square is green in color, name with dark-blue background)

Not transferred yet as part of a job (square sides are bold)

R4001 0504:   Linked point (a red line ends at this point)

Currently non-selected (square is dark-blue in color)

Not transferred yet as part of a job (square sides are bold).

Project file structure

If you create a project called "PatBrixen", then this project will be represented as shown below, beside the Project Wizard icon in the Projects window. The following folder and file are then present in the **SIS** directory.

Later, the **PatBrixen** folder will be completed with results files (<job>.JRS), and possibly raw data files if during jobs, recording sessions were performed.

While working on a project, you may need to create **QRY** files. This type of file, which contains a number of criteria used to select points, is invoked when using the "Select Where " function. By default, **QRY** files are saved in the **SIS** directory:

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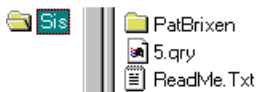
Using SISS before field surveying

Project creation algorithm

As shown in the diagram below, there are three possible ways of creating a project:
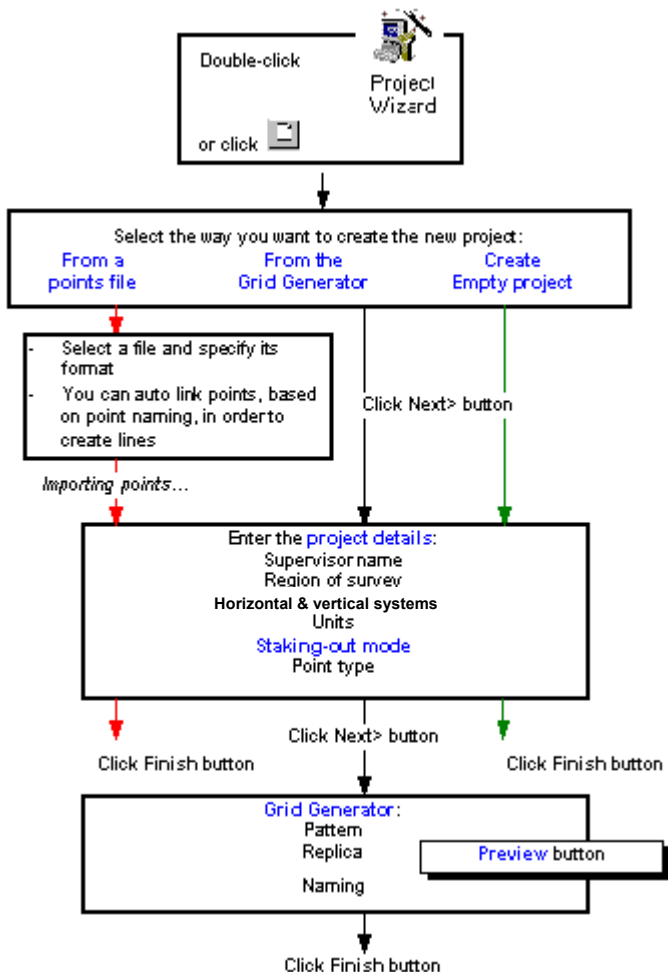
Creating a project from a points file

1. Choose this option if you want the new project to originate from a file containing a number of useful points. If you check this option, the following appears in the lower part of the tab:

Source file	Specify the name of the file from which to create the project. Click the **…** button to navigate to the directory containing the desired file (by default to Points directory). Once a selection is made, you can edit the file by clicking the **View File…** button.
Format	Select the option corresponding to the format in which the source file was saved (ASCII SPS, ASCII DXF or ASCII User)
Auto link points where names contain	Check this button if you want to link some of the points read from the source file in order to build a line (or a grid). In this case, it is assumed that each point name in the source file includes line and point number information. Only those points meeting the auto link statement will be linked (continued in page *13-16*).

2. Enter a name for the project, click the **Next>** button and then enter the project details in the **Project Wizard-Details** tab:

Supervisor	Enter the supervisor name (optional)
Region	Enter a label for the region of survey (a town, a village, a particular site, etc.) (8 characters max.; optional)
Horz. System	Specify a horizontal system from the drop-down menu (all the systems stored in the 3SPack database are prompted in this menu)
	If you are creating a project from an SPS file, then the coordinate system present in this file is automatically entered in this field.
Vert. System	Choose one of the vertical systems available. The vertical system is used to determine the Z coordinate of every point surveyed.

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Distances In	Specify the Distance unit chosen for the project (meters, US Feet or Imperial Feet)
Angles In	Specify the Angle unit chosen for the project (degrees or grades)
Notes text box	Add comments or recommendations of any kind which you want to associate to this project (optional). Press Ctrl+Enter to start a new line in this text box.
Mode	Specify the staking-out mode to be used in your project (2D or 3D)
Radius/Half Width	Enter the value of distance defining the radius of the acceptance circle (in 3D) or the half-width of the acceptance strip (in 2D)
Classification	Specify the point type ("Source" or "Receiver") (Preset if project created from a points file)

3. When you agree with the content of this tab, click the **Finish** button. Unless the corresponding button has been cleared in the **SISS Options** dialog box (see page *13-43*), the **Coordinate System** dialog box will now appear. This box lets you read the characteristics of the chosen coordinate system before definitively validating it for the project (you can still modify some of these characteristics if necessary).

4. Click **OK**. SISS now creates the new project. A map of the region of survey appears in the SISS window. In the same time, the project is saved in the SIS directory (Refer to page *13-5*, *Project file structure*).

If you now select the **Properties** command from the **Edit** menu, note that some of the fields are dimmed (no changes allowed).

Creating a new project from the Grid Generator

1. Choose this option if you want the new project to be created from the Grid Generator. After checking this option, do the following:

2. Enter a name for the project

3. Click the **Next>** button in the lower part of the tab and enter the details of the new project in the **Project Wizard-Details** tab:

Supervisor	Enter the supervisor name (optional)
Region	Enter a label for the region of survey (a town, a village, a particular site, etc.) (8 characters max.; optional)
Horz. System	Specify a horizontal system from the drop-down menu (all the systems stored in the 3SPack database are prompted in this menu)
Vert. System	Choose one of the vertical systems available. The vertical system is used to determine the Z coordinate of every point surveyed.
Distances In	Specify the Distance unit chosen for the project (meters, US Feet or Imperial Feet)
Angles In	Specify the Angle unit chosen for the project (degrees or grades)
Notes text box	Add comments or recommendations of any kind which you want to associate to this project (optional). Press Ctrl+Enter to start a new line in this text box.
Mode	Specify the staking-out mode to be used in your project (2D or 3D)
Radius/Half Width	Enter the value of distance defining the radius of the acceptance circle (in 3D) or the half-width of the acceptance strip (in 2D)
Classification	Specify the point type ("Source" or "Receiver") (Preset if project created from a points file)

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4. Click the **Next>** button in the lower part of this tab when you agree with its content.

5. In the **Project Wizard-Grid Generator** tab which then appears, enter the following:

Pattern pane: defines the length and orientation of the pattern line:

Origin Easting	Enter the easting of the point where the line starts
Origin Northing	Enter the northing of the point where the line starts
End point defined by	Check one of the following options:
	(1) Azimuth and number of points (origin excluded)
	(2) Azimuth and line length
	(3) Coordinates of end point
End Easting	If (3) checked, enter the easting of the point where the line ends
or	
Azimuth	If (1) or (2) checked, enter the azimuth angle of the line
End Northing	If (3) checked, enter the northing of the point where the line ends
or	
Line length	If (2) checked, enter the total length of the line (expressed in the chosen distance unit)
or	
Number of points	If (1) checked, enter the number of planned points along the line (start point excluded)
Inter-point Spacing	Interval of distance between any two consecutive points along the line.

Replica pane: defines other lines, based on the pattern line, to form a grid. If "2D" was selected in the previous tab, then this pane is irrelevant and is replaced by the message "single line!". If "3D" was selected, enter the following:

Inter-line spacing	Interval of distance, expressed in the chosen distance unit, between any two adjacent lines
Number of lines	Number of lines forming the grid (1 to 100)
Origin of line defines	Check "Right side of grid" if you want the grid to be generated to the left of the pattern line (thereby making this line the right side of the grid). Check the "Left side of grid" option to obtain the inverse result.

Naming pane: Defines rules allowing SISS to assign a name to each of the generated points:

Line	**Start**: In 2D, number of the line being created. In 3D, number of the pattern line. Only the last 4 characters entered in this field are validated.
	Step: In 3D only. Increment (100 max) allowing SISS to assign a number to each line other than the pattern line
	Example: Line Start =0300 and Line Step=5; then 1st line: 0300, 2nd line: 0305, 3rd line= 0310, etc.
Point	**Start**: In 2D and 3D, number of the first point in each line. Only the last 4 characters entered in this field are validated.
	Step: In 2D and 3D, increment (100 max) allowing SISS to assign a number to each point in each line
	Example: Point Start =1800 and Point Step=1; then 1st point: 1800, 2nd point: 1801, 3rd point= 1802, etc.
Prefix	Forced to "R" for receiver points
	Forced to "S" for source points.

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<u>**Preview** button</u>:

Before creating the project by clicking the **Finish** button, which is an irreversible operation, you can preview the grid that would be created from the current settings of the Grid Generator.

Example:

Grid preview (click **Show Grid** button):
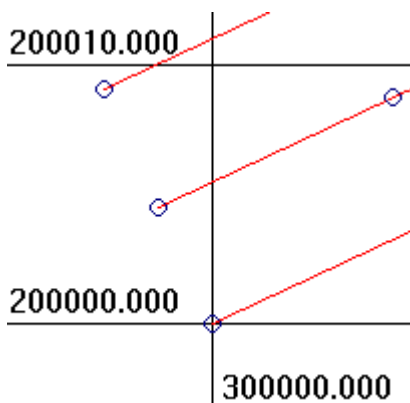
…and resulting names table (click **Show Names** button):

	Line 0	Line 1
Point 0	S4000 0500	S4001 050(
Point 1	S4000 0502	S4001 050(
Point 2	S4000 0504	S4001 050(
Point 3	S4000 0506	S4001 050(

6. When you agree with the content of this tab, click the **Finish** button. Unless the corresponding button has been cleared in the **SISS Options** dialog box (see page *13-43*), the **Coordinate System** dialog box will now appear. This box lets you read the characteristics of the chosen coordinate system before definitively validating it for the project (you can still modify some of these characteristics if necessary).

7. Click **OK**. SISS now creates the new project. A map of the region of survey appears in the SISS window. In the same time, the project is saved in the SIS directory see page *13-5*, *Project file structure.*

   If you now select the **Properties** command from the **Edit** menu, note that some of the fields are dimmed (no changes allowed).

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Creating an empty project

Use this option if you want to create a project for the sole purpose of allowing field operators to log points in the field. With this option selected, the project details you then need to specify are mainly the horizontal & vertical systems used and the work area (coordinates of center point and scale) (staking-out mode and point classification are irrelevant).

1. Check "Created empty for logging only"

2. Enter a name for your project

3. Click the **Next>** button and then enter the project details. in the **Project Wizard-Details** tab:

Supervisor	Enter the supervisor name (optional)
Region	Enter a label for the region of survey (a town, a village, a particular site, etc.) (8 characters max.; optional)
Horz. System	Specify a horizontal system from the drop-down menu (all the systems stored in the 3SPack database are prompted in this menu)
Vert. System	Choose one of the vertical systems available. The vertical system is used to determine the Z coordinate of every point surveyed.
Distances In	Specify the Distance unit chosen for the project (meters, US Feet or Imperial Feet)
Angles In	Specify the Angle unit chosen for the project (degrees or grades)
Notes text box	Add comments or recommendations of any kind which you want to associate to this project (optional). Press Ctrl+Enter to start a new line in this text box.
Center Easting	Enter the easting of the center point
Center northing	Enter the northing of the center point
Scale	Enter the scale of the map

4. When you agree with the content of this tab, click the **Finish** button. Unless the corresponding button has been cleared in the **SISS Options** dialog box (see page *13-43*), the **Coordinate System** dialog box will now appear. This box lets you read the characteristics of the chosen coordinate system before definitively validating it for the project (you can still modify some of these characteristics if necessary).

5. Click **OK**. SISS now creates the new project. A map of the region of survey appears in the SISS window. In the same time, the project is saved in the SIS directory refer to page *13-5*, *Project file structure*).

If you now select the **Properties** command from the **Edit** menu, note that some of the fields are dimmed (no changes allowed).

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Auto-link statement

(Continued from page *13-7*)

When creating a project from a points file, you can ask SISS to auto-link points on the basis of criteria that you specify after checking the **Auto link points where names contain** check button. The criteria are defined as follows:

A line number from… Specify the location of the line number within each of the point names.

To do this, tell SISS what are, in every point name, the first and last characters delimiting the line number. For example, if you select "0" and "2", SISS will regard the first three characters as the line number.

SISS will then create a link between all the points having the same line number.

A point number from… Specify the location of the point number within each of the point names.

To do this, tell SISS what are, in every point name, the first and last characters delimiting the point number. For example, if you select "3" and "7", SISS will regard the 4th character up to the 8th character as the character string holding the point number.

SISS will then create a line in which all the points having the same line number will be arranged in the order of their point numbers.

To help you complete the above 4 fields, use the text box located at the bottom of this tab and the three buttons (**Paste**, **L** and **P**). Follow the procedure below:

- After choosing a file, click on the **View File** button. This causes WordPad to be run to view this file

- In the window showing this file, extract a sample of this file by copying any line in which you can identify the location of the line number and the point number

- Come back to SISS and click the **Paste** button to paste the sample in the box beside this button

- In this sample, select the line number and click on the **L** button to complete the first two fields

- Still from this sample, select the point number and click on the **P** button to complete the last two fields.

Placing additional target points on the map

After creating a project from a file or the Grid Generator, additional target points can be placed directly on the map of the project to complete the list of target points to be surveyed.

The points that you add in this way are necessarily isolated "unlinked" points and of the same classification as those already present in the project (for example only "receiver" points can be added if the project already contains such points).

- In the toolbar, click ⊕ or from the **Draw** menu, select the **Target** command.

- Position the mouse pointer (now a ⊕) where you want to create a new target point. In the right-lower part of the SISS window, the status bar helps you locate the point accurately on the map by giving the current coordinates of the mouse pointer as you move it within the window:

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| 300801.462 | 198717.123 | | NUM | |

- When the mouse pointer is at the desired location, click with the left mouse button. This causes to **Point Properties** dialog box to open. This dialog box contains two tabs:

General tab

Name	A default name, of the type "Target n", is assigned to the point. "n" is the order number (n=1 if first point created, =2 if second point created, etc.). Change this name if required.
Notes text box	Add comments or recommendations of any kind which you want to associate to this point (optional). Press Ctrl+Enter to start a new line in this text box (5 lines max.).
	(All the other fields are dimmed).

Target tab

Target position pane	Adjust the E and N coordinates of this point if required. By default, all target points are 2D. On this tab however, you can change the target point into a 3D point by checking the "H:" button and then by entering the value of its height component.

- Click the **OK** button when the definition is complete. This causes a new Target Point icon to appear on the map.

- Position the mouse pointer where you want to create a second target point and resume the same operations as above. To stop creating target points, click any other button in the toolbar.

Forcing the azimuth angle

This command can be used in two different cases:

- You want the azimuth angle to be a round figure (45° is easier to use than 45.01248°!)

- You do not want the line to be used as the reference direction on which the roving unit will express the components of the offset, should the operator be unable to reach the target point.

    These 2 examples illustrate the role of the azimuth in the expression of an offset point:
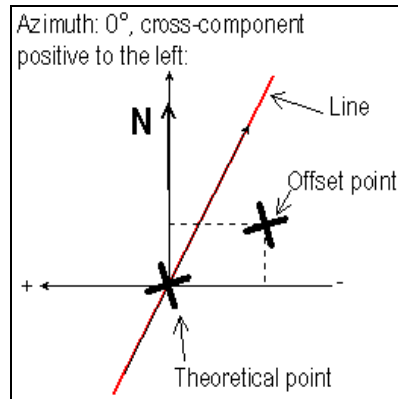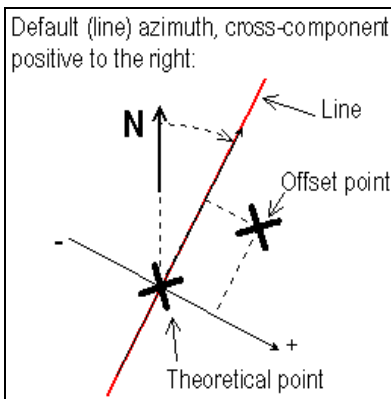
Changing this angle has no effect on the graphic representation of both the point and the link passing through this point.

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- **Procedure:**

  - Select the linked point or points for which you want the azimuth to be changed

  - From the **Edit** menu, select the **Azimuth** command. In the dialog box which then appears, do the following:

    Az Change or correct the azimuth angle

    With across line offsets positive Check one of the following options to orient the axis system on which the offset components will be expressed:

    To the right: the cross-component of the offset is positive if it is to the right of the theoretical point, seen from that point, and compared to the direction given by the azimuth

    To the left: the inverse statement.

  - Click **OK** to validate the changes. Note that these changes have no effect on the map. Edit the Target tab for one of the points to check that these changes are effective.

Linking/unlinking target points

When creating a project from a file, you may want to create links manually rather than let SISS create them for you. In this case, you will have to ensure that the Auto Link button is cleared before validating the new project. Here are the few rules which you should know before using the **Link** and **Unlink** commands from the **Draw** menu.

Whatever the staking-out mode used in the project (2D or 3D):

- Links (red lines) are systematically drawn for the current selection of points, in the order of creation of the points, starting from the oldest.

- Links can only be created on a selection of isolated target points. If a linked point is part of the selection, then SISS will make the **Link** command unavailable to you. In this case, only the **Unlink** command is valid, suggesting that the linked point in the selection should be unlinked.

- The azimuth of each linked point can be forced to any value (0.. 360°) using the Azimuth command

In 3D staking-out mode:

- SISS will stop a link at any point from which the next point could only be joined by changing the azimuth angle by more than ± 90°. In this case, the current line is stopped at this point and a new line is started from the next point (unless it is the last point of the selection in which case this point will remain an isolated point).

- By default, the same azimuth angle is assigned to all the points forming a line. This angle represents the direction of the straight line connecting the two ends of the link. This assignment will be done even if the link is not a straight line, but rather looks like a "polyline", due to the fact that all the points are not accurately aligned.

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In 2D staking-out mode:

- Unlike the 3D mode, the change in azimuth angle can take any value (0.. 360°). By default, the azimuth angle assigned to each point represents the direction of the line to the next point.

Editing the properties of a target point before field operations

Double-click on this point. A dialog box appears showing the properties of the target point. The dialog box consists of two tabs (General, Target). The amount of information shown on these tabs depends on whether the point is isolated or linked (i.e. it is part of a line).

General tab

Name   Target point name (read-only). This field is preceded by the classification icon (a square or a circle)

Check pane (read-only information):

Planned   Checked only after you write this point on PCMCIA as part of a job

Offset, Surveyed
Post processed
Validated   All these buttons necessarily cleared before field operations

Notes pane (read-write text box):

Add comments or recommendations of any kind which you want to associate to this point (optional). Press Ctrl+Enter to start a new line in this text box.

Target tab

Target position pane:

E, N, H	Theoretical coordinates of the point (Easting, Northing, Height)
	By default a 2-dimensional point (E and N checked and dimmed)
	If the point is linked , you cannot change E and N. If the point is isolated, you can still do it.
	To define a 3-dimensional point, whether the point is linked or isolated, check the H button and enter the H coordinate.

Target Lines pane (read-only information): shown only if a linked point

Az	Azimuth angle associated with the point. This information will be required when field operators have to offset the staking-out of a target point. In this particular case, the roving unit will express the components of the offset using an axis system whose origin is the theoretical location of the point and its orientation based on the direction given by this angle (see Expressing the components of an offset point).
	By default, this angle is the azimuth of the line connecting this point to the next point.
Across line offsets are positive	Check one of the following options to orient the axis system on which the offset components will be expressed:
	To the right: the cross-component of the offset is positive if it is to the right of the theoretical point, seen from that point, and compared to the direction given by the azimuth
	To the left: the inverse statement.
Mode	Staking-out mode (2D or 3D)
Radius/ Half-width	Defines the size of the acceptance area, (radius of acceptance circle in 3D, half-width of acceptance strip in 2D)
Classification	Receiver or source

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Acceptance area:

The upper-right corner of the dialog box shows the nature of the acceptance area:

> Linked point in 3D:

> A circle centered at the theoretical target point. The orientation of the horizontal axis is in compliance with the "Across line offsets are positive" selection at the foot of the Target tab. The line is always oriented upward.

> Linked point in 2D:

> A strip, perpendicular to the line, centered vertically around the theoretical target point. The orientation of the horizontal axis is in compliance with the "Across line offsets are positive" selection at the foot of the Target tab. The line is always oriented upward.

> Isolated point:

> No acceptance area (just a point)

Importing target points

When preparing a project, you can add points on the map by importing them from a file or from 3SPack.

As these points have no classification before being imported, SISS will give these points the same classification (source or receiver) as the one chosen for the project.

- From the **Edit** menu, select the **Import Target Points** command

- In the **Import Positions** dialog box which then appears, select the import mode (**Import From File** or **Import From 3SPack**). Then do one of the following:

- **Import From File**

  - Click the **Add** button to choose the file(s) from which to import points (default directory: ... /Points)

  - Select the desired file(s) and click the **Open** button. The selected files then appear in the **Import** list box.

    When appropriate, use the other two buttons associated with the **Import** list box (**Edit** and **Remove**) after selecting a file name from this box. Use the **Edit** button to edit the selected file (default editor: Wordpad). Click the **Remove** button to remove the selected file name from the **Import** list box (no targets will then be imported from this file).

  - In the **Format** pane, specify the format of the file (ASCII DXF or User). To create new user formats, click the **User formats** button and then the **New** button. Then refer to page *3-64*.

  - Click the **Go** button to start importing the points. The points will appear on the map after successful import operation (the map is adjusted through a zoom-to-fit-and-grab operation so that all the points can be viewed).

- **Import From 3SPack**

  - Same as from a file, except that clicking the **Add** button will display directly all the sites available from the 3SPack Database. Another difference is that you should specify which solution of the site should be imported (the **default** or **last** one).To make this choice, from the **Get 3SPack** pane, click the appropriate radio button.

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Exporting target points

- From the **Edit** menu, select the **Export Target Points** command.

- In the dialog box which then appears, select the export mode (**Export to File** or **Export to 3SPack**). Then do one of the following:

- **Exporting to a File**

  - Click the **Add** button to choose the target points to export from the active project (if you selected the points before selecting the **Export Target Points** command, then the points are automatically selected and you do not need to click **Add**)

  - Select the target points from the list and click the **OK** button

  - Define the export ASCII file by specifying its path, name and format (SPS, DXF or User)

  - Click the **Go** button to start exporting the target points. All the target positions of these points will be exported.

- **Exporting to 3SPack database**

  Same as **to a File**, except that you just need to specify (or pre-select) the points.

  - Click the **GO** button

    All selected points will be stored as Sites in the 3SPack database.

- **Creating new user formats for exporting results to a file**

  - Click the **User formats** button and then the **New** button. Then see page *3-64*.

Transferring jobs to a palmtop (6x0x series only)

- Connect the palmtop to the computer through a serial line.
- Select the **Tools>Options>Transfer** tab and check that the choices on this tab are appropriate (Scorpio 630x series selected, right choice for the port used on the PC to communicate with the Husky). Then click **OK**.
- Open the project in the SISS window
- If you want to focus on particular points, then select the corresponding icons. Otherwise, do not make any selection.
- In the toolbar, click or, from the **Transfer** menu, select the **Write Job** command.
- In the **Write Job…** dialog box which then appears, enter a name for the file which is going to be written to the palmtop (8 characters max.) or select an existing one from the list box which you will overwrite with the new job.
- Specify the content of the job:

Selected Points	This option should logically be checked if you have made a prior selection of points on the map (option dimmed otherwise)
Remaining Points	Check this option if you want the field operator to deal only with the points not surveyed yet (which supposes that a part of the project has already been made). With this option you do not need to make a prior selection.
All Points	Check this option if you want to make a job of the entire project.

- Click the **OK** button to write the job to the palmtop. The extension of a job file is J2D (2D staking-out), J3D (3D staking-out) or J0D (logging)

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Transferring jobs to a PC card (600x series only)

- Insert a card into the PC card reader of your PC.

- Select the **Tools>Options>Transfer** tab, then, in the **PC card drive:** field, indicate the location of the PC card drive on your computer. Clear or check the **Remind me of...** check button relevant to the PC card. Click **OK** to enter your choices. This closes the dialog box.

- Open the project in the SISS window

- If you want to focus on particular points, then select the corresponding icons. Otherwise, do not make any selection.

- In the toolbar, click or, from the **Transfer** menu, select the **Write Job** command.

- In the **Write Job…** dialog box which then appears, enter a name for the file which is going to be written to the PC card (8 characters max.) or select the existing one which you will overwrite with the new job.

- Specify the content of the job:

Selected Points	This option should logically be checked if you have made a prior selection of points on the map (option dimmed otherwise)
Remaining Points	Check this option if you want the field operator to deal only with the points not surveyed yet (which supposes that a part of the project has already been made). With this option you do not need to make a prior selection.
All Points	Check this option if you want to write the entire project.

- Click the **OK** button to write the job to the PC card. As there can only be a single file on the PC card, SISS will ask you to confirm the deletion of the file present on the card (if any) before writing the new job. Click **Yes** to confirm this choice.

  The file extension used when writing a job is in the form "J<x>" where x: staking-out mode. Two file extensions are therefore possible for staking-out operations: J2D and J3D. For logging operations, the file extension is J0D.

Deleting a project

Projects are deleted from the projects window. Only close projects can be deleted.

- In the projects window, select the corresponding icon and then press the Del key (or choose the **Delete** command from the **Edit** menu).

- Click **Yes** to confirm this choice.

When you delete a project, in fact you delete all the files stored in the corresponding project folder, and this folder. A project folder generally contains a SIS file, one or more JRS files and possibly raw data BIN files.

It may be useful to backup the project folder before deleting it from the SIS directory.

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How to quit SISS

·   From the menu bar, select **File** and then **Exit**. Unless an unsaved project is still open, this causes the **SISS** main window to be closed immediately.

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

Geoids module

This module allows you to import geoids, extract data from a geoid to create a smaller file containing just the necessary data for your working area, and load geoid models (partial or complete) directly into a Scorpio receiver (only if it is from the 650x-to-630x series).

Two geoid models are available in the Geoids module: RAF98 and EGM96

Starting the Geoids module:

-   On the **SISS 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 geoid). 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.

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Using SISS after field surveying

Retrieving the results of a job (600x series)

You do not need to work with the PC containing a project to read the results of a job prepared for this project. The only requirement is, of course, that 3SPack+SISS be installed and operating on this PC. If you work with the same PC, you can start the retrieve procedure by first opening the project from which the job was created.

- Insert the PC card from the field into the drive of your computer

· In the SISS toolbar, click 📂 or from the **Transfer** menu, select the **Read Results...** command. This action is also possible if there is no project open in the SISS window, which will be the case if you work on a PC other than the one used to create the project

- In the **Read Results** dialog box which then appears, select the job.

- Click the **OK** button. Once SISS has successfully retrieved the results of the job (a JRS file), these results appear directly on the map. All the points for which solutions are now available are selected . See page *13-3* to understand the meaning of the icons used.

If no project is open in the SISS window, or if the open project is incompatible with the results of the job, the PC card will restore the job as it was written earlier (this JxD file is still present on the PC card) and you will be asked to save this data as a new project. Then SISS will restore the solutions of the points surveyed during the job.

On transfer completion, a warning message will appear if particular events occurred during the transfer in relation with the **transfer options** chosen for SISS (see page 13-43):
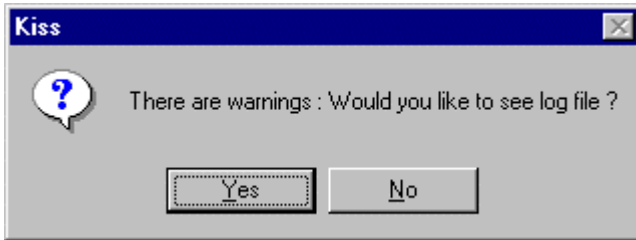
The message will prompt you to open the log file so that you can be informed of the nature of these events. If you click the **Yes** button, the log file will be opened using the WordPad text editor of Windows 95.

Outside this particular context, you cannot open the log file from SISS. If you need to open it at another moment, use Windows explorer (the log file is stored in ...\3SPack\bin under the name "SISS.log").

If raw data files are present on the card (raw data was recorded during the job by the rover), then these files will be copied to the corresponding project folder and renamed JOB_*.Dxx, where * : time (hhmmss) and xx : recording session number.

Retrieving the results of a job (650x-to-630x series)

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− Run **SISS** and open the project corresponding to the job completed in the field

− In the toolbar, click 🗂 or from the **Transfer** menu, select the **Read Results...** command. The **Read Results From...** dialog box then appears listing a number of job names.

  (This action is also possible if there is no project open in the SISS window, which will be the case if you work on a PC other than the one used to prepare the job.)

(If a project is open, this dialog box will list all the job files present in the palmtop for which result files exist. If no project is open, ALL the job files will be listed, regardless of whether result files exist for these jobs or not.)

– In the dialog box, select the job you have just completed in the field.

– Click the **OK** button.

(If no project is open and you select a job, or if the open project is incompatible with the job, then SISS will ask you to create a new project on the basis of the selected job. If a result file exists for this job, then the results of this job will be retrieved.)

Note that during file transfer, format conversion is performed from binary to SVAR (ASCII).

Once **SISS** has successfully retrieved the results of the job (a JRS file), these results appear directly on the map. All the points for which solutions are now available are selected.

– On transfer completion, a warning message will appear if particular events occurred during the transfer in relation with the transfer options chosen for SISS.

The message will prompt you to open the log file so that you can be informed of the nature of these events. If you click the **Yes** button, the log file will be opened using the WordPad text editor of Windows 95.

Outside this particular context, you cannot open the log file from SISS. If you need to open it at another moment, use Windows Explorer (the log file is stored in ...\3SPack\bin under the name "siss.log")

Retrieving raw data recorded on PC card (650x-to-630x series)

- Insert the PC card containing the raw data files into the drive of your computer

- Open the project relevant to the station or rover where raw data files were recorded

- In the SISS toolbar, click 🗃 or 🗃, or from the **Transfer** menu, select **Read Station** or **Read Mobile** respectively. A dialog box appears listing all the raw data files present on PC card (*.Dxx). All files are selected by default for transfer.

- Change the current selection if necessary

- In the **Recorded...** text box, enter the identification of the station or rover where recording took place

- Click **OK** to start transferring the files. Once transfer is complete the raw data files are visible in the project folder, and renamed as follows

    STATION_*.Dxx (raw data from stations)

    JOB_*.Dxx (raw data from rovers)

where:

    xx: session number-1 (00 for 1st session, 01 for 2nd session, etc.).

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Raw data can then be imported to 3SPack for post-processing. Station raw data files should be associated with a site, and rover raw data files to a trajectory.

Warning! Raw data files recorded at a station or by a rover are exactly of the same type. It is therefore the user's responsibility to establish the origin of the raw data files.

Editing a target point after a solution is available for this point

Double-click on a surveyed point. The dialog box which then appears includes the following additional information, compared with the same dialog box before surveying the point (see page *13-22*):

In the **General** tab

- The name of the job through which the point was surveyed is mentioned in the check pane

- The "Surveyed" button is checked

- The "Offset" button will also be checked if the point had to be offset

- On the upper-right diagram, the real time solution (RT) is shown. A segment connects this point to the theoretical point. For an offset point, the acceptance area is centered around the offset point and so the diagram is not indicative of the deviation between the two points.

The **Target** tab is unchanged except if the point was offset. In this case:

- The coordinates of the offset point are provided

- The offset components with respect to the target are provided, expressed on an axis system based on the azimuth associated to the target

- The upper-right diagram shows the location of the offset point with respect to the target.

A new (read-only) tab is added (**RT Solution**) containing the complete description of the real time solution

Solution pane

Time	Date & time of survey
E, N, H	Coordinates of the solution
Ant. Height	GPS antenna height above the ground when surveying the point
DGNSS button	Displays the current WGS84 coordinates of both the roving unit and the station when the point was surveyed. The baseline is indicated at the foot of the window.

Errors pane

Along line/On North	Northing deviation (isolated point) or longitudinal deviation (linked point) with respect to the theoretical location of the target
Across line/On East	Easting deviation (isolated point) or transverse deviation (linked point) with respect to the theoretical location of the target.

Quality Control pane

Processor	Real-time processing method used
SV count	Current count of visible satellites when the point was surveyed
Meas.	Count of GPS solutions involved in this real time solution (through averaging)
PDOP	Current value of PDOP
Correlation Matrix	The components of the Correlation matrix.

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Selecting points according to a number of preset criteria: "Select where"

See page *13-37*.

Validating/invalidating one of the available solutions for a target point

This function allows you to declare one of the solutions available for a target point (real time or post-processing) as the valid solution for this point. Following this operation, you will be able to export this solution (and not the other one) to 3SPack or to a file. The function can be applied to a multiple selection.

- **Validating the solution of a target point**

    - Select a surveyed target point (full icon)

    - In the SISS toolbar, click or, from the **Edit** menu, select **Validate Results**. A dialog box appears asking you to specify which solution to validate for this point (Real time or Post processing)

    - Check one of the two options and click **OK**. As a result, a check symbol is now superimposed on each of the point icon selected on the map. Example of icon for a source point with validated solution:

        If you now edit this point, note that on the **General** tab, the "Validated" button is now checked and on the tab of the chosen solution, the following symbol is displayed in the upper-right corner:

- **Invalidating the solution of a target point**

  This is the reverse operation.

    - Select a validated target point (full icon with superimposed check symbol)

    - In the SISS toolbar, click or, from the **Edit** menu, select **Invalidate Results**. As a result, the check symbol is removed from the point icon.

    - If you now edit this point, note that on the **General** tab, the "Validated" button is now cleared and on the tab of the invalidated solution, the following symbol is displayed in the upper-right corner:

Importing post-processed results

When preparing a project or when collecting the results of a project, you can add post-processed solutions to existing target points by importing these solutions from a file or from 3SPack.

  - From the **Edit** menu, select the **Import Post-processed Results** command.

  - In the **Import Positions** dialog box which then appears, select the import mode (**Import From File** or **Import From 3SPack**). Then do one of the following:

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- **Import From File**

  - Click the **Add** button to choose the file(s) from which to import post-processed solutions (default directory: ... /Points)

  - Select the desired file(s) and click the **Open** button

- Specify the format of the file (DXF or User)

- Click the **Go** button to start importing the points and their solutions. After transfer, edit one of the points concerned by this transfer to check that a new tab is now present. This tab contains the Post-Processed solution of this point.

- **Import From 3SPack**

  - Same as from a file, except that clicking the **Add** button will display directly all the sites available from the 3SPack Database.

  - If there are too many sites in the database, it is a good idea to make a selection of the concerned points on the project map before selecting the **Import Post-processed Results** command. Then, after selecting this command, checking the "focus on selection" button in the **Add Sites** dialog box will allow SISS to make a pre-selection of the corresponding sites from the 3SPack database.

  - Another difference is that you should specify which solution of the site should be imported (the **default** or the **last** one).

- **Creating new user formats**

  - Click the **User formats** button and then the **New** button. Then see page *3-64*.

Exporting validated results

  - From the **Edit** menu, select the **Export Validated Results** command.

- In the dialog box which then appears, select the export mode (**Export to File** or **Export to 3SPack**). Then do one of the following:

- **Exporting to a File**
  - Click the **Add** button to choose the validated points to export from the active project (if you selected the points before selecting the **Export Validated Results** command, then the points are automatically selected and you do not need to click **Add**)
  - Select the target points from the list and click the **OK** button
  - Define the export ASCII file by specifying its path, name and format (SPS, DXF or User)
  - Click the **Go** button to start exporting the validated points. Only the validated solution of each of these target points will be exported.

- **Exporting to 3SPack database**

  Same as **to a File**, except that you just need to specify (or pre-select) the points.
  - Click the **GO** button

    All selected points will be stored as Sites in the 3SPack database. Each of these sites will hold a single solution: the one you validated ("Written by SISS" will be the text appearing in the **Notes** text box of this solution).

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- **Creating new user formats for exporting results to a file**
  - Click the **User formats** button and then the **New** button. Then see page *3-64*.

Printing a project

Use the usual buttons to print a project:

- Select a printer and the few other print options through the
  Print Setup command from the **File** menu

- Print preview : use

- Print : use

The complete printout of a project consists of three pages:

- The first page shows a map of the work area, as currently
  viewed in the SISS window (same grab setting and scale)

- The second page lists the project details and indicates the
  count of target points and the count of surveyed points

- The third page provides a complete description of the
  coordinate system used (projection and datum).

Saving a project

- In the toolbar, click   or from the **File** menu, select the
  Save command.

Changing the options of SISS

- In the toolbar, click or from the menu bar, select **Tools** and then **Options**. A dialog box appears in which you can set the options of the SISS module. The dialog box contains the following three tabs.

General Tab

**Always check coord. system
when creating a new project** check button

- If you check this button, the **Coordinate System** dialog box will automatically appear right before validating the definition of a new project. Displaying this dialog box, which shows the characteristics of the chosen coordinate system, allows you to check/modify this system before definitively validating it.

- If you clear that button, the **Coordinate System** dialog box will not appear in that particular context.

Transfer tab

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Scorpio receiver series used : Tick the button corresponding to the series of Scorpio receiver used (6500-to-6300 series, or former 6000 series)

Then depending on the selection you have just made:

PC Card Drive : Type the path of the PC card (default: E:\)

PC port to Husky : Select the port on your PC that you want to use to communicate with the Husky (via its serial port)

Transfer procedure reminder: Check or clear the **Remind me of...** check button, depending on whether you wish to be guided during the job transfer procedures or not.

When reading results... pane

This pane deals with all the anomalous events detected by SISS when reading results files after the field operator has completed a job. The pane gives access to two different options. A single option is displayed at a time. To proceed with the next choice, use the vertical scroll bar.

For each option, tell SISS what to do in the following two cases, by checking the corresponding button. You *must* choose an option in each of the two cases.

1 : If the coords of a planned target point read from the results file are different from those of the same point in the active project:

○ Discard point read from the results file

○ Create a new point in the active project

○ Replace the initial coordinates with those read from the the results file

2 : If the results file contains a planned target point not defined in the active project:

○ Discard point read from the results file

○ Create a new point in the active project

Map commands

You will probably need to use the following commands when you work on a project.

Map window status bar

For the active project, the status bar of the SISS window permanently indicates the total number of points in the project, the number of currently selected points and the number of hidden points.

Showing/hiding the Map grid

Click ⊞ in the toolbar to show/hide the map grid. This button operates as a toggle. You can also select the **Grid** command from the **View** menu. This command also operates as a toggle.

Showing/hiding the ruler

Click 🔳 in the toolbar to show/hide the ruler. This button operates as a toggle. You can also select the **Ruler** command from the **View** menu. This command also operates as a toggle.

Showing/hiding map details

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Click ⬚ in the toolbar to show/hide the map details. You can also select the **Map** command from the **View** menu. This command also operates as a toggle.

Maps are bitmap files obtained with scanners. They must be stored in the **Maps** object of the 3SPack database to be used by SISS.

Selecting a point on the map

In the toolbar, click [icon] and then click on the point you want to select. If shown, the point name turns white with dark-blue background

To add another point to the selection, hold down the Shift or Ctrl key while clicking on the second point. If necessary, add other points to the selection by repeating this action.

To select several points at the same time, drag to create a rectangle that encloses all of the points you want to select. Selection is effective after you release the mouse button.

To remove a point from the selection, hold down the Ctrl key while clicking this point.

To cancel a selection, click in the map where there is no point.

Selecting all points

After clicking [icon] to view all the points, drag to create a rectangle that encloses all the points, or from the **Edit** menu, select the **Select All** command.

Moving the map within the SISS window

- In the toolbar, click [icon] or from the **View** menu, select the **Grabber** command
- Move the mouse pointer onto the map. This causes the pointer shape to change to a [icon]
- 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.

Deleting points

Select these points (using the **Select** or "**Select Where**" function) and then press the **Del** key. A message will then ask you to confirm the Delete operation. The points will definitively disappear from the map if you click the **Yes** button.

The fact that a point is linked to one or two other points does not constitute a restriction in the use of the Delete command. Deleting linked points will cause SISS to re-draw the target lines, taking into account the fact that some of the points which initially were part of these lines do not exist any more.

Editing a point

- Select this point and then from the **Edit** menu, select the **Properties** command (alternate action: double-click on the point). This will display the **Properties** dialog box for the selected point.

    Note that if no point, or two or more points, are selected on the map, then the **Properties** command will display the properties of the project.

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Selecting points according to a number of preset criteria: "Select where"

The "Select Where" function is very useful when you need to select a large number of points meeting one or more criteria. After you specify this criterion (or these criteria), SISS will be capable of selecting these points for you in no time.

In addition, you can restrict the selection of points meeting the criteria by drawing a rectangle on the map (after specifying your criteria). By doing this, only the points meeting the criteria and located inside this rectangle will be effectively selected.

- In the toolbar, click ![icon] or, from the menu bar, select **Draw** and then **Select Where**. A new dialog box appears in which you can do the following:

Criteria pane

Add button	Click this button to add a new criterion. A new dialog box appears ("Add criterion" dialog box) in which you can build the expression of the new criterion
	Click **OK** when the expression of the criterion is complete. The criterion then appears in the list box of the "Select Where" dialog box.
	Resume this operation until all the required criteria are shown in the list box.
Edit button	Click this button after selecting a criterion which you want to modify. A new dialog box appears ("Add criterion" dialog box) in which you can change the expression of this criterion. Click OK when you agree with the new expression of the criterion. The list box in the "Select Where" dialog box is then updated accordingly
Delete button	Click this button after selecting a criterion which you want to delete. The criterion will then disappear from the list box.

Query pane

You can save the set of criteria created in the list box as a file (a QRY file) so that it will be easy for you to use it again at a later date. You can also load a QRY file created earlier for this project (or for another project) in order to use the criteria contained in this file.

By default, QRY files are saved in the SIS directory, at the same level as the project folders.

Load button   Click this button to load a QRY file created earlier (default directory: SIS). After selecting a file, click the **Open** button. As a result, all the criteria held by this file appear in the list box of the "Select Where" dialog box

Save button   Click this button to save the displayed criteria as a QRY file (default directory: SIS). After naming the file, click the **Save** button. As a result, all the displayed criteria are saved into this file.

**Select points
that match…**   Check one of the following options:

"**At least one of the following criteria**" : any tested point meeting any of these criteria will be selected

or "**All the following criteria**" : only the tested points meeting *all* the criteria will be selected

- At the foot of the dialog box, check one of the following options

"**and match cursor selection as well**" : only the points in the area that you will drag with the mouse pointer will be tested to see if they match the criteria.

or "**without cursor selection**" : all points in the project will be tested to see if they match the criteria.

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Zoom In/Out/to Fit

- **Zoom in**

    - In the toolbar, click 🔍 or from the **View** menu, select the **Zoom In** command

    - Move the mouse pointer onto the map. This causes the pointer shape to change to a ⊕

    - Position the pointer in the area from which to zoom in and click with the left mouse button. As a result the window displays a magnified view of the area, centered around the clicked point

    - You can zoom in repeatedly (i.e. so long as the mouse pointer looks like a ⊕).

- **Zoom out**

    - In the toolbar, click 🔍 or from the **View** menu, select the **Zoom Out** command

    - Move the mouse pointer onto the map.

      This causes the pointer shape to change to a ⊖

    - Position the pointer in the area from which you want to zoom out and click with the left mouse button. As a result the window displays a larger-scale view centered around the area

    - You can zoom out repeatedly (i.e. so long as the mouse pointer looks like ⊖).

- **Zoom To Fit**

    - In the toolbar, click 🔍 or from the **View** menu, select the **Zoom To Fit** command.

      This causes the map to be re-adjusted (through a zoom-and-grab operation) so that it can view all the objects you have defined for the project.

Measuring a segment on the map

- Move the pointer to the toolbar and click [icon] or from the **View** menu, select the **Distance** command.

  This causes the pointer to change to [icon]

- Move the pointer to an end of the segment and start dragging the pointer toward the other end. From that moment, SISS will provide the value of distance (with red background) between the initial point and the one currently pointed by the mouse until you release the mouse button:
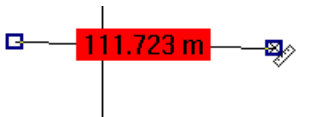
- Once the pointer accurately coincides with the second point, read the distance measured and then release the mouse.

  After releasing the mouse, the pointer shape is still [icon] meaning that SISS is ready to measure a new segment.

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A review of the SISS commands

File menu commands

New	Creates a new project
Open...	Opens an existing project
Close	Closes the active project (or the Projects window if it's the only open window)
Save	Saves the active project
Save As...	Saves the active project under a new name thus creating a new project
Print...	Prints the active project
Print Preview	Displays the active project as it would appear printed
Print Setup...	Selects a printer and printer connection
{Recent files}	Names of the projects last opened using SISS
Exit	Exits SISS

Edit menu commands

Copy	Copies the map to the clipboard
Delete	Deletes the current selection
Select All	Selects all the objects placed on the map
Azimuth	Forces the azimuth associated to a linked point (or to linked points) to the desired value
Validate Results…	Allows you to choose one of the solutions computed for the selected target points as their true positions (check symbols then appear on icons)
Invalidate Results	Allows you to stop using the solutions chosen with the **Validate Results** command to be the true positions of the selected points (check symbols then disappear from icons)

Reset Target Points	Deletes the solutions computed for the selected points (icons are then turned into empty squares or circles, as if the points had just been created)
Import Target Points…	Imports points from one or more files, or from 3Spack data base
Export Target Points	Exports the selected target points to 3Spack or to a file
Import Post-processed Results…	Imports the post-processed solutions of points either from a file or 3SPack
Export Validated Results…	Exports the validated solution of each of the selected points to 3Spack or to a file
Properties…	Shows the **Project properties** dialog box as was defined for the active project, or shows the properties of the selected point (only if there is a single point selected).

View menu commands

Zoom In	Magnifies the map, by one zoom-in step, around the clicked point
Zoom Out	Shrinks the map, by one zoom-out step, around the clicked point
Zoom To Fit	Adjusts the zoom so that all the points defined on the map can be viewed
Grabber	Moves the map in the direction in which you drag the mouse pointer. The move is effective only after releasing the mouse button.

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Distance	Activates a meter tool allowing you to know the distance between any two points: click the first point and drag the mouse pointer to the second one. Read the distance before releasing the mouse button.
Hide	Hides the selected point (or points)
Show...	Gives access to a points list in which you can check the points you want to hide or clear the points you want to show. The number of currently hidden points is indicated in the status bar of the SISS window. Asking for a point to be hidden means that both the icon and the name, if shown, will be hidden.
Map	Shows/Hides all the geographical details other than the objects you have placed on the map using SISS
Ruler	Shows/hides the grid coordinates
Grid	Shows/hides the map grid lines
Names	Shows/hides the names of the points on the map
Toolbar	Shows/hides the toolbar
Status Bar	Shows/hides the status bar
Projects	Opens/closes the Projects window
Results...	Edits a JRS results file using a text editor much similar to WordPad. Both the data and the record sessions are shown.

Draw menu

Select   Allows you to select any point on the map

Select Where   Allows you to select the points meeting the active criteria. The criteria may be applied to all the points on the map, or only to the selection you make after selecting this function

Target   Lets you create a target point at the location that you click with the left-mouse button.

Link Points   Creates a red line connecting the selected target points

Unlink Points   Deletes the line connecting the selected points.

Transfer menu commands

Write Job...   Writes all or part of the active open project, to PC card or palmtop as a job, under a name that you specify

Read Results...   Reads the results of a job directly from palmtop (6x0x) or from PC card (600x)

Read Station   Reads raw data files from PC card (recorded at a station)

Read Mobile   Reads raw data files from PC card (recorded by a rover). With the former 600x series, this command is implicitly run when using the **Read Results...** command

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Tools menu

Geoids...   Runs the Geoids module

Options   Allows you to display/change the options of SISS.

Window menu

Cascade	Arranges all the open files in cascade configuration
Tile	Places all the open files side by side according to a vertical arrangement
Arrange Icons	Auto-arranges all iconized files (icons are moved to the lower part of the SISS window and arranged horizontally starting from the left)
Close All	Closes all the open project files
{File list}	The names of the currently open project files are listed here to let the user choose a new active file directly from this menu.

Help menu

Index	Displays the opening screen of Help
Using Help	Displays instructions for using Help
About SISS	Displays the version number of SISS.

♣

14. Appendices

Project Document Abstract

The information contained in the abstract is listed below:

(From Project General tab)	Project name
	Project supervisor
	Project start date & time
	Planned project end date & time
(From Project Region tab)	Time zone
	N/W & S/E coordinates
(From Project General tab)	Coordinate system name
(From Coord.sys record)	Complete description of coordinate system
(From Project General tab)	Notes about the project, if any

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ASCII SVAR Format

File Header

> < stx ><eoln>
> **!L,**<GPS week><GPS time><eoln>
> *1,<label11>,<label12>,<label13><eoln>
> *2,<label21>,<label22><eoln>

!L line

<GPS week> GPS week number

<GPS time> GPS time in week, in seconds (Reference time is Jan 6 1980 at 0hr00)

*1 : Header line #1

< label11 > Time when file first opened (mm/mm/yyyy hh :mm :ss)

< label12 > Operator name (20 characters max.)

< label13 > Work area label (8 characters max.), or job name for seismic surveys

*2 : Header line #2

< label21 > File or Job name

< label22 > Comment (48 characters max.)

Points list

<stx><eoln>
!I,<GPS week>,<GPS time><eoln>
*1,<point type>,<point number>,<label11>,<label12>,
<label13>,<label14>,<label15>,<label16>,<label17> <eoln>
*2,<X >,<Y>,<Z>,<distance unit code>,<angle unit code><eoln>
*3,<X ECEF>,<YECEF>,<ZECEF>,<unit code><eoln>
*4,<value41>,<value42>,<value43>,<value44>,
<value45>,<value46>,<distance code><eoln>
∗6,<EL0>,<NL0>,<DE>,<DN>,<BETA>,<K>,<distance unit
code>,<angle unit code><eoln>
∗9,<SDE>,<CEN>,<SDN>,<CEH>,<CNH>,<SDH>,
<MU>,<N>,<Q>,<unit code><eoln>
∗A,<Dif station number>,<XECEF>,<YECEF>, <ZECEF><eoln>
∗B,<Dif station number>,<XECEF>,<YECEF>, <ZECEF>< eoln >
∗C,<Dif station number>,<XECEF >,<YECEF>, <ZECEF>< eoln >
∗T, <XT>,<YT>,<ZT>,<point type>,<unit code><eoln>
<etx>

!I Time tagging line

<GPS week> GPS week number

<GPS time> GPS time in week, in seconds (Reference time is
Jan 6 1980 at 0hr00)

!I: point identifier, character 49_{Hex} (GPS week and time are
optional)

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*1 : Point description line

<Point type>:

10:	reference point or staked-out reference point
11:	staked-out reference point, modified by operator
12:	staked-out reference point, through linear offset
13:	staked-out reference point, through lateral offset
20:	staked-out target point
21:	staked-out target point, modified by operator
22:	staked-out target point, through linear offset
23:	staked-out target point, through lateral offset
30:	logged point
31:	logged point, modified by operator
32:	logged point, through linear offset
33:	logged point, through lateral offset
34:	logged point, through intersection of lines
50:	logged point during trajectory work
51:	logged point during trajectory work, modified by operator
60 to 69:	Intermediate points involved in point offset procedure
70 to 79:	Points involved in the computation of grid parameters
80 to 89:	Points involved in the computation of altitude correction parameters

<point number>: recording number (software-set)

<label11>: point name (12 characters max.)

<label12>: geocode 1 (12 characters max.)

<label13>: geocode 2 (12 characters max.)

<label14>: geocode 3 (12 characters max.)

<label15>: geocode 4 (12 characters max.)

<label16>: comment (48 characters max.)

<label17>: recording local time ("26/11/97 18:51:59")

For seismic surveys:

\<label11\>:	point name (characters 0 to 11)
\<label12\>:	point name (characters 12 to 23)
\<label13\>:	point name (characters 24 to 35)
\<label14\>:	geocode of a logged point (12 characters max.)
\<label15\>:	Count of SVs used and PDOP format: "%2d %9.1f" (12 characters max.)

*2 : Line containing ground position in local coordinates

*3 : line containing ECEF position of antenna phase centre

This line contains the ECEF position of the antenna phase center when logging the point or the ECEF position of the antenna phase center in the case of an offset logged point.

*4 : Offset line

\<value41\>:	P1-to-P distance if point type is 12, 13, 22, 23, 32 or33
\<value42\>:	P2to-P distance if point type is 12, 13, 22, 23, 32 or33
\<value43\>:	Offset direction (1: to the right, −1: to the left) if point type is 13, 23 or 33
\<value44\>:	Not used
\<value45\>:	Not used
\<value46\>:	Antenna height

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For seismic surveys:

    <value41>

    <value42>

    <value43>:   Theoretical ground position of offset point

    <value44>:   Longitudinal offset

    <value45>:   Transverse offset

*6 : Deviations from user local grid

    <EL0>:   Origin local easting

    <NL0>:   Origin local Northing

    <DE>:   Easting deviation

    <DN>:   Northing deviation

    <BETA>:   User local grid rotation angle

    <K>:   Scale factor

*9 : Qualification line

    <SDE>:   Easting standard deviation

    <CEN>:   Easting/Northing correlation

    <SDN>:   Northing standard deviation

    <CEH>:   Easting/Height correlation

    <CNH>:   Northing/Height correlation

    <SDH>:   Height standard deviation

    <MU>:   Weighting factor standard deviation

    <N>:   Count of measurements involved in qualification processing

<Q>:   Kind of position solution:
          1:    Natural
          11:   DGPS
          21:   EDGPS L1
          31:   KART R
          41:   KART A
          51:   EDGPS L1/L2
          61:   LRK R
          71:   LRK A
          81:   OFFSET

*A or B or C : line describing Differential station used

<Dif station No.>:   identification number of a differential
                      station involved in the position
                      solution processing

<X ECEF><Y ECEF><Z ECEF>:
                      Coordinates of a differential station
                      involved in the position solution
                      processing

*T : line containing the planned position of a point to be staked out

<XT><YT><YT>:   planned ground position, in local
                coordinates, of a reference or target
                point.

<point type>:
                      1 for 1D
                      2 for 2D
                      3 for 3D

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Kinematic re-initialization

(Output every time the receiver is re-initialized in real-time kinematic)

<stx ><eoln>
!**K**, <GPS week>,<GPS time><eoln>
∗1, <label11>,<value12>,<label13><eoln>
<etx>

!K Time tagging line

<GPS week> GPS week number

<GPS time> GPS time in week, in seconds (Reference time is Jan 6 1980 at 0hr00)

Header line #1

<label11> local date & time of initialization (dd/mm/yyyy hh:mm:ss)

<value12> Number of initialization cause

<label13> Labelof initialization cause

Datum

<stx ><eoln>

!**G**, <GPS week>,<GPS time><eoln>

∗1, <datum No. "datum name">< eoln >

∗2, <"A" value>,<"1/F" value>,< "S" value>,
    <unit code><eoln>

∗3, <"Dx" value>,<"Dy" value>,<"Dz" value> ,
    <unit code><eoln>

∗4, <"Ax" value>,<"Ay" value>,< "Az" value> ,
    <unit code><eoln>

1st line :

Identification of the datum used. The reference is the WGS84. If it is unknown, the datum number is 0, and lines *2 to *4 are not provided.

Projection parameters

"*n*" lines are required to describe the projection parameters whose identifier is *<#n>*. Projection parameters are always preceded by the characteristics of the datum used.

The first line contains the number of the projection type. This number indicates the algorithm used. Is may be followed by a label containing the instance name for the projection type. The labels listed below are just examples.

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If the projection is unknown, line #1 reads #1,0,0 and the next lines (2 and 3) are not provided.

$<value1>$ in line **#1** qualifies the coordinate system used:

> 0: not used
> 1: standard coordinate system (known datum & projection)
> 2: not used
> 3: standard coordinate system with local grid
> 4: coordinate system with unknown datum & projection
> 5: coordinate system with known datum & unknown projection
> 6: coordinate system with unknown datum & known projection
> 7: coordinate system with local grid and unknown datum & projection
> 8: coordinate system with local grid, with known datum & unknown projection
> 9: coordinate system with local grid, with unknown datum & known projection

Tangent conical projection (Lambert):

#1,$<$**02** "Lambert 1"$>$,$<value1><eoln>$
#2,$<$"Lori" valeur$>$**,**$<$"Gori"value$>$**,**
    $<$"Eori" value$>$**,**$<$"Nori" value$>$**,**$<unit code><eoln>$
#3,$<$"Ko" value$><eoln>$

1st line:	Number of projection type used, possibly followed by the name of the projection
2nd line:	*Lori, Gori:* latitude and longitude of origin (angles)
	Eori, Nori: projected (XY) coordinates of origin (distances)
	angle unit code and distance unit code (no separator in between)
3rd line:	*Ko:* Scale factor (a coefficient)

Secant conical projection (Lambert)

#**1,**<**03** "Maryland">,<value1><eoln>
#**2,**<"Lref" value>,<"Gori" value>,
          <"Eori" value>,<"Nori" value>,
          <unit code><eoln>
#**4,**<"LatN value>,<"LatS" value>,<unit code><eoln>

1st line: Number of projection type used, possibly
              followed by the name of the projection
2nd line: *Lref, Gori:* latitude and longitude of origin (angles)
              Eori, Nori: projected (XY) coordinates of origin
              (distances)
              angle unit code and distance unit code (no
              separator in between)
3rd line: *LatN, LatS:* latitudes of 1st and 2nd parallels
              (scale: 1) (angles)
              angle unit code

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UTM projection (Universal Transverse Mercator)

#**1,**<**01** "UTM xx">,<valeur1><eoln>
#**2,**<"Lori" value>,<"Gori" value>,
        <"Eori" value>,<"Nori" value>,
        <unit code><eoln>
#**3,**<"Ko" value><eoln>

1st line:	Number of projection type used, possibly followed by the name of the projection
2nd line:	*Lori, Gori:* latitude and longitude of origin (angles)
	Eori, Nori: projected (XY) coordinates of origin (distances)
	angle unit code and distance unit code (no separator in between)
3rd line:	*Ko:* Scale factor (a coefficient)

Oblique cylindrical projection (Skew Orthomorphic)

#1,<**04** "Switzerland">,<valeur1><eoln>
#2,<"Lori" value> , <"Gori" value>,<"Eori" value>,
      <"Nori" value>,<unit code><eoln>
#3,<"Ko" value>,<"Skew" value>,<unit code><eoln>

1st line:	Number of projection type used, possibly followed by the name of the projection
2nd line:	*Lori, Gori:* latitude and longitude of origin (angles)
	Eori, Nori: projected (XY) coordinates of origin (distances)
	angle unit code and distance unit code (no separator in between)
3rd line:	*Ko:* Scale factor (a coefficient)
	Skew: rotation (an angle)
	angle unit code

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Oblique cylindrical projection (Rectified Skew Orthomorphic)

> **#1,**<**05** "Borneo">,<valeur1><eoln>
> **#2,**<"Lori" value>,<"Gori" value>,
>   <"Eori" value>,<"Nori" value>,
>   <unit code><eoln>
> **#3,**<"Ko" value>,<"Skew" value>,<unit code><eoln>

> 1st line: Number of projection type used, possibly
>   followed by the name of the projection
> 2nd line: *Lori, Gori:* latitude and longitude of origin (angles)
>   *Eori, Nori:* projected (XY) coordinates of origin
>   (distances)
>   angle unit code and distance unit code (no
>   separator in between)
> 3rd line: *Ko:* Scale factor (a coefficient)
>   *Skew*: rotation (an angle)
>   angle unit code

Oblique stereographic projection (Skew Stereographic)

#1,<**06** "Holland">,<value1><eoln>
#2,<"Lori" value> **,** <"Gori" value>**,**<"Eori" value>**,**
          <"Nori" value>**,**<unit code><eoln>
#3,<"Ko" value><eoln>

1st line: Number of projection type used, possibly
                  followed by the name of the projection
2nd line: *Lori, Gori:* latitude and longitude of origin (angles)
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                  (distances)
                  angle unit code and distance unit code (no
                  separator in between)
3rd line: *Ko:* Scale factor (a coefficient)

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Altimetric parameters

"*n*" successive lines are required to describe the altimetric parameters whose identifier is **<%*n*>**.

%1,<value1>,<value2>,<value3>,<altitude file name><eoln>
%2,<value1>,<value2>,<value3>,<value4>,<value5><eoln>

%1 : <value1>, <value2> and <value3> stand for the data held by the command $PDAS,ALTI interpretable by GNSS receivers.

<value1> : altitude processing mode
0      $H = H_{84} - MSL_{STANAG} - \Delta h$ - offset
1      $H = H_{84} - \Delta h$ - offset
2      $H = H_{ELLIPSOID} - \Delta h$ - offset
3      $H = H_{84} - MSL_{LOCAL} - \Delta h$ - offset
<value2> : Altitude offset with respect to ground (antenna height)
<value3> :User correction:

        0: $\Delta h = 0$
        1 : $\Delta h = h_0 + a (L_{WGS84}-L_0) + b (G_{WGS84}-G_0)$
          (linear local altimetry)
<altitude file name>: file name (8 characters - a DOS-compliant name)

%2 : <value1> to <value5> correspond to the data used for the altitude processing, in the order given by the BIN file.

> <value1>: h_0
> <value2>: a
> <value3>: L_0
> <value4>: b
> <value5>: G_0

<etx>

Unit code

ASCII character identifying the different units used in a data line, in the same order as the data, and without separator (example: 2b). The unit codes are described in the two tables below.

Length units

unit code	unit	value in metres
1	metre	1
2	US foot	0.304799999
3	imperial foot	0.304797265

Angle units

Unit code	unit	comments
a	degrees, minutes, seconds and fractions of a second	45.120952 for 45° 12' 9.52"
b	degrees and fractions of a degree	45.2026444 for 45° 12' 9.52"
c	grades	
d	radians	
e	seconds	for datum rotation
f	degrees, minutes and fractions of a minute	45.1215866 for 45° 12' 9.52"

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Adding a Coordinate System

- In the toolbar, click

    or

- From the menu bar, select the **Window** command and then the **Database Manager** command.

- Click the **Coord. Systems** object in the left-hand pane of the window

- Click or from the menu bar, select the **Record** command and then the **Add** command

- In the dialog box that appears, enter the following parameters:

    System : Enter a name for the new coordinate system

    Kind : From this list box, specify the kind of projection used in the new coordinate system:

    1P-Lambert: A simple conic projection (i.e. using a single tangent cone).
    2P-Lambert: A secant conic projection (a secant cone is defined intersecting the earth at two standard parallels).
    Geocentric: Not a projection. Coordinates are expressed in a XYZ coordinate system whose origin is the centre of the earth.
    LatLong: Provides angular coordinates in relation to the chosen datum.
    RectSkewOrtho: A particular case of SkewOrtho projection consisting of a transverse Mercator projection in which an initial line is defined as the central meridian.
    SkewOrtho: An oblique conformal cylindrical projection.
    Stereographic: A projection in which points on the surface of the earth are projected geometrically onto a tangent plane, from a point on the surface of the earth opposite the point of tangency (also called azimuthal orthomorphic projection).
    UTM: **U**niversal **T**ransverse **M**ercator, an orthomorphic projection based upon a cylinder tangent along a meridian.

Datum **:** From this list box, specify the name of the datum used in the new coordinate system.

Unit **:** From this list box, specify the name of the unit used in the new coordinate system.

Labels **:** From this list box, specify the name of the labels used in the new coordinate system.

- If you choose the kind of projection **Geocentric** or **LatLong**, you don't need to specify any other parameters. Click the **OK** button when the definition is complete.

- For the other kinds of projection, before you click the **OK** button, you need to specify the following:

Extra parameters for 1P-Lambert, Stereographic & UTM

Extent button : Is used to access the **System Extent** dialog box through which you can define the limits of the area in which the projection is assumed to be valid.
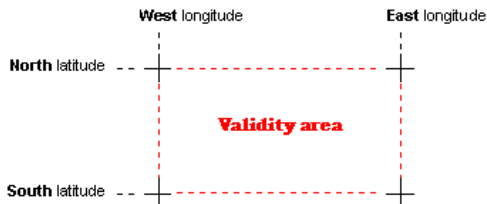
False Eastings : User-chosen eastings for projection centre

False Northings : User-chosen northings for projection centre

Central Meridian : Longitude of projection centre

Central Latitude : Latitude of projection centre

Scale : Scale factor

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- **NOTE:**

  Defining the validity area is essential when you define this kind of projection. That is why 3SPack will force the display of the **System Extent** dialog box if you try to validate a new coordinate system without defining this area.

Extra parameters for 2P-Lambert

Extent button : Is used to access the **System Extent** dialog box through which you can define the limits of the area in which the projection is assumed to be valid (see in the previous page)

False Eastings : User-chosen eastings for projection centre

False Northings : User-chosen northings for projection centre

Central Meridian : Longitude of projection centre

North Latitude : Latitude of 1st parallel

Ref.Latitude : Latitude of projection centre

South Latitude : Latitude of 2nd parallel

- **NOTE:**

  Defining the validity area is essential when you define this kind of projection. That is why 3SPack will force the display of the **System Extent** dialog box if you try to validate a new coordinate system without defining this area.

Extra parameters for RectSkewOrtho & SkewOrtho

Extent button :	Is used to access the **System Extent** dialog box through which you can define the limits of the area in which the projection is assumed to be valid (see in the previous page)
False Eastings :	User-chosen eastings for projection center
False Northings :	User-chosen northings for projection center
Central Meridian :	Longitude of projection center
Central Latitude :	Latitude of projection center
Scale :	Scale factor
Skew :	Azimuth of initial line

- **NOTE:**

    See Note above concerning the definition of the validity area.

Adding a Datum Record

- In the toolbar, click 🔑

    or

- From the menu bar, select the **Window** command and then the **Database Manager** command.

- Click the **Datums** object in the left-hand pane of the window

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- Click 🖺 or from the menu bar, select the **Record** command and then the **Add** command

- In the dialog box that appears, enter the following parameters:

      Datum : Enter the Datum name

    Ellipsoid : Enter the name of the reference ellipsoid

       Dx : Enter the X deviation of the datum compared with the reference ellipsoid (signed value in metres)

       Dy : Enter the Y deviation of the datum compared with the reference ellipsoid (signed value in metres)

       Dz : Enter the Z deviation of the datum compared with the reference ellipsoid (signed value in metres)

        K : Enter the scale factor

       Rx : Enter the angular deviation of the datum around the X axis compared with the reference ellipsoid (angle in seconds)

       Ry : Enter the angular deviation of the datum around the Y axis compared with the reference ellipsoid (angle in seconds)

       Rz : Enter the angular deviation of the datum around the Z axis compared with the reference ellipsoid (angle in seconds)

- Click the **OK button** when the definition is complete.

Adding an Ellipsoid Record

- In the toolbar, click 🔧

    or

- From the menu bar, select the **Window** command and then the **Database Manager** command.

- Click the **Ellipsoids** object in the left-hand pane of the window

- From the menu bar, select the **Record** command and then the **Add** command

    or

    In the tool bar, click 📄

- In the dialog box that appears, enter the following parameters:

        Ellipsoid : Enter the name of the new ellipsoid

Semi-Major Axis : Enter its Semi-Major Axis, in metres

Inverse Flattening : Enter its inverse flattening coefficient (1/f)

- Click the **OK** button when the definition is complete.

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Adding a Label Record

- In the toolbar, click [icon]

  or

- From the menu bar, select the **Window** command and then the **Database Manager** command.

- Click the **Labels** object in the left-hand pane of the window

- From the menu bar, select the **Record** command and then the **Add** command

  or

  In the tool bar, click [icon]

- In the dialog box that appears, enter the following parameters:

Label	:	Enter a name for the new Label
Field 1	:	Enter the term introducing the first coordinate
Field 2	:	Enter the term introducing the second coordinate
Field 3	:	Enter the term introducing the third coordinate

- Click the **OK** button when the definition is complete.

Adding a Unit Record

- In the toolbar, click 🔧

  or

- From the menu bar, select the **Window** command and then the **Database Manager** command.

- Click the **Units** object in the left-hand pane of the window

- From the menu bar, select the **Record** command and then the **Add** command
  or
  In the tool bar, click 📄

- In the dialog box that appears, enter the following parameters:

  Units : Enter the name of the new unit (for example "meter")

  Ratio : Enter the value of the unit expressed in meters (for example as the US foot equals 0.304799999 m, then we have **Ratio**=0.304799999 for the US foot **Unit**)

  Digits : Enter the number of digits reserved for the fractional part of coordinates (for example coordinates of the type "**xx**...**xx.xxx**" will be obtained if **Digits**=3)

  Label : Enter the term placed after coordinates to indicate the unit used (for example "m" for "meter")

- Click the **OK** button when the definition is complete.

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Importing GPS data from within the database

- In the toolbar, click

    or

- From the menu bar, select the **Window** command and then the **Database Manager** command.

- Click the corresponding database object (ephemerides, iono-UTC or almanacs) in the left-hand pane of the window.

- In the toolbar, click or, from the menu bar, select the **Record** command and then the **Import** command

- In the **Import GPS Data** Dialog box that appears, click the **Add** button

- The **Browse** dialog box which then appears shows the content of the **Raw** directory where all types of GPS raw data are expected to be located.

- Double-click the file icon containing the data you would like to import, or click this icon and then the **Open** button. To make a multiple selection, first click the first file in your list and then, while holding down the **Shift** key, click the last file in your list.

- Now that the name of the file you have just selected appears in the **Import GPS Data** Dialog box and is highlighted, click the **Go** button to start importing the data. A message appears providing information on the data import step in progress.

- At the end of this step, the database is updated with a new record (or new records).

- GPS data can also be imported by clicking

Editing an ephemeris record

- In the toolbar, click 🔑

  or

- From the menu bar, select the **Window** command and then the **Database Manager** command.

- Click the **Ephemeris** database object in the left-hand pane of the window. In the list of ephemerides now shown in the right-hand pane:

- Double-click the Ephemeris record you wish to edit

  Ephemeris Data:

Sv	SV PRN Number
URA (m)	User Range Accuracy
SvHealth	Health Status
Toe (s)	Reference Time Ephemeris
Weeks	Week Number
IODC	Issue Of Data Clock
IODE	Issue Of Data Ephemeris
Fit Inter (h)	Fit Time
Mo	Mean Anomaly at Reference Time
DeltaN (deg/s)	Mean Motion Difference From Computed Value
E	Eccentricity
Ao (m)	Semi-Major Axis
Omega	Right Ascension at Reference Time
IO	Inclination Angle at Reference Time
W	Argument of Perigee
OmegaDot (deg/s)	Rate of Right Ascension

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IDOT (deg/s)	Rate of Inclination Angle
Cuc (deg)	Amplitude of the Cosine Harmonic Correction Term to the Argument of Latitude
Cus (deg)	Amplitude of the Sine Harmonic Correction Term to the Argument of Latitude
Crc (m)	Amplitude of the Cosine Harmonic Correction Term to the Orbit Radius
Crs (m)	Amplitude of the Sine Harmonic Correction Term to the Orbit Radius
Cic (deg)	Amplitude of the Cosine Harmonic Correction Term to the Angle of Inclination
Cis (deg)	Amplitude of the Sine Harmonic Correction Term to the Angle of Inclination
Toc	Reference Time of SV Clock Data (max: 604784)
Af0 (μs)	Polynomial Coefficient required to compute SV Clock Correction Data
Af1 (ns/s)	Polynomial Coefficient required to compute SV Clock Correction Data
Af2 (ns/s2)	Polynomial Coefficient required to compute SV Clock Correction Data
TGD (ns)	L1-L2 correction term for single-frequency users
CodesOnL2	Indicates whether L2 is modulated by P or C/A
L2Dataflag	Indicates whether code P is modulated by Navigation Data on L2 Channel
Transmit time	Time when SV transmits ephemeris

Editing an almanac record

- In the toolbar, click

    or

- From the menu bar, select the **Window** command and then the **Database Manager** command.

- Click the **Almanacs** database object in the left-hand pane of the window. In the list of almanacs now shown in the right-hand pane:

- Double-click the Almanac record you wish to edit

Almanac Data:

Time	GPS time
Sv	Satellite PRN number
A (m)	Semi-major axis
w	Argument of Perigee
Mo	Mean Anomaly at Reference Time
e	Eccentricity
Io	Inclination Angle at Reference Time
Omg	Right Ascension at Reference Time
OmegaDot (deg/s)	Rate of Right Ascension
af0 (μs)	Polynomial Coefficient required for SV clock correction data computation
af1 (ns/s)	Polynomial Coefficient required for SV clock correction data computation
Toa (s)	Almanac Reference Time
Week	Week number
Health	Health Status

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Editing a Iono-UTC record

- In the toolbar, click 🔑

  or

- From the menu bar, select the **Window** command and then the **Database Manager** command.

- Click the **Iono-UTC** database object in the left-hand pane of the window. In the list of iono-UTC records now shown in the right-hand pane:

- Double-click the Iono-UTC record you wish to edit

  Iono-UTC Data:

Alpha0 (ns)	Coefficient to be used in the single frequency user correction model
Alpha1 (ns/s)	Coefficient to be used in the single frequency user correction model
Alpha2 (ns/s2)	Coefficient to be used in the single frequency user correction model
Alpha3 (ns/s3)	Coefficient to be used in the single frequency user correction model
Beta0 (s)	Coefficient to be used in the single frequency user correction model
Beta1 (s/s)	Coefficient to be used in the single frequency user correction model
Beta2 (s/s2)	Coefficient to be used in the single frequency user correction model
Beta3 (s/s3)	Coefficient to be used in the single frequency user correction model
A0 (μs)	Polynomial Coefficient
A1 (ns/s)	Polynomial Coefficient

Tot (s)	Reference Time of UTC Data (Max: 602112)
WNT (weeks)	UTC Reference Week Number
DeltaTLS (s)	Delta Time due to Leap Seconds
WNLSF (weeks)	Week Number of future Leap Second Effectivity
DN (days)	Day Number of future Leap Second Effectivity
DeltaTLSF (s)	Delta Time due to future Leap Seconds

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