ProMark™ Field Software

Getting Started Guide

From V3.5.3

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Introduction to ProMark Field

English

ProMark Field is a software program designed for general-purpose land survey applications. ProMark Field runs on Microsoft Windows Mobile or Windows Embedded Handheld.

ProMark Field allows you to determine positions of points with centimeter precision through one of two types of projects:

- *Post-processed Project*: Centimeter-accurate positions for your surveyed points will be computed at the office by specific post-processing software (GNSS Solutions) after raw data have been collected in the field.
- *Real-time RTK Project*: Centimeter-accurate positions for your surveyed points are determined in real time using the data sent by a corrections provider to refine all positions computed from the received satellites.

  This means a specific data link needs to be implemented for the acquisition of these corrections.

  Additionally, you can stake out a list of points stored on the receiver as a job, possibly assisted by built-in voice guidance. (Alternately, the stakeout function can be used in all types of projects for navigation purposes.)

  You can also determine a local coordinate system (3D grid) through the calibration function.

Whatever the type of project you choose, ProMark Field will always require that you first create a job:

- A job is either a file in csv format (a standard spreadsheet format) or in shp format.

  A job in shp format will contain only a single type of object, i.e. it will hold exclusively 3D points, 3D lines or 3D polygons. When creating an shp job, you can define attributes for the points, lines or polygons you will log. Later, during the data logging phase, you will be able to assign values to these attributes. SHP jobs can be used in real-time projects, not in post-processed projects.

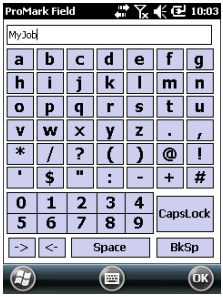
  All points stored in a csv job can be exported to a text (txt) or DXF file. Conversely, points stored in a text file can be imported into a csv job open in ProMark Field. SHP jobs can be exported to DXF.
- When starting a new project, the job file may be either empty or holding a list of stakeout points (in that case, the job file is usually not created from scratch but downloaded from an office computer). As you progress in your project,

a full description of each of the surveyed points (name, coordinates, solution status, PDOP, number of satellites used, etc.) will be saved to the job file.

In a real-time RTK project, the coordinates of all the surveyed points saved to the job file will feature centimeter accuracy. In a post-processed project, they will only be meter accurate.

Points may be logged individually (static or stop & go surveying), or automatically along a line (trajectory) at a preset interval of time or distance (continuous kinematic surveying).

ProMark Field can host a background map showing all the useful details of your working area. Background maps should be in ecw, osm, bmp, gif, tif, jpg or jp2 format. They can be viewed on the map screen in the background.



ProMark Field integrates a large virtual keyboard to make data entry easier in the field. When enabled, this keyboard appears automatically on the screen every time you tap inside a user-editable data field.

The ProMark Field keyboard is a good alternative to the Microsoft operating system's smaller on-screen keyboard. It can however be disabled if the smaller Microsoft virtual keyboard is more suitable in your case of use.

ProMark Field allows you to set the receiver as an RTK base, generating corrections data in one of the commonly used formats (RTCM, CMR, CMR+ or ATOM). ProMark Field will allow you to configure the data link through which corrections will be delivered to users, based on the use of the receiver's built-in cellular modem or an external cell phone via Bluetooth, or using an external UHF radio transmitter.

ProMark Field supports the built-in e-compass. See *E-Compass & External Device on page 61*.

Installing ProMark Field

This section describes how to install ProMark Field from the CD provided, using an office computer.

If Windows XP (or older OS version) is used on your computer, you first need to install Microsoft Active Sync on your office computer.

If Windows Vista or Windows 7 is used, you don't normally need to install an additional program on your computer. However, if the installation of the ProMark Field software fails, you will have first to install Windows Mobile Device Center and then resume the installation of ProMark Field.

The latest versions of ActiveSync and Device Center can be downloaded from http://www.microsoft.com/en-us/download/.

IMPORTANT! If you are upgrading ProMark Field, you need to uninstall the previous version of ProMark Field both from the receiver, using **Start**, **Settings**, **System**, **Remove Programs**, and from the office computer.

Installation Procedure

- Place the receiver on the docking station.
- Connect the docking station to your office computer using the USB data cable provided.
- Turn on the receiver.
- Insert the ProMark Field CD in your office computer. This automatically starts the setup file stored on the CD.
- Click on the **Install ProMark Field** option. This starts the ProMark Field Setup Wizard.
- Click **Next>** twice.
- Keep the default settings and just click **Next>**.
- Confirm installation by clicking **Next>** again. The wizard starts copying Spectra Precision TTSBase.CAB to the receiver. (With Spectra Precision TTSBase installed, you will be able to use the voice guidance function when staking out points.) At the end of this phase, a message window appears asking you to check your mobile device screen to see if additional steps are needed to complete the installation.
- The receiver asks you to confirm the location where to install Spectra Precision TTSBase.CAB ("Device" is the default choice). Choose "Device" (recommended).
- Tap **Install** at the bottom of the screen. The CAB file is being installed.

- On receiver side, tap **OK** after successful installation of Spectra Precision TTSBase.CAB.
- Go back to your computer and click **OK** to close the message window and proceed. The installer on the computer then runs the same sequence as the previous one, this time to copy Spectra Precision Required Data.CAB to the receiver.
- Again, a message on the computer tells you to check the receiver screen.
- As previously, the receiver asks you to choose the location where to install Spectra Precision Required Data.CAB. Choose the same location as before for the Spectra Precision TTSBase.CAB file (i.e. "Device"), and then tap **Install**.
- On receiver side, tap **OK** after successful installation of Spectra Precision Required Data.CAB.
- Go back to your computer and click **OK** to close the message window and proceed.
- A third round, similar to the first two ones, is then run to install ProMark Field: Choose "Device" on the receiver where to install ProMark Field and tap **Install**.

  Wait until the installation is complete. The receiver then re-boots automatically. Once re-booted, the ProMark Field option can be seen on the Home screen.
- On computer side, click **OK** to close the message window, then **Close** to quit the installation program.

Entering the Activation Code

You will not be able to use ProMark Field until you enter an activation code. This code can be seen on the adhesive label placed on the ProMark Field CD box. This code was generated from your receiver serial number. To enter the activation code:

- Tap on the "ProMark Field" line on the Home screen. A message is displayed showing the serial number of your receiver and a blank activation code field.
- Type your activation code in the blank field.
- Tap **OK** to validate the code entry. If the "serial number/ activation code" pair matches, then ProMark Field is normally started right after tapping **OK**.

Connecting the External Antenna

Connect your external antenna to the receiver. The following icon appears at the bottom of the screen, indicating that the antenna is properly connected to the receiver.

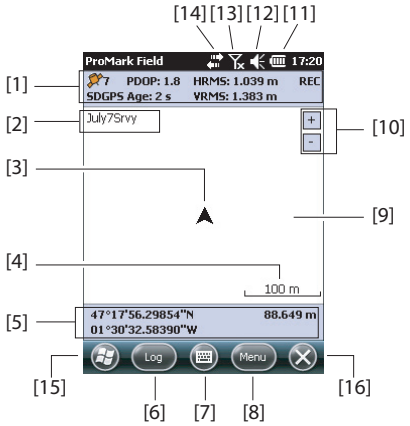
If the external antenna is missing or not properly connected, then the message “No external antenna” will pop up on the screen.

Launching ProMark Field

Tap **Start**>**ProMark Field** or tap **ProMark Field** on the Home screen. The main ProMark Field window is described below.

Note: Spectra Precision recommends you do not keep GNSS Toolbox running when using ProMark Field.

Description of the ProMark Field Main Window



- **[1]**: Status bar. From left to right, by column (These information lines will not appear until the receiver can determine its own position):
  - Column #1:

    Number of satellites currently used in position computation.

"BASE" permanently displayed if the receiver is used as a base, otherwise position computation status if the receiver is used as a rover. In the latter case, the position computation status may take one of the following values:

Status	Operating Mode
Autonomous	GPS only
DGPS	Conventional Differential GPS using corrections from a beacon or a base.
SDGPS	SBAS Differential
FLOAT	RTK, subfoot accuracy
FIXED	RTK, centimeter accuracy

- Column #2:

  Current value of PDOP.

  Age of corrections in all differential modes (Blank if no corrections received, or if a base).
- Column #3: Current values of HRMS and VRMS
- Column #4: "REC" if the raw data logging option is unlocked and active.

- **[2]**: Name of the currently open job.
- **[3]**: This symbol shows your current position. The arrow points in your last walking direction.
- **[4]**: Current zoom setting. The current value of scale is provided, based on the currently selected unit.
- **[5]**: Current 3D position of the receiver (no coordinates displayed if the receiver has not determined its position yet).
- **[6]**: Log button. Use this button to log the position of the point where the external antenna is currently located. The button is grayed until GPS positions are computed and a job is open. You can use either the on-screen Log button or the left-hand "–" key on the keyboard to access the Log function.
- **[7]**: Button used to show or hide the virtual Microsoft keyboard.
- **[8]** Menu button. Gives access to the ProMark Field function menu. You can use either the on-screen Menu button or the right-hand "–" key on the keyboard to show or hide the function menu.

Menu Option	Function
Stop	Use this option to stop the current logging.
Pause	Use this option to pause the current logging.
Stakeout...	RTK only. Use this function to be guided to points you are requested to go to. Alternately, can be used for navigation purposes, whether in real-time RTK or post-processed projects.
Initialize	Use this option to choose one of the available methods to speed up the initialization process.
Calibration	RTK only. Use this option to determine a local coordinate system from points the coordinates of which are known in that system. Available only if a projection is used in the coordinate system.
Zoom In	Increases the scale of the map view by one step.
Zoom Out	Decreases the scale of the map view by one step.
Job	Gives access to job-related functions: New, Open, Points (and Properties if a job is already open).
Configuration	Allows you to set the receiver as a base or a rover and perform different settings, including setting up the data link to acquire/generate RTK corrections.
Options	Allows you to access the following settings: Survey, Units, Feature Codes, Map, View, E-compass, Tolerances, External Devices, Voice and Keyboard.
Status	Gives access to three tabs describing the current GPS reception status, in digital (Position) or graphical (Satellites, Signal) form. (In fact the GNSS Status function from the GNSS Toolbox.)
About	Displays the installed version of ProMark Field.
Exit	Quits ProMark Field.

- **[9]**: Area showing a map of the working site (map screen). Tapping anywhere within this area will return the horizontal coordinates of the tapped point (expressed in the coordinate system used in the job). Tap **ok** to close the window providing these coordinates.
- **[10]**: Zoom in/out buttons
- **[11]**: Battery status
- **[12]**: Volume setting, for voice guidance (when activated)
- **[13]**: Phone status
- **[14]**: Connectivity status.
- **[15]**: Microsoft Windows button; Used to switch between the Microsoft Start screen and the ProMark Field application when ProMark Field is running.

- **[16]**: Takes you to the Microsoft Home screen by minimizing the ProMark Field window. Tap on the ProMark Field icon ( ) at the bottom of the screen to return to ProMark Field.

Dragging the Map on the Screen

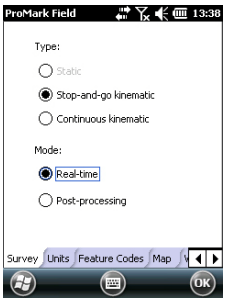
Use one of the following two methods.

- Press the ESC key to move the arrow symbol representing your current position back to the center of the map screen. Following this action, the whole screen is updated to reflect the map shift.

- Drag the stylus in the desired direction.

A routine is also implemented bringing your current position back to the center of the screen after 15 seconds of idle time on the map screen.

Setting General Parameters



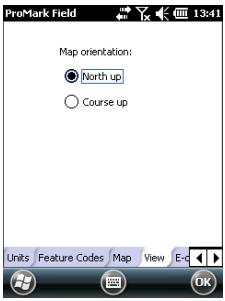
1. Tap **Menu>Options....**.This opens the **Survey** tab on which you should choose the type of survey you wish to perform. These settings only make sense if you are using your receiver as a rover. Ignore them if the receiver is used as a base.
   - **Type**: Choose whether you will be using your rover in static, stop & go kinematic or continuous kinematic mode, Note that a rover cannot be used in static if intended to be used in a real-time application.
   - **Mode**: Choose whether you will be performing a real-time or post-processed job with your rover. The choice you make here impacts the available initialization modes. If you select “Real-time”, four initialization modes will be available whereas only two will be possible if “Post-processing” is selected (see *Initialization on page 48*).

   These settings are not part of the job itself, which means they won’t be restored automatically next time you re-open the job.

   Please keep this setting unchanged until you open a new job. At that time, you may decide to keep or change this setting depending on the nature of the new job.

   NOTE: Only the real-time mode can be used if an shp job is open.

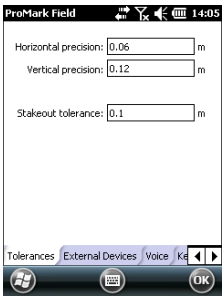
2. Tap on the **Units** tab located at the bottom of the screen and select the distance (linear) units you wish to use. Choose between “kilometers/meters”, “miles/feet” and “miles/US feet”.
3. Tap on the **View** tab and choose one of the two available options to orientate the map:
   - **North Up**: Map orientation is fixed. The top of the map screen will always give the North direction.
   - **Course Up**: Map orientation will change as you walk. The map will rotate in order to have your course always orientated upward on the map screen. This option cannot be used if a georeferenced background map is displayed.



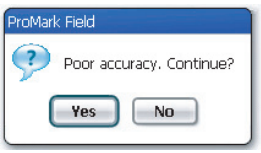
4. Tap on the **Feature Codes** tab. Use this tab to name all types of points you will be surveying with your receiver (e.g. pavement, fence, etc.). Then as you work in the field, it will be easy for you to associate a feature code with each of the points you will be surveying.

   Tap on the **Add** button to add a new feature code and then tap **OK** to validate the new entry. Repeat this operation as many times as necessary. Feature codes are stored in a separate file, independently of jobs, and so are available for use in any new job you create.
5. Tap on the **Tolerances** tab. Use this tab to set the upper limits of error on the position solution, both along the horizontal and vertical axes. There is a third field allowing you to set separately the tolerated horizontal error for all staked points.

   In practice, tolerance settings will trigger error messages whenever you try to log a point with current HRMS and VRMS values higher than the set tolerances. Error message [1] will appear in this case (see below). In addition, error message [2] (see below) will appear if you attempt to stake out a point that is not found within the acceptance circle (stakeout tolerance).



[1]



[2]

6. Tap on the **Voice** tab. Use this tab to enable or disable the voice guidance function.

When enabled, vocal information is provided when the receiver delivers its first position solution, and every time the position status changes state. In stake out, vocal instructions (distance and direction to point) are regularly provided to guide you to the stakeout point until you get to that point. When raw data are collected in static mode, vocal information is given to indicate a change to the current value of the observation timer (see *Rover Collecting Raw Data in Static on page 23*).

7. Tap on the **Keyboard** tab. Use this tab to enable or disable the large on-screen keyboard. The large keyboard is only available for use within the ProMark Field application. Only the Microsoft smaller keyboard can be used when working from within the operating system.
8. For background maps (**Map** tab), see *Adding Background Maps on page 57*.
9. For connecting external devices and using/calibrating the e-compass, see *E-Compass & External Device on page 61*.
10. Tap **OK** to validate all your choices.

Minimizing the ProMark Field Window

Tap  in the upper-right corner of the map screen.

To re-open the ProMark Field window, either tap on "ProMark Field" on the Home screen or the icon at the bottom of the Home screen.

Minimizing the ProMark Field window has no effect whatsoever on software operation. The receiver will continue to operate normally while the window is minimized.

Quitting ProMark Field

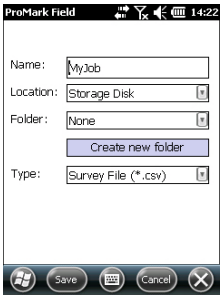
Use the **Menu**>**Exit** option to quit the program.

Caution! Tapping  in the upper-right corner of the screen only minimizes the ProMark Field window and so does not fully exit the program.

If a GSM modem is being used to acquire corrections when you ask the program to quit, the message "**Disconnect data link?**" will show up. ProMark Field will quit only after you have answered the question.

Creating a New Job

During your First ProMark Field Session



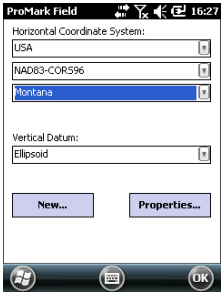
After entering the activation code, ProMark Field displays the map screen. Do the following to create a new job.

1. Tap **Menu**>**Job**>**New...**
2. Enter the following parameters:
   - **Name**: Enter a name for your job using the Microsoft virtual keyboard, or the large ProMark Field keyboard, if enabled.
   - **Location**: Choose the storage medium where to store the job file. You can choose between “Main memory”, “Storage Disk” (resident memory), or “Storage Card” (if there is an SD card inserted in the receiver).
   - **Folder**: Choose a folder where to store the job file you are creating.

     The **None** option stands for either the “My Documents” folder in the main memory, the root folder of the storage card or the “Storage Disk” folder in the main memory. Any other option available from the drop-down menu can only be a sub-folder of the “My Documents” folder in the main memory, the root folder of the storage card or the “Storage Disk” folder in the main memory.

     If you want to use a subfolder where to store your job files, tap **Create New Folder**. You can only create subfolders in the “My Documents” folder, on the storage card, or in the “Storage Disk” folder.

     NOTE: “Storage_Disk” has a higher storage capacity than “My Documents” (located in the Main Memory).
   - **Type**: The job may be saved either as a survey file (“csv” extension), or as a 3D shape file (“shp” extension). If you choose to create a shape file, you need to specify whether it will be a point, line or area shape file.
3. Tap **Save** to create the job file. You are then asked to choose a coordinate system for the job. Proceed in this order:

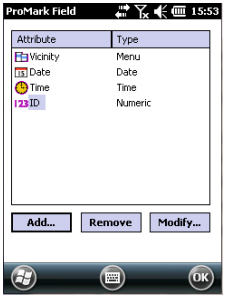


4. Choose the World Geodetic System or the country where your field operations will take place.
5. In the field just underneath, choose the datum used
6. In the field just underneath, choose the projection used.
7. Choose the vertical datum in the last field. The default possible choices are:
   - **Ellipsoid**: Each altitude or height value is simply determined with respect to the selected ellipsoid (second field above).
   - **EGM84**: Each altitude or height value is still initially determined with respect to the selected ellipsoid but a correction is applied to that value. The correction is read from the EGM84 geoid (Earth Geoid Model 1984, a global geoid model) and is specific to the computed horizontal position.
   - **MN75**: Each altitude or height value is still initially determined with respect to the selected ellipsoid but a correction is applied to that value. The correction is read from the MN75 geoid model (a Romanian model).

   Other geoid models may be downloaded to the receiver via the ProMark Field CD from the Spectra Precision website. Once downloaded, they are made available as possible choices in the **Vertical Datum** field.

   NOTE: If none of the available horizontal systems and vertical datums are suitable, then you can create a specific coordinate system by tapping **New** on the coordinate system selection screen. To create a new coordinate system, see *Defining a User System on page 14*.
8. Tap **OK**. If you chose to save the job in csv format, this terminates the job creation procedure right away. The software will close the currently open job and open the new one instead.

   But if you chose to save the job as an shp file, ProMark Field will then give you the option of defining attributes for each point, line or polygon you will collect:



– Tap **Add**. You may define as many attributes as necessary. Eight different types of attributes are available (see table below).

Attribute Type	Purpose	Additional Information Needed
Text	Entering comment, etc.	Maximum number of characters.
Menu	Choosing an option (menu item) that suits the attribute for the collected data.	All possible menu items for this attribute.
Image	Attaching a picture to the collected data.	-
Voice	Recording voice comment	-
Numeric	Entering a number.	Max. number of digits and decimal places.
Date	Entering the current logging date (mm/dd/yy).	-
Time	Entering the current logging time (hh:mm:ss)	
Yes/No	Choosing “Yes” or “No” in response to the statement suggested by the attribute name for the collected data.	-

– Name and define each attribute you add. Most attributes may be named at your convenience, except for voice, image and time attributes which are automatically named ”Sound”, “Picture” and “Time” respectively.
– Tap **OK** once you have added and defined all the attributes you need. This will terminate the job creation procedure. The software will close the currently open job and open the new one instead.

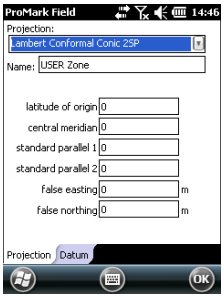
  NOTE: From this time on, you can no longer change the list of attributes defined for the job.

Subsequent Uses of ProMark Field

The next time you launch ProMark Field, the program will open the job you last opened.

If this job is no longer present in the receiver, then a message will warn you that the program has been unable to open that job. You will then have to create a new job or open an existing one.

Defining a User System



- Tap on the **New** button.
- Select the type of projection you wish to use in your coordinate system. Depending on that choice, you will have to enter a certain number of parameters.

  Remember every time you create a new projection and you have to enter the latitude and longitude of origin, or the central meridian, these must be expressed in degrees with eight decimal places (ddd.dddddddd). On the other hand, false eastings and false northings should always be expressed in meters, even if a different unit has been selected in the **Units** field on the same screen.
- After you have named and defined your new projection and datum, just tap **OK** to save the new system and choose it as the system used in the current job. This will take you back to the coordinate system selection screen on which you will now be able to see how the new USER coordinate system has been defined (new projection and datum names displayed in the second and third fields respectively).

Opening an Existing Job

- Tap **Menu**>**Job**>**Open...**. ProMark Field browses all the folders in search of all the *.csv or *.shp files stored in the receiver (depending on how you set the **Type** field). A new window then opens listing all these jobs.
- After you have found the job you wish to open, tap on its name in the list. This opens the job and takes you to the map screen where you can see the points already logged in that job.

Viewing the Properties of the Open Job

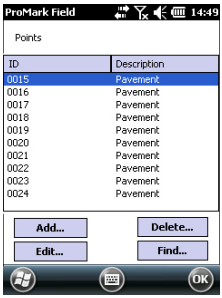
- Tap **Menu**>**Job**>**Properties**. ProMark Field then displays a two-tab window. The first tab provides the job's name, type and location (folder). The second one views the properties (projection and datum) of the coordinate system used in the job.
- Tap **OK** or press ESC to return to the map screen.

Working on Points

You can easily access the complete list of points contained in a job to perform one of the following functions:

- Find a point
- Edit a point
- Delete a point

- Add a point (stakeout point, installation point for a base, etc.)



After opening the job in ProMark Field, do the following:

- Select **Menu**>**Job**>**Points**. A two-column table appears listing all the points contained in the job. The first column provides the point ID and the second, the point description (if any). The point description may take one of the following values:
  - Blank (three hyphens shown)
  - The feature code you assigned to the point when logging it
  - The result of a stakeout function (<Point ID><Horizontal_Coordinates><Cut/Fill_value>) (see *Using the Stake Out Function on page 40*).
  - Any text string you wish to assign to the point (base location, etc.)
- **Finding a Point**: Tap **Find...**, then successively type on **Id** and **Description** in the Attribute column to set your search criteria.

  Then tap **Find**. The search results are then displayed (one or more points; the list will be empty if none of the points meet your search criteria). At this stage, you can either edit or delete the selected point.
- **Editing a Point**: Select the point you want to edit from the complete list of points, or from the list of searched points (see above). Then tap **Edit**.

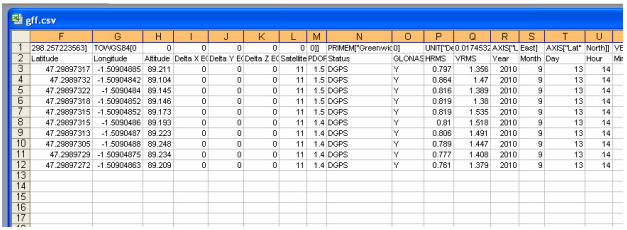
  The Edit function allows you to change the ID, the description and the three coordinates of the point. ProMark Field will accept that several points in the job have the same point ID.
- **Deleting a Point**: Simply select the point you want to delete from the complete list of points, or from the list of searched points (see above), then tap **Delete**. ProMark Field will ask confirmation before actually deleting the point
- **Adding a Point**: Tap **Add...**. Enter the ID, the description and the three coordinates of the new stakeout point. The content of the Description field is left to your choice: it may be left empty, set to one of the feature codes you defined earlier for the job, or freely defined. Tap **OK** when the definition of the point is complete. The new point then appears in the list.

There is an additional procedure to delete points from a job, based on the use of the map screen:

- Adjust the map screen (zoom, drag) to make visible on the screen the point you want to delete.
- Tap on the point. This opens a new window showing its properties.
- Tap on **Delete** in the lower-left corner of the window. The point is instantly deleted from the job (no user confirmation required).

More About Job Files in CSV Format

Job files in “csv” format are standard spreadsheets that you will later be able to open using GNSS Solutions, Microsoft Excel, Open Office, etc.


gff.csv

	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U
1	298.257223563]	TOWGS84[0	0	0	0	0	0	0]]	PRIMEM[“Greenwic	0]	UNIT[“D	0.0174532	AXIS[“L	East]	AXIS[“Lat”	North]]	VE
2	Latitude	Longitude	Altitude	Delta X E	Delta Y E	Delta Z E	Satellite	PDOF	Status	GLONAS	HRMS	VRMS	Year	Month	Day	Hour	Mi
3	47.2989737	-1.5090488	89.211	0	0	0	11	1.5	DGPS	Y	0.797	1.358	2010	9	13	14	
4	47.2989732	-1.5090484	89.104	0	0	0	11	1.5	DGPS	Y	0.864	1.47	2010	9	13	14	
5	47.2989732	-1.5090484	89.145	0	0	0	11	1.5	DGPS	Y	0.816	1.389	2010	9	13	14	
6	47.2989731	-1.5090485	89.146	0	0	0	11	1.5	DGPS	Y	0.819	1.38	2010	9	13	14	
7	47.2989731	-1.5090485	89.173	0	0	0	11	1.5	DGPS	Y	0.819	1.535	2010	9	13	14	
8	47.2989731	-1.5090486	89.193	0	0	0	11	1.4	DGPS	Y	0.81	1.518	2010	9	13	14	
9	47.2989731	-1.5090487	89.223	0	0	0	11	1.4	DGPS	Y	0.808	1.491	2010	9	13	14	
10	47.2989730	-1.5090488	89.248	0	0	0	11	1.4	DGPS	Y	0.789	1.447	2010	9	13	14	
11	47.2989729	-1.5090487	89.234	0	0	0	11	1.4	DGPS	Y	0.777	1.408	2010	9	13	14	
12	47.2989727	-1.5090486	89.209	0	0	0	11	1.4	DGPS	Y	0.761	1.379	2010	9	13	14	
13																	
14																	
15																	
16																	
17																	

A job file in csv format lists all the points logged during a project (one point per row). The coordinates of each point are those computed in real-time by your receiver. The file also contains various information listed in the table below.

Csv File	Parameters
Above the table:	Coordinate system used
Table columns:	Site ID
	Description
	Coordinates (X, Y, Z and/or Lat, Lon, Alt)
	Delta X, Y, Z (ECEF)
	Number of satellites
	Position solution status (Autonomous, DGPS, SDGPS, FLOAT or FIXED)
	GLONASS status (Y or N)
	HRMS & VRMS values
	Date & time
	Occupation time
	Antenna height value
	Antenna height measurement type (slant or not, "1" if slant)
	Offsets (distance and bearing)

When a job is open in ProMark Field, all the points contained in that job can be seen on the map screen and the properties of each of these points can be displayed by simply tapping on their location. The complete list of points present in the job can also be listed using **Menu**>**Job**>**Points**.

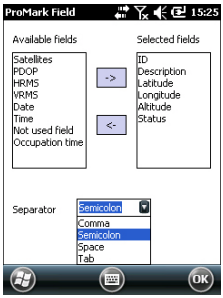
IMPORTANT! In job files, a distinction must be made in terms of position accuracy between RTK (real-time) projects and post-processed projects during which collecting raw data is required:

- In post-processed projects, the coordinates only feature autonomous or differential GPS accuracy, whichever is available at that time. It's only after post-processing, and provided the collected raw data are good quality, that centimeter-accurate coordinates will be delivered for your points.
- In RTK projects, the coordinates provided in the job file are directly centimeter-accurate, as long as RTK initialization is maintained (i.e. all position solutions are "fixed").

A job file may also be used to hold points you would like to stake out. In that case, the file will usually be prepared separately (in GNSS Solutions for example), then downloaded to your receiver for use in ProMark Field.

Importing/Exporting Jobs

Exporting Jobs



The list of points held in a csv job file can be exported to a user-defined text file or to DXF format. Shp jobs can only be exported to DXF. With the job open in ProMark Field, do the following:

- Tap **Menu** > **Job** > **Export**.
- Enter a name for the text file that will be created by the Export function.
- Choose a location and a folder where to store the file once generated.
- Tap **Save**.
- Select the type of information you want to export for each point in the job. ProMark Field lists all the fields for which information is available for each point. Use the left arrow to create the list of fields you want to export for each point.
- Select the character used as field separator. This may be a comma, a semicolon, a space or a tab.
- Tap **OK** when you are ready to export the list of points. When finished, ProMark Field indicates the number of exported points (number of records).

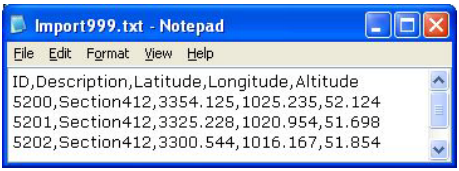
Importing Text Files

Points can be added to the open csv job as text files (the Import function is made unavailable when an shp job file is open). Typically you will use this function to import a list of stakeout points. To be imported successfully, a text file needs to comply with the following rules:

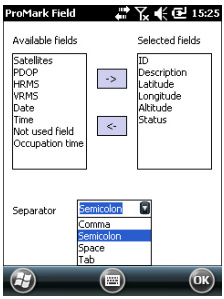
- Each point description occupies one line. The same field separator is used throughout the line.
- Each point description uses the same sequence of fields (e.g. first Point ID, then Point Description, then Northing, then Easting, etc.).
- You may add a header line to ease identification of each field in the next lines when you open the file with a standard text editor. The header line will be ignored when the file is imported to the ProMark Field job.
- Point coordinates should be expressed in the same coordinate system as the one used in the job.

Latitude and longitude should be expressed in degrees and fraction of a degree, with up to 9 decimal places (DDD.DDDDDDDDD).

File example using the comma separator:



Follow the instructions below to import a list of points from a text file:

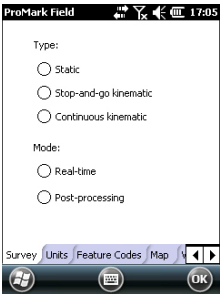


- Tap **Menu** > **Job** > **Import**. ProMark Field lists all the text files stored on your platform.
- Tap the name of the text file you would like to import. This opens a new window on which you can customize the import function.
- Select the type of information you would like ProMark Field to pick for each point from the text file. ProMark Field lists all the fields that it will be able to process once imported in the job. This list is displayed on the left-hand side of the window. Use the left arrow to create the list of fields that ProMark Field will actually import for each point.
- Indicate which character is used in the text file to be the field separator. This may be a comma, a semicolon, a space or a tab.
- Tap **OK** when you are ready to import the list of points. When finished, ProMark Field indicates the number of imported points (number of records).

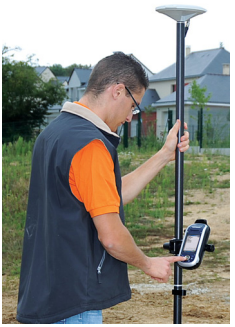
Running a Post-Processed Project

Choosing the Survey Type/Mode and the System Setup

Use the Survey tab on ProMark Field's Options menu for this setting.



Read the table below to choose the survey type and mode and the system setup suitable for your project.

Your Project	Setup	Survey
Collecting Raw Data on One Point: You want to collect raw data at the same location throughout the project. The receiver is used either as a base or a rover.	Receiver and antenna mounted on a tripod: 	Post-processing, Static
Collecting Raw Data on Several Points: You want to go to several points and perform static occupations on each of these points. Raw data will be collected continuously throughout the project.	Receiver and antenna mounted on a pole or bipod: 	Post-processing, Stop-and-go Kinematic
Collecting Raw Data along a Line: You want to walk along a line and let the receiver automatically log a series of points along the way. Raw data will be collected continuously throughout the project.		Post-processing, Continuous kinematic

Reminder: If you are using a base/rover system, remember in all cases of use, the two receivers should collect raw data at the same time at their respective locations, using the same recording interval, and with no interruption allowed.

Typical Setups

On a Tripod (static survey):

- Place the receiver in its field bracket and mount the assembly onto one the tripod's legs.
- Insert the antenna vertical extension (a short pole provided along with the receiver) at the top of the tripod.
- Secure the antenna provided at the top of this short pole.
- Connect the antenna to the receiver antenna input using the coaxial cable provided.
- Install the tripod over the chosen point (the reference point for a base, the surveyed point for a rover).
- Skip to *page 22* for a base, *page 23* for a rover.

On a pole or bipod (kinematic survey):

- Place the receiver in its field bracket and mount the assembly onto the pole at a suitable height.
- Secure the antenna provided at the top of the pole.
- Connect the antenna to the receiver antenna input using the coaxial cable provided.
- Skip to *Rover Collecting Raw Data in Stop & Go Kinematic on page 25* or *Rover Collecting Raw Data in Continuous Kinematic on page 27*.

IMPORTANT! Choosing the right setup before starting collecting raw data is crucial.

Modifying the setup after starting data collection will have a detrimental effect on the post-processing of your field data.

Please follow the recommendations below once data collection is started:

- DO NOT change the external antenna.
- DO NOT switch between external and internal antenna (by plugging / unplugging the external antenna cable).
- DO NOT change the tracking mode (in GNSS Toolbox, GNSS Settings).

Not following these recommendations will inevitably force the receiver to close the current raw data file and create a new one, thus impeding seriously the outcome of the post-processing step.

Base Collecting Raw Data

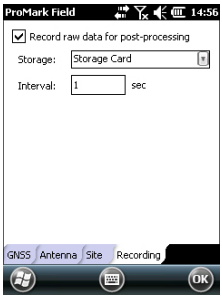
- Set up the base at its planned location as explained in *Typical Setups on page 21*. Measure the antenna height according to the slant measurement method, using the HI tape provided:
  - Insert the end of the tape into one of the three height marks located at the edge of the antenna radome (as shown).
  - Unfold the tap until you place the tip located at the other end of the tape on the reference point.
  - Read the graduation directly on the tape: This is the slant antenna height.
- Turn on the receiver, run ProMark Field and create a job as explained in *Creating a New Job on page 11*.
- Go to **Menu**>**Options**. On the **Survey** tab, select "Post-processing" as the survey mode. As the survey type, "Static" should logically be selected but when the receiver is configured as a base, the survey type setting is simply ignored.
- Tap **OK**.
- Tap **Menu** and select **Configuration...**
- Select "Base" from the Configuration drop-down list
- Tap **Settings**.
- On the **GNSS** tab, make sure the "Internal" GNSS receiver is selected. Ignore the **Port** field.
- Tap on the **Antenna** tab,
- Enter the antenna height you have just measured and select "Slant", corresponding to the measurement method used.
- Select the antenna type used. Keep the **Virtual Antenna** option cleared.

  However, if you plan to post-process the collected base data in some office software other than GNSS Solutions, you will need to enable this option if the base antenna used is not known to this software. In that case, the collected raw data will be adjusted as if they had been collected with the standard ADVNULLANTENNA.
- Tap on the **Site** tab. In the **Site ID** field, enter a name of your choice for the point where the base is installed (e.g. "BASE"). This name will be saved in the base raw data file, not in the job file.

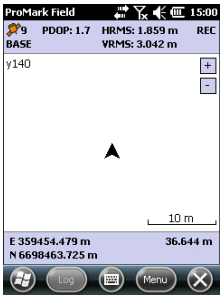
  If however a point accurately describing the base position is stored in the job, you can select this point after tapping on the [...] button. In that case, the existing point name

assigned to the base position will also be saved to the base raw data file.

You may also leave this field blank since you will still have the ability to define a point name for the base position when post-processing your field data with GNSS Solutions.



- On the **Recording** tab, make sure the **Record raw data for post-processing** function is enabled, check that the storage medium used to store the collected data is the one you really want to use (it is a good practice to use a Storage Card) and choose the recording interval (default: 1 second). To change the storage medium, see also *Changing the Storage Medium for Raw Data Collection on page 47*.
- Tap **OK** to complete the base configuration step. Tap **OK** again to start collecting base data. Let the base operate on its own until the end of the survey. The screen is then as shown in the left-hand column.



- At the end of the survey, come back to the base, select **Menu**, **Exit** to end the working session. This will automatically close the raw data file.

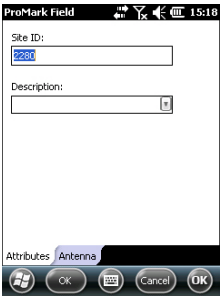
  NOTE 1: The base will automatically start collecting raw data next time you run ProMark Field.

  NOTE 2: The Log function is greyed (unavailable) when the receiver is configured as a base,

Rover Collecting Raw Data in Static

- Set up the rover as explained in *Typical Setups on page 21* and measure the antenna height according to the slant measurement method, using the HI tape provided:
  - Insert the end of the tape into one of the three height marks located at the edge of the antenna radome (as shown).
  - Unfold the tap until you place the tip located at the other end of the tape on the surveyed point.
  - Read the graduation directly on the tape: This is the slant antenna height.
- Turn on the receiver, run ProMark Field and create a job as explained in *Creating a New Job on page 11*.
- On the **Options** menu, select “Static” and “Post-processing” on the Survey tab, then tap **OK**.
- Tap **Menu** and select **Configuration...**
- Select “Rover” from the Configuration drop-down list
- Tap **Settings**.

- On the **GNSS** tab, make sure the “Internal” GNSS receiver is selected. Ignore the **Port** field.
- Tap on the **Antenna** tab,
- Enter the antenna height you have just measured and select “Slant”, corresponding to the measurement method used.
- Select the antenna type used.
- On the **Recording** tab, make sure the **Record raw data for post-processing** function is enabled, check that the storage medium used to store the collected data is the one you really want to use (it is a good practice to use a Storage Card) and choose the recording interval (default: 1 second). To change the storage medium, see also *Changing the Storage Medium for Raw Data Collection on page 47*.



- Tap **OK** to complete the rover configuration step. Tap **OK** again to return to the map screen.
- Tap **Log**. In the **Site ID** field, type the name of the surveyed point. Optionally, add a point description in the field underneath. This may be one of the feature codes you defined earlier.

  On the **Antenna** tab, you may also check the antenna height and type entered previously and make last-minute changes.

- Tap **OK** to start collecting data on the point. The screen now shows the following:
  - The name of the Site ID being surveyed.
  - The number of satellites for which raw data are collected.
  - The current value of PDOP.
  - The time elapsed since the beginning of the data collection.
  - **Range Achieved**: An estimation of the maximum baseline length, based on GPS L1 only and not the currently selected tracking mode, and deduced from the current amount of collected data for which centimeter-accurate determination of the point position will be guaranteed through post-processing. The baseline length represents the distance between the base used during post-processing and your rover.

  - **File**: Name of the file in which raw data are being saved.
  - **Folder**: Name of the folder where the raw data file can be found.
  - **Location**: Hardware location of the folder and file.
- When you estimate that enough data have been recorded, taking into account the value of the **Range Achieved**, tap **Stop**.

  NOTE: You may tap on the **Log** button again and resume data logging for the same Site ID name (or for a different name). This will create a new raw data file (G file), which by default will be the only one to be seen as a static observation when imported in GNSS Solutions. In the job file (csv file), this will result in two points collected.
- Select **Menu**, **Exit** to close the job and quit ProMark Field.

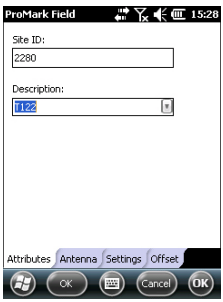
Rover Collecting Raw Data in Stop & Go Kinematic

In Stop & Go kinematic, the rover antenna is placed successively over several points and each time, a static occupation takes place for a preset time. Raw data are collected continuously in the background.

- Set up the rover as explained in *Typical Setups on page 21*.
- Turn on the receiver, run ProMark Field and create a job as explained in *Creating a New Job on page 11*.
- On the **Options** menu, select "Stop & Go Kinematic" and "Post-processing" on the **Survey** tab, then tap **OK**.
- Think about which initialization method you will be using at the beginning of the project and take the corresponding steps:
  - *From Known Point*: Go to the known point and place the rover antenna exactly over this point.
  - *From Bar*: Go to the base (fitted with the initializer bar) and place the rover antenna at the free end of the initializer bar.
- Tap **Menu** and select **Configuration...**
- Select "Rover" from the Configuration drop-down list.
- Tap **Settings**.
- On the **GNSS** tab, make sure the "Internal" GNSS receiver is selected.
- Tap on the **Antenna** tab,
- Select "Vertical" and enter the antenna height, which in this case corresponds to the pole or bipod length.

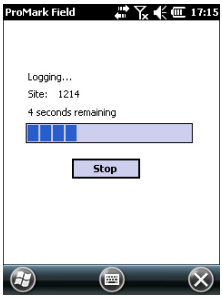
If you are using a fixed-height pole, just enter this height. if you are using a height-adjustable pole or bipod, read the graduation on this device, and then enter the read value in the **Antenna Height** field.

- Select the antenna type used.
- On the **Recording** tab, make sure the **Record raw data for post-processing** function is enabled, check that the storage medium used to store the collected data is the one you really want to use (it is a good practice to use a Storage Card) and choose the recording interval (default: 1 second). To change the storage medium, see also *Changing the Storage Medium for Raw Data Collection on page 47*.
- Tap **OK** to complete the rover configuration step. Tap **OK** again to return to the map screen.
- Select **Menu**>**Initialize** and choose your initialization method:
  - If you select "From Bar", ProMark Field asks you to name the initialization point (the point will be saved to the job) and possibly correct the antenna height on the bar. Then tap **OK**. Keep the rover antenna on the bar until the initialization time is up (60 seconds; see progress bar on the screen), then carefully move this antenna to the top of the pole or bipod, taking care not to mask it.
  - If you select "From Known Point" (you are supposed to stand on that point), choose that point from the list of points stored in the job and stay there until the initialization time is up (5 sec; see progress bar on the screen).



- Taking care to keep the pole upright and the antenna unmasked, go to the first point you want to survey.
- Tap **Log**. In the **Site ID** field, type the name of that point.

  If you use a purely numerical value for this field, then ProMark Field will automatically increment the Site ID name after each site occupation. Optionally, add a description in the field underneath. This may be one of the feature codes you defined earlier.
- On the **Antenna** tab, you may also check the antenna height and type entered previously and make last-minute changes.
- On the **Settings** tab, preset the time required on each point during which you should stay static (default: 5 seconds).
- **Offset** tab: See *Point Offset on page 50*.



- Tap **OK** to start marking the point. Countdown is started on the point. Stay static until the time is up. The logged point is now visible on the screen.

  You may survey as many points as necessary in the same job. You can later read the properties of each point pertaining to the job by tapping on it on the map screen.
- When you are finished with the job, select **Menu**, **Exit** to close the job and quit ProMark Field. This will automatically close the raw data file.

  NOTE: The rover will automatically start collecting raw data next time you run ProMark Field, unless you clear the **Record raw data for post-processing** option (in **Menu**> **Configuration** >**Rover** >**Settings**, **Recording** tab) before you quit ProMark Field.

Rover Collecting Raw Data in Continuous Kinematic

In Continuous Kinematic, the rover is moved along a line, marking points at regular intervals of time or distance, and simultaneously and continuously collecting raw data.

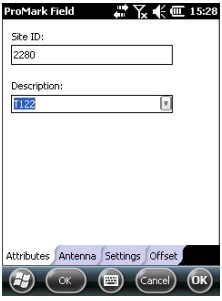
- Set up the rover as explained in *Typical Setups on page 21*.
- Turn on the receiver, run ProMark Field and create a job as explained in *Creating a New Job on page 11*.
- On the **Options** menu, select “Continuous Kinematic” and “Post-processing” on the **Survey** tab, then tap **OK**.
- Think about which initialization method you will be using at the beginning of the project and take the corresponding steps:
  - *From Known Point*: Go to the known point and place the rover antenna exactly over this point.
  - *From Bar*: Go to the base (fitted with the initializer bar) and place the rover antenna at the free end of the initializer bar.
- Tap **Menu** and select **Configuration...**
- Select “Rover” from the Configuration drop-down list
- Tap **Settings**.
- On the **GNSS** tab, make sure the “Internal” GNSS receiver is selected.
- Tap on the **Antenna** tab,
- Select “Vertical” and enter the antenna height, which in this case corresponds to the pole or bipod length.

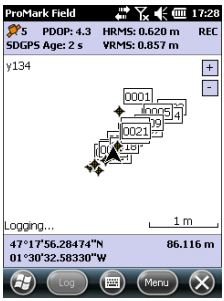
  If you are using a fixed-height pole, just enter this height. if you are using a height-adjustable pole or bipod, read the

graduation on this device, and then enter the read value in the **Antenna Height** field.

- Select the antenna type used.
- On the **Recording** tab, make sure the **Record raw data for post-processing** function is enabled, check that the storage medium used to store the collected data is the one you really want to use (it is a good practice to use a Storage Card) and choose the recording interval (default: 1 second). To change the storage medium, see also *Changing the Storage Medium for Raw Data Collection on page 47*.
- Tap **OK** to complete the rover configuration step. Raw data collection is now started. Tap **OK** again to return to the map screen.
- Select **Menu**>**Initialize** and choose your initialization method:
  - If you select “From Bar”, ProMark Field asks you to name the initialization point (the point will be saved to the job) and possibly correct the antenna height on the bar. Then tap **OK**. Keep the rover antenna on the bar until the initialization time is up (60 seconds; see progress bar on the screen), then carefully move this antenna to the top of the pole or bipod, taking care not to mask it.
  - If you select “From Known Point” (you are supposed to stand on that point), choose that point from the list of points stored in the job and stay there until the initialization time is up (5 sec; see progress bar on the screen).
- Taking care to keep the pole upright and the antenna unmasked, go to the start point of the line.
- Tap **Log**. In the **Site ID** field, type the name of the start point of the line.

  If you use a purely numerical value for this field, then ProMark Field will automatically increment the Site ID name. Optionally, add a description in the field underneath. This may be one of the feature codes you defined earlier.
- On the **Antenna** tab, you may also check the antenna height and type entered previously and make last-minute changes.
- On the **Settings** tab, you may choose the rate at which the software will log points (along the line) in the job file. Points may be logged every x seconds or units of distance.





Choose what's best for you, depending on your speed along the line.

- **Offset** tab: See *Line Offset on page 50*.
- Tap **OK** to mark the beginning of the line.

  "Logging..." then appears on the screen and you can see the line being plotted on the map (i.e. a series of points) as you walk along, based on the real-time position solution computed by the receiver.
- When you reach the end of the line, select **Menu** > **Stop**.

  You may use the **Pause**/**Resume** function in the **Menu** when the line is discontinuous. While in pause, ProMark Field stops marking points according to the chosen time or distance rate.
- When you are finished with the job, select **Menu**, **Exit** to close the job and quit ProMark Field. This will automatically close the raw data file.

  NOTE: The rover will automatically start collecting raw data next time you run ProMark Field, unless you clear the **Record raw data for post-processing** option (in **Menu**> **Configuration** >**Rover** >**Settings**, **Recording** tab) before you quit ProMark Field.

Quick Start to Post-Processing Raw Data

Assuming raw data files (G files) were collected directly on SD Cards, one by the base, another by the rover, do the following:

- Copy the G files from the rover and the base to your computer.
- With Spectra Precision Survey Office (SPSO):
  - Run SPSO.
  - On the start page, click on **Start new project**.
  - Click **OK**.
  - Drag and drop the G files from the base, then from the rover, onto the Plan View.
  - Confirm/reject each G file by respectively checking or clearing the Import box in the first column.
  - Click **OK**.
  - Define the projection used and click **OK** to import the files.
  - Click on **Survey** in the menu bar and select **Process Baselines**. SPSO will then process all the baselines.
  - Click on the **Save** button to save all the processing results.
  - Save the project.

- With GNSS Solutions:
  - Run GNSS Solutions
  - Select **Create a New Project**.
  - Name the project.
  - Click on **Modify Default Settings** and choose a coordinate system.
  - In the Import dialog box that shows up after selecting the coordinate system, select **Import Raw Data From Files or ProMark/ProFlex Devices**.
  - In the Browse dialog box, select the G files you want to import and tell GNSS Solutions whether you want a local copy of these files or not.
  - Click **Open**. GNSS Solutions converts the G files into B, D, E and ION files (in the same folder if not copied to the project folder, in the project folder otherwise) and lists their properties in tabular form.

    At this stage you may create a control point for the base site and enter its true coordinates (more information on this particular topic in the *GNSS Solutions Reference Manual*).
  - Select **OK**>**To Import and Process Baselines**. GNSS Solutions will now import the files and post-process the resulting baseline (more information on the results in the *GNSS Solutions Reference Manual*).

NOTE 1: The convention used by the receiver for naming raw data files (G files) is recalled below:

G<Site><Index><Year>.<Day>

Parameter	Description
G	Raw data file header (ATOM format)
<Site>	First four characters of the point name where raw data recording took place
<Index>	File rank in current day (A to Z, then AA to ZZ) (A for first file logged in the day)
<Year>	Last two figures of current year (“11” for 2011)
<Day>	File extension; A three-figure number representing the current day number in year (1.. 366)

Example of file name for second file logged on Site ID 85X2 on June 6th 2011:

G85X2B11.157

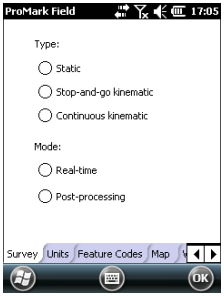
NOTE 2: The ProMark Field job file is of no use in the post-processing step. However, when defining control points in GNSS Solutions, the job file may be useful as a separate memo, for example to copy the coordinates of the point where the base was declared to be installed (cf. **Site** tab and **Site ID** field).

NOTE 3: There is no implicit “connection” between a raw data file logged by a receiver and the job file that was open at that time. It is therefore your responsibility to create this “connection” if that makes sense for your project.

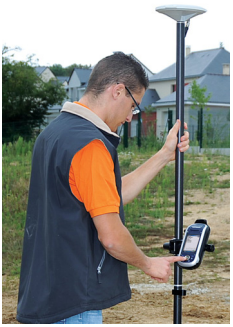
Using Your Rover in a Real-Time RTK Project

Choosing the Survey Type and Mode

Use the Survey tab on ProMark Field's Options menu for this setting.



Read the table below to choose the survey type and mode suitable for your project.

Your Project	Setup	Survey
Logging Points: You want to collect centimeter-accurate positions in real time on each of the surveyed points.	Receiver and antenna mounted on a pole or bipod: 	Real-time, Stop & Go Kinematic
Logging Points along a Line: You want to collect centimeter-accurate positions in real time, at regular intervals of time or distance, along a line.		Real-time, Continuous Kinematic
Staking out Points: You want to be guided successively to each of the points listed in your job so you can place a stake on each of them (or simply go back to each of them).		Real-time, Stop & Go Kinematic

There is only one system setup possible for a rover used in a real-time RTK project, which is to mount it on a pole or bipod:

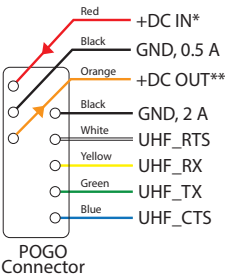
- Place the receiver in its field bracket and mount the assembly onto the pole at a suitable height.
- Secure the antenna provided at the top of the pole.
- Connect the antenna to the receiver antenna input using the coaxial cable provided.
- Determine the length of the pole. The real height of the antenna will be deduced from this value

Setting an RTK Rover

Device used to receive corrections:

- If you are using a cellular modem, make sure you have purchased and inserted the SIM card that will allow the modem to fulfill this task.

POGO Cable
P/N 111659



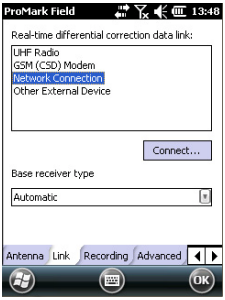
*: DC power input
(12-28 V DC/2 A external battery)

**: DC power output to UHF radio
(12 V DC/0.5 A)

- If you are using an external radio receiver, connect the radio to the receiver through a POGO cable (this accessory is available from Spectra Precision):
  - For most models of supported radios, the POGO cable that should be used is the one with bare wires on radio side (Unterminated POGO cable P/N 111659), which means you have to add a connector that is suitable for your radio model. The POGO cable pinout is provided in the left-hand column. Some radio models can be configured directly from within ProMark Field.
  - If you purchased a Satel Easy radio from Spectra Precision, then the POGO cable is provided with the suitable connector (it's part of the radio kit P/N 802144). You just need to connect this cable between the GNSS receiver and the Satel radio. The Satel radio should be configured separately (this cannot be done from within ProMark Field).

Step-by-step procedure:

- Turn on the receiver, run ProMark Field and create a job as explained in *Creating a New Job on page 11*.
- Go to **Menu**>**Options**. On the **Survey** tab, select "Real-time" as the survey mode. The **Type** parameter should be set to "stop-and-go kinematic" to log or stake out points, or to "Continuous kinematic" to log lines.
- Tap **OK**.
- Tap **Menu** and select **Configuration...**
- Select "Rover" from the Configuration drop-down list
- Tap **Settings**.
- On the **GNSS** tab, make sure the "Internal" GNSS receiver is selected.
- Tap on the **Antenna** tab,
- Enter the antenna height, then select "Vertical", corresponding to the pole length, with the pole held vertical.
- Select the type of antenna used.



- Tap on the **Link** tab and select the device through which RTK corrections will be received. Make the required settings depending on the choice of device made (modem or radio). See table below.

Device	Settings
UHF Radio	Type (U-Link, License-Free Europe, License-Free America or Satel Easy), baud rate, advanced
GSM (CSD) modem	Tap on the **Dial** button, then enter the base phone number.
Network Connection	Direct IP parameters: • Name, host, port Or NTRIP parameters: • Name, host, port • Password, station **Resend corrections via radio** option: Enable this option if you want your rover to forward the corrections received to other rovers located in the vicinity, using an external radio connected to it. This operating mode is referred to as the *RTK Bridge* mode.
Other external device	Port, baud rate

Base receiver type	"Automatic" is the default choice and usually the right choice as well. In some cases you may have to specify the brand of the receiver used at the base to make sure the corrections are decoded correctly by the rover.

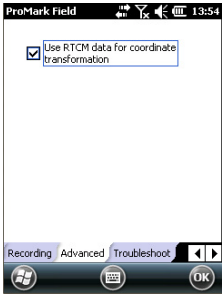
NOTE: You can create as many NTRIP and Direct IP configurations as necessary. Each configuration can be recalled by just selecting its name (**Name** field). A recalled configuration may be deleted by tapping on the **Del** button.

- **Recording** tab: Although operated as an RTK rover, the receiver can also collect raw data. In that case, enable the **Record raw data for post-processing** function, check that you are using the desired storage medium (it is a good practice to use a Storage Card) and choose the recording interval (default: 1 second).

  For easy reference, ProMark Field automatically provides the name, folder and location of the raw data file the receiver will now be creating.

  NOTE: Changing the storage medium requires that you temporarily disable the **Record raw data for post-processing** function and validate the configuration of the rover with this function disabled. When coming back to the settings

of the rover, you will then be allowed to change the storage medium on the **Recording** tab. Don't forget to re-enable the **Record raw data for post-processing** function afterwards.



- **Advanced** tab: This tab contains a single parameter. When **Use RTCM data for coordinate transformation** is activated, the rover will provide position solutions in the same coordinate system as the one used by the base. This will be effective if the rover receives the definition of this coordinate system from the base through RTCM message types 1021 to 1023. SAPOS networks for example deliver such messages.
- **Troubleshoot** tab: For maintenance purposes, technical support may ask you to use this tab. The **Enable debug file output** option should always be inactive in normal conditions of use.
- Tap **OK** to complete the rover configuration step. Tap **OK** again to let the receiver operate as an RTK rover.

  NOTE: The auto-dial function attached to the internal modem has been deactivated intentionally to reduce the cost of your mobile communications. This means that every time you turn off the modem when you quit ProMark Field, you will have to re-activate the connection from the **Link** tab before you can start a new working session. Conversely, if you quit ProMark Field and you choose to keep the modem turned on, the connection will still be active next time you start a new working session with ProMark Field.

Logging Points

- Set up the rover as explained in *Choosing the Survey Type and Mode on page 32*.
- Turn on the receiver, run ProMark Field and create a job as explained in *Creating a New Job on page 11*.
- On the **Options** menu, select "Stop & Go Kinematic" and "Real-time" on the **Survey** tab, then tap **OK**.
- Think about which initialization method you will be using at the beginning of the project and take the corresponding steps:
  - *On the Fly*: Nothing special needs to be done.
  - *From Known Point*: Go to the known point and place the rover antenna exactly over this point.
  - *From Bar*: Go to the base (fitted with the initializer bar) and place the rover antenna at the free end of the initializer bar.

  - *Statically:* You will stay static for a while on a point of your choice.

- Tap **Menu** and select **Configuration...**
- Select "Rover" from the Configuration drop-down list.
- Tap **Settings**.
- On the **GNSS** tab, make sure the "Internal" GNSS receiver is selected. Ignore the **Port** field.
- Tap on the **Antenna** tab,
- Select "Vertical" and enter the antenna height, which in this case corresponds to the pole or bipod length.

  If you are using a fixed-height pole, just enter this height. if you are using a height-adjustable pole or bipod, read the graduation on this device, and then enter the read value in the **Antenna Height** field.
- Select the antenna type used.
- Tap on the **Link** tab and select the option through which RTK corrections will be delivered to the receiver. All these settings are fully described in the *Handheld Platform for MobileMapper 120, ProMark 120 & ProMark 220 Getting Started Guide* (GNSS Toolbox - Differential mode).
- **Recording** tab: Although specific to post-processed projects, there is no reason why you could not log raw data while you run your real-time RTK project. Raw data logging can indeed be run in parallel if you wish to double check your real-time centimeter positions with those obtained later through post-processing. If that is what you want to do, set the **Recording** tab accordingly.
- Tap **OK** to complete the rover configuration step. Tap **OK** again to return to the map screen.
- Select **Menu**>**Initialize** and choose your initialization method/
  - If you select "On the Fly", or "From Bar", nothing else needs to be done at this stage.
  - If you select "Statically", stay immobile for a while with your rover.
  - If you select "From Bar", keep the rover antenna on the bar for a while, then carefully move this antenna to the top of the pole or bipod, taking care not to mask it.
  - If you select "From Known Point", choose that point from the displayed list and stay there for a while.
- Wait until the receiver returns the "FIXED" indication in the status bar.

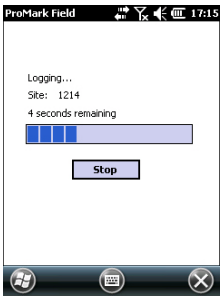
- Taking care to keep the pole upright and the antenna unmasked, go to the first point of your project.
- Tap **Log**. This opens the **Attributes** tab on the logging screen.

  With a csv job open, in the **Site ID** field, type the name of that point. If you use a purely numerical value for this field, then ProMark Field will automatically increment the Site ID name after each site occupation. Optionally, add a description in the field underneath. This may be one of the feature codes you defined earlier.

  With an shp job open, ProMark Fied lists the attributes defined for the job. You should enter a value for each of them, describing the point you are about to log.

  A warning message will be displayed at this stage if the position accuracy does not meet your acceptance criteria (see **Tolerances** tab in *Setting General Parameters on page 8*).
- On the **Antenna** tab, you may also check the antenna height and type entered previously and make last-minute changes.
- On the **Settings** tab, preset the time required on each point during which you should stay static (default: 5 seconds; max.: 3600 seconds).
- **Offset** tab: See *Line Offset on page 50*.
- Tap **OK** to start logging the point position. Countdown is started on the point. Stay static until the time is up.

  The screen then shows the properties of the logged point (the real-time position is averaged over the occupation time). A warning message will be displayed at this stage if the position accuracy does not meet your acceptance criteria (see **Tolerances** tab in *Setting General Parameters on page 8*).



- Tap **OK** to close the window. The logged point is now visible on the screen.

  You may log as many points as necessary in the same job. You can later read the properties of each point pertaining to the job by tapping on it on the map screen.
- When you are finished with the job, select **Menu**, **Exit** to close the job and quit ProMark Field.

Logging Points along a Line

- Set up the rover as explained in *Choosing the Survey Type and Mode on page 32*.

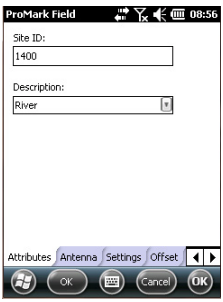
- Turn on the receiver, run ProMark Field and create a job as explained in *Creating a New Job on page 11*.
- On the **Options** menu, select "Continuous Kinematic" and "Real-time" on the **Survey** tab, then tap **OK**.
- Think about which initialization method you will be using at the beginning of the project and take the corresponding steps:
  - *On the Fly*: Nothing special needs to be done.
  - *From Known Point*: Go to the known point and place the rover antenna exactly over this point.
  - *From Bar*: Go to the base (fitted with the initializer bar) and place the rover antenna at the free end of the initializer bar.
  - *Statically:* You will stay static for a while on a point of your choice.
- Tap **Menu** and select **Configuration...**
- Select "Rover" from the Configuration drop-down list
- Tap **Settings**.
- On the **GNSS** tab, make sure the "Internal" GNSS receiver is selected. Ignore the **Port** field.
- Tap on the **Antenna** tab,
- Select "Vertical" and enter the antenna height, which in this case corresponds to the pole or bipod length.

  If you are using a fixed-height pole, just enter this height. if you are using a height-adjustable pole or bipod, read the graduation on this device, and then enter the read value in the **Antenna Height** field.
- Select the antenna type used.
- Tap on the **Link** tab and select the option through which RTK corrections will be delivered to the receiver. All these settings are fully described in the *Handheld Platform for MobileMapper 120, ProMark 120 & ProMark 220 Getting Started Guide* (GNSS Toolbox - Differential mode).
- **Recording** tab: Although specific to post-processed projects, there is no reason why you could not log raw data while you run your real-time RTK project. Raw data logging can indeed be run in parallel if you wish to double check your real-time centimeter positions with those obtained later through post-processing. If that is what you want to do, set the **Recording** tab accordingly.
- Tap **OK** to complete the rover configuration step. Tap **OK** again to return to the map screen.

- Select **Menu**>**Initialize** and choose your initialization method/
  - If you select “On the Fly”, or “From Bar”, nothing else needs to be done at this stage.
  - If you select “From Known Point”, choose that point from the displayed list and stay there for a while.
  - If you select “From Bar”, keep the rover antenna on the bar for a while, then carefully move this antenna to the top of the pole or bipod, taking care not to mask it.
  - If you select “Statically”, stay immobile for a while with your rover.
- Wait until the receiver returns the “FIXED” indication in the status bar.
- Taking care to keep the pole upright and the antenna unmasked, go to the start point of the line.
- Tap **Log**. This opens the **Attributes** tab on the logging screen.

  With a csv job open, in the **Site ID** field, type the name of the start point of the line. If you use a purely numerical value for this field, then ProMark Field will automatically increment the Site ID name. Optionally, add a description in the field underneath. This may be one of the feature codes you defined earlier.

  With an shp job open, ProMark Field lists the attributes defined for the job. You should enter a value for each of them, describing the line you are about to log.
- On the **Antenna** tab, you may also check the antenna height and type entered previously and make last-minute changes.
- On the **Settings** tab, you may choose the rate at which the software will log points (along the line) in the job file. Points may be logged every x seconds or units of distance. Choose what’s best for you, depending on your speed along the line.
- **Offset** tab: See *Line Offset on page 50*.
- On the **Advanced** tab, you may also require of ProMark Field that only fixed solutions of position be logged along the line (check the **Store FIXED only** check box in that case).



- Tap **OK** to start logging the line.

  “Logging...” then appears on the screen and you can see the line being plotted on the map as you walk along, based on the RTK position solution computed by the receiver.

A warning message will be displayed at this stage if the position accuracy does not meet your acceptance criteria (see **Tolerances** tab in *Setting General Parameters on page 8*).

- When you reach the end of the line, select **Menu** > **Stop**.

  You may use the **Pause/Resume** function in the **Menu** when the line is discontinuous. While in pause, ProMark Field stops logging points according to the chosen time or distance rate.
- When you are finished with the job, select **Menu**, **Exit** to close the job and quit ProMark Field.

Using the Stake Out Function

The file containing the stakeout points is a survey file (csv) or a shape file (shp). It may have been prepared with GNSS Solutions and/or derived from a job run earlier with ProMark Field. With a csv job, stakeout points can also be added directly in the open job file using the **Add** button after selecting **Menu**>**Job**>**Points**.

To export stakeout points from a GNSS Solutions project, select these points in the project, then use the **Project**>**Export Geo Data to File** command, choosing "CSV" as the output format.

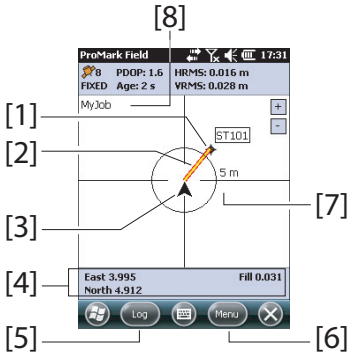
NOTE: The Stakeout function can also be used simply to take you back to the selected point (navigation function).

Follow the instructions below to use the Stakeout function:

- Set up the rover as explained in *Choosing the Survey Type and Mode on page 32*.
- Turn on the receiver, run ProMark Field and open the job file containing the stakeout points.
- Go to **Menu**>**Options**, select "Stop & Go Kinematic" and "Real-time" on the **Survey** tab, then tap **OK**.
- Think about which initialization method you will be using at the beginning of the survey and take the corresponding steps:
  - *On the Fly*: Nothing special needs to be done.
  - *From Known Point*: Go to the known point and place the rover antenna exactly over this point.
  - *From Bar*: Go to the base (fitted with the initializer bar) and place the rover antenna at the free end of the initializer bar.
  - *Statically:* You will stay static for a while on a point of your choice.
- Tap **Menu** and select **Configuration...**

- Select “Rover” from the Configuration drop-down list.
- Tap **Settings**.
- On the **GNSS** tab, make sure the “Internal” GNSS receiver is selected.
- Tap on the **Antenna** tab,
- Select “Vertical” and enter the antenna height, which in this case corresponds to the pole or bipod length.

  If you are using a fixed-height pole, just enter this height. if you are using a height-adjustable pole or bipod, read the graduation on this device, and then enter the read value in the **Antenna Height** field.
- Select the antenna type used.
- Tap on the **Link** tab and select the option through which RTK corrections will be delivered to the receiver. All these settings are fully described in the *Handheld Platform for MobileMapper 120, ProMark 120 & ProMark 220 Getting Started Guide* (GNSS Toolbox - Differential mode).
- **Recording** tab: Although specific to post-processed projects, there is no reason why you could not log raw data while you run your real-time RTK project. Raw data logging can indeed be run in parallel if you wish to double check your real-time centimeter positions with those obtained later through post-processing. If that is what you want to do, set the **Recording** tab accordingly.
- Tap **OK** to complete the rover configuration step. Tap **OK** again to return to the map screen.
- Select **Menu**>**Initialize** and choose your initialization method/
  - If you select “On the Fly”, or “From Bar”, nothing else needs to be done at this stage.
  - If you select “From Known Point”, choose that point from the displayed list and stay there for a while.
  - If you select “From Bar”, keep the rover antenna on the bar for a while, then carefully move this antenna to the top of the pole or bipod, taking care not to mask it.
  - If you select “Statically”, stay immobile for a while with your rover.
- Wait until the receiver returns the “FIXED” indication in the status bar.
- Tap **Menu**>**Stakeout**.
- Select the first target from the displayed list. The map screen then indicates the path to take you to that point.



[1]: Selected stakeout point (target).

[2]: Direct path to the stakeout point from your location.

[3]: Your current location.

[4]: Instructions to help you get closer to the target:

- West/East, North/South if **North up** is selected (see **Menu**>**Options**, **View** tab),
- Or Right/Left, In/Out if **Course up** is selected on the **View** tab.

If the voice guidance is activated (see **Menu**>**Options**, **Voice** tab), the first guidance information shown on the screen (West/East or Right/Left) will be replicated at regular intervals of time in the form of voice messages. A Cut/Fill information, in meters, is also provided on the screen indicating the difference of height between the current location and the project stakeout point. (Cut value given if current location higher than stakeout point, fill value is given otherwise).

[5]: **Log** button available: Points can be logged at any time as you walk toward the stakeout point, or you are exactly on the stakeout point.

A warning message will be displayed at this stage if the position accuracy does not meet your acceptance criteria (see **Tolerances** tab in *Setting General Parameters on page 8*).

[6]: **Menu** button available: You can stop the Stakeout function (or change the stakeout point) at any time by simply clearing **Stakeout** in the menu.

[7]: By providing the radius of the circle surrounding your current location, this indication gives you a good idea of the distance you still have to go before you reach the target.

[8]: Open job name. The job contains the list of stakeout points.

- When you are almost on the stakeout point, adjust the antenna pole over the point, making sure the pole stands in vertical position above the point, to cancel the West/ North or Right/In values.
- Stake the point.

  You may want to log the position of the point you are on for subsequent verifications.

  – With the antenna rod still kept vertical over the point, tap **Log**.

  – Type in a new point name relevant to the name of the stakeout point.

  – Tap on the **Settings** tab and then enter the time of occupation on the point.

  – When this is done, tap **OK** (any of the two **OK** buttons shown at the bottom of the screen) to start logging the point position. Countdown is started on the point. Stay static until the time is up.

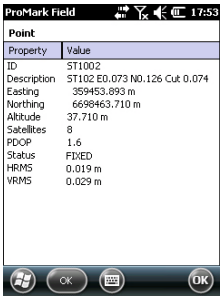
  The screen then shows the properties of the logged point (the real-time position is averaged over the occupation time). The description of the logged point will be in the form:

  <Stakeout_Point_ID><E/W><DeltaX><N/S><DeltaY><Fill/Cut><Fill/ Cut Value>

  (See also screen example.)

  A warning message may be displayed repeatedly during this sequence if the position accuracy does not meet your acceptance criteria (see **Tolerances** tab in *Setting General Parameters on page 8*).

  – Tap **OK** to close the window.



- Select **Menu** > **Stakeout** to select the next stakeout point or quit the stakeout function.

Calibration

General Case

The Calibration function (also known as the “Localization” function) allows you to log points in a local coordinate system, first an unknown system when starting the project, but then accurately determined using at least three points for which coordinates are known in that unknown system.

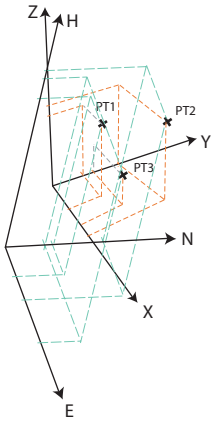
For a successful determination of the local system (a 3D system), the known points should be evenly spread over the

working area. The higher the number of points known in the local system, the higher the redundancy and the more accurate the determination of the unknown local system.

Once the local system is determined and used, all the points logged afterwards will be expressed in that system. In this kind of project, the calibration step should then be performed in the first place.

Using the Calibration function is a two-step procedure:

1. First you visit each of the known points with your rover, and when you are there, you enter the known coordinates in the unknown local system. In the background, the rover will associate the “fixed” RTK position computed in real time with the coordinates you enter.
2. Then, when enough points have been logged and the post-fit residuals are all zero or close to zero (meaning the local system has been determined successfully), make the local system the new coordinate system used in the job. The properties of the job will show that a “fitted” system, instead of the original one, is now used in the job.



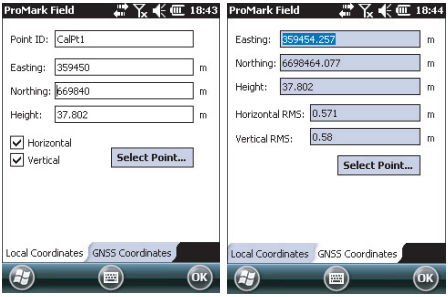
Follow the instructions below to determine the local coordinate system:

- Create a new job.
- Choose a coordinate system (ENH axis system) that is suitable for your working area, with a projection that will stay unchanged in the local coordinate system, once determined (XYZ axis system). The calibration function is inaccessible if the selected coordinate system does not use a projection.
- Take the necessary steps to get a “fixed” position solution from your rover.
- Go to the first known point and stay static on that point.
- Select **Menu** > **Calibration** and tap on the **Add** button.
- Enter the point ID and its coordinates, as known in the local system.

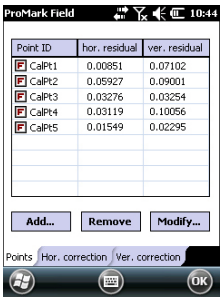
  You may either select the point from the list of points stored in the job (using the on-screen **Select Point** button) or directly type in the point ID and its coordinates in the corresponding fields if this point is not available from the list of points.

  Tell ProMark Field if that point provides reference coordinates either horizontally or vertically, or both (both by default).

The coordinates of your current location, as computed by the rover (a fixed solution) can be read on the **GNSS Coordinates** tab.



- With the antenna pole still perfectly positioned over the point, tap **OK** to log the two sets of coordinates for that point.
- Go to the next known point and stay static on that point.
- Repeat the previous three steps until all your known points have been logged.

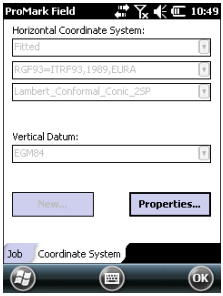


As you go forward in the procedure, ProMark Field starts determining the local system, updating the residual columns as new points are added.

In the **Point ID** column, each entry is preceded by a box indicative of the way the point is involved in the calibration (see table below) and corresponding to how you set the **Horizontal** and **Vertical** boxes when adding the point. This can be changed directly from this screen by simply tapping on the box until you get the desired setting.

Status	Point Coordinates Involved in the Calibration Process
	All (horizontal and vertical)
	Horizontal only
	Vertical only
	None. Point not used in the calibration process.

The **Remove** button allows you to delete a point from the list. You can resume the logging of a known point using the **Modify** button. This requires that you are still



physically located on this point and you have previously selected it in the list.

You can view the **Hor. correction** and **Ver correction** tabs showing the characteristics of the local system, as currently determined by the process.

- When you are pleased with the results of the process (i.e. all residuals are zero or close to zero), then you can make the local system the new coordinate system used in the job by tapping **OK**.

  Note that the coordinates displayed at the bottom of the screen now reflect the change of coordinate system.

- If you select **Menu**>**Job**>**Properties** and you open the **Coordinate System** tab, you will notice that the name of the coordinate system used is now "Fitted" and the projection and vertical datum are unchanged compared to the coordinate system originally used in the job.

NOTE: After the local coordinate system has been determined and validated in a job, there is no way you can revert to the coordinate system initially defined for the job.

One-Point Calibration

This is a particular case of calibration in which you only need to refine the coordinate system used to match an existing known point. The adjustment only consists of translating the coordinate system used in the horizontal and/or vertical plane.

The procedure is similar to the general case of calibration except that you just need to occupy one point (the known point). ProMark Field will then indicate the deviation introduced by the point to the initially selected coordinate system. Just tap **OK** after you agree with the results of the calibration.

Like in the general case, if you select **Menu**>**Job**>**Properties** and you open the **Coordinate System** tab, you will notice that the name of the coordinate system used is now "Fitted". The projection and vertical datum are in this case unchanged compared to the coordinate system originally used in the job, Only vertical and/or horizontal corrections may have been introduced through the one-point calibration process.

Changing the Storage Medium for Raw Data Collection

Changing the storage medium requires that you temporarily disable the **Record raw data for post-processing** function and validate the configuration of the base or rover with this function disabled.

When coming back to the settings of the base or rover, you will then be allowed to change the storage medium on the **Recording** tab.

Don't forget to re-enable the **Record raw data for post-processing** function afterwards.

Initialization

Post-Processed Projects

In a rover, the initialization step is recommended at the beginning of the data collection phase to make sure GNSS Solutions will have enough data to post-process the field data and deliver the expected level of accuracy. Two initialization methods are possible in this case:

Initialization Method	What You Are Supposed To Do
From Bar	It is assumed that you are using your own base. Start your project with the rover antenna placed at the end of the initializer bar (installed at the base). Keep it there immobile for 60 seconds (there is a progress bar on the screen asking you to wait), then move the antenna to the top of the rover pole, taking care not to obstruct the antenna. You can then start your project.
From Known Point	Place the rover antenna on a point the coordinates of which are known to the receiver. Keep the antenna immobile for 5 seconds on this point (there is a progress bar on the screen asking you to wait), then start your project.

ProMark Field will then monitor the number of satellites received to make sure the initialization is preserved throughout data logging.

If at one point, the receiver loses too many satellites, a message will show up ("**Loss of lock. Please initialize**") prompting you to start a new initialization.

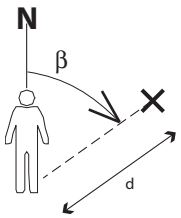
Real-Time RTK Projects

This step is recommended in real-time RTK projects to reduce the time needed before the rover can provide its first "fixed" position solution (i.e. "FIXED" position status displayed on the screen). Four initialization methods are possible:

Initialization Method	What You Are Supposed To Do
From Bar	It is assumed that you are using your own base. Start your project with the rover antenna placed at the end of the initializer bar (installed at the base). Wait until the "FIXED" position status is displayed on the screen, then move the antenna to the top of the rover pole, taking care not to obstruct the antenna. Then start your project.
From Known Point	Place the rover antenna on a point the coordinates of which are known to the receiver. Keep the antenna immobile on this point until the "FIXED" position status is displayed on the screen. Then start your project.
On the Fly	Default initialization mode for which nothing particular needs to be done at the beginning of the project. Whether you are static or walking when you start the project, wait until the "FIXED" position status is displayed on the screen before actually starting your work.
Statically	Start your survey from any point and remain static on this point until the "FIXED" position status is displayed on the screen.

Logging with Offsets

Point Offset



Use this function when you cannot position the antenna exactly over the desired point. The offset is defined as a bearing (β) and a horizontal distance (d) to that point from your current location.

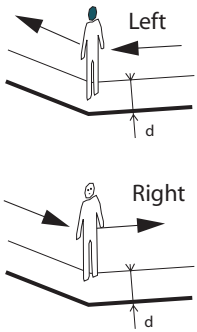
Set the horizontal distance back to 0 to cancel the point offset.

In a **real-time RTK project**, the centimeter-accurate RTK position saved to the job will truly be that of the point you want to survey – taking into account the entered offset – and not the one from which the computation was performed.

In a **post-processed project**, the same will be true for the DGPS/SDGPS point saved to the job. But the centimeter-accurate position you will get through post-processing using GNSS Solutions will NOT be that of the desired point but that of the point on which data collection was made.

In that case, you will have to manually apply the offset to the point computed by GNSS Solutions, using the offset parameters found for the point in the last two columns of the job file (remember the job file is in csv format).

Line Offset



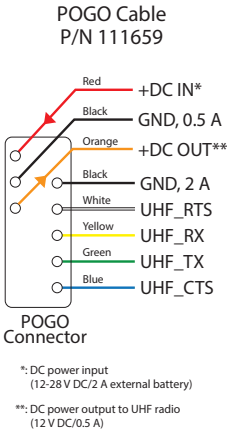
Use this function when you cannot position the antenna exactly over the desired line. The offset is defined as a direction (left or right) and a horizontal distance (d) perpendicular to that line from your current location.

In a **real-time RTK project**, the centimeter-accurate RTK positions saved to the job will truly be those of the points forming the line you want to survey – taking into account the entered offset common to all these points – and not those from which the RTK positions were actually determined.

In a **post-processed project**, the same will be true for the DGPS/SDGPS points saved to the csv job. But the centimeter-accurate positions you will get for the line through post-processing using GNSS Solutions will NOT be those of the desired line but those of the points on which data collection was actually made.

In that case, you will have to manually apply the offset to the points computed by GNSS Solutions, using the offset parameters common to all the points forming the line. The offset parameters can be found in the last two columns of the job file (remember the job file is in csv format) for the series of concerned points.

Setting an RTK Base



*: DC power input
(12-28 V DC/2 A external battery)

**: DC power output to UHF radio
(12 V DC/0.5 A)

Device used to send out corrections:

- If you are using a cellular modem, make sure you have purchased and inserted the SIM card that will allow the modem to fulfill this task.
- If you are using an external radio transmitter, connect the radio to the receiver through a POGO cable (this accessory is available from Spectra Precision):
  - For most models of supported radios, the POGO cable that should be used is the one with bare wires on radio side (unterminated POGO cable P/N 111659), which means you have to add a connector that is suitable for your radio model. The POGO cable pinout is provided in the left-hand column. An external DC source is recommended to power the radio transmitter. Some radio models can be configured directly from within ProMark Field.
  - If you are using a Satel Easy radio, Spectra Precision recommends the use of the Y-shaped POGO cable kit P/N 90247 allowing you to connect the radio directly to the GNSS receiver and to power both the GNSS receiver (through pin +DC IN) and the radio from a single, external DC source (Reminder: This setup does NOT allow the receiver's internal battery to be charged). The Satel radio should be configured separately (this cannot be done from within ProMark Field).

Step-by-step procedure:

- Set up the base at its planned location. Measure the antenna height according to the slant measurement method, using the HI tape provided:
  - Insert the end of the tape into one of the three height marks located at the edge of the antenna radome (as shown).
  - Unfold the tap until you place the tip located at the other end of the tape on the reference point.
  - Read the graduation directly on the tape: This is the slant antenna height.

- Turn on the receiver, run ProMark Field and create a job as explained in *Creating a New Job on page 11*.
- Go to **Menu**>**Options**. On the **Survey** tab, select "Real-time" as the survey mode. The **Type** parameter may be set to any of the available two choices.
- Tap **OK**.
- Tap **Menu** and select **Configuration...**
- Select "Base" from the Configuration drop-down list
- Tap **Settings**.
- On the **GNSS** tab, make sure the "Internal" GNSS receiver is selected.
- Tap on the **Antenna** tab,
- Enter the antenna height you have just measured and select "Slant", corresponding to the measurement method used.
- Select the antenna type used. Keep the **Virtual Antenna** option cleared.

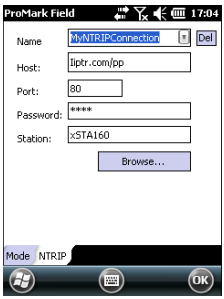
  However, if you also plan to collect raw data for further post-processing using some office software other than GNSS Solutions, you will need to enable this option if the base antenna used is not known to this software. In that case, the collected raw data will be adjusted as if they had been collected with the standard ADVNULLANTENNA.
- Tap on the **Position** tab. In the **Site ID** field, enter a name of your choice for the point where the base is installed (e.g. "BASE"). Then enter its accurate coordinates. When leaving the **Position** tab, ProMark Field will ask you whether you wish to save that point to the job file or not.

  If a point accurately describing the base position is stored in the job, you can select this point directly after tapping on the [...] button.

  You may also use the position last computed by the receiver and define it as the base position by tapping on the **Current Position** button. You then have to enter a **Site ID** for this position. Also in that case, when leaving the **Position** tab, ProMark Field will ask you whether you wish to save that point to the job file or not.
- Tap on the **Link** tab and select the device through which RTK corrections will be generated and delivered to rovers. Make the required settings depending on the choice of device made.

See table below.

Device	Settings
UHF radio	Type, baud rate, advanced
GSM (CSD) modem	None
Network connection via GSM (GPRS) modem	Direct IP parameters: • Name, host, port Or NTRIP parameters: • Name, host, port • Password, station
External cell phone via Bluetooth	See *Handheld Platform for ProMark Getting Started Guide, Advanced Features section.*
Other external device	Port, baud rate



NOTE: You can create as many NTRIP and Direct IP configurations as necessary. Each configuration can be recalled by just selecting its name (**Name** field). A recalled configuration may be deleted by tapping on the **Del** button.

- Tap on the **Format** tab and choose the format of the corrections the base will generate and deliver (Eight possible choices: RTCM3.0, RTCM2.3 (DGPS), RTCM2.3 (RTK), CMR, CMR+, ATOM, ATOM compact or ATmOM super compact).
- Tap on the **Station** tab: Enter the **Station ID** for the base. This number is left to the user's choice but the following ranges of **Station ID** values are recommended depending on the selected data format:

Format	Station ID
RTCM 3.0	0-4095
RTCM2.3	0-1023
CMR, CMR+	0-31
ATOM	0-4095

- **Recording** tab: Although operated as an RTK base, the receiver can also collect raw data. In that case, enable the **Record raw data for post-processing** function, check that you are using the desired storage medium (it is a good practice to use a Storage Card) and choose the recording interval (default: 1 second).

For easy reference, ProMark Field automatically provides the name, folder and location of the raw data file the receiver will now be creating.

NOTE: Changing the storage medium requires that you temporarily disable the **Record raw data for post-processing** function and validate the configuration of the base with this function disabled. When coming back to the settings of the base, you will then be allowed to change the storage medium on the **Recording** tab. Don't forget to re-enable the **Record raw data for post-processing** function afterwards.

- **Troubleshoot** tab: For maintenance purposes, technical support may ask you to use this tab. The **Enable debug file output** option should always be inactive in normal conditions of use.
- Tap **OK** to complete the base configuration step. Tap **OK** again to let the receiver operate on its own as an RTK base until the end of the survey.

  NOTE: The Log function is greyed (unavailable) when the receiver is configured as a base.
- You may now quit ProMark Field. The receiver will continue to smoothly operate as an RTK base and generate RTK corrections although ProMark Field is not running anymore. If however the internal modem is used to send out corrections, DO NOT turn off the modem when quitting ProMark Field (Choose "No" when the message "Disconnect data link?" pops up on the screen). If you chose "Yes", the base would stop sending out its corrections.
- At the end of the survey, go back to the base and simply turn it off to end your working session.

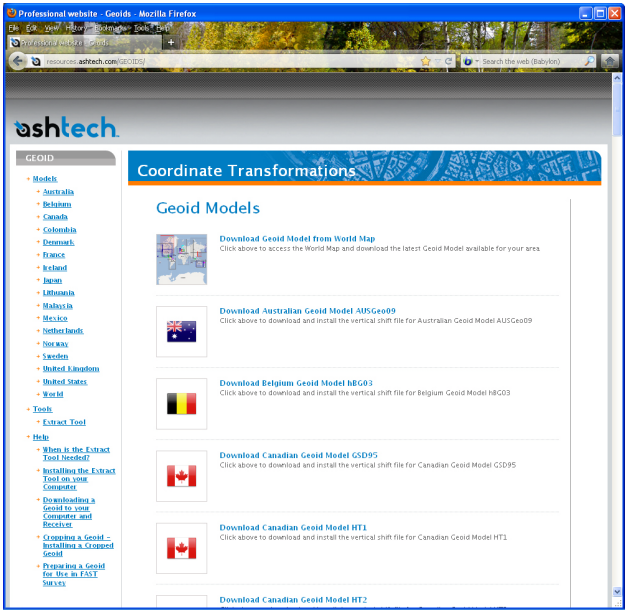
  NOTE: Quitting the RTK base operating mode for a receiver operated in this mode can be done in two ways: Either you turn off the data link used (GSM modem or external UHF radio) or you set up the receiver as a rover.

Installing Geoids

Spectra Precision makes available a collection of geoids for use in many countries around the world. This collection is hosted on the Spectra Precision website and is regularly updated.

To download a geoid, use the link **Geoids (models & tools)** in the welcome menu of your application software CD.

In absence of the CD, you can still list and download the available geoids using your web browser to connect to the following URL: http://resources.ashtech.com/GEOIDS.



After a new geoid has been downloaded to your computer, run the downloaded “install.exe” file to install the new geoid on your computer (for use in your office software), and your receiver (for use in your field software) if it is currently connected to the computer via ActiveSync and the docking station.

Installing the geoid on the receiver will be only postponed if it’s not currently connected to the computer. Installation will be run automatically when later you connect the receiver to the computer via the docking station and ActiveSync.

Through the above URL, you can also install the **Extract Tool** on your computer (see bottom of the menu on the left).

Use this tool to limit the geographical extent of the selected geoid to your working area. This may be useful to reduce the space occupied by the geoid file on your receiver.

The extracted geoid (also a *.geo file) should then be copied to **My Device \Program Files\Geoids Data** on the receiver.

Adding Background Maps

Background maps can be displayed on the map screen to help you better locate the different features found in the working area. Two types of background maps are supported:

- Background maps in vector format (OSM files)
- Background maps in raster format (ecw, bmp, gif, tif, jpg or jp2 files)

In order to be used in MobileMapper Field, a background map must be properly georeferenced.

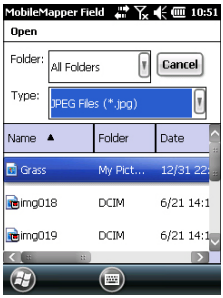
OSM files are "naturally" georeferenced due to their very nature. (To create an OSM file go to http://www.openstreetmap.org/, follow the instructions to extract the portion of map you need for your job, and then download it to your receiver.)

With a raster map, georeferencing may have been done earlier using a third-party tool or it can be done, using one of the two procedures below, after defining it as a background map in MobileMapper Field:

1. You know the coordinates of the reference points used to georeference the image. You will have to tap successively on each of these points on the map. For each point, you will have to enter its coordinates.
2. You go to the field and stand successively on each reference point used to georeference the image. (You should choose reference points that can easily be spotted both on the map and in the field.) You will have to tap successively on each of these points on the map. Each time, the receiver will automatically fill in the corresponding fields on the screen with the computed coordinates of your current location.

MobileMapper Field may accept several background maps, each holding a different geographical area. All logged features will always appear over the background map.

- Tap **Menu**>**Options** and then on the **Map** tab.
- Tap on the **Add...** button



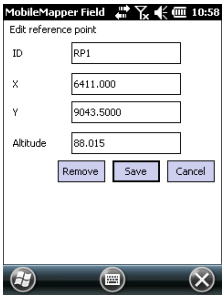
- Tap in the **Type** field and select the format of the file containing the background map:
  - ECW Enhanced Compression Wavelet (ecw)
  - Bitmap (bmp)
  - GIF (gif)
  - GeoTIFF (tif)
  - JPEG (jpg)
  - JPEG2000 (jp2)
  - Open StreetMap (osm)

  MobileMapper Field then browses all the folders in search of all the image files stored in the receiver meeting the current **Type** selection.
- Tap on the name of the image file you want to add. This automatically adds the file to the list of background maps. A message will warn you if you are attempting to add an already georeferenced background map that uses a coordinate system different from the one used in the open job. If the image file needs georeferencing, MobileMapper Field will first invite you to make this georeferencing (see the procedure explained below).

  In contrast, adding a background map in OSM format will never raise a warning message because, although originally in WGS84, the OSM file will be transformed to be always matching the coordinate system of the open job.

  Like layers, each of the added background maps can be shown or hidden on the map screen. Set accordingly each of the check boxes placed before the names of the background maps (cleared= hidden, ticked= shown).
- Tap **OK** to return to the map screen. Note that the map screen will show the background map(s) only after the receiver can compute a position. Remember you may also have to press the ESC button (MobileMapper 100 or 120) so that the map screen can show the location of the first logged feature.

Georeferencing an Image File



Georeferencing an image file means defining at least three reference points giving the position of the image in space.

Defining a reference point means entering its precise X-Y-Z or Lat-Lon-Height coordinates depending on the coordinate system used in the currently open job.

The larger the number of reference points you define, the more evenly distributed these points over the entire image, the better the georeferencing of the image.

To georeference an image, do the following after adding it to the list of available background maps:

- Select the name of the background map from the list.
- Tap on the **Modify** button.
- Find the point on the image for which coordinates are known. Adjust the zoom setting and drag the stylus on the image if necessary.
- Tap on the point location and then enter its ID and coordinates. If you are currently standing at that location and the receiver delivers a valid GPS position, you don't need to enter any coordinates. The receiver will do that for you.
- Tap **Add** to enter and complete the definition of this point.
- Resume the previous three steps until all the reference points have been defined. Each point on the map is represented by a red circle. If this happens, you can always delete a bad point by double-tapping on it and then tapping on the **Delete** button.
- Tap **OK** to complete the georeferencing process. This takes you back to the screen showing the list of background maps.

More about Background Maps

- The background map will be displayed only when it is geographically close to the computed GPS position and the zoom is set properly.
- For large background maps, you may have to zoom in several times before the map screen can start viewing details of the background map.
- If a background map is not properly georeferenced, the background map will never appear on the map screen, and the reference points you incorrectly created on the background map will all be deleted. Try again, this time with correct point location and coordinates.

- **It is highly recommended to place the original image file used to create the background map in the same folder as the job file using it. Observing this rule will simplify the download procedure.**
- When georeferencing an image, the original image file is unchanged and three new files are created:

Created files	Designation
<image filename>.prj	Coordinate system used
<image filename>.xxw	Auxiliary data. “xx” in the extension stands for the first two letters in the extension of the original image file (e.g. “JP” for a jpg file)
<image filename>.<image file extension>.ref.txt	Coordinates of reference points and coordinate system used.

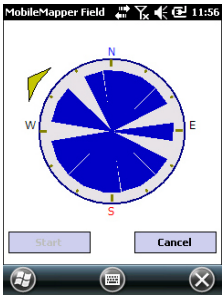
When the original image file is in TIF format, some of these three files may not be created.

E-Compass & External Device

Enabling/Disabling the E-Compass

- Tap **Menu>Options**.
- Tap on the right-arrow button several times until you unveil the **E-compass** tab.
- Tap on the **E-compass** tab.
- Set the **Use electronic compass to determine orientation** button to enable or disable the E-compass. The compass calibration is described in the section below.

Calibrating the E-Compass



Calibrating the E-compass is a two-step process during which you are asked first to rotate the receiver anticlockwise in horizontal position and then turn the unit upside down until a beep is heard.

This procedure should be run with the receiver powered from its internal batteries rather than an external power source.

- Tap on the **Calibrate** button.
- Read the instructions and then tap on the **Start** button.
- Wait until the arrow outside of the compass starts rotating slowly clockwise. Rotate the receiver anticlockwise in order to maintain the arrow in your direction. You will have to perform three to five rotations until the inside of the compass is completely dark blue. Try to be as accurate as possible as this will speed up the calibration process.

  Note that the arrow momentarily stops every 30 degrees or so before continuing its rotation.
- When the inside of the compass is all dark blue and after the arrow has come back to the South direction, a message asks you to proceed with the last step of the calibration.
- Tap **ok** in the message window and turn the receiver upside down on a horizontal surface. Wait a few seconds until a beep can be heard.
- Put the receiver the right way up. A message on the screen indicates that the calibration is complete and successful.
- Tap **ok** in the message window. This takes you back to the **E-compass** tab of the **Options** screen.
- Tap **OK** to return to the map screen.

Recommendations for E-Compass Calibration

The E-compass being a very sensitive sensor, Spectra Precision recommends you adhere to the following recommendations.

- Calibration should always be performed:
  - Outdoor, not indoor.
  - On a flat horizontal surface, not in your hands.
  - In the same operating conditions (i.e. same backlight level, with/without SD card) as those you will work in later when you collect your data.

    For screen backlight, this means the two options controlling the backlight function on the **Battery Power** tab of the **Settings** window must be cleared for the calibration phase, but also as long as you need to use the e-compass.
- During calibration, make sure all compass sectors become dark blue.
- Always recalibrate the E-compass in the following cases:
  - After changing the batteries.
  - Whenever you suspect the E-Compass to deliver incorrect values.

E-Compass Vs. GPS Compass

In fact, the receiver has two compasses:

- The *e-compass*. which can be used by MobileMapper Field.
- The *GPS compass*, **which is the default compass used by MobileMapper Field when the e-compass is not activated**. (The GPS compass information is a by-product of the GPS position computation.)

Follow the recommendations below to know which compass should be used, depending on what you are doing:

- Measuring bearings with the E-compass requires that the receiver be held in horizontal position. On the other hand, the GPS sensor requires that the receiver be held at an angle of 45° from the horizontal. A good compromise is therefore to orientate the receiver 20 to 25° from the horizontal. If the bearing measurement is most important to you, you can temporarily place the receiver horizontal until you get a valid bearing measurement.

- Using the E-compass is recommended for static occupations. The GPS compass is recommended in kinematic.
- E-compass readings stabilize after a few seconds. When logging a point after a walking period, please hold the receiver horizontally and wait a few seconds before starting logging.

Setting an External Device

- Tap **Menu>Options**.
- Tap on the right-arrow button several times until you unveil the **External Devices** tab.
- Tap on the **External Device**s tab.
- Tap on the **Connect** button.
- Select the device used from the **Device type** field.
- Set the virtual port number (**Port**) and baud rate (**Baud rate**) used to let your receiver communicate with this device.
- Tap **OK** to enter your settings and return to the map screen.

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ProMark™ Field Software

Getting Started Guide

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