FAST Survey Software

Getting Started Guide

Trademarks

All product and brand names mentioned in this publication are trademarks of their respective holders.

Ashtech Products - Limited Warranty (North, Central and South America)

Ashtech warrants their GPS receivers and hardware accessories to be free of defects in material and workmanship and will conform to our published specifications for the product for a period of one year from the date of original purchase. THIS WARRANTY APPLIES ONLY TO THE ORIGINAL PURCHASER OF THIS PRODUCT.

In the event of a defect, Ashtech will, at its option, repair or replace the hardware product with no charge to the purchaser for parts or labor. The repaired or replaced product will be warranted for 90 days from the date of return shipment, or for the balance of the original warranty, whichever is longer. Ashtech warrants that software products or software included in hardware products will be free from defects in the media for a period of 30 days from the date of shipment and will substantially conform to the then-current user documentation provided with the software (including updates thereto). Ashtech's sole obligation shall be the correction or replacement of the media or the software so that it will substantially conform to the then- current user documentation. Ashtech does not warrant the software will meet purchaser's requirements or that its operation will be uninterrupted, error-free or virus-free. Purchaser assumes the entire risk of using the software.

PURCHASER'S EXCLUSIVE REMEDY UNDER THIS WRITTEN WARRANTY OR ANY IMPLIED WARRANTY SHALL BE LIMITED TO THE REPAIR OR REPLACEMENT, AT ASHTECH'S OPTION, OF ANY DEFECTIVE PART OF THE RECEIVER OR ACCESSORIES WHICH ARE COVERED BY THIS WARRANTY. REPAIRS UNDER THIS WARRANTY SHALL ONLY BE MADE AT AN AUTHORIZED ASHTECH SERVICE CENTER. ANY REPAIRS BY A SERVICE CENTER NOT AUTHORIZED BY ASHTECH WILL VOID THIS WARRANTY.

To obtain warranty service the purchaser must obtain a Return Materials Authorization (RMA) number prior to shipping by calling 1-800-229-2400 (North America) or 1-408-572-1134 (International) and leaving a voice mail at option 3, or by submitting a repair request on-line at: http://ashtech.com (fill out the RMA request from under the Support tab). The purchaser must return the product postpaid with a copy of the original sales receipt to the address provided by Ashtech with the RMA number. Purchaser's return address and the RMA number must be clearly printed on the outside of the package.

Ashtech reserves the right to refuse to provide service free-of-charge if the sales receipt is not provided or if the information contained in it is incomplete or illegible or if the serial number is altered or removed. Ashtech will not be responsible for any losses or damage to the product incurred while the product is in transit or is being shipped for repair. Insurance is recommended. Ashtech suggests using a trackable shipping method such as UPS or FedEx when returning a product for service.

EXCEPT AS SET FORTH IN THIS LIMITED WARRANTY, ALL OTHER EXPRESSED OR IMPLIED WARRANTIES, INCLUDING THOSE OF FITNESS FOR ANY PARTICULAR PURPOSE, MERCHANTABILITY OR NON-INFRINGEMENT, ARE HEREBY DISCLAIMED AND IF APPLICABLE, IMPLIED WARRANTIES UNDER ARTICLE 35 OF THE UNITED NATIONS CONVENTION ON CONTRACTS FOR THE INTERNATIONAL SALE OF GOODS. Some national, state, or local laws do not allow limitations on implied warranty or how long an implied warranty lasts, so the above limitation may not apply to you.

The following are excluded from the warranty coverage: (1) periodic maintenance and repair or replacement of parts due to normal wear and tear; (2) batteries and finishes; (3) installations or defects resulting from installation; (4) any damage caused by (i) shipping, misuse, abuse, negligence, tampering, or improper use; (ii) disasters such as fire, flood, wind, and lightning; (iii) unauthorized attachments or modification; (5) service performed or attempted by anyone other than an authorized Ashtechs Service Center; (6) any product, components or parts not manufactured by Ashtech; (7) that the receiver will be free from any claim for infringement of any patent, trademark, copyright or other proprietary right, including trade secrets; and (8) any damage due to accident, resulting from inaccurate satellite transmissions. Inaccurate transmissions can occur due to changes in the position, health or geometry of a satellite or modifications to the receiver that may be required due to any change in the GPS. (Note: Ashtech GPS receivers use GPS or GPS+GLONASS to obtain position, velocity and time information. GPS is operated by the U.S. Government and GLONASS is the Global Navigation Satellite System of the Russian Federation, which are solely responsible for the accuracy and maintenance of their systems. Certain conditions can cause inaccuracies which could require modifications to the receiver. Examples of such conditions include but are not limited to changes in the GPS or GLONASS transmission.) Opening, dismantling or repairing of this product by anyone other than an authorized Ashtech Service Center will void this warranty.

ASHTECH SHALL NOT BE LIABLE TO PURCHASER OR ANY OTHER PERSON FOR ANY INCIDENTAL OR CONSEQUENTIAL DAMAGES WHATSOEVER, INCLUDING BUT NOT LIMITED TO LOST PROFITS, DAMAGES RESULTING FROM DELAY OR LOSS OF USE, LOSS OF OR DAMAGES ARISING OUT OF BREACH OF THIS WARRANTY OR ANY IMPLIED WARRANTY EVEN THOUGH CAUSED BY NEGLIGENCE OR OTHER FAULT OFASHTECH OR NEGLIGENT USAGE OF THE PRODUCT. IN NO EVENT WILL ASHTECH BE RESPONSIBLE FOR SUCH DAMAGES, EVEN IF ASHTECH HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES.

This written warranty is the complete, final and exclusive agreement between Ashtech and the purchaser with respect to the quality of performance of the goods and any and all warranties and representations. This warranty sets forth all of Ashtech's responsibilities regarding this product. This limited warranty is governed by the laws of the State of California, without reference to its conflict of law provisions or the U.N. Convention on Contracts for the International Sale of Goods, and shall benefit Ashtech, its successors and assigns.

This warranty gives the purchaser specific rights. The purchaser may have other rights which vary from locality to locality (including Directive 1999/44/EC in the EC Member States) and certain limitations contained in this warranty, including the exclusion or

limitation of incidental or consequential damages may not apply.

For further information concerning this limited warranty, please call or write:

Ashtech SAS - ZAC La Fleuriaye - BP 433 - 44474 Carquefou Cedex - France Phone: +33 (0)2 28 09 38 00, Fax: +33 (0)2 28 09 39 39.

Ashtech Products Limited Warranty (Europe, Middle East, Africa)

All Ashtech global positioning system (GPS) receivers are navigation aids, and are not intended to replace other methods of navigation. Purchaser is advised to perform careful position charting and use good judgment. READ THE USER GUIDE CAREFULLY BEFORE USING THE PRODUCT.

1. ASHTECH WARRANTY

Ashtech warrants their GPS receivers and hardware accessories to be free of defects in material and workmanship and will conform to our published specifications for the product for a period of one year from the date of original purchase or such longer period as required by law. THIS WARRANTY APPLIES ONLY TO THE ORIGINAL PURCHASER OF THIS PRODUCT.

In the event of a defect, Ashtech will, at its option, repair or replace the hardware product with no charge to the purchaser for parts or labor. The repaired or replaced product will be warranted for 90 days from the date of return shipment, or for the balance of the original warranty, whichever is longer. Ashtech warrants that software products or software included in hardware products will be free from defects in the media for a period of 30 days from the date of shipment and will substantially conform to the then-current user documentation provided with the software (including updates thereto). Ashtech's sole obligation shall be the correction or replacement of the media or the software so that it will substantially conform to the then- current user documentation. Ashtech does not warrant the software will meet purchaser's requirements or that its operation will be uninterrupted, error-free or virus-free. Purchaser assumes the entire risk of using the software.

2. PURCHASER'S REMEDY

PURCHASER'S EXCLUSIVE REMEDY UNDER THIS WRITTEN WARRANTY OR ANY IMPLIED WARRANTY SHALL BE LIMITED TO THE REPAIR OR REPLACEMENT, AT ASHTECH'S OPTION, OF ANY DEFECTIVE PART OF THE RECEIVER OR ACCESSORIES WHICH ARE COVERED BY THIS WARRANTY. REPAIRS UNDER THIS WARRANTY SHALL ONLY BE MADE AT AN AUTHORIZED ASHTECH SERVICE CENTER. ANY REPAIRS BY A SERVICE CENTER NOT AUTHORIZED BY ASHTECH WILL VOID THIS WARRANTY.

3. PURCHASER'S DUTIES

To obtain service, contact and return the product with a copy of the original sales receipt to the dealer from whom you purchased the product.

Ashtech reserves the right to refuse to provide service free-of-charge if the sales receipt is not provided or if the information contained in it is incomplete or illegible or if the serial number is altered or removed. Ashtech will not be responsible for any losses or damage to the product incurred while the product is in transit or is being shipped for repair. Insurance is recommended. Ashtech suggests using a trackable shipping method such as UPS or FedEx when returning a product for service.

4. LIMITATION OF IMPLIED WARRANTIES

EXCEPT AS SET FORTH IN ITEM 1 ABOVE, ALL OTHER EXPRESSED OR IMPLIED WARRANTIES, INCLUDING THOSE OF FITNESS FOR ANY PARTICULAR PURPOSE OR MERCHANTABILITY, ARE HEREBY DISCLAIMED AND IF APPLICABLE, IMPLIED WARRANTIES UNDER ARTICLE 35 OF THE UNITED NATIONS CONVENTION ON CONTRACTS FOR THE INTERNATIONAL SALE OF GOODS.

Some national, state, or local laws do not allow limitations on implied warranty or how long an implied warranty lasts, so the above limitation may not apply to you.

5. EXCLUSIONS

The following are excluded from the warranty coverage:

(1) periodic maintenance and repair or replacement of parts due to normal wear and tear;

(2) batteries;

(3) finishes;

(4) installations or defects resulting from installation;

(5) any damage caused by (i) shipping, misuse, abuse, negligence, tampering, or improper use; (ii) disasters such as fire, flood, wind, and lightning; (iii) unauthorized attachments or modification;

(6) service performed or attempted by anyone other than an authorized Ashtechs Service Center;

(7) any product, components or parts not manufactured by Ashtech,

(8) that the receiver will be free from any claim for infringement of any patent, trademark, copyright or other proprietary right, including trade secrets

(9) any damage due to accident, resulting from inaccurate satellite transmissions. Inaccurate transmissions can occur due to changes in the position, health or geometry of a satellite or modifications to the receiver that may be required due to any change in the GPS. (Note: Ashtech GPS receivers use GPS or GPS+GLONASS to obtain position, velocity and time information. GPS is operated by the U.S. Government and GLONASS is the Global Navigation Satellite System of the Russian Federation, which are solely responsible for the accuracy and maintenance of their systems. Certain conditions can cause inaccuracies which could require modifications to the receiver. Examples of such conditions include but are not limited to changes in the GPS or GLONASS transmission.).

Opening, dismantling or repairing of this product by anyone other than an authorized Ashtech Service Center will void this warranty.

6. EXCLUSION OF INCIDENTAL OR CONSEQUENTIAL DAMAGES

ASHTECH SHALL NOT BE LIABLE TO PURCHASER OR ANY OTHER PERSON FOR ANY INDIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES WHATSOEVER, INCLUDING BUT NOT LIMITED TO LOST PROFITS, DAMAGES RESULTING FROM DELAY OR LOSS OF USE, LOSS OF OR DAMAGES ARISING OUT OF BREACH OF THIS WARRANTY OR ANY IMPLIED WARRANTY EVEN THOUGH CAUSED BY NEGLIGENCE OR OTHER FAULT OFASHTECH OR NEGLIGENT USAGE OF THE PRODUCT. IN NO

EVENT WILL ASHTECH BE RESPONSIBLE FOR SUCH DAMAGES, EVEN IF ASHTECH HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES.

Some national, state, or local laws do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation or exclusion may not apply to you.

7. COMPLETE AGREEMENT

This written warranty is the complete, final and exclusive agreement between Ashtech and the purchaser with respect to the quality of performance of the goods and any and all warranties and representations. THIS WARRANTY SETS FORTH ALL OF Ashtech'S RESPONSIBILITIES REGARDING THIS PRODUCT.

THIS WARRANTY GIVES YOU SPECIFIC RIGHTS. YOU MAY HAVE OTHER RIGHTS WHICH VARY FROM LOCALITY TO LOCALITY (including Directive 1999/44/EC in the EC Member States) AND CERTAIN LIMITATIONS CONTAINED IN THIS WARRANTY MAY NOT APPLY TO YOU.

8. CHOICE OF LAW.

This limited warranty is governed by the laws of France, without reference to its conflict of law provisions or the U.N. Convention on Contracts for the International Sale of Goods, and shall benefit Ashtech, its successors and assigns.

THIS WARRANTY DOES NOT AFFECT THE CUSTOMER'S STATUTORY RIGHTS UNDER APPLICABLE LAWS IN FORCE IN THEIR LOCALITY, NOR THE CUSTOMER'S RIGHTS AGAINST THE DEALER ARISING FROM THEIR SALES/PURCHASE CONTRACT (such as the guarantees in France for latent defects in accordance with Article 1641 et seq of the French Civil Code).

For further information concerning this limited warranty, please call or write:

Ashtech SAS - ZAC La Fleuriaye - BP 433 - 44474 Carquefou Cedex - France.

Phone: +33 (0)2 28 09 38 00, Fax: +33 (0)2 28 09 39 39

English

Table of Contents

English

Introduction to FAST Survey

English

FAST Survey is a software program intended for advanced land surveying. FAST Survey can be used with the following Ashtech GNSS receivers:

- ProMark 800
- ProMark 200, ProMark 100
- ProMark 500, ProFlex 500
- Z-Max, ProMark 3 RTK

In its standard version, FAST Survey allows you to perform the following types of surveys.

- Logging positions of points in the coordinate system used.
- Staking out points, straight lines and curves, with or without offset, while providing the specific information needed as you do that, including cut and fill information (in 3D).
- Logging GNSS raw data (post-processed projects or as backup to real-time RTK projects).
- Entering attributes, based on feature code lists, as you store new points, in a way much similar to GIS mobile software.

FAST Survey includes various tools to assist surveyors in their projects. Some of these tools are listed below.

- Monitoring GNSS reception and current position status
- Writing notes to be appended to job files
- Creating and saving local coordinate systems through localization
- Setting height references (arbitrary, DTMs, etc.)
- GNSS utilities (Send command, reset RTK)
- Interfacing with total stations. FAST Survey can also support different peripherals as inputs (lasers, depth sounders) or outputs (light bars)

As software options, FAST Survey offers the following functions:

- Set of COGO tools
- ROAD tools, including a map editor to prepare maps for use as visual background information while surveying. This editor operates in a way much similar to an AutoCad editor.

This Getting Started Guide only deals with FAST Survey's basic functions. For more information on this program and its software options, see the *FAST Survey Reference Manual*.

Installing FAST Survey

This section describes how to install FAST Survey from the CD provided, using an office computer. FAST Survey can also be downloaded from the Ashtech FTP server.

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 is used, you don't normally need to install an additional program on your computer. However, if the installation of FAST Survey fails, you will have first to install Windows Mobile Device Center and then resume the installation of FAST Survey.

The latest versions of ActiveSync and Device Center can be downloaded from http://www.microsoft.com/windowsphone/en-us/howto/wp6/sync/prepare-to-sync-windows-phone-6-5-with-my-computer.aspx at no cost.

In the procedure described below, the term "data collector" is used equally to designate either a "pure" data collector (i.e. without embedded GNSS receptions capabilities) or a GNSS handheld such as the ProMark 100/200 or a MobileMapper 10).

Note that ProMark 100 or ProMark 200 may be used:

- Either as standalone RTK equipment using an external antenna and running FAST Survey for this purpose (typically ProMark 200)
- or as a simple data collector for ProMark 500 or ProMark 800. In this case, the GNSS reception capabilities of the handheld are not used.

Installation Procedure

- Connect the data collector to your office computer using the USB data cable provided. For ProMark 200 or ProMark 100, place the receiver on its docking station and connect the docking station to the computer through the USB cable.
- Turn on the data collector.
- Insert the FAST Survey CD in your office computer. This automatically starts the setup file stored on the CD.
- Click on the **Install FAST Survey for...** option corresponding to your equipment. This starts the FAST Survey Setup Wizard.
- Click **Next>**.

- Check on the **I accept the terms in the License Agreement** option and then click **Install**.
- At the end of this phase, a message appears asking you to check the data collector screen to see if additional steps are needed to complete the installation.
- Click **OK**, then **Finish** to complete installation on computer side.
- On the data collector, the installation phase has automatically started. For ProMark 200 or ProMark 100, a message first appears asking you to choose the location where to install FAST Survey (the default “Device” option is recommended), then tap on **Install** to continue.

  When the progress bar disappears from the screen, this means installation is complete. The FAST Survey icon can then be seen on the screen.

  For ProMark 200 and ProMark 100, a message indicates that installation has been successful. Tap **OK** to go back to the screen where the FAST Survey command line and icon line will now be visible.

Registering as a FAST Survey User

The first time you start FAST Survey, you will be prompted to register your license of the software. If you do not register, FAST Survey will remain in demo mode, limiting each job file to a maximum of 30 points.

FAST Survey registration is done via the Internet at the following address:

www.survce.com/Ashtech

You will be asked to enter the following information:

- User Name
- Company Name
- Serial Number*
- Email Address
- Phone Number
- Fax Number
- Hardware ID#1*
- Hardware ID#2*
- Reason for Install
- Registration Code*

*: Select **Equip>About Fast Survey>Change Registration** in FAST Survey to read this information.

After you submit this information, your change key will be displayed and emailed to the address that you submit. Keep this for your permanent records. You may then enter the manufacturer and model of your equipment.

If you do not have access to the Internet, you may fax the above information to (+1) 606-564-9525. Your registration information will be faxed back to you within 48 hours. During this time, you may continue to use the program without restriction. After you receive your Change Key, enter it and tap **OK**. You can then create a new FAST Survey job, as explained further.

Creating a New FAST Survey Job

1. Turn on the data collector and wait until the boot sequence is complete.
2. Make sure the clock is set properly before starting FAST Survey.
3. Tap on "FAST Survey" on the Today screen to launch FAST Survey.
4. Tap the **Select New/Existing Job** button. This opens the Coordinate Files window.
5. Tap on the highlighted "crd" file name located at the bottom of the screen. This opens FAST Survey's virtual keyboard with the file name now appearing above.
6. Using the keyboard, type in the name of the "crd" file in which FAST Survey will store the data you will collect during your job.
7. Tap  . This takes you back to the Coordinate Files window where your file name now appears in the **Name** field.
8. Tap  again. This opens the Job Settings window, which consists of five different tabs on which you can set a large number of parameters pertaining to the job (or future jobs).

   Only the parameters that make sense with a GNSS system are presented below. All other parameters should be kept with their default settings.

   On the **System** tab:

   – **Distance**: Choose the unit in which all measured distances will be expressed (US Survey Feet, Metric or International Feet). Unless "Metric" is selected, you can also choose the units in which distances will be displayed ("Decimal feet" or "Inches"). **Warning! You cannot change this setting after creating the file!**

   – **Angle**: Choose the unit in which all measured angles will be expressed (degrees, minutes, seconds or grads)

   – **Zero Azimuth Setting**: Choose the direction for which azimuth is arbitrarily set to 0° (North or South)

   – **Projection**: Choose a projection from the combo box. To select a different projection, tap the **Edit Projection List** button. The **Add Predefined** button allows you to select an existing projection. The **Add User Defined** button allows you to create an entirely new projection. The

selected or created projection will then be selectable from the combo box.

On the **Stake** tab:

– **Precision**: Choose the number of decimal places (0 to 5) used to express the three coordinates of any stakeout point. “0.000” (3 decimal places) is the best setting to fully benefit from the precision offered by your equipment.

On the **Format** tab:

– **Coordinate Display Order**: Choose the order in which you want FAST Survey to display East and North coordinates (East, North or North, East).

– **Angle Entry and Display**: Choose the type of angle FAST Survey will display (Azimuth or Bearing).

9. Tap  . This creates the file, closes the Job Settings window and takes you to the FAST Survey menu.

Configuring a ProMark 200 or ProMark 100 RTK Rover

Prerequisites

- Your rover is properly set up (ProMark 200 or 100 handheld connected to an external GNSS antenna placed on top of a pole) and powered on.
- FAST Survey is running on the rover and a job file is open.

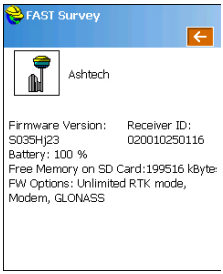
Set Tracking Mode Using GNSS Toolbox

First use the GNSS Toolbox utility to set the tracking mode of the receiver. FAST Survey will only be able to work from the signals selected with this utility.

Running GNSS Toolbox from within FAST Survey is simply done by selecting **Equip** > **GPS Utilities** > **GNSS Toolbox** > **GNSS Settings**. Select the desired tracking mode option. You can also set the elevation mask and enable or disable the use of SBAS.

Set Receiver and Antenna

- In FAST Survey, tap on the **Equip** tab and then on the **GPS Rover** button. A message may appear asking you to confirm your choice of configuring a rover. Tap **Yes**. This opens the **Current** tab of the GPS Rover window.
- The **Manufacturer** and **Model** fields should normally have been set to the right values on launching FAST Survey:
  - **Manufacturer**: “Ashtech”
  - **Model**: “ProMark 100/200”



Note that the  button beside the **Manufacturer** field allows you to read the following information about the connected receiver:

- Firmware version
- Receiver ID
- Power status
- Free memory space
- Firmware options installed.

Tap on  to return to the **Current** tab.

- Tap on the **Receiver** tab.
- Tap on  to define the external antenna used.
- Find the antenna model used (default: ASH111661) in the **Part Number** scroll-down menu.

- Tap ☑ to choose this antenna and close the window. The chosen antenna model can now be seen on the **Receiver** tab. The value in mm on the right refers to the vertical distance between the top of the pole (or the base of the antenna) and the L1 phase center of the selected antenna.
- Select the **Vertical** option for the antenna height measurement.
- Tap within the **Antenna Height** field and enter the value you have measured or read for the range pole length.
- Choose your preferred setting for **Elevation Mask**, (default: 5°)
- **Store Vectors in Raw Data**: Enable this option if you want to save all vectors to the job file (the crd file). Keep it cleared otherwise.
- **Advanced** Button: Provides access to the following settings:
  - **Ambiguity Fixing** (see table below).

Choice	Definition
Float	Choose this option if you only need decimeter accuracy (position status will never go to "Fixed").
95.0	95% confidence level
99.0	99% confidence level (default and recommended setting)
99.9	99.9 confidence level

  - **Use SBAS**, **Use GLONASS**: Using SBAS and/or GLONASS satellites helps to maintain the availability of fixed positions in those difficult environments where GPS alone would fail to do so.

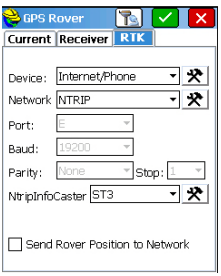
    IMPORTANT! Activating the **Use GLONASS** option will be effective on GLONASS reception only if you have previously set the **Tracking mode** parameter in GNSS Toolbox to "GPS L1+GLONASS L1". See *Set Tracking Mode Using GNSS Toolbox on page 8*. As for the **Use SBAS** option, only the last setting made is effective, whether you do it from GNSS Toolbox or from FAST Survey.
  - The **Virtual Antenna** option is disabled by default. Enabling the virtual antenna, which is defined as the generic "ADVNULLANTENNA" GNSS antenna, allows all collected data to be decorrelated from the GNSS antenna actually used at signal reception level. This may be useful if you wish to post-process the collected raw data using base raw data collected with a base from another manufacturer.

– **Send file after config**: You may have your receiver executing a number of additional commands (proprietary commands of the "$PASH" type) when later you tap on ✔ to configure the receiver. These commands must have been saved to a text file, for example to a file created using **Equip** > **GPS Utility** > **Send command**. To select the file you want the receiver to execute when being configured, tap on the blue button and highlight the corresponding file name.

– **NMEA Output Port**: You may ask the rover to output one or more NMEA messages (GGA, GLL, RMC, VTG, GSV, GSA, ZDA, GST) on the specified output port (Bluetooth or port A). Once you have defined the output port (common to all NMEA messages), tap on the **Configure** button and then, for each desired NMEA message, select its output rate (in Hertz or seconds).

  Once this is done, tap on ✔ to enable all your NMEA messages, and on the same button again to validate all the advanced parameters.

Set Data Link



- Tap on the **RTK** tab. This tab allows you to set the data link on the rover side, in accordance with the base or network you will be working with. Several configurations are possible:
  1. Using the internal cellular modem for a network connection (Direct IP, NTRIP or SpiderNet).
  2. Using the internal cellular modem in CSD mode for a "phone call" type connection with the base (Direct Dial).
  3. Using an external device (for example an external corrections receiver).
  4. Using an external radio receiver (several radio models are possible).
- To use the cellular modem, select "Internet/Phone" as the **Device** used.
- Tap on 🛠 after the **Device** field to access the modem's **Auto Dial** setting.

  With this option enabled, the connection to the last base used (CSD mode), to the last mount point used (NTRIP), or to the last IP address used (Direct IP) will be automatically re-established after a power cycle.

- Tap  to return to the **RTK** tab after making your choice for **Auto Dial**.
- Use the **Network** field to define the type of connection you want to establish through the internal modem.

  Then use the visible  buttons accordingly.

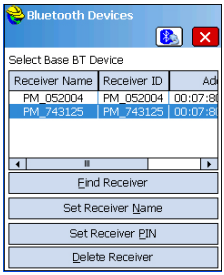
The tables below summarize all the settings required for each type of connection:

Parameters	TCP/IP Direct	NTRIP	SpiderNet	Direct Dial
Base ID (See sub-parameters below)	•		•	•
Broadcaster Name (See sub-parameters below)		•		
Station Name (from source table)		•		
Send Rover Pos?		•		

Sub-Parameters	Base ID (TCP/IP Direct)	Broadcaster Name (NTRIP)	Base ID (SpiderNet)	Base ID (Direct Dial)
Name	•	•	•	•
IP Address	•	•	•	
Port	•	•	•	
User Name		•	•	
Password		•	•	
Phone Number				•
Send Rover Pos?	•		•	•

- Tap  to initiate the connection. Use the **Monitor/Skyplot** function to check that the receiver is set to operate in RTK mode. See *Checking For a "Fixed" Position Solution Before Starting an RTK Project on page 28*.

How FAST Survey Interfaces With Your Equipment Via Bluetooth



First-Time Use

Right after you start FAST Survey and create or open your first job, FAST Survey will activate the previous connection to the receiver, if that is possible.

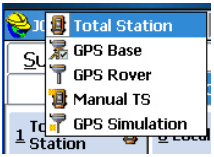
Assuming your base and rover are nearby and powered on, follow the procedure below to perform a Bluetooth connection with the base.

- Tap **Equip>GPS Base**.
- On the **Current** tab, select “Ashtech” from the **Manufacturer** drop-down list, and “ProMark 800” from the **Model** drop-down list.
- Tap on the **Comms** tab.
- Select “Bluetooth” from the **Type** drop-down list and“Windows Mobile” from the **Device** drop-down list.
- Tap on . This opens the Bluetooth Devices window.
- Tap **Find Receiver**. Wait until FAST Survey lists the Bluetooth identifiers of your base and rover. The list appears in a new window.
- Highlight the Bluetooth identifier corresponding to the base. To make sure you select the right identifier, press the Scroll button on the base until you display the Receiver Identification screen. The identifier is in the lower line (after the “BT:” prefix).
- Tap . This takes you back to the previous screen where the selected Bluetooth identifier remains highlighted in the list. The following actions may be performed on the selected receiver using the following buttons:
  - **Set Receiver Name**: By default, the “Receiver Bluetooth Identifier” of the detected receiver is assigned to this parameter. You may use a more self-explanatory name to identify your base (e.g.: “MyBase”).
  - **Set Receiver PIN**: Do not use this button. In its default configuration, your equipment does not request a PIN code to allow a peripheral device to connect to it via Bluetooth.
  - **Delete Receiver**: Removes the selected receiver from the list of remote receivers detected by Bluetooth.

- Tap  to connect the data collector to the base via Bluetooth and then configure the base according to your needs (see *RTK Base Configuration on page 14*).
- Later, you will establish a Bluetooth connection with the rover. The process will start when you tap **Equip**>**GPS Rover** to configure the rover. From the **Comms** tab, you will be able to access the Bluetooth Devices window and select the rover receiver from the list of remote receivers detected by Bluetooth, in the same way as you did for the base.

Switching Between Base and Rover

During a FAST Survey session, you can quickly change the receiver you are communicating with (provided the receiver you want to communicate with is within Bluetooth range).



The  icon located in the upper-right corner of the FAST Survey window allows you to change receivers. Tap on this icon and then:

- Select **GPS Base** to switch to the base,
- Or select **GPS Rover** to switch to the rover.

NOTE: If you examine more carefully this icon, you will see that it changes aspect (base or rover icon) depending on which receiver is currently communicating with FAST Survey.

In addition, on the **Equip** menu, a small check box appears in the icon inside either the **GPS Rover** or **GPS Base** button to indicate which connection is active.

Subsequent Uses

In the next sessions of FAST Survey, the software will prompt you to re-activate the Bluetooth connection you last established in the previous session, or simply work without a connection. If you choose the first option, FAST Survey will automatically re-establish the connection, provided the concerned receiver is still on and within Bluetooth range.

RTK Base Configuration

Prerequisites

- Your base is properly set up and powered on. It is on its definitive location for the survey and the data collector is located at less than 10 metres from the base.
- Your data collector is on, FAST Survey is running, a Bluetooth connection has already been configured (with the base; see *How FAST Survey Interfaces With Your Equipment Via Bluetooth on page 13*) and a job file is open.

- In FAST Survey, tap on the **Equip** tab and then the **GPS Base** button. A message may appear asking you to confirm your choice of configuring a base. Tap **Yes**. This opens the **Current** tab of the GPS Base window.

Set Manufacturer & Model

- Set the **Manufacturer** (“Ashtech”) and **Model** (“ProMark 800”) of the equipment used as the base.

  Note that the  button beside the **Manufacturer** field allows you to read the following information about the connected receiver:

  – Firmware version
  – Receiver ID
  – Power status
  – Free memory space
  – Firmware options installed.

  Tap on  to return to the **Current** tab.

Check/Change Bluetooth Connection

- Tap on the **Comms** tab. Since the Bluetooth connection was performed earlier, just check that FAST Survey is properly configured to communicate with the base. You should read:
  - **Type** = “Bluetooth”
  - **Device** = “Windows Mobile”
  - **Instr** = should be set to the name you gave earlier to the base, as seen from FAST Survey Bluetooth.

  Note that  located next to the **Device** field allows you to return to the Bluetooth Devices window through which you earlier configured the Bluetooth connection to the base (see *How FAST Survey Interfaces With Your Equipment Via Bluetooth on page 13*). Changes can be made now if necessary.

Set Receiver Parameters

- Using the HI measurement tool provided, perform a slant measurement of the antenna height (recommended).
- On the data collector, tap on the **Receiver** tab.

- Select the **Slant** option for the antenna height measurement.
- Tap within the **Antenna Height** field and enter the value you have just measured.
- Choose your preferred setting for **Elevation Mask**.
- Tap on the **Advanced** button. Choose your preferred settings for **Use SBAS**, **Use GLONASS** and **Use Galileo**.

  Using SBAS, GLONASS and/or Galileo satellites will help the rover maintain the availability of fixed positions in those difficult environments where GPS alone would fail to do so.

  The **Virtual Antenna** option is disabled by default. Enabling the virtual antenna, which is defined as the generic "ADVNULLANTENNA" GNSS antenna, allows all broadcast differential data and recorded raw data to be decorrelated from the GNSS antenna actually used at signal reception level. This may be useful when a rover from another manufacturer, which does not know the type of antenna used at the base, needs to receive RTK corrections from this base.
- **Send file after config**: You may have your receiver executing a number of additional commands (proprietary commands of the "$PASH" type) when later you tap on ☑ to configure the receiver. These commands must have been saved to a text file, for example to a file created using **Equip** > **GPS Utility** > **Send command**. To select the file you want the receiver to execute when being configured, tap on the blue button and highlight the corresponding file name.
- **NMEA Output Port**: You may ask the base to output one or more NMEA messages (GGA, GLL, RMC, VTG, GSV, GSA, ZDA, GST) on the specified output port (Bluetooth or port A). Once you have defined the output port (common to all NMEA messages), tap on the **Configure** button and then, for each desired NMEA message, select its output rate (in Hertz or seconds).

  Once this is done, tap on ☑ to enable all your NMEA messages, and on this button again to validate all the advanced parameters.

Set Data Link

- Tap on the **RTK** tab. This tab allows you to set the data link on the base side. Several configurations are possible:
  1. Using an external radio transmitter connected to ProMark 800' port A (Satel, Ashtech U-Link, former

"Magellan" radio transmitter P/N 800986-x0, a license-free radio or PacCrest PDL or ADL), or using another external device connected to ProMark 800's port A. The external device may be a radio transmitter from another manufacturer, or the local computer running the RTDS software.

2. Using ProMark 800's internal modem for a network connection either in TCP/IP or UDP/IP protocol. When the internal modem is used, the receiver unconditionally uses its internal port E to deliver RTK corrections to the modem.

Using either of these devices to set the data link is explained below.

1. **Setting an external radio or other device on port A** (in all cases, parity is forced to "none" and stop bits to "1"):

Radio type	Possible Baud Rates
Satel	19200, 38400
Ashtech U-Link	38400 only
Magellan Radio (P/N 800986-x0)	19200 only
ARF7474A NA or ARF7474B EU	9600 only
Pacific Crest PDL or ADL	9600, 19200, 38400, 57600 or 115200

Cable or Generic Device	(1200, 2400, 4800, 9600, 19200, 38400, 57600 or 115200

Except for Satel, additional settings are required for all radio types.

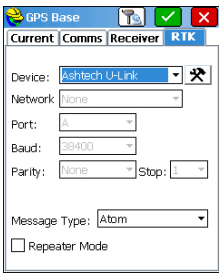
These settings are accessible by tapping  located next to the **Device** field, once you have selected one of these radios in the **Device** field. See below.

Satel: None

Ashtech U-Link:

Parameter Name	Possible choices
Protocol	"Transparent" (recommended) or "DSNP". See also table below.

Selecting Radio



Parameter Name	Possible choices
Power Management	"Automatic" or "Manual". "Automatic" is recommended. In Automatic, the radio is automatically powered when you turn on the receiver and will only be turned off when you turn off the receiver. In Manual, the modem will be powered on only when you configure the base
Channel	Choose the channel used (channel No. - Frequency)
Squelch	"Low", "Medium" or "High"
Over the Air Baud	"4800","7600" or "9600". "9600" recommended.

The DSNP protocol should be used for the following transmitter-receiver combinations:

Transmitter	Receiver
800986-x0	U-Link Rx
800986-x0	PDL
U-Link TRx	PDL
U-Link TRx	TDRE (Z-Max)

Magellan Radio (P/N 800986-x0), ARF7474B EU, ARF7474A NA:

Parameter Name	Possible choices
Channel	Choose channel used (channel No. - Frequency)

PacCrest PDL:

Parameter Name	Possible choices
Protocol	"Transparent" (recommended) or "Trimtalk".
Channel	Choose the channel used (channel No. - Frequency)
Over the Air Baud	"4800", "9600" or "19200". "9600" recommended.
Forward Error Correction	Enable or disable this function in the radio.
Scrambling	Enable or disable this function in the radio.

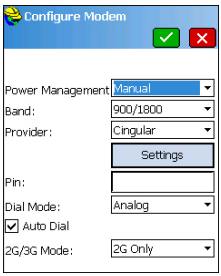
PacCrest ADL:

Parameter Name	Possible choices
Protocol	“Trimtalk”. “Transparent”, “Satel”, “TriMarkII/IIe”, “TRIMMARK3”, “TT450S” or “Transparent FST”
Power	100 mW, 500 mW, 1 W, 2 W or 4 W
Channel	Choose the channel used (channel No. - Frequency)
Over the Air Baud	“4800”, “9600”, “19200”, “8000” or “16000”.
Forward Error Correction	Enable or disable this function in the radio.
Scrambling	Enable or disable this function in the radio.

2. **Using the internal modem** (in all cases of use, internal port E is used, baud rate is forced to 19200 Bd, parity to “none” and stop bits to “1”),:

   Select “Internal GSM” from the **Device** field. Choose the type of network connection desired using the **Network** field just underneath (selecting “None” means you keep the modem idle while still allowing base data to be generated in the selected format; see further below).

   Tap on  located next to the **Device** field to access the settings of the internal modem. The modem settings are listed in the table below:



Field	Setting
Power Management	“Automatic” is recommended. In Automatic, the modem is automatically powered when you turn on the receiver and will only be turned off when you turn off the receiver. In Manual, the modem will be powered on only when you configure the base.
Band	Select the frequency band used for GSM communications in the country where you are.
Provider	If you choose **Network**=” TCP/IP Network” or **Network**=”UDP/IP Network”, choose the name of your mobile communication provider in this field. There are three preset providers: Cingular, T-Mobile and MoviStar. If you are using another provider, select “User” or “Other” in this field and then tap on the **Settings** button underneath to enter the parameters of your provider (APN server, APN User Name and APN Password).
Pin	Enter the Pin number of the SIM card inserted in your ProMark 800.
Dial Mode	“Analog” is usually the right selection at the base. Please call your communication provider for more information.

Field	Setting
Auto Dial	Keep this box disabled for a base.
2G/3G Mode	You may force the modem to work only in a 2G network or let it work either in a 2G or 3G network, depending on which network is available from the base location.

If you chose Network="TCP/IP Network" or "UDP/IP Network", an accordingly named field appears further down on the screen allowing you to define the other end of the network connection (i.e. recipient IP address and port number) and name it at your convenience.

Tap on  located next to the **xxP/IP Network** field to create and manage different network connections.

- Use the **Message Type** field to set the format in which base data messages will be generated: ATOM, ATOM compact, RTCM V3.0, RTCM V2.3, CMR or CMR+, (RTCM-DGPS).

  When the Internal GSM is used and a TCP/IP network connection is active, this field is forced to "ATOM".
- If a repeater is used within your system to extend the range of the UHF radios used, enable the **Repeater Mode** check box. Enabling this option causes the output rates of all the differential messages to be changed into an even value (2 sec.) in order to make them compatible with the use of the repeater.
- Tap  to load the settings to the radio or modem. This may take a few seconds. FAST Survey then returns to the GPS Base configuration window.

Load Configuration to the Base

Now that you have browsed all the tabs in the Base Configuration window and set all the parameters, just tap  to connect and load the configuration to the base. This may take a few seconds.

Set Base Position

FAST Survey then asks you to set the base position. Depending on the chosen method, follow the instructions displayed on the screen to define this position (see also *Setting the Base Position With FAST Survey on page 48* for more information). This completes the base configuration phase.

RTK Rover Configuration

Prerequisites

- Your rover is properly set up and powered on.
- Your data collector is on, FAST Survey is running and a job file is open.
- In FAST Survey, tap on the **Equip** tab and then the **GPS Rover** button. A message may appear asking you to confirm your choice of configuring a rover. Tap **Yes**. This opens the **Current** tab of the GPS Rover window.

Set Manufacturer & Model

- Set the **Manufacturer** (“Ashtech”) and **Model** (“ProMark 800”) of the equipment used as the rover.

  Note that the button beside the **Manufacturer** field allows you to read the following information about the connected receiver:

  – Firmware version
  – Receiver ID
  – Power status
  – Free memory space
  – Firmware options installed.

  Tap on to return to the **Current** tab.

Set Bluetooth Connection

- Tap on the **Comms** tab.
- In the **Type field**, select “Bluetooth”.
- In the **Device** field, select “Windows Mobile”.
- Tap on to access the Bluetooth Devices window. The window lists Bluetooth identifiers that correspond to the receivers found in the vicinity.
- Select the rover’s Bluetooth identifier from the list. To make sure you are making the right selection, press the Scroll button on your rover until you display the Receiver Identification screen. The Bluetooth identifier is shown in the lower line. This is the parameter you must select from the list.

  You may give the rover a more familiar name (e.g. “MyRover”) using the **Set Receiver Name** button.
- Tap to connect the data collector to the rover via Bluetooth. FAST Survey then returns to the GPS Rover configuration window.

- Check that the rover name is now selected in the **Instr** field.

Set Receiver Parameters

- Measure or read the length of the range pole on top of which the ProMark 800 is mounted.
- On the data collector, tap on the **Receiver** tab.
- Select the **Vertical** option for the antenna height measurement.
- Tap within the **Antenna Height** field and enter the value you have just measured or read for the range pole length.
- Choose your preferred setting for **Elevation Mask**.
- **Store Vectors in Raw Data**: Enable this option if you want to save all vectors to the job file (the crd file). Keep it cleared otherwise.
- **Advanced** Button: Provides access to the following settings:
  - **Ambiguity Fixing** (see table below).

Choice	Definition
Float	Choose this option if you only need decimeter accuracy (position status will never go to "Fixed").
95.0	95% confidence level
99.0	99% confidence level (default and recommended setting)
99.9	99.9 confidence level

  - **Use SBAS**, **Use GLONASS**, **Use Galileo**: Using SBAS, GLONASS and/or, Galileo satellites helps to maintain the availability of fixed positions in those difficult environments where GPS alone would fail to do so.
  - The **Virtual Antenna** option is disabled by default. Enabling the virtual antenna, which is defined as the generic "ADVNULLANTENNA" GNSS antenna, allows all collected data to be decorrelated from the GNSS antenna actually used at signal reception level. This may be useful if you wish to post-process the collected raw data using base raw data collected with a base from another manufacturer.
  - **Send file after config**: You may have your receiver executing a number of additional commands (proprietary commands of the "$PASH" type) when later you tap on ☑ to configure the receiver. These commands must have been saved to a text file, for example to a file created using **Equip** > **GPS Utility** > **Send command**. To select the file you want the receiver

to execute when being configured, tap on the blue button and highlight the corresponding file name.

– **NMEA Output Port**: You may ask the rover to output one or more NMEA messages (GGA, GLL, RMC, VTG, GSV, GSA, ZDA, GST) on the specified output port (Bluetooth or port A). Once you have defined the output port (common to all NMEA messages), tap on the **Configure** button and then, for each desired NMEA message, select its output rate (in Hertz or seconds).

  Once this is done, tap on ☑ to enable all your NMEA messages, and on the same button again to validate all the advanced parameters.

Set Data Link

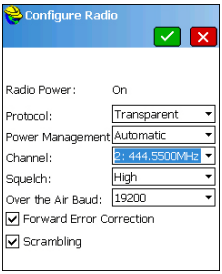
- Tap on the **RTK** tab. This tab allows you to set the data link on the rover side, in accordance with the base or network you will be working with. Several configurations are possible:
  1. Using the internal radio receiver.
  2. Using the internal modem for a network connection (TCP/IP, NTRIP or SpiderNet).
  3. Using an external radio receiver connected to ProMark 800' port A (Satel, ARF7474B EU or ARF7474A NA).

     Or using an external device also connected to this port (for example an external corrections receiver)
  4. Using the data collector's internal modem for a network connection (TCP/IP Direct, UDP/IP Direct, NTRIP or SpiderNet).

  Using either of these devices to set the data link is explained below.

  1. **Setting the internal radio receiver ("Internal ADL")**: (internal port D used at 38400 Bd, parity=None, Stop Bits=1)

     Additional settings are accessible through  located next to the **Device** field, once you have selected "Internal ADL" in the **Device** field. See below.



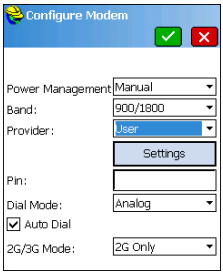
Parameter Name	Possible Choices
Protocol	Match the choice of protocol to the one made at the base. Available protocols: Trimtalk, Transparent, Satel, TrimMarkII/IIe, TRIMMARK3, TT450S or Transparent FST.
Power Management	"Automatic" is recommended. In Automatic, the radio module is automatically powered when you turn on the receiver and will only be turned off when you turn off the receiver. In Manual, the module will be powered on only when you configure the rover.
Channel	Choose the channel used (Channel No. - Frequency)
Squelch	The factory default setting of "High" provides maximum effective sensitivity to incoming signals.This is the preferred setting. "Medium" and "Low" sensitivity settings are available for use if local electrical noise or distant radio signals falsely activate the radio receiver. Use of these settings may reduce the radio range.
Over the Air Baud	Five possible baud rates: 4800, 9600, 19200, 8000 or 16000.
Scrambling	Set this parameter as set at the base if it uses a Pacific Crest transmitter. For another radio used at the base, keep this option disabled.
Forward Error Correction	Set this parameter as set at the base if it uses a Pacific Crest transmitter. For another radio used at the base, keep this option disabled.

Then tap ✓ to load the settings to the radio. This may take a few seconds. FAST Survey then returns to the GPS Rover configuration window.

2. **Using ProMark 800's internal modem** (in all cases of use, internal port E is used, baud rate is forced to 19200 Bd, parity to "none" and stop bits to "1"):

   Select "Internal GSM" from the **Device** field. Choose the type of network connection desired using the **Network** field just underneath (selecting "None" means you keep the modem idle).

   Tap on ⚒ next to the **Device** field to access the settings of the internal modem. The modem settings are listed in the table below:



Field	Setting
Power Management	"Automatic" is recommended. In Automatic, the modem is automatically powered when you turn on the receiver and will only be turned off when you turn off the receiver. In Manual, the modem will be powered on only when you configure the rover. "Automatic" is mandatory if "Auto Dial" is enabled.
Band	Select the frequency band used for GSM communications in the country where you are.
Provider	Choose the name of your mobile communication provider in this field. There are three preset providers: Cingular, T-Mobile and MoviStar. If you are using another provider, select "User" or "Other" in this field and then tap on the **Settings** button underneath to enter the parameters of your provider (APN server, APN User Name and APN Password).
Pin	Enter the Pin number of the SIM card inserted in your ProMark 800.
Dial Mode	Depending on the provider, this may be "Analog" or "Digital". "Analog" is usually the right selection. Please call your communication provider for more information
Auto Dial	Check this box if you wish that after a power cycle, the receiver can connect automatically to the last used NTRIP mount point or last used Direct IP server.
2G/3G Mode	You may force the modem to work only in a 2G network or let it work either in a 2G or 3G network, depending on which network is available from the rover location.

If you choose **Network**= "NTRIP", then, tap on  next to the **Network** field, for additional settings (NTRIP broadcaster name, IP address, port, username and password).

Then tap  to validate your new settings and load the source table from the NTRIP provider. This takes you back to the **RTK** tab. Further down on the screen, in the **NtripInfoCaster** field, select one of the stations returned by the NTRIP provider as the base station you want the rover to work with.

If you tap on  next to this field, you will see the properties of the selected station (identifier, message format, position, etc.)

If you choose **Network**= "TCP/IP Direct" or "SpiderNet", then a **Base ID** field appears further down on the screen in which you can select the name of the base station you want the rover to work with.

If the **Base ID** field is blank, tap on  next to this field and enter the properties of one or more of these stations: Name, IP address, IP port (+username and password for SpiderNet). Then tap  to validate the new station and return to the **RTK** tab. Select the name of the new station in the **Base ID** field.

3. **Using an external radio receiver or other device connected to ProMark 800 's port A** (in all cases, parity is forced to "none" and stop bits to "1"):

Radio type	Possible Baud Rates
Satel	19200, 38400
ARF7474A NA or ARF7474B EU	9600 only

Cable or Generic Device	1200, 2400, 4800, 9600, 19200, 38400, 57600 or 115200

Except for Satel, additional settings are required for all radio types.

These settings are accessible by tapping  located next to the **Device** field, once you have selected one of these radios in the **Device** field. See below.

Satel: None

ARF7474B EU, **ARF7474A NA**:

Parameter Name	Possible choices
Channel	Choose channel used (channel No. - Frequency)

4. **Using the cellular modem of a mobile phone**: Select "Data Collector Internet" in the **Device** field, then select the type of network connection you wish to use (TCP/IP Direct, UDP/IP Direct, NTRIP or SpiderNet).

   Use the "Data Collector Internet" option to operate in a CDMA mobile network. This requires a Bluetooth connection between the data collector and the mobile phone.

   If you choose **Network**= "NTRIP", then tap on  next to the **Network** field, for additional settings (NTRIP broadcaster name, IP address, port, username and password).

   Then tap  to validate your new settings and load the source table from the NTRIP provider. This takes you back to the **RTK** tab. Further down on the screen, in the **NtripInfoCaster** field, select one of the stations returned

by the NTRIP provider as the base station you want the rover to work with.

If you tap on  next to this field, you will see the properties of the selected station (identifier, message format, position, etc.)

If you choose **Network**= “TCP/IP Direct”, “UDP Direct” or “SpiderNet”, then a **Base ID** field appears further down on the screen in which you can select the name of the base station you want the rover to work with.

If the **Base ID** field is blank, tap on  next to this field and enter the properties of one or more of these stations: Name, IP address, IP port (+username and password for SpiderNet). Then tap  to validate the new station and return to the RTK tab. Select the name of the new station in the **Base ID** field.

- **Send Rover Position to Network**: Depending on the network/ station you selected, you may have been asked to return the rover position before the station can deliver its corrections through the data link. If that was so, then enable this function, otherwise keep it disabled.
- Tap  to load the settings to the radio or modem. This may take a few seconds. FAST Survey then returns to the GPS Rover configuration window.

Load Configuration to the Rover

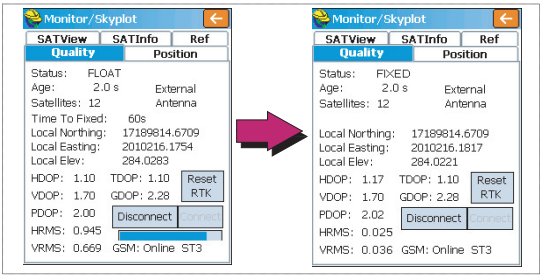
Now that you have browsed all the tabs in the Rover Configuration window and set all the parameters, just tap  to connect and load the configuration to the rover.

Use the **Monitor/Skyplot** function to check that the receiver is set to operate in RTK mode. See Checking For a “Fixed” Position Solution Before Starting an RTK Project on page 28.

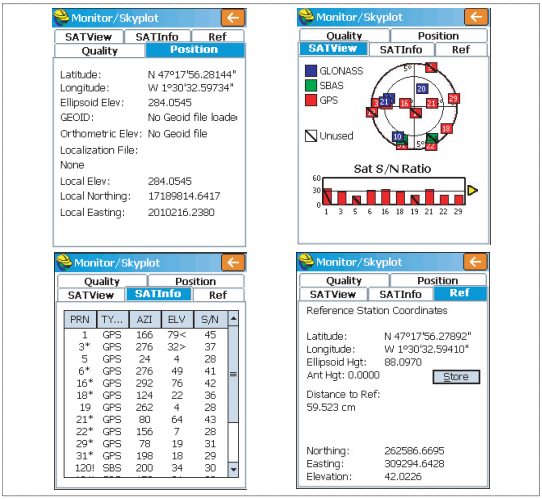
Checking For a “Fixed” Position Solution Before Starting an RTK Project

After the data link has been established, the rover starts acquiring corrections data from the selected source. Note that the rover will automatically recognize the format of the received data (ATOM, RTCM2.3, RTCM 3, CMR, CMR+, DBEN). Do the following before starting your survey:

- In the **Equip** menu, tap on the **Monitor/Skyplot** button
- Read the different parameters displayed on the screen. You should see the HRMS and VRMS rapidly decrease from a few meters to less than 10 to 20 mm, while the position status switches from “AUTO” to “FLOAT” and finally “FIXED”.



Other screens are available from within the **Monitor/Skyplot** function showing the details of the constellation, of the base position and of the RTK position solution:



In NTRIP and Direct IP modes, a **Disconnect/Connect** button is available on the **Quality** tab to easily control the network connection. There is also a horizontal bar showing the GSM signal level.

In Direct Dial mode, a **Hang up** button is available on the same tab to terminate the connection with the base.

- Tap  after you have made sure the FIXED position status is settled. This takes you back to the FAST Survey menu from which you can start your survey.

Using FAST Survey's Basic RTK Functions

Uploading Stakeout Points

In your office, do the following:

- Connect the receiver or data collector to your office computer using the USB data cable. For ProMark 200 or ProMark 100, place the receiver on its docking station and connect the docking station to the computer via the USB cable.
- Make sure ActiveSync is installed on your computer and is allowed to perform USB connections. If you do not have ActiveSync installed, download the latest version from the following web page:

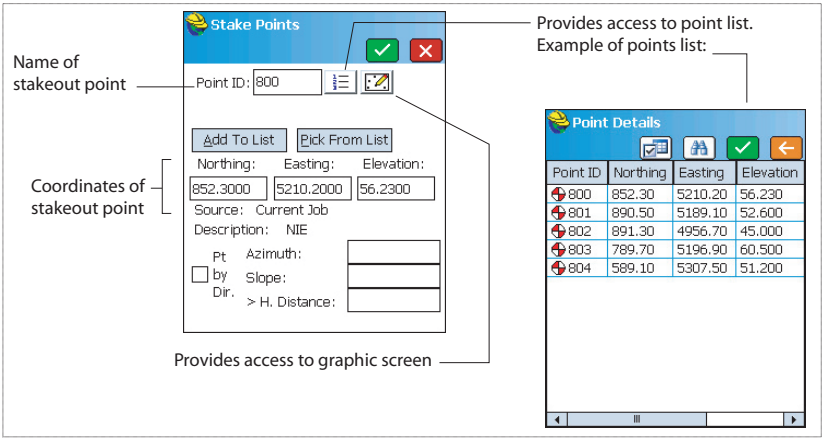
  http://www.microsoft.com/download/en/details.aspx?id=15

- Run GNSS Solutions on your office computer.
- Open the project containing the stakeout points you want to transfer to the receiver or data collector as your job.
- On the project map view, select all the reference and target points making up your job.
- Select **Project>Upload Positions to External Device..**
- Select **RTK Job** and **FAST Survey data collector**.
- Click **OK**.
- Name the job (e.g. MYJOB). Keep the **Selected Targets and References** option selected and click **OK**. This opens the Data Transfer dialog box.
- In the combo box, select **Active Sync** and keep **Automatic transfer** enabled.
- Click **OK** to establish the connection with the receiver or data collector and upload the job (to \My Device\Program Files\FAST Survey\Data\).
- After the job has been uploaded, turn off the receiver or data collector, disconnect the USB cable and go to the field with your surveying equipment to stake out your points.

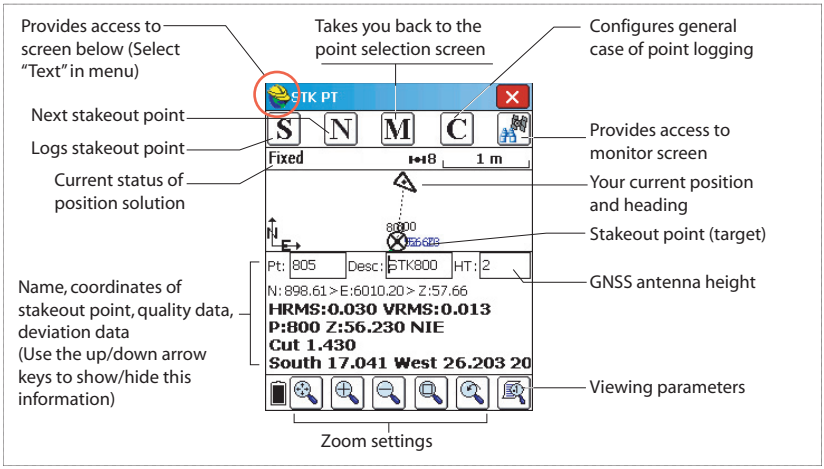
Staking Out Points

1. Run FAST Survey and open the job containing the points you want to stake out.
2. Tap on the **Survey** tab and then select **Stake Points**. The screen now displayed allows you to stake out points.
3. On this screen, FAST Survey asks you to choose the point you want to stake out. You can either type in its coordinates in the **Northing**, **Easting** and **Elevation** fields, or

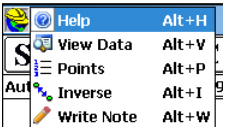
select a pre-defined point from the points list (see **File> Points**). You can also define graphically the point by tapping on the point on the graphic screen, or define the point according to azimuth, slope and horizontal distance.



4. Once you have chosen a point, tap . A graphic screen is now displayed to help you head for the point.

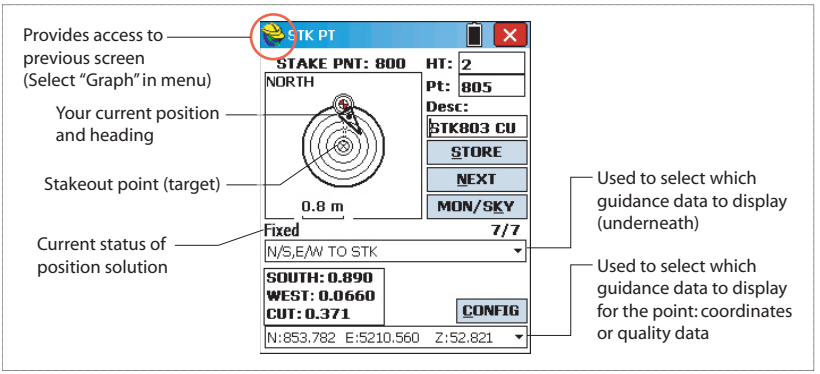


Yellow helmet gives access to Function Menu!



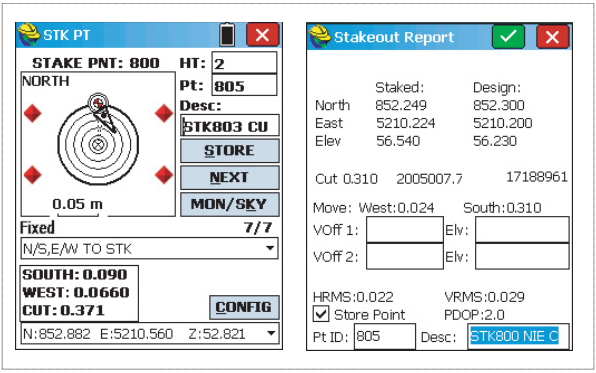
5. When the distance to the stakeout point is too small to be clearly seen on this screen, tap on the surveyor's helmet in the upper-left corner and select **Text** from the menu that pops up.

   A new screen appears giving a more accurate view of the remaining distance to the stakeout point. (If you want to return to the previous screen, just select **Graph** in the same menu.)



When the remaining distance is within the stakeout tolerance (this parameter can be changed in **Equip**>**Tolerances**), markers appear in the four corners of the target. You can now set a stake on this point.

6. Tap on the **STORE** button if you want to store the position of this point. You will be notified if the values of HRMS and VRMS exceed the tolerances set for these two parameters in **Equip**>**Tolerances**. A new screen is then displayed showing the coordinates of both the staked and design points.



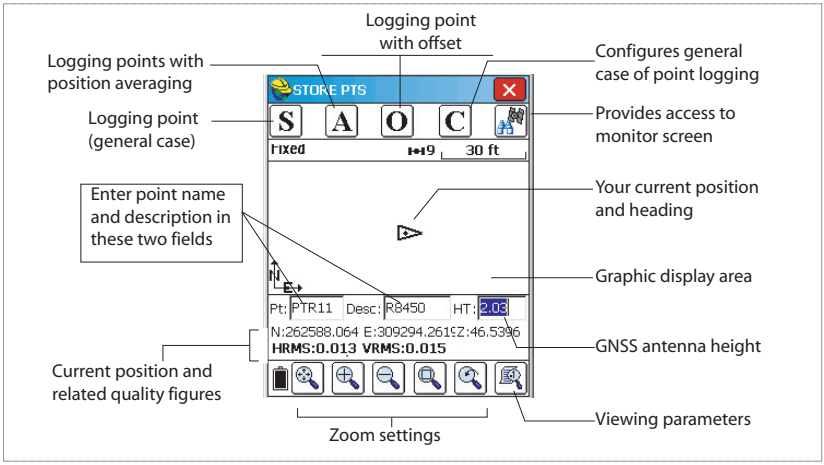
7. Tap  if you agree. The "**Point Stored**" message appears briefly. The screen then comes back to the Stake Points screen where you can choose the next point to be staked.

8. After staking out all your points, tap  in the upper-right corner of the screen to return to the menu.

Logging Points

1. Tap on the **Survey** tab and then on **Store Points**. The screen now displayed allows you to log all your points.

   The figure below summarizes all the functions available from that screen.



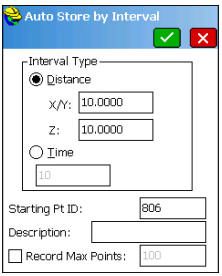
2. Type in the point name and description in the corresponding two fields (see above)

3. Tap on the "**A**" button
4. Enter the number of readings you want before FAST Survey is allowed to compute an average position for this point.

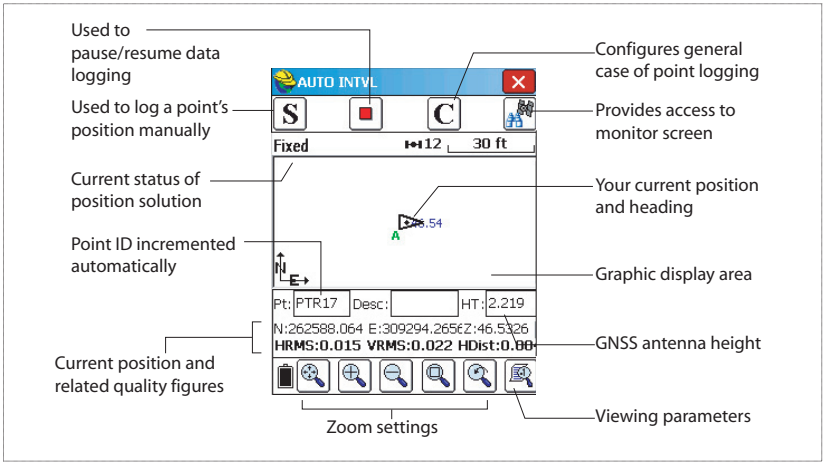
   For example, type in "5" and tap  .

   Messages follow successively indicating that the system is taking the five requested readings. Then FAST Survey displays the average coordinates it has determined for the point.
5. Tap  if you agree. The "**Point Stored**" message appears briefly. The screen then shows the location of the point together with its name and description.
6. After logging all your points, tap  in the upper-right corner of the screen to return to the menu.

Logging a Line



1. On the **Survey** tab, select the **Auto by Interval** function. Two different modes are possible: Time or Distance.
2. If you choose **Distance**, enter the horizontal and vertical increment value respectively in the **X/Y** and **Z** fields, according to the chosen unit. If you choose **Time**, enter the increment value, in seconds.
3. Enter a point Id. for the start point in the **Starting Pt ID** field. This field will be incremented by one after each point logging. Initially, the Point Id. may only consist of letters (e.g. "ABCD"). FAST Survey will then increment the Point Id. as follows: ABCD1, ABCD2, etc.
4. Tap  to switch to the graphic screen (see figure below) and start logging the series of points along the line.



The **S** button lets you instantly log the position of a point.

The pause button allows you to pause data logging in continuous mode.

If data logging in continuous mode is paused, you can still continue to log points in manual mode using the **S** button.

Tap the pause button again to resume data logging in continuous mode.

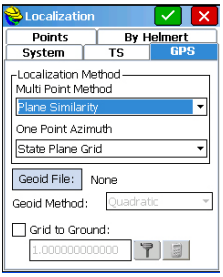
If you directly tap  to come back to the main menu, data logging in continuous mode is automatically stopped.

Downloading RTK Points to GNSS Solutions

- Go back to your office and connect the receiver or data collector to your office computer using the USB data cable. For ProMark 200 or ProMark 100, place the receiver on its docking station and connect the docking station to the computer via the USB cable.
- Run GNSS Solutions on your office computer.
- Open the project in which to add the points from the field.
- Select **Project>Download Positions from External Device..**
- Select **RTK Results** and **FAST Survey data collector**.
- Click **OK**. This opens the Data Transfer dialog box.
- In the combo box, select **ActiveSync**, enable **Automatic Transfer** and click **OK**. This opens a new window listing all the jobs stored in the data collector.
- Select the job you want to download (e.g. "MYJOB") and click **OK**. This starts the download process.

Vector information relative to surveyed points is available only in .rw5 files. FAST Survey saves vector information directly in this file format and so *does not* create O-files that would contain such information.

Running Localization in an RTK Project

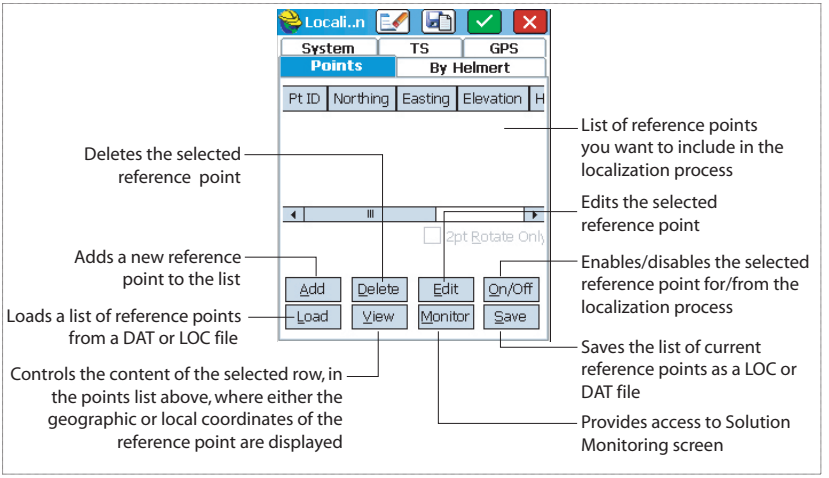


Choosing the Localization Method

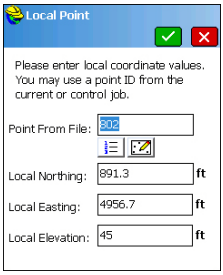
- With your job open in FAST Survey, tap on the **Equip** tab and then on the **Localization** button. This opens the Localization window with the **System** tab shown first.
  For your information, this tab shows the name of the projection selected earlier for the project (see **File>Job Settings>System**). Choosing another projection here would change the projection used in the job. It is your responsibility to have the right projection selected on which the localization process is going to be run.
- Tap on the **GPS** tab and select your localization methods for multi-point and one-point localizations. If you choose "Helmert" as the localization method, the one-point method selection is grayed.

One-Point or Multi-Point Localization

1. Tap on the **Points** tab. This tab allows you to define the reference points used as the input to the localization process.

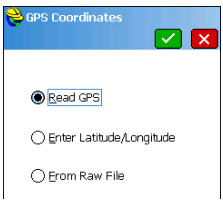


For each of the available reference points, you need to enter the local coordinates and then the WGS84 coordinates, as measured by your equipment.

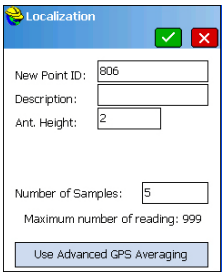


2. Tap **Add** to define the first reference point. A new window (Local Point) is displayed allowing you to do that. To add a reference point that already exists in the job, do one of the following:
   - Type its name in the **Point From File** field. This automatically updates the window with the point's local coordinates.
   - Or tap on the  button to access the list of points available. Choose one and tap the green button to return to the Local Point window.
   - Or tap on the  button to select the point directly on the map of the working area.

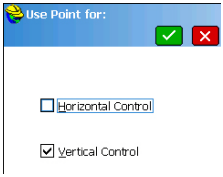
3. Tap on the green button () to enter the name and local coordinates of the reference point.
   FAST Survey then asks you to enter the WGS84 coordinates of the point. Choose one of the following methods:



   - **Read GPS**. Choosing this method means your equipment should be placed exactly over the reference point. Then enter a number of samples required before the equipment delivers an averaged WGS84 solution for the point (5 minimum recommended). Tap on the green button to let the equipment take the required readings and return a result (averaged position + residuals). Then validate the result.
   - **Enter latitude/Longitude**. Enter the three WGS84 coordinates of the point, using the "dd.mmssss" format, for latitude and longitude. Elevation should be entered in the distance unit chosen for the job. Enter the orthometric elevation if a geoid file is used otherwise enter the ellipsoid elevation.
   - **From Raw File**: Select a point from the job holding the WGS84 coordinates of the reference point. This point should have been surveyed earlier by the system in the same measurement conditions (same base setup, etc.) as now.

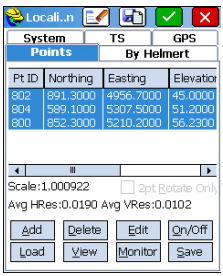


   Once both the local and WGS84 coordinates have been entered, the reference point appears in the list of points used in the localization process.



4. With the point selected in the list, tap on the **On/Off** button to tell FAST Survey how the point should be used in the localization process.

   You can force the local grid to pass through its horizontal position by checking the **Horizontal Control** button and/or its vertical position by checking the **Vertical Control** button. Clearing the two options means the point is not involved at all in the localization process. Tap on the green button to validate your choices.



5. Resume the previous three steps until all your reference points have been added to the list.

   As you add new points, check the amount of residual for each reference point involved in the localization (residuals are displayed in the lower part of the screen). The lower these values, the better the consistency of your set of reference points.

   Should some residuals be abnormally high, the relevant point(s) should be deleted using the **Delete** button, or its contribution to the localization process changed by editing its control settings through the **On/Off** button.

   If you enter only two reference points, the **2 pt Rotate Only** button is made available. This option allows you to use the second point for direction but not for scaling.

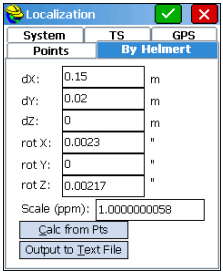
6. Tap ✓ when you are satisfied with the level of residuals. FAST Survey then asks you to save your list of points as a LOC or DAT localization file.

7. Name the file and tap ✓. **The localization process is now complete and active**. **This means every new point you will now survey will be expressed on the local grid**.

   If points have been surveyed in the job prior to the localization process, FAST Survey will prompt you to convert their coordinates to the new local grid. If you accept, FAST Survey will open the Process Raw File window.

   Simply tap ✓ to re-process the coordinates of these points. FAST Survey will return the list of converted coordinates.

   NOTE: Tapping ✓ from the Localization screen is mandatory to activate the new localization file. Using the **Save** button saves the localization file but does not make it active.



Helmert Localization

1. With your job open in FAST Survey, tap on the **Equip** tab and then on the **Localization** button.
2. Tap on the **GPS** tab and select "Helmert" from the **Multi Point Method** field.
3. Tap on the **By Helmert** tab and then enter the seven parameters defining the new datum of the local grid.
4. Tap ✓. **The localization process is now complete and active**. This means every new point you will now survey will be expressed on the local grid.

Computing Helmert Parameters from a Multi-Point Localization File

- Follow the instructions to perform a multi-point localization.
- After all the points have been defined, tap on the **By Helmert** tab.
- Tap on the **Calc from Pts** button. FAST Survey computes the seven Helmert parameters and displays the result in the corresponding fields.
- To save the seven parameters as a TXT file, tap on the **Output to Text File** button and name the file.

Using a Geoid File in the Localization Process

A library of geoids is available from the Ashtech website. Once you have downloaded the desired geoid, you need to use the Extract tool, also available and downloadable from the same web page, to convert the geoid into a GSF file, the only format FAST Survey can work from. The converted file can then be downloaded to the data collector through ActiveSync.

The details of the procedure are given below. Note that the Extract Tool can also be used to reduce the geographical extent of the geoid before you download it to the data collector.

Downloading a Geoid to your Computer

- Use your office computer to go to the web page: http://resources.ashtech.com/GEOIDS,
- Select the desired geoid by clicking on the corresponding link. You are then prompted to save the *Install_<Geoid_Name>.exe* file on your computer.
- Click **Save File** and wait until the download is complete.
- Run the *Install_<Geoid_Name>.exe* file on your computer. Follow the instructions on the screen to complete the installation.

If your data collector is currently connected to the computer via ActiveSync, instructions will also be provided to install the geoid file on the receiver as well (in *\Program Files\Geoids Data*). Tap "No" in this case.

Installing the Extract Tool on your Computer

- Go back to the web page: http://resources.ashtech.com/GEOIDS,
- Click on **Extract Tool** located at the bottom of the menu in the left-hand part of the screen.
- Again, click on the **Extract Tool** link, now appearing at the bottom of the web page (you need to scroll down the page). You are then prompted to save the *Install_Geoids.exe* file on your computer.
- Click **Save File** and wait until the download is complete.
- Run *Install_Geoids.exe* on your computer. Follow the instructions on the screen to complete the installation. Click on the **Close** button once complete.

Preparing the Geoid for Use in FAST Survey

- From the computer's task bar, select **Start**>**All Programs**>**Ashtech**> **Geoids**.
- Select **File**>**Open**. The program opens directly the folder containing the downloaded geoid.
- Select it and click **Open**.
- Select **File**>**Save**, select "GSF File (*.gsf)" as the new file format, name the file and click **Save**. By default, the resulting GSF file is saved to the same folder on the computer.
- Copy the resulting GSF file to the *...\FAST Survey\Data* folder on the receiver, using Microsoft ActiveSync.

Selecting a Geoid File for Use in FAST Survey's Localization Process

In FAST Survey, do the following:

- In the **Equip** menu, tap on the **Localization** button.
- Tap on the **GPS** tab.
- Tap on the **Geoid File:** button. This opens the \MyDevice\FAST Survey\Data\ folder from which you can now select the geoid file you have just uploaded.
- Select the file and tap  . The name of the geoid file now appears underneath the **Geoid File:** button, meaning that

from now on, it is used in the localization procedure for the processing of elevations.

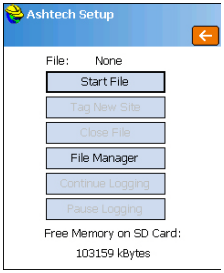
Deselecting the Currently Used Geoid File

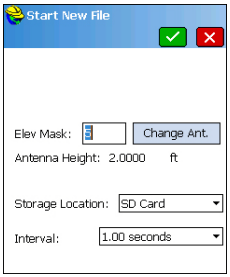
In FAST Survey, do the following:

- In the **Equip** menu, tap on the **Localization** button.
- Tap on the **GPS** tab.
- Tap on the **Geoid File:** button. This opens the \MyDevice\FAST Survey\Data\ folder.
- Select the file corresponding to the geoid currently used.
- Tap  . This causes the geoid filename to disappear from underneath the **Geoid File:** button, meaning the geoid is no longer used in FAST Survey.

Using FAST Survey's Raw Data Collection Function

Collecting Raw Data in Static or Kinematic Mode





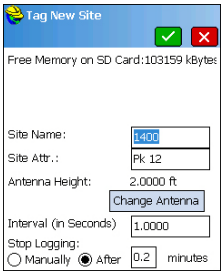
Collecting raw data with FAST Survey may be done in static or kinematic mode.

In Stop & Go kinematic, you may tag several points and mark the beginning and end of static occupations on these points. These events will be saved in the raw data file. When post-processing the raw data file with GNSS Solutions, you will have to declare it as a kinematic observation.

1. Tap on the **Survey** tab and then on **Log Raw GPS**.
2. Tap on **Start File**. The screen lists the currently used settings.
3. Keep or edit these settings:
   - **Elev Mask**: Elevation mask, in degrees (default: 5 degrees)
   - **Antenna Height**: Current value of antenna height, expressed in the chosen unit. Use the **Change Ant.** button to change the antenna height. Choose the measurement type first (**Vertical** or **Slant**) and then enter the measured value.
   - Choose the storage medium where to store the file.
   - **Interval**: Raw data recording rate, in seconds.
4. Tap . On top of the screen now appears the **Logging...** message indicating raw data recording in progress. A default name is given to the open raw data file, based on the ATOM naming conventions:

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

   Where "Site" is the name you last entered in the **Site Name** field below (this may be a bit confusing but you have to get used to it).



5. Use the **Tag New Site** button to tag the raw data file with the name of the site (point or line) you are surveying:
   - **Site Name**: Enter a four-character name (recommended) so that the entire name, and not a truncated name, can appear later in the raw data file name. Longer site names will not be truncated however in GNSS Solutions.

     For a static observation (by a base or a rover), enter the name of the site where data collection takes place.

     For a Stop & Go observation, enter a new name each time you arrive at a new point. This will later be interpreted as the beginning of a static occupation on this point. The end of the static occupation is controlled by the **Stop Logging** parameter below.

     For a continuous kinematic observation, enter the name of the line you are surveying.
   - **Site Attr.**: Enter an optional description for the surveyed site.

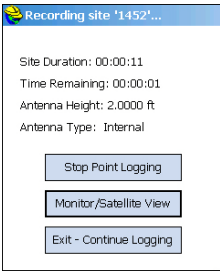
     [The antenna height and raw data recording rate (interval) are recalled on this screen. You can still change them if necessary.]
   - **Stop Logging**: This parameter controls the end of the static observation on the specified point name (not to be confused with the end of raw data collection).

     This control may be manual (you will decide by yourself when to stop: select **Manually**), or automatic, by selecting **After** and entering a preset duration, in minutes, for the observation on the point.

     Typical durations in static are a day's work for a base or several minutes or hours for a rover.

     Typical durations in Stop & Go are several seconds to several minutes on each point.

     In continuous kinematic, it makes sense to choose **Manually** because you do not know in advance how long it will take to get to the end of the line.



6. Tap ✓. A new screen is displayed summarizing all your settings.
   - **Site Duration**: Shows the time elapsed since you started the observation on the point
   - **Time Remaining** is displayed only if you have selected **After** (x minutes)
   - Reminder on the antenna parameters used (height and type)
   - **Stop Point Logging**: Tap on this button to stop the observation on the point (required if **Manually** was selected). if **After** (x minutes) was selected, tapping on this button will shorten the observation.
   - **Monitor/Satellite View** button: May be used to make sure GNSS reception is good on the surveyed point (enough satellites are received, DOP values low). Ignore all RTK-related indicators. Note that making this check is not always compatible with short static occupation times on a point.
   - **Exit - Continue Logging** button: Use this button if you change your mind and you no longer want to tag the point (and you want to continue logging the raw data file).
7. If you stop manually, you will be asked to confirm this. A message "Finished collecting data for this site (xx)" will then appear. In automatic, you will get this message directly.
8. Tap **OK** to close the message. This takes you back to the initial screen where you can see that raw data are still being collected.
9. Tap on the **Close File** button to end data collection and close the raw data file.
10. Tap on the **File Manager** button. You should recognize the last file in the list as the file you have just closed.

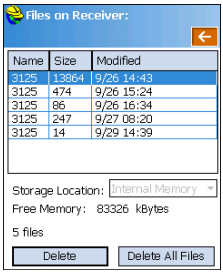
You may quit the **Log Raw GPS** function while letting FAST Survey collect raw data. In this case, you will have to confirm that you don't want to close the raw data file.

When coming back to the Log Raw GPS function, again FAST survey will ask you what to do about the raw data file being currently logged.

Deleting Raw Data Files

Use FAST Survey to delete raw data files from the receiver internal memory.

1. Tap on the **Survey** tab and then on **Log Raw GPS**.



2. Tap on **File Manager**. The screen displays the following parameters:
   - List of raw data filenames.
   - Selected storage medium.
   - Free memory available.
   - Current number of raw data files in memory.
3. Unless already done, select **Internal Mem** to list the files stored in the internal memory.
4. To delete one file, highlight its name in the list and tap the **Delete** button. To delete all the files, tap **Delete All Files**.

   Important! When the receiver is logging raw data, the file being logged cannot be deleted. The file is protected from deletion until you close it.

Saving/Restoring Base and Rover Configurations

FAST Survey allows you to save into a file all the settings you have prepared for your base or rover.

This function is useful when you regularly have to switch between two or more configurations. By simply selecting the right configuration, you immediately restore all the settings FAST Survey needs to load to the receiver before it can operate as expected.

The table below summarizes the parameters held in a configuration file.

Parameters	Base	Rover
Equipment manufacturer	•	•
Equipment model	•	•
Communication Type (Bluetooth or other)	•	•
Antenna height measurement type and value	•	•
Elevation mask	•	•
Ambiguity fixing		•
Use SBAS satellites	•	•
Use GLONASS satellites	•	•
Use Galileo satellites	•	•
Use virtual antenna	•	•
NMEA outputs	•	•
Store vectors in raw data		•
Device used in RTK data link and device settings	•	•

For network connections, the file includes the provider's connection parameters as well as, for NTRIP, the last reference station selected from the source table. Needless to say in these cases, you'll really save time when starting your system if you first take a couple of seconds to save your configurations.

FAST Survey manages base and rover configurations independently of job files. All saved configurations are potentially usable in all new jobs and whatever the existing jobs you re-open, provided the hardware available matches the configuration.

The two procedures described below apply to either a base or rover.

Saving a Configuration

- Tap **Equip** then **GPS Base** for a base, or **GPS Rover** for a rover.
- Enter all the parameters needed to set the equipment in the tabs presented in this window.

- Before you tap ☑ to load the configuration to the receiver, come back to the **Current** tab.
- Tap on the **Save** button located in the lower part of the window and then name the configuration (e.g. “Radio” or “NTRIP”).
- Name the configuration file and tap ☑. This takes you back to the current tab where the new configuration is now listed.

Making a Saved Configuration the Current Configuration

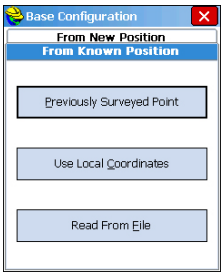
- Tap **Equip** then **GPS Base** for a base, or **GPS Rover** for a rover.
- Select the name of the desired configuration from the lower list.
- Tap on the **Load** button.
- Tap **Yes** to confirm your choice. This restores all the settings held in this configuration. You may check this by scrolling all the tabs in the window.
- Tap ☑ to load the configuration to the receiver.

Setting the Base Position With FAST Survey

Depending on how you chose the base site (is its position known or unknown?), choose either **From Known Position**, for known position, or **From New Position**, for unknown position.

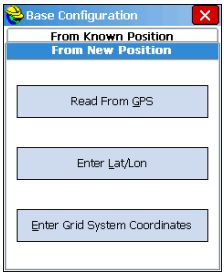
Then of the three possible choices, choose the one that suits your job.

Known Base Position



Choice	Case of Use
Previously Surveyed Point	Choose this option if the base is installed on a point you surveyed earlier and the latitude, longitude and ellipsoidal height of this point are saved in the open job. In this case, select this point from the job's point list or select it graphically on the map of the working area.
Use Local Coordinates	Choose this option if the coordinates of the point where the base is installed are known and expressed in the projection system used in the job. You can enter the local coordinates either manually or by choosing a point from the job's points list. In this case, and unlike the previous choice, the point from the points list is defined with local instead of geographical (lat, lon, height) coordinates.
Read from File	Choose this option if the geographical coordinates of the base were saved earlier to a REF file. Then select this file to load the position held in this file as the base position.

Unknown Base Position



Choice	Case of Use
Read from GPS	Choose this option if you want the base receiver to determine its own WGS84 coordinates. The coordinates will be determined to within 1-3 meters as the autonomous GPS or S-DGPS mode is used in this case. To improve the accuracy of the computation, FAST Survey prompts you to take several readings (typically 10 readings or x readings over a certain period of time) so that all these readings can be averaged to provide a more accurate position solution for the base.

Choice	Case of Use
Enter Lat/Lon	Choose this option if you know and want to enter manually the latitude, longitude and ellipsoidal height of the base location, rather than ask the receiver to compute them by itself. The coordinates should be entered in the “dd.mmssss” format for latitude and longitude.
Enter Grid System Coordinates	Choose this option to freely enter base coordinates expressed in the projection system used in the job. You may enter them manually or derive them from a point in the points list or a point you select on the map of the working area.

English

Index

FAST Survey Software

Getting Started Guide

Contact Information:

Spectra Precision Division
10355 Westmoor Drive,
Suite #100
Westminster, CO 80021, USA
www.spectraprecision.com

Ashtech S.A.S.
Rue Thomas Edison
ZAC de la Fleuriaye, BP 60433
44474 Carquefou Cedex, FRANCE
www.ashtech.com

P/N 631654-01C