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# ProFlex<sup>®</sup>500

## **Getting Started Guide**

Backpack Configuration

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

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(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)

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#### CAUTION

RISK OF EXPLOSION IF BATTERY REPLACED BY AN INCORRECT TYPE. DISPOSE OF USED BATTERIES ACCORDING TO THE INSTRUCTIONS.

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#### Introduction

# What is ProFlex 500?



Congratulations! You have just acquired the latest dualfrequency ProFlex 500 GNSS<sup>1</sup> receiver from Ashtech!

GNSS have revolutionized control surveys, topographic data collection, construction surveying, marine surveying and machine guidance and control. Purchasing the right tools for a professional job is essential in today's competitive business environment. Learning to put these tools to work quickly and efficiently will be the focus of this manual.

ProFlex 500 is a flexible, rugged and high-performance GNSS receiver integrating the best of today's technologies, including the exclusive BLADE<sup>™</sup> algorithms and multiconstellation (GPS+GLONASS+SBAS) capabilities.

#### Scope of this Guide

This guide is designed to help you rapidly familiarize yourself with your new equipment. It is more particularly focused on land surveying applications, when the ProFlex 500 is carried in a backpack and used with a field terminal and FAST Survey.

However, other applications (machine guidance and marine surveying) are suggested in this guide, for example when describing the receiver (connectors, available accessories, etc.), and when presenting the different ways of installing the receiver. For detailed information about using ProFlex 500 in applications other than land surveying implying the use of FAST Survey and a backpack, please refer to the *ProFlex 500 Reference Manual*.

For the sake of conciseness, only a selection of the many ProFlex 500 and FAST Survey functions are presented in this guide.

Most notably, in the RTK surveying section, only the use of radios is fully described in the implementation of the data link. The other solutions are only outlined. For a full description of these solutions, please refer to the *ProFlex 500 Reference Manual*.

In the Logging Raw Data section, the assumption is made that raw data logging takes place simultaneously with the RTK field operations, which means the setup and configuration of the equipment is as described in the RTK surveying section. In fact, post-processed surveys can be

<sup>1.</sup>GNSS= Global Navigation Satellite System.

English

conducted using optimized setups and configurations for static, Stop&Go and kinematic surveys. These are also discussed in the *ProFlex 500 Reference Manual*.

Lastly, this guide only introduces a couple of FAST Survey functions, which are "Stake Points" and "Store Points". For a detailed and comprehensive description of all the FAST Survey functions, refer to the *FAST Survey Reference Manual*.

The tables below provide an overview of the different key items composing the ProFlex 500. The list of items is intentionally limited to those more particularly required to operate a temporary base, and a rover in backpack configuration. The complete list of items is provided in the *ProFlex 500 Reference Manual*.

Depending on your purchase and based on the type of survey you wish to perform, you may only have some of the listed items. Please refer to the packing list for an accurate description of the equipment that has been delivered to you. Ashtech reserves the right to make changes to the items listed below without prior notice.

#### **Basic Supply**

Item	Part Number	Picture
ProFlex 500 GNSS Receiver, L1/L2 GPS ProFlex 500 GNSS Receiver, L1 GPS/Glonass	990622 990621	
Cellular antenna (quad-band)	111397	
Bluetooth antenna	111403	
7.4 V-4.4 Ah Li-ion Battery Pack (rechargeable)	111374	
USB Host-to-Device Cable, 0.2 m Makes ProFlex 500 a USB device.	702104	
Ethernet adaptor cable	702426	
Serial data cable	700461	Q
Soft transport bag	206410	Ushtech

ltem	Part Number	Picture
AC/DC Power Supply Kit (includes external AC adapter, battery charger and cable extension for powering ProFlex 500 directly from the AC adapter)	802064	500
ProFlex 500 User Documentation CD	501510	Provins 500

### Optional Accessories

Item	Part Number	Picture
ASH-661 L1/L2/L5 GNSS antenna, gain: 38 dB	802135	and a
ASH-660 L1 GNSS antenna, gain: 38 dB	802133	authorse (
RTDS Software	990610	(PC software)
DC power kit for port A	802086	(Internal part)
Choice of radio transmitter kits	Refer to page 5	See table on page 5
Choice of radio receiver kits	Refer to page 5	See table on page 5
Survey Backpack kit	890309	See table on page 6
External reference clock input kit: Consists of an internal coaxial cable fitted with a TNC female connector (mounted on rear panel), and a protective cap for this connector (GNSS input #2).	802097	(Coaxial cable is an internal part)

## **Optional Transmitter Kits**

ltem	Part Number	Picture
U-Link TRx, 12.5- kHz channel band- width	Transmitter: 802080-10 (0.5/2/4W; 410-430 MHz) 802080-30 (0.5/2/4W; 430-450 MHz) 802080-50 (0.5/2/4W; 430-450 MHz) Repeater: 802106-10 (0.5/2/4W; 410-430 MHz) 802106-30 (0.5/2/4W; 430-450 MHz) 802106-50 (0.5/2/4W; 430-450 MHz) 802106-50 (0.5/2/4W; 450-470 MHz) Each P/N includes a whip antenna, and an antenna bracket. The Y-shaped power/data cable is an integral part of the transmitter (no connector).	Picture of transmitter with its cable
Pacific Crest radio transmitter, 25-kHz channel bandwidth	110972-30 (35 W, 430-450 MHz) 110972-50 (35 W, 450-470 MHz) Each P/N includes a whip antenna, an antenna bracket and an OEM Y-shaped data/power cable.	Transmitter alone

## **Optional Receiver Kits**

ltem	Part Number	Picture
U-Link Rx, 12.5 kHz channel	802081-10 (410-430MHz)	
bandwidth (includes whip	802081-30 (430-450 MHz)	(internal part)
antenna).	802081-50 (450-470 MHz)	
PDLRXO receiver kit, 25-kHz channel bandwidth (includes whip antenna).	802087-35 (430-450 MHz) 802087-55 (450-470 MHz)	(Internal part)

# English

#### Survey Backpack Kit Option

Item	Part Number	Picture
"Quick Release" male/TNC-male coaxial cable, 1.50 meters.	P076500A	$\bigcirc$
"Quick Release" female/TNC-male coaxial cable, 0.75 meters.	P076510A	
7.4 V-4.4 Ah Li-ion Battery Pack (rechargeable)	111374	
Backpack	206247	
GNSS Solutions package, includes CD	702081-01	
Range pole option for UHF antenna (includes 0.50-meter pole with 5/8" female adaptor, TNC receptacle and TNC-female/TNC-female cable extension, 0.80 meter long)	802088	Ĺ
HI Measurement Tool	111146-1	Eshtech Hitage Weiter Hitage H

#### **Front View**



From left to right:



#### **Bluetooth Antenna**

A coaxial female connector (reverse SMA type) allowing you to connect a Bluetooth antenna for wireless communication with a field terminal or other device.



#### Cellular Antenna

A coaxial female connector (SMA type) allowing you to connect a cellular antenna. A cellular antenna is required when the ProFlex 500 sends or receives RTK or differential corrections data via its internal cellular modem (GSM).

Take care not to swap the Bluetooth antenna and the cellular antenna. The picture below shows where the shorter and longer antennas should be connected.





#### **USB Host & Device**

A nine-contact female connector (Fischer type). Depending on how it is configured, the USB port can be used in two different ways:

- 1. For a USB host, such as a mass storage device using optional device cable P/N 702103.
- 2. For a USB device allowing ProFlex 500 to be seen as a disk from the computer connected to this port. In this configuration, files can be transferred between the ProFlex 500's internal memory and the computer using the USB cable provided (P/N 702104).



#### **Display Screen**

The display consists of a 128 x 64-pixel, 1.5-inch monochrome yellow screen using organic LED technology (OLED).

Used in conjunction with the Scroll button, the display screen allows you to view different pages of information. See *Display Screens on page 14* for a detailed description of the information available from this screen.

After a few seconds of inactivity (i.e. Scroll button idle), screen luminosity turns from high to low level.



#### Power button

To turn on the ProFlex 500, hold the Power button pressed until the power LED lights up.

To turn off the ProFlex 500, hold the Power button pressed until the "Ashtech" screen is displayed. Then release the button and wait until the ProFlex 500 shuts down.



#### Power LED

- This indicator light is off when the ProFlex 500 is off and no external power source is connected to the DC power input.
- It is on and red when an external power source is present at the DC power input and the ProFlex 500 is off.
- It is on and green when the ProFlex 500 is on, regardless of whether it is powered from the internal battery or an external power source.



#### Log Button

Press this button briefly to start recording raw data on the selected storage medium.

Another short press on this button will immediately stop raw data recording.



#### Scroll button

Press this button briefly to scroll through the different pages of information viewed on the screen.

If an alarm is reported on the display screen, a short press on the Scroll button will acknowledge the alarm. The Scroll button will recover its display scrolling function only after all the alarms have been acknowledged this way.

Another function of the Scroll button is to re-activate the screen backlight after the latter has automatically been turned off. The Scroll button is also used in the firmware update procedure.

#### **Rear View**





#### **DC Power Input**

A Fischer, three-contact, female connector **[1]** allowing the ProFlex 500 to be powered from either the provided AC adapter (connect the cable extension between ProFlex 500 and the end of the AC adapter output cable), or an external 9- to 36-V DC power source through cable P/N 730477 (cf. base setup using an external radio transmitter).



#### GNSS Input #1

A TNC coaxial female connector **[2]** allowing you to connect a GNSS antenna to the receiver via a coaxial cable.



#### Serial Data Ports

These are all Fischer, seven-contact, female connectors, each allowing a serial connection to an external device.

- Ports F [3] and B [4] are both RS232-only ports
- RS232/422 Port A [5] is a switchable RS232/RS422 port (Default is RS232).

As an option (installed at the factory), port A also delivers a regulated DC power voltage between pin 1 (+12 V DC) and pin 2 (GND) that can be used to power a connected device. The DC current available is 0.5 A steady state, and 1.0 A peak.



#### **UHF Input Option**

A TNC coaxial female connector **[6]** allowing you to connect a radio whip antenna. This connector is available only if the ProFlex 500 has been fitted with a radio module.



#### **Ethernet Port**

A Fischer, seven-contact female connector [7] allowing you to connect the ProFlex 500 to a local network (LAN). Through this connector, you may remotely control and monitor the ProFlex 500 from any computer connected to the Internet. Data may also flow through this port, in the same way as through a serial port.



#### **GNSS Input #2 Option**

A TNC coaxial female connector **[8]** for a second GNSS antenna input (future optional heading mode), or for applying an external reference clock. (Connector **[8]** is missing from the rear view above.)



#### CAN 2.0 Bus

A Fischer, five-contact, female connector **[9]** allowing you to connect the ProFlex 500 to external, NMEA2000-compatible equipment via CAN bus. (For future use.)



#### **Earth Terminal**

A screw terminal  $\left[ 10\right]$  for connecting the receiver chassis to Earth.



#### **Electric Isolation**

All signals available on the following connectors are optically isolated from the receiver's internal circuitry and chassis ground, as well as from each other:

- Serial ports A, B and F (including DC power output voltage on port A)
- Ethernet port
- CAN bus
- **Buzzer** The internal buzzer will sound whenever an error is detected. The buzzer will sound six times and then stop. The error icon will however continue to blink. To acknowledge the error notification, first press the Scroll key to view the error and associated code and then press the same button again.

Battery Model & Battery Compartment



The battery used is a 7.4-V DC - 4400 mAh rechargeable battery. It is a standard model used in many camcorders. The battery is housed in a battery compartment accessible from above the ProFlex 500. The compartment door can be



opened by lifting and then turning the quarter-turn finger screw counter-clockwise.

The battery will automatically operate as a backup power source for the receiver if for some reason the external DC source used is removed from the DC power input.

A slide switch is available at the bottom of the battery compartment to set the behavior of the receiver after removal or failure of the DC power source while the receiver is on:

- Slide switch pushed to the right: Automatic re-start. The receiver will automatically be switched on when DC power is restored.
- Slide switch pushed to the left: Manual re-start. After power is restored, the receiver will stay off. Operator intervention is needed to switch the receiver back on.

Use for example the tip of a pen to slide the switch to the left or right.

#### Special Button Combinations

- With the ProFlex 500 OFF, pressing the Power, Log and Scroll buttons simultaneously for a few seconds will restore all the factory settings.
- With the ProFlex 500 OFF and a USB key connected, pressing the Power and Scroll buttons simultaneously for a few seconds will cause the ProFlex 500 to start a firmware upload process. If there is no USB key connected or the key does not contain a firmware upgrade, then the process will abort after a few seconds.

Because data has to be decompressed on the USB key during upgrades, the USB key must be unlocked, with at least 10 MBytes of free memory, before starting the upgrade.

These button combinations are summarized in the table below:

Button Combination	ProFlex 500 State	Function
Power+Log+Scroll	OFF	Restores Factory Settings.
Power+Scroll	OFF	Initiates firmware update from USB key.

#### **Backpack Mount**

The ProFlex 500 is secured in a backpack when used as a rover for land surveying applications. Securing the receiver using the backpack kit is fully described in RTK Rover Setup on page 25.

Tripod Mount

In land surveying applications, when used as a roaming base mounted on a tripod, the ProFlex 500 can be secured on one of the legs of the tripod using the lug located on its bottom side.

This type of installation is fully described in Temporary RTK Base Setup on page 21.

#### Bottom Mount

This type of installation is suitable for machine guidance or marine applications. The ProFlex 500 is secured from underneath the receiver case, using four screws M4.

Preparing the support (a flat plane) on which the receiver will be mounted only consists of drilling four holes, forming a simple, 100-mm square.

Note that this is a VESA<sup>1</sup>-compliant mounting scheme.

## **Cradle Mount**

135 mm

This type of installation is also suitable for machine guidance or marine applications. The ProFlex 500 can be secured on a cradle of your choice, possibly designed to allow adjustable orientation of the receiver front panel.

On both sides of the receiver case are two M4 screws, 135 mm apart, that can be used for mounting the receiver on the chosen cradle.

In this mounting case, the two Ashtech logo plates located on either side of the receiver case can either be kept in position or simply removed.

1.VESA= Video Electronics Standards Association.







## **Display Screens**

If you press the Scroll button several times, you will see the following displays successively.

**Power-On Screen** When you power on the receiver, the Ashtech logo appears on the screen. It is displayed until the receiver has completed its auto-test (this takes about 30 seconds).



Then the General Status screen is displayed.

#### General Status Screen

An example of General Status screen is shown below.



This screen displays the following information:

- 🗾 : Satellite icon [1] (always displayed).
- Number of satellites tracked [2].
- Position solution status [3]:
  - NONE: Position not available
  - AUTO: Autonomous GPS position
  - DGPS: Differential GPS position
  - S DGPS: SBAS Differential GPS position
  - FLOAT: Float solution
  - FIXED: Fixed solution (RTK is operational)
  - BASE: Receiver configured as a base.

- Number of satellites used [4]: Number of satellites used in the position processing, regardless of the current position solution status.
- Data link icon [5]. This icon is displayed only when corrections are received.
- Age of corrections [6], in seconds. This value is displayed when corrections are received and only after base station information has been received (Position status is at least "DGPS").
- Raw data logging icon [7]:



- Percentage of free memory in the storage medium used [8].
- D: Battery icon [9] with visual indication of remaining charge. If an external power source is used (AC adapter or external battery), the battery icon will be animated to indicate battery charging in progress.

is displayed when there is no battery in the compartment and the receiver is operated from an external power source.

• Power status [10].

lcon	Definition
	Percentage of remaining battery. This indication will flash when
Percent	the remaining energy drops below 5%. When an internal battery is
value	used with external power applied, this icon alternates between the
	plug and the percentage of charge on the battery.
<u>-</u>	Replaces percentage when an external power source is used.

• Alarm status [11].

Icon	Definition
0	Alarm detected. Press the Scroll button to view the alarm type. Press it again to acknowledge the alarm, which then disappears from the list. Unless there is another alarm in the queue, in which case you will have to resume the acknowledge sequence, the screen then displays the memory screens.
None	No alarm detected

• GSM module (modem) status [12]. This may be one of the following icons:

lcon	Definition
Blank	Modem turned off.
a	Blinking icon: Modem turned on but not initialized yet. Indicates signal strength at modem antenna input. Fixed icon: Modem turned on and initialized (ready for a connection). Indicates signal strength received at modem antenna input. The hicker the number of hars the better the signal
۸ 	This icon will show four horizontal bars and an upside down antenna when the input signal is zero.
	Modem on line.

• [13]: USB status and/or Bluetooth status and/or Ethernet port status.

lcon	Definition
¢	USB port connected to active device
*	Bluetooth active
*	Ethernet port active
。 4	These three icons will appear successively when the USB port, the Ethernet port and Bluetooth are all active.
Blank	USB port unconnected, Bluetooth and Ethernet inactive.

**Memory Screens** From the General Status screen, press the Scroll button to access the Memory screens. Memory screens appear successively (see examples) at a display rate of about five seconds:



Left screen:

- First line: Percentage of free space in the internal memory.
- Second line: Number of files currently stored in the internal memory.
- Third line: Percentage of free space on the USB mass storage device.

• Fourth line: Number of files currently stored on the USB mass storage device.

Right screen:

- First line: Total space occupied by the files currently stored in the internal memory.
- Second line: Nominal size of the internal memory.
- Third line: Total space occupied by the files currently stored on the USB mass storage device.
- Fourth line: Nominal size of the USB mass storage device.

About the "\*" symbol:

- It can only appear at the end of the first or third line.
- Where placed, it indicates that this storage medium is used for data logging.

What if there is no USB mass storage device connected to the receiver?

- Parameters relevant to the USB key size and space used and available are void (three dots displayed instead).
- Number of files is forced to "0".

Receiver Identification Screen

From any of the two Memory screens, press the Scroll button to access the Receiver Identification screen. See example below.



- Receiver Serial Number
- Firmware Version
- Receiver Bluetooth Identifier
- IP Address

Position Computation Screen From the Receiver Identification screen, press the Scroll button to access the Position Computation screen. This screen displays the latitude, longitude and ellipsoidal height of the position currently computed by the receiver. If the receiver is a base, the displayed coordinates are set ones (not computed ones) representing the reference position assigned to the base. See example below for a rover. The upper line contains the same information as in the upper line of the General Status screen.

A new press on the Scroll button will take you back to the General Status screen. If however the receiver is fitted with a radio receiver or is connected to an external radio transmitter, one or two additional display screens will show up before pressing the Scroll button takes you back to the General Status screen.



These possible two screens show the current radio settings:

- First line: Serial port used, "Rx" for radio receiver or "Tx" for radio transmitter, radio type (U-Link, PDL). Extraparameter for "Rx": Power status
- Second line: Channel number, carrier frequency
- Third line: Protocol used (Transparent, Trimtalk, DSNP), airlink speed
- Fourth line: Squelch setting (medium, low, high). Extraparameters for Rx if a Pacific Crest: "FEC" if forward error correction enabled, "SCR" if scrambling enabled.
- **Screen Backlight** The screen backlight is automatically turned off if no key is pressed for 1 minute. When the backlight is off, a short press on the Scroll button will turn it back on. The Scroll button will then recover its usual functions.

# Data Transfer<br/>ScreenFor more information on the screen displayed when<br/>downloading files, refer to Downloading Raw Data on<br/>page 53.

### **Charging Batteries Before Use**

Make sure the battery is fully charged for each ProFlex 500 you will be using in the field.

Follow the instructions below to charge a battery.

Removing the Battery from the ProFlex 500 Unless the battery has already been taken out, do the following:

 Open the battery trapdoor, accessible from above the ProFlex 500, by lifting and then turning the quarter-turn finger screw anticlockwise. This releases the two springs located under the battery, pushing the battery slightly upward (see picture).



• Grab the battery and take it out of the compartment.

#### Charging the Battery

The battery charger comes with a separate universal AC adapter fitted with a 1.5-m output cable. The AC adapter includes a choice of four different, detachable plug types. Follow the instructions below to operate the charger.

- Choose the plug type that is suitable for your country.
- Secure that plug on the AC adapter.
- Connect the cable from the AC adapter to the battery charger.
- Give the battery the right orientation with respect to the charger [1] (the battery terminals should come into contact with the two sets of connectors on the charger), then push the battery against the plate and slide it forward [2] until it locks into place.



• Plug the adapter into an AC outlet. Battery charging starts immediately.

For a low battery that's being charged, you will first see the three LEDs switch on and off, one after the other, followed by a short period of time when none of the LEDs is on (see [3]).

After about two hours of charging, the MED LED will stay on **[4]**. A few minutes later, the HI LED **[5]**, and then the MAX LED **[6]** will also stay on.

- When the three LEDs are on, this means the battery is fully charged and can be disconnected from the charger.
- Insert the battery into the compartment making sure the battery has the right orientation (the battery terminals should come into contact with the two sets of connectors located at the bottom of the compartment).
  - Close the trapdoor, push the finger screw in tight, and turn it fully clockwise.

Note that once it is properly secured, the trapdoor pushes the battery against the bottom of the compartment to ensure electrical connection of the battery to the ProFlex 500.



#### Inserting the Battery in the ProFlex 500

- **Prerequisites** You will need a tripod and a tribrach (not provided) to install the base. You will also need an antenna extension pole fitted with a 5/8" male adaptor (not provided but available as an Ashtech accessory).
  - For a long-range radio link, i.e. more than 1 mile or 1.6 km, for which the radio antenna should be placed as high as possible, it is good practice to install the antenna on top of an antenna pole secured on a tripod (neither of these items is provided).
  - To power the radio, you need an external 9-28 V DC (U-Link TRx), 10-16 V DC (Radio P/N 800986-x0) or 9-16 V DC (Pacific Crest radio) power source. In all cases, using a standard 12 V DC battery is a convenient choice. In this configuration, the ProFlex 500 can be powered either from the same power source (recommended), using cable P/N 730477, or from its internal battery.

Powering the ProFlex 500 from the external battery offers two advantages:

- 1. Operating sessions can be extended significantly.
- 2. The external battery operates as a trickle charger for the ProFlex 500's internal battery.

U-Link TRx

The connection diagram is as follows. The use of port A is recommended on the receiver side. However, any of the other serial ports may be used as well.



Mount the different items as shown on the picture.



#### Radio P/N 800986

The connection diagram is as follows. Note that, due to the limited input voltage range for this radio, only a 12-V battery can be used in this setup. Use of port A is mandatory with this transmitter.



Mount the different items as shown on the picture.



## PacCrest Radio Link

The connection diagram is as follows. The use of port A is recommended on the receiver side. However, any of the other serial ports may be used as well.



Mount the different items as shown on the picture.



## **RTK Rover Setup**

- **Prerequisites** Insert a freshly charged battery into the ProFlex 500.
  - Use a range pole fitted with a 5/8" male adaptor at the upper end (not provided).
     Caution! Use of a non-metal range pole is recommended

to maintain the performance level of the radio antenna.

- Mount the GNSS antenna at the top of the range pole.
- Connect coaxial cable P/N P076510A to the GNSS antenna.
- If a radio link is used with the base, your rover should normally have been fitted with the radio receiver kit that matches the reception band covered by the radio transmitter used at the base.
- If a GPRS connection is used, your rover should normally have been fitted with the SIM card that will allow it to perform a network connection.

To connect a SIM card, open the trapdoor and remove the battery. The SIM card can be inserted in a dedicated socket located at the bottom of the compartment. Insert the SIM card as shown on the picture.

- 1. Unzip the larger compartment of the backpack.
- Insert the different cables needed into the backpack. All cables can pass through either of the velcro flaps [1] located at the top of the backpack.
  - **GNSS antenna**: Insert the TNC end of the 1.50 m "Quick Release" cable (P/N P076500A) into the backpack through one of the velcro flaps, then make it run along the inner edge of the compartment, down to where the rear panel of the receiver will be located once placed in the backpack.
  - Data Link:

If cellular communication is used to receive RTK corrections, no special cable is needed.

If a radio is used to receive RTK corrections, insert the UHF range pole into the side compartment of the backpack. Secure the pole using the short velcro strap [2] located on top of the side compartment. Pass the attached coaxial cable through a velcro flap [1], then





#### Preparing the Backpack





[3]



make it run along the inner edge of the main compartment, down to where the rear panel of the receiver will be located once placed in the backpack.

• Communication with field terminal:

If Bluetooth is used, no special cable is needed. If wired communication is used, pass the Fischer end of serial data cable P/N 700461 (provided) through a velcro flap, and again make it run along the inner edge of the compartment, down to where the rear panel of the receiver will be located once placed in the backpack.

- 3. Anchor all the cables together, inside the compartment, using the short velcro straps **[3]**.
- 4. Insert the ProFlex 500 into the compartment in such a way that the rear panel is facing the bottom of the compartment [4].
- 5. Connect all the ends of the cables present at the bottom of the compartment to the rear panel. The required connections are:
  - GNSS cable to GNSS Input #1 (mandatory)
  - UHF radio cable to UHF input (if a radio is used)
  - Serial data cable to the serial port of your choice (if a serial link is used with the field terminal).





- 6. If needed, connect the following antennas directly to the front panel of the receiver:
  - Bluetooth antenna, if wireless communication with the field terminal is preferred to a serial link.
  - Cellular antenna, if the internal cellular modem is used to receive RTK corrections.
- 7. Secure the receiver inside the backpack by tightening the three pairs of Velcro straps [5] over the case. If internal antennas are used, some straps should be positioned in

such a way that the antennas can pass through the slots designed into these straps.

- 8. Turn on the ProFlex 500 and close (zip) the compartment.
- 9. Place the backpack on your back.
- 10.Connect the free ends of the quick-release coaxial cables together. This connects the GNSS antenna to the receiver.
- 11.Secure your field terminal on the range pole and turn it on. You are now ready to start using your system.





If you are using an external cell phone for acquiring RTK corrections, place it in the mesh pocket **[6]** located on the left-hand belt of the backpack.

#### 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.

#### How to Register

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.

#### Saving your registration in the Field Terminal

When you register FAST Survey in a MobileMapper CX, a ProMark 100 or ProMark 200, the code is automatically and safely saved at the end of the registration procedure.

With a Juniper Allegro CX, you need to perform a RAM backup or a System Save to be sure your authorization code will not be lost when you next reboot your Allegro CX. If you cannot find this option on the Allegro CX Start menu, then open the Control Panel and choose RAM backup.

## **Creating a New FAST Survey Job**

- 1. Turn on the field terminal and wait until the boot sequence is complete.
- 2. Make sure the clock is set properly before starting FAST Survey.



- 3. Double-tap Fast Survey 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 Z. This takes you back to the Coordinate Files window where your file name now appears in the **Name** field.
- 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 "Feet and 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.

How FAST Survey Interfaces With Your Equipment Via Bluetooth

<mark>)</mark> Bluetooth D	evices	
	🚯 🚺	
Select Base BT De	evice	
Receiver Name	Receiver ID	
My Base	PM500_200800000	1
PM500_20080000	PM500_200800003	0
•		
Eind	Receiver	
Set Re	ceiver <u>N</u> ame	
Set R	eceiver <u>P</u> IN	
Delet	e Receiver	

#### First-Time Use

Right after you start FAST Survey and create or open your first job, FAST Survey will try to activate the preset connection (default: "Cable") to the receiver. Because no cable is connected to the field terminal, a message will be displayed informing you that the connection failed.

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.
- Tap on the **Comms** tab.
- Select "Bluetooth" from the **Type** field and, depending on the field terminal used, "Ashtech BT" or "Windows Mobile" from the **Device** field.
- 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 Z. 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 **(b)** to connect the field terminal to the base via Bluetooth and then configure the base according to your needs (see *RTK Base Configuration on page 33*).
- 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.

- **Prerequisites** Your base is properly set up and powered on. It is on its definitive location for the survey and the field terminal is located at less than 10 metres from the base.
  - Your field terminal 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 30*) 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

FAST Survey
Ashtech
FW Version:
S073Gg19
Receiver ID:
200812007 Power Status: Unknown
Free Mem on Receiver: 95716 kBytes
FW Options: Unlimited RTK mode, Fast output, Modem, GLONASS

#### Check/Change Bluetooth Connection

• Set the **Manufacturer** ("Ashtech") and **Model** ("ProFlex 500") of the equipment used as the base.

Note that the **D** 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 **C** to return to the **Current** tab.

- 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** = "Ashtech BT" or "Windows Mobile", depending on the field terminal used.
  - **Instr** = should be set to the name you gave earlier to the base, as seen from FAST Survey Bluetooth.

Note that Note that I 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* 

- Using the HI measurement tool provided, perform a slant measurement of the antenna height (recommended).
  - On the field terminal, tap on the Receiver tab.
  - In the scroll-down menu, select "[ASH111661] AT..." as the antenna type.
  - 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 settings for Elevation Mask, SBAS, GLONASS and Virtual Antenna.

Using SBAS and/or GLONASS 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.

• Enable Ports B, F and Ethernet: Check this box if one of these ports is used for the connection to the radio transmitter. If port A is used for this connection and ports B, F and Ethernet are not used for other purposes, clear this box to disable ports B, F and Ethernet. This will reduce power consumption in the receiver.

# **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 a U-Link TRx device



Selecting Radio

😂 GPS B	ase  🔀 🗙
Current	Comms Receiver RTK
Device:	Ashtech U-Link 🔹 🛠
Network	None 🔻
Port:	Α
Baud:	38400 -
Parity:	None 🔻 Stop: 1 🔻
Message	Type: Atom 🔻
Repea	ater Mode

- 2. Using radio transmitter P/N 800986-x0
- 3. Using an external Pacific Crest radio.
- 4. Using the internal modem in CSD mode for a "phone call" type connection (Direct Dial).
- 5. Using the internal modem for a Direct IP connection to the RTDS software.
- 6. Using an external device connected to ProFlex 500's port A. The external device may be a radio transmitter from another manufacturer, or the local computer running the RTDS software.

The table below gives all the required settings depending on the chosen configuration.

	#1	#2	#3	#4	#5	#6
	U-Link TRx	Radio P/N 800986	Pacific Crest Radio	Direct Dial	Direct IP/GPRS - RTDS	External Device
Device	Ashtech U-Link	Magellan Radio	Pacific Crest PDL	Internal GSM	Internal GSM	Cable or Generic Device
Network	[None]	[None]	[None]	Direct Dial	"TCP/IP Netw." or "UDP/IP Network"	[None]
Port	[A]	[A]	User-settable (A, B or F)	[E]	[E]	User-settable (A, B or F)
Parity	[None]	[None]	[None]	[None]	[None]	[None]
Baud	[38400]	[19200]	9600 to 115200 User-settable	[19200]	[19200]	1200 to 115200 User-settable
Stop	[1 bit]	[1 bit]	[1 bit]	[1 bit]	[1 bit]	[1 bit]
Message	Choose the format used to generate base data messages: ATOM, ATOM compact, RTCM V3.0,					
Туре	RTCM V2.3, CMR or CMR+, (RTCM-DGPS)					
Base ID	Choose a number to identify the base. Several ranges are possible depending on the selected data format (0-4095 for RTCM 3.0, 0-1023 for RTCM 2.3, 0-31 for CMR and CMR+)					

NOTE: All parameters between square brackets [..] are software-set, they cannot be changed.

• If you want to use a radio, tap on 🖄 located next to the **Device** field to set the radio. The table below lists the required and recommended settings for the three radio models available.

Field	I Model P/N U-Link TRx 800986-x0 Model		Pacific Crest Radio Model
Protocol	-	"Transparent" recommended	"Transparent" recommended
Channel	Choose channel used (channel No Frequency)	Choose channel used (channel No Frequency	Choose channel used (channel No Frequency)

Field	Model P/N 800986-x0	U-Link TRx Model	Pacific Crest Radio Model
Over the Air Baud	-	4800 Bd recom- mended	"9600 Bd" recommended
Scram- bling	-	-	In a PacCrest radio trans- mitter, enables or disables scrambling in this radio. Keep disabled for other radios.
Forward Error Cor- rection	-	-	In a PacCrest radio trans- mitter, enables or disables FEC in this radio. Keep dis- abled for other radios.

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)

• If you want to use the internal modem, tap on 🗷 located next to the **Device** field to set 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	<ul> <li>If you choose Network=" TCP/IP Direct" or Net-work="UDP/IP Direct", 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 "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).</li> <li>If you choose Network="Direct Dial", ignore this field.</li> </ul>		
Pin	Enter the Pin number of the SIM card inserted in your ProFlex 500.		
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.

- If you choose Network="TCP/IP Direct" or "UDP/IP Direct", tap on the Config button next to the Network field and enter the IP address and port number allowing the connection to the RTDS software.
- 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 Now that you have browsed all the tabs in the Base Configuration window and set all the parameters, just tap I 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. This completes the base configuration phase.

## **RTK Rover Configuration**

#### Prerequisites

- Your rover is properly set up and powered on.
- Your field terminal 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 Set the Manufacturer Set the Manufacturer Sot the Manufacturer Sot

EAST Survey
Ashtech
FW Version:
S073Gg19
Receiver ID:
200812007 Power Status: Unknown
Free Mem on Receiver: 95716 kBytes
FW Options: Unlimited RTK mode, Fast output, Modem, GLONASS

#### Set Bluetooth Connection

• Set the **Manufacturer** ("Ashtech") and **Model** ("ProFlex 500") of the equipment used as the rover.

Note that the **b** 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 **C** to return to the **Current** tab.

- Tap on the **Comms** tab.
- In the Type field, select "Bluetooth".
- In the **Device** field, select "Ashtech BT" or "Windows Mobile" depending on which field terminal is used.
- 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 last line but one. 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 field terminal 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 ProFlex 500 GNSS antenna is mounted.
  - On the field terminal, tap on the Receiver tab.
  - In the scroll-down menu, select "[ASH111661] AT..." as the antenna type.
  - 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 settings for Elevation Mask, Ambiguity Fixing (see table below), SBAS, GLONASS and Virtual Antenna.

Choice	Definition
Float	Choose this option if you only need decimeter accuracy (position
riual	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

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.

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.

• Enable Ports B, F and Ethernet: Check this box if one of these ports is used for the connection to the radio transmitter. If port A is used for this connection and ports B, F and Ethernet are not used for other purposes, clear this box to disable ports B, F and Ethernet. This will reduce power consumption in the receiver.



- **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 in CSD mode for a "phone call" type connection with the base (Direct Dial).
  - 3. Using the internal modem in Direct IP mode (TCP/IP or UDP/IP) to receive base data from either a third-party network or the remote RTDS software.
  - 4. Using the internal modem for a network connection (NTRIP or SpiderNet).
  - 5. Using an external CDMA cell phone for a network connection (Direct IP, NTRIP or SpiderNet).
  - 6. Using an external device (for example an external corrections receiver).

The table below gives all the required settings depending on the chosen configuration.

	#7	#8	#9	#10	#11	#12	#13
	Internal	Internal	Direct	Direct IP	Network,	Network,	External
	Radio	Radio	Dial	GPRS	GPRS	CDMA	Device
Device	Ashtech	Pacific	Internal	Internal CSM	Internal GSM	Data Collector	Cable or
Device	U-Link	Crest	GSM			Internet	Generic Device
Network	[None]	[None]	Direct Dial	"TCP/IP Direct", or "SpiderNet"	NTRIP	"NTRIP", "TCP/IP Direct", "UDP/IP Direct" or "Spi- derNet"	[None]
Port	[D]	[D]	[E]	[E]	[E]		User settable
Parity	[None]	[None]	[None]	[None]	[None]		[None]
Baud	[38400]	[38400]	[19200]	[19200]	[19200]		1200 to 115200 User-settable
Stop	[1 bit]	[1 bit]	[1 bit]	[1 bit]	[1 bit]		[1 bit]
Send Rover	This optior	should be	e enabled	only when working	g with networks	offering VRS capa	bility (NTRIP).

NOTE: All parameters between square brackets [..] being software-set, they cannot be changed.

• If you want to use the internal radio, tap on 🕅 next to the **Device** field to set the radio receiver:

Configure Rat	dio 🔽 🗙
Radio Power:	On
Protocol:	Transparent 💌
Power Management:	Automatic 💌
Channel:	0: 439.8500MH: 💌
Squeich:	High 💌
Over the Air Baud:	9600 💌

Field	Setting
Protocol	Select "DSNP" if the radio transmitter used at the base is radio model P/N 800986-x0. Select "Transparent" if it's a U-Link TRx or a Pacific Crest radio transmitter.
Power Man- agement	"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 Man- ual, the module will be powered on only when you configure the rover.
Channel	Choose channel used (Channel No Frequency)
Squelch	The factory default setting of "High" provides maximum effec- tive sensitivity to incoming signals. This is the preferred set- ting. "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	Forced to "4800" with DSNP protocol; "9600 Bd" recom- mended with other protocols; "7600 Bd" for U-Link.
Scrambling	Relevant to Pacific Crest radios only. 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	Relevant to Pacific Crest radios only. 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  $\checkmark$  to load the settings to the radio. This may take a few seconds. FAST Survey then returns to the GPS Rover configuration window.

If you want to use the internal GSM modem, tap on next to the **Device** field to set 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.

Nonfigure Mo	dem 🗸 🗙
Power Management	Manual
Band	900/1800 💌
Provider:	Other 💌 jetting
Pin:	
Dial Mode:	Analog 💌
🔽 Auto Dial	

Field	Setting
Provider	<ul> <li>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 "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).</li> <li>If you set Network=Direct Dial, ignore this field.</li> </ul>
Pin	Enter the Pin number of the SIM card inserted in your Pro- Flex 500.
Dial Mode	Depending on the provider, this may be "Analog" or "Digital". "Analog" is usually the right selection. Please call your com- munication provider for more information
Auto Dial	Check this box when the data link is based on a GSM con- nection in CSD mode between the base and the rover. Check this box as well 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.

- If you want to use a CDMA cell phone, you should first establish and then pair a Bluetooth link between that cell phone and your field terminal, using Bluetooth Manager. Then, you should use the Network and Dial-up Connections utility in your field terminal to connect it to the Internet. The incoming corrections will be automatically transferred to the ProFlex 500.
- When this button is visible, tap on next to the **Network** field, for additional settings. The table lists all the parameters that need to be defined, depending on the desired operating mode.

Parameter	TCP/IP Direct UDP/IP Direct	NTRIP	SpiderNet	Direct Dial (CSD mode)
Name	•	•	•	•
IP Address	•	•	•	
Port	•	•	•	
User Name		•	•	
Password		•	•	
Phone Number				•

• 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.

Check that a "Fixed" Solution is Now Available The rover then starts acquiring corrections data from the selected base. 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:

internation 7 si	opior	×		-	Contracting of the second second	Abiot		
SATView	SATI	nfo	Ref		Quality		Pos	ition
Quality		Posit	tion		SATVie₩	SATI	nfo	Re
titude: ngitude: ipsoid Elev: iOID No Ge thometric El calization Fil ne cal Elev: cal Northing cal Easting:	N 47 W 1' 86.3 old file li ev: No 0 e: 40.2 : 2262 3092	°17'56 °30'32 360 Daded. Seoid fi 616 2586.00 294.64	6.25924" .59272" ile 611 21		GLONASS SBAS GPS Unused Sat		atio	
					7 4 13 8	120	2 10	27
Monitor/S Quality	kyplot	Posit	tion		7 4 13 8	120 kyplot	2 10 Posi	27 ition
Monitor/S Quality SATView	cyplot SATIr	Posit 1fo	tion Ref		Monitor/S Quality SATView	kyplot SATIr	2 10 Posi	27 ition Re

In NTRIP and Direct IP modes, a **Disconnect/Connect** button is available on the **Ref** tab to easily control the network connection. There is also a horizontal bar showing the GSM signal level until the modem is on-line. The bar disappears when the modem is online.

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

• Tap C 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.

Uploading Stakeout Points to the Field Terminal In your office, do the following:

- Connect the receiver or field terminal 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/windowsmobile/activesync/default.mspx

- Run GNSS Solutions on your office computer.
- Open the project containing the stakeout points you want to transfer to the receiver or field terminal 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 field terminal and upload the job (to \My Device\Program Files\FAST Survey\Data\).
- After the job has been uploaded, turn off the receiver or field terminal, 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.

Name of stakeout point	Stake Points           ✓         ×           Point ID; 800         1	<ul> <li>Provides access to p Example of points I</li> </ul>	ooint list. ist:
Coordinates of -	Add To List       Pick From List         Northing:       Easting:       Elevation:         [852.3000]       [5210.2000]       [56.2300]         Source:       Current Job       Description:         Description:       NIE       Pt         Pt       Azimuth:	Point Details           Point ID         Northing         E           9 800         852.30         5           9 802         891.30         4           9 803         789.70         5           9 804         589.10         5	A         Image: Constraint of the second secon

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!

	wenu:
≷ 🕖 Help	Alt+H
🔽 🐺 View Data	Alt+V
🕒 🗄 E Points	Alt+P
Aul 🔧 Inverse	Alt+I 🖁
🧪 Write Note	Alt+W

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.)

STAKE PNT: 800     HT: 2       (Select "Graph" in menu)     NORTH       Your current position     Pt: 805       Desc:     Desc:	Provides access to	😂 тк рт	Î 🗙	
(Select "Graph" in menu) NORTH Pt: 805 Your current position Desc:	previous screen	STAKE PNT: 800	HT: 2	
Your current position	(Select "Graph" in menu)	NORTH	Pt: 805	
and heading (((((())))) STORE	Your current position —— and heading		Desc: STK803 CU STORE	
Stakeout point (target) Used to select which	Stakeout point (target) ——		NEXT	Used to select which
0.8 m Guidance data to display		0.8 m	MON/S <u>k</u> y	(underneath)
Fixed 7/7 (Underleadin)	Current status of	Fixed	7/7	(underneath)
N/S,E/W TO STK		N/S,E/W TO STK	•	
SOUTH: 0.890 WEST: 0.0660 CUT: 0.371 CONFIG for the point: coordinates	position solution	SOUTH: 0.890 WEST: 0.0660 CUT: 0.371	CONFIG	guidance data to display for the point: coordinates
[N:853.782 E:5210.560 Z:52.821 ▼ OI quanty data		[N:853.782 E:5210.56	U Z:52.821 ▼	

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.

😂 STK PT		📚 Stakeout Report 🛛 🗸	×
STAKE PNT: 80	0 HT: 2		
	Pt: 805	Staked: Design:	
	Desc:	North 852.249 852.300	
	🔨 БТК803 СU	East 5210.224 5210.200	
(((@)))	STORE	Elev 56.540 56.230	
• 🤍		Cut 0.310 2005007.7 17188	96:
0.05 m	MON/S <u>k</u> y	Move: West:0.024 South:0.310	
Fixed	7/7	VOff 1: Elv:	
N/S,E/W TO STK	•	VOff 2: Elv:	
SOUTH: 0.090			
WEST: 0.0660		HRMS:0.022 VRMS:0.029	
CUT: 0.371	CONFIG	Store Point PDOP:2.0	
N:852,882 E:5210	560 7:52,821 🔻		c.

- 7. Tap right 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 upperright 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
- 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  $\checkmark$ .

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

Auto Store by Interval
Interval Type © Distance X/Y: [10.0000 Z: [10.0000 Jime 10
Starting Pt ID: 806
Record Max Points: 100

- 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 do 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 field terminal 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 field terminal.
- 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.

Introduction	<ul> <li>You can log raw data in two different ways:</li> <li>Standalone: You simply need to use the Log button to start and stop raw data logging.</li> <li>Later, you will however need to do the following manually:</li> <li>1. Downloading phase: Rename the raw data files collected on each site.</li> <li>2. Post-processing phase: Manually correct all computed elevations for the antenna height.</li> </ul>
	<ul> <li>Using FAST Survey: The Survey&gt;Log Raw GPS function allows you to fully control raw data logging. Using this method offers three advantages:.</li> <li>1. Antenna reduction is automatically performed during post-processing because of the antenna height value (from the receiver properties) stored in the raw data files.</li> <li>2. Ability to name the raw data file and insert time tags.</li> <li>3. Ability to pause/resume data logging.</li> </ul>
	By default, raw data is logged to the receiver's internal memory. Using FAST Survey, you can change the storage medium (internal memory or USB memory stick). The choice of storage medium is then valid for both data logging methods (standalone and using FAST Survey). If "USB memory stick" is selected and no USB stick is connected to the receiver, then no data logging will take place. In both data logging methods, the Raw Data Logging icon on the General Status screen will start flashing when a raw data file is open for logging.
Raw Data Logging Methods	<ul> <li>Standalone</li> <li>Press the Log button to start data logging.</li> <li>Press the Log button again when it's time to stop data logging.</li> </ul>
	Using FAST Survey <ul> <li>Tap Survey&gt;Log Raw GPS.</li> </ul>

• Tap Start File.

Start New File

<mark>ề</mark> Magel	llan Setup	K
File	Start File	
	Tag New Site	
	Close File	
	File Manager	
0	Continue Logging	
	Pause Logging	
Fre	ee Mem on Receive 65372 kBytes	r:

- Set the following parameters:
  - Elevation Mask in degrees.
  - Check the antenna height value. If it's wrong, tap the Change Ant. button to set the new value.
  - Storage medium (internal or USB memory stick). Choosing the internal memory is recommended for inclement conditions because USB sticks are not waterproof. If using a USB stick is necessary, please be sure to somehow ensure that it is out of contact with water.
  - Logging interval in seconds.
- Tap Z. This starts data logging. From the screen then displayed, you can do the following:
  - Name the raw data file, mark a particular point or event (**Tag New Site**).
  - Stop data logging (Close File).
  - Access the File Manager window in read-only mode (File Manager).
  - Continue Logging / Pause Logging. Pausing data logging means closing the currently open file. Continuing data logging means opening a new file. Data logging will start immediately based on the parameters set for the previous file.

#### Combining the two Methods

Combining the two methods is possible.

For example, you can start data logging using FAST Survey. Then you can quit FAST Survey and turn off the field terminal without disturbing data logging. Later, you will be allowed to stop data logging by simply pressing the Log button on the receiver front panel.

#### Downloading Raw Data

Use a USB mass storage device as a transit storage medium to download raw data files from the receiver's internal memory to your office computer.

**Important!** During a download operation, files are not deleted from the receiver but simply copied to the USB mass storage device.

After downloading the files to this device, connect the USB device to your computer and use your usual browser to copy the files to the project folder.

#### Using a USB Mass Storage Device

 Connect the USB mass storage device to the receiver via the short USB Device cable provided (P/N 702103).
 If raw data files are present in the receiver's internal memory, the following icons will automatically appear on the display screen:



- To confirm the file transfer, press the Log button. The General status screen will re-appear after the file transfer is complete.
- To cancel the file transfer, press the Scroll button.
- If you do not press any button within the next 10 seconds, the download procedure will be canceled automatically and the screen will come back to the previous display.

#### **Using the USB Cable Provided**

- Connect the USB cable provided (P/N 702104) between the office computer and the receiver's USB port. The receiver is then seen as a USB device from the office computer
- Using Windows Explorer on your office computer, browse the receiver's internal memory for the raw data files.
- Copy/paste the files to your project folder. Note that raw data files can directly be deleted from the receiver's internal memory through this connection.

#### Case of Static Survey in Standalone

When static surveys are performed without the field terminal and FAST Survey, you must be careful with raw data file names. In view of the ATOM naming conventions used and the system's default settings, there is indeed every chance that the base file and the rover file have the same name. It is good practice to follow this procedure:

- 1. Download the raw data file from one of the receivers to the USB device.
- 2. Plug the USB device to the office computer, copy the raw data file to the project folder and rename the file to reflect

the site where the static occupation took place (e.g. replace "G\_\_\_\_" with "GPREF")

 Repeat the previous two steps with the other receiver, using a different name for the file (e.g. replace "G\_\_\_\_\_" with "GP100").

#### 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.

🔁 Files on Receiver :			
	$\leftarrow$		
2 kBytes 2/	1 13:20		
2 KBytes 2/	1 13:21		
6 kBytes 2/	1 13:45		
9 kBytes 2/	1 13:53		
5 kBytes 2/	1 13:57		
	_		
Internal Mem OUSB Mem Stick			
Free Memory: 65354 kBytes			
5 files			
Delete	Delete All Files		

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## Getting Started Guide

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