Z-Max®.Net

Getting Started Guide

Z-MAX

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FCC Notice
Z-Max.Net Receiver complies with the limits for a Class B digital device, pursuant to the Part 15 of the FCC rules when it is used in Portable Mode. See Note below related to Class B device.

Class B digital devices NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try and correct the interference by one or more of the following measures:
- Reorient or locate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

When Z-Max.Net is used with an external power supply or connected to an external device using the USB port, it complies with the limits for a Class A digital device, pursuant to the Part 15 of the FCC rules. See Note below related to Class A device.

Class A digital devices NOTE: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Remark: Any changes or modifications not expressly approved by Magellan Navigation, could void the right for user to operate the equipment.

RF Safety Exposure To Radio Frequency Energy (SAR)
Radio transmitting devices radiate Radio Frequency (RF) energy during its operation. RF energy can be absorbed into the human body and potentially can cause adverse health effects if excessive levels are absorbed. The unit of measurement for human exposure to RF energy is "Specific Absorption Rate" (SAR).

The Federal Communications Commission (FCC), Industrie Canada (IC), and other agencies around the world have established limits that incorporate a substantial safety margin designed to assure the safety of all persons using this equipment. In order to certify this unit for sale in the US, Canada and Europe this unit has been tested for RF exposure compliance at a qualified test laboratory and found to comply with the regulations regarding exposure to RF Energy. SAR was measured with the unit (GSM Module) transmitting at its maximum certified RF power. Often, however, during normal operation the unit (GSM Module) will transmit much less than maximum power. Transmit power is controlled automatically and, in general is reduced as you get closer to a cellular base station. This reduction in transmit power will result in a lower RF energy exposure and resulting SAR value.

SAR: ANSI/IEEE C95.1 1992
FCC OET Bulletin 65 Supplement C
1999/519/CE

The SAR value for this wireless survey system when worn on the body, as described in this user guide, is always less than 1.45 W/kg.

Caution! FCC RF exposure requirements: SAR compliance for body-worn operations is restricted to belt-clips, holsters, and accessories supplied or designated for this product. Use of other accessories may not ensure compliance with FCC RF exposure guidelines.

FCC and CE UHF Safety Statement
The different versions of the UHF Transmitters are FCC and CE compliant.

In order to comply with FCC and CE RF exposure safety guidelines as body-worn, normal use of unit, the following must be followed:

A distance of AT LEAST 10 feet (3 m) of separation between the users body and the unit (UHF Transmitter). This distance has been defined taken into account the FCC and CE Requirements and the worst output power configuration.

Do NOT use the device in a manner such that it is in direct contact with the body (e.g. on the lap). Such use will likely exceed FCC RF safety exposure limits. See www.fcc.gov/oet/rfsafety/ for more information on RF exposure safety.

Antenna Care/Unauthorized Modifications
Use only the supplied integral antenna. Unauthorized antenna modifications or attachments could damage the unit and may violate FCC and CE regulations. Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Replacing the Magellan U-Link Transmitter Power Fuse
The Magellan U-Link transmitter is protected by a 4-A fuse inserted in the data/power cable. This Y-shaped cable is used to connect the U-Link transmitter to the Z-Max.Net receiver via a 7-pin connector, and to the power battery. Should you have to replace this fuse, please get a spare fuse, 4 A, fast acting, ATO type, and then do the following:
- Unplug the battery end of the data/power cable
- Open the fuse holder located along the data/power cable
- Extract the damaged fuse
- Insert the new fuse and then push the holder lid back into place
- Connect the data/power cable back to the battery.

Where to Find Information
This manual is designed to guide you through the basic Z-Max.Net procedures. You can find additional information in the *Z-Max.Net Reference Manual*, also provided on the Z-Max.Net CD.

Warranties
Refer to the Z-Max.Net Reference Manual.

Table of Contents

1. Introduction

Congratulations! You have just acquired your new dual-frequency Z-Max™.Net GNSS Surveying System from Magellan!

GNSS (or Global Navigation Satellite System) has revolutionized control surveys, topographic data collection and construction surveying. 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 the present guide.

System Components Overview

The table below provides an overview of the different key items composing the Z-Max.Net System. Depending on your purchase, based on the type of survey you wish to perform, you may only have part of the listed items. Please refer to the delivered packing list for an accurate description of the equipment that has been delivered to you.

Conversely, as this table is just an overview, it does not list all the possible items and accessories. For example, the list of all the possible field terminals is provided but we intentionally do not mention the field brackets that usually come along with them. For more information on these items, please contact your dealer.

For ordering information, please refer to the *Z-Max.Net Reference Manual*.

Basic		Post-Processing		Rover, RTK	
GPS Receiver Module		V-Module (1) (Void module)		Communication Module	
		Rover, Backpack			
GNSS Antenna Module		Backpack		UHF Antenna Module (2)	
Power Module		Range Pole RF Adapter		Range Pole	
Charger		Max RF Adapter		Mounting Bracket	
		Field Terminal		**Radio**	
USB Cable		Magellan MobileMap-per CE		Magellan U-Link transmitter	
Serial Data Cable		Juniper Allegro CX		Pacific-Crest UHF Transmitter	
Static, Base		**Software**		**RF Cables**	
HI measure-ment tool		GNSS Solu-tions CD		GPS-RF cable	
HI Measure-ment Plate		FAST Survey CD		UHF-RF cable	
Transport Case		**Memory Device**			
Soft case		SD Card (sold by Magellan)			

(1) Also used in an RTK base using a UHF radio as the data link.
(2) A void UHF antenna module also exists.

Locating the Basic Components

2. GNSS Antenna Module

3. Power Module

4. Communication Module or V-Module
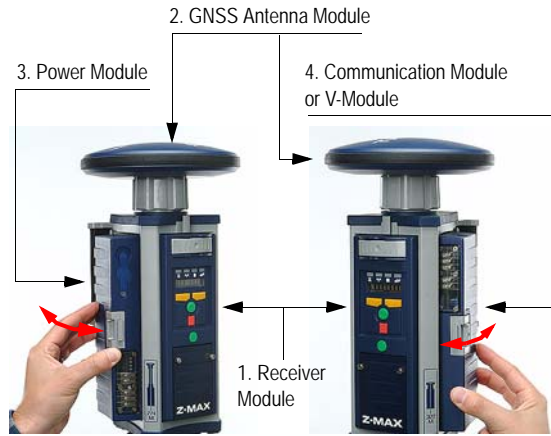
1. Receiver Module

As you are facing the front panel of the GPS receiver module, the power module attaches to the left-hand side of the receiver module and the communication module (or V-module) to the right-hand side.

Z-Max.Net Front Panel

Z-Max.Net Bluetooth®

Status LEDs

Front Panel User Interface

Control keys

Power key

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Bluetooth® Port

This device allows you to communicate with the Z-Max.Net through a Bluetooth wireless connection. This port is identified as "port C" on the Z-Max.Net.

Status LEDs

From left to right, the LEDs are:

• **RTK Solution**. This LED is only operational when the receiver is configured as an RTK rover.

Color	Meaning
Off	Not a RTK rover
Blinking green	Fixed solution
Blinking orange	Float solution
Blinking red	No RTK solution

• **Communication**. This LED indicates when real-time data is transmitted (base) or received (rover).

Color	Meaning
Off	No data link has been configured
Blinking green	Base: Transmits data Rover: Base data received and used
Blinking red	Base: Irrelevant Rover: Base data received but not used
Not blinking	Base: No data transmitted Rover: No base data received

• **Data Log**. This LED shows the data logging status.

Color	Meaning
Off	No data logging in progress
Blinking green	Data logging in progress. Blinks at the frequency of the recording interval setting (20 seconds by default).
Red	Unable to log data (memory full)

• **Satellite/Power**. After power up, this LED will continue to blink red once every 1-2 seconds to indicate that the unit is powered on. Between each red blink, the LED will also blink green once for each satellite that the receiver is tracking.

Front Panel Display

The front panel display is an 8-character, alphanumeric LED display that is used to monitor receiver status, set receiver parameters and configure the receiver to perform different types of surveys.

The screen displays up to eight characters at one time. Messages or parameters longer than eight characters are scrolled from right to left.

Control Keys

The four control keys are used in conjunction with the front panel display. They will work differently depending on whether the screen is in Display or Edit mode.

Display Mode:

UP (yellow)	Scrolls menu (at same level) forward
DOWN (yellow)	Scrolls menu (at same level) backward
ENTER (green)	Selects and moves down to next level or enters Edit mode
CANCEL (red)	Returns to upper level

Edit Mode:

UP (yellow)	Data entry context: Scrolls forward through characters Parameter list context: Scrolls forward Fast scrolling if held depressed for 3 seconds
DOWN (yellow)	Data entry context: Scrolls backward through characters Parameter list context: Scrolls backward Fast scrolling if held depressed for 3 seconds
ENTER (green)	Parameter list context: Selects parameter Data entry context: Accepts character and moves to next space or quits Edit mode
CANCEL (red)	Data entry context: Deletes last edited character, stays in Edit mode Parameter list context: Moves from Edit mode to Display mode without selecting the parameter.

See *Z-Max.Net Reference Manual* for more information.

Power Key

This key is used to power up, power down or initialize the unit (see page 10).

SD Card Reader and USB

Below the four control keys is a small door fastened by two thumbscrews. Unscrew the attaching screws and open the door to reveal the SD Card slot and the USB port.

The SD card slot holds the SD card that serves as the receiver's data storage memory. All data recorded by the unit is stored on the SD card. **Warning! Use exclusively SD cards sold by Magellan**.

The USB port is one of the external ports available for connecting to a computer. The USB port is a type-B connector.
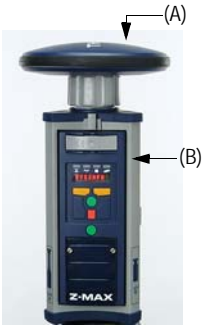
Z-Max.Net Rear Panel

Handle

External Power In (10-28 V DC)

Port A (RS232)

Port B (RS232 or RS422)

For connector pinout, see *Z-Max.Net Reference Manual*.

GNSS Antenna Configurations

In all cases of use, the GNSS antenna module must be connected to the receiver module. But there are three different ways of doing this, as explained below.
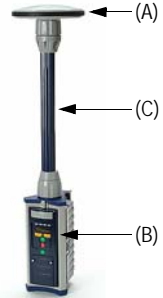
Base

The GNSS antenna module (A) is directly attached to the receiver module (B).

←

Pole-Mounted Rover

The GNSS antenna module (A) is attached to the receiver module (B) via a UHF antenna module or a Void UHF antenna module (C). →

Backpack-Mounted Rover

The GNSS antenna module (A) is attached to the receiver module (B) via a UHF antenna module or Void UHF antenna module (C), a range pole adapter (D), a dual RF cable (E) and a Max-RF adapter (F).

↓

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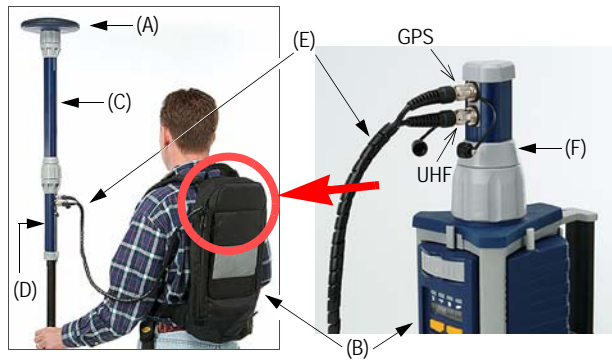
2. Preparing For First-Time Use

Charging the Power Module

To charge the power module:
- Plug in your charger and connect the power module to the charger as shown opposite.
- Charge **for a minimum of five hours** or preferably overnight (even if the charger indicates that the battery is full).
- Verify that the battery is fully charged by pressing the button on the back side of the power module. The four LEDs should light up green.

The power module contains rechargeable lithium-ion battery cells and "smart" charging circuitry. Recharging the power module is done using the AC/DC power supply, included with the system.

This power supply can also be used to provide power directly to the Z-Max.Net through an external connector. The charger is designed to work with a 110-240 VAC power source and delivers 12 V DC of input voltage with at least 4-A current capability to the power module.

For more information on the characteristics and management of the power module, see *Z-Max.Net Reference Manual*.

Use of non-Magellan power supplies for charging the power module is not recommended.

Attaching the Lateral Modules

Whatever the type of module you are attaching to the receiver module, i.e. a power module on the left, or a communication or V-module on the right, do the following:

- Insert the small ledge of the module into the rear of the housing first as shown opposite (left and right). This will correctly align the module.

- Using the ledge like a hinge, start swinging the module. To make sure the module is correctly positioned vertically, take care to align the protruding edges, on either side of the connector pins, with the grooves in the receiver module casting. Then swing the module closed until the latch on the module clicks into place.

- Make sure the module is well seated and the latch on the edge of the module clicks shut.

Please take all precautions to keep connector pins clean and avoid touching them.

Attaching the GNSS Antenna Module

The base of the GNSS antenna module is circular except for a flattened area. The top of the receiver module, UHF antenna module or Void UHF antenna module is keyed so there is only one way the GNSS antenna module can be inserted.

- Make sure the base of the GNSS antenna module is oriented so that the flattened area is lined up with the flattened area of the receptacle.

- Once aligned, insert the GNSS antenna module into the antenna receptacle. The module should push easily into place.

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• Once in place, twist the threaded collar on the GNSS antenna module until the antenna is securely locked in place.

Inserting a Memory Card

A memory card is required if you want to run a post-processing survey or more generally, when you want to log raw data with your Z-Max.Net.

To install the SD Memory Card into the reader:

• Orient it so that the chamfered corner of the card is oriented downwards, as shown opposite.
• Gently push the card into the reader until you feel a soft "click". The click indicates that the card is properly seated. A correctly inserted SD card should not move once you have removed your hand from the card.

Use exclusively SD cards sold by Magellan!

Turning On/Off the System

It is important to power off the receiver using the Power key on the Front Panel *before* removing the SD card.

• Power on the system by pressing the Power button on the receiver front panel for about 2 seconds (until a beep is emitted) and then releasing the Power button.
  The SV/Power LED should begin to blink red once per second to indicate that the receiver is powered up.
• To turn off the system, just press and hold the power key for two seconds. The receiver will generate a beep every second, a "shutdown" message will be displayed, and the receiver will then power down.

Initializing the System

Initializing the system is recommended the first time you use your system to:

• Clear the internal memory
• Reset the user settings to their default values
• Clear ephemeris and almanac information in memory
• Re-format the SD card. Note that initialization should also be performed every time you prepare your SD card for a new survey project. It's always better to delete files from the SD Card by running an initialization sequence rather than using any other method.

Initializing the system is also appropriate any time the Z-Max.Net does not work as expected.

To initialize the system from the Power button, assuming the system is off, do the following:

• Press the Power button for at least 5 seconds.
  The display will show "re-init", indicating that the receiver is in the initialization process.
  The initialization process will take several minutes depending on the size of the SD card. The front panel will continue to display "re-init" until the process is complete. When complete, the receiver will be powered on and in the normal state with the front panel displaying "SYSINFO" and the SD card ready to use.

Checking that Z-Max.Net Receives Satellites

If the GPS antenna has a reasonably good view to the sky, within a few minutes, the receiver should begin to track satellites. This is indicated by the SV/Power LED:

⚠️

Please go outside after initialization and make sure your system has a clear view of the sky in all directions.

1. It should blink red once per second to indicate that power is on, and blink green several times between each red blink.
2. It will blink green once for each satellite that is being tracked. In normal conditions of reception, the system should receive about eight satellites on average.

3. RTK Surveying

RTK Surveying Method Requirements
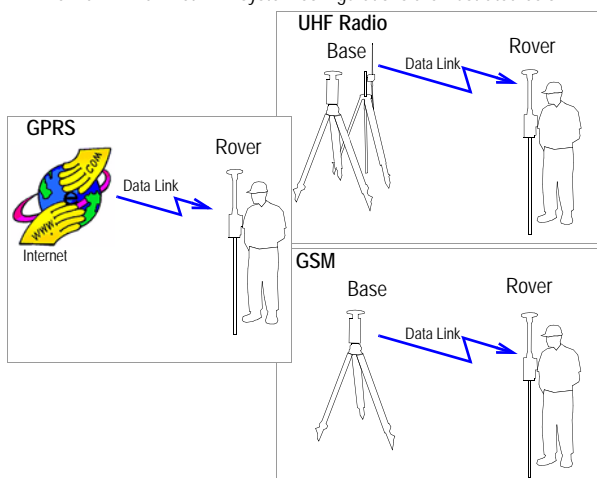
Key information is provided below.

1. Two units are needed: one (the base) is operated on an accurately known position while the other (the rover) is used in the working area.
2. A data link must be established from the base to the rover. This data link can be implemented in three different ways:
    - UHF radio
    - Cellular modem (GSM)
    - Other external device
3. Depending on the chosen data link, the base will be either:
    - A "real" base system (with UHF radio, GSM, or other external device)
    - Or a "virtual" base system that delivers its data via a cellular modem (GPRS).
    The main Z-Max.Net RTK system configurations are illustrated below:

⚠️

When the base setup is under your responsibility, make sure the base is sited in a clear area giving the best possible view of the sky!

When this is possible, avoid trees, buildings or any high obstacles in the vicinity of the base.

Having a clear view of the sky will allow the base to collect data from a maximum of visible satellites, which is highly recommended to perform a successful, accurate and fast survey.

4. Two different rover setups can be used, backpack or range pole, yet operated similarly. Only the pole-mounted rover system will be described in this Guide. For more information on the backpack mounting, refer to the *Z-Max.Net Reference Manual.*
5. RTK is easier to operate using a field terminal running FAST Survey. RTK can also be operated from the receiver front panel display.
6. Whatever the base used ("real" or "virtual"), its distance to the rover, called "baseline" (up to 50 km or 30 miles), must roughly be known to make sure RTK results will achieve the expected level of accuracy.

RTK Base Setup

A typical base setup is described in this section in which:

- A conventional tripod is used
- A Magellan U-Link radio is used for the data link
- RTK corrections data are transmitted in Ashtech CPD (DBEN) format
- An external 12-V DC battery is used for powering both the Z-Max.Net base and the U-Link transmitter
- A Bluetooth-enabled field terminal (MobileMapper CE) is used, running the FAST Survey software, to set up the base.

For other base configurations, it's easy to extrapolate from the instructions given below, knowing that configuring a base always implies: 1) entering its geographical location and 2) defining the data link.

Choosing the Installation Site

The installation site should offer the best possible GPS reception conditions. The GNSS antenna should have a clear view of the sky in all directions. There should be no, or a minimum of satellite obstructions in the vicinity.

Setting Up the RTK Base

1. Connect the system components (power module, GNSS antenna and V-module) as explained on page *9*.
   Because a UHF radio transmitter is used for the data link, a V-module, and not a communication module, can be attached to the right side of the receiver module.
2. Center and level the tripod over the ground mark.

3. Insert the brass tribrach adapter through the hole in the HI measurement plate and screw the adapter/plate into the 5/8" threaded receptacle in the bottom of the Z-Max.Net receiver module.

4. Carefully place the Z-Max.Net assembly into the tribrach mounted on the tripod over the point.

5. Use the tape to measure from the reference point on the ground to the measurement point of the Z-Max.Net (see *Hb* opposite). Later on, you will have to enter the value read on the tape (see point *5.* on *page 25*).

"Hb" read on tape
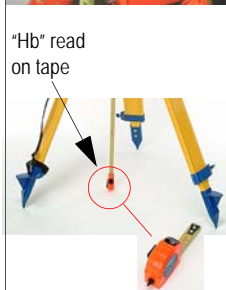
6. Using the power cable supplied (P/N 730477), connect the Z-Max.Net power input (marked "PWR") to the external 12-V DC battery.

7. Install the tripod for the UHF radio transmitter a few meters away from the Z-Max.Net tripod. The distance between the two tripods is limited by the length (10 meters) of the data/power cable connecting the Z-Max.Net receiver to the radio (see point *10* below).

8. Screw the radio antenna (A) to the antenna connector on the U-Link radio (B).

9. Hook the flange on the radio into the mounting bracket (C), and attach the mounting bracket to the telescoping survey pole (D).
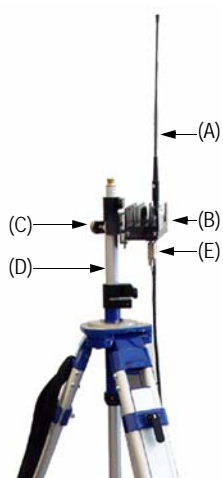
10. Connect the Y-shaped data/power cable (P/N 730476) between 7-pin connector port B on the Z-Max.Net and the 15-pin data/power port on the U-Link radio (E).
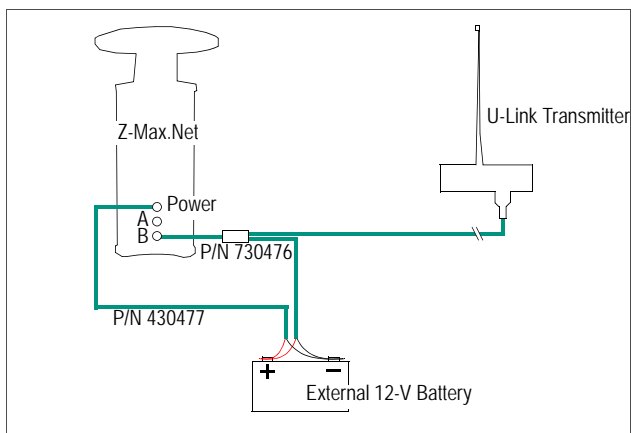
11. Connect the free end of the data/power cable to the battery

12. Raise the UHF radio and its antenna together as high as possible to maximize transmission distance.

(A)
(C)
(B)
(E)
(D)

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The diagram below summarizes the different connections described previously.

RTK Rover Setup

Two typical RTK rover setups are described:

- **Rover Setup #1**: RTK rover using a UHF radio data link to communicate with an RTK base such as the one described in the previous chapter.
- **Rover Setup #2**: RTK rover using a GSM/GPRS data link to acquire corrections data from a provider using the NTRIP protocol.

The rover setup procedure is the following

1. Connect the system components (power module, GNSS and UHF antenna modules, com module) as explained on page *9*, taking into account the following:
   - **Rover Setup #1**: Because a UHF radio is used as the data link, a UHF communication module, and not a V-module, should be attached to the right side of the receiver module. Connect the UHF antenna module directly to the top of the receiver module and attach the GNSS antenna module to the top of the UHF antenna module.
   - **Rover Setup #2**: Because a GSM/GPRS modem is used as the data link, a GSM communication module, and not a V-module, should be attached to the right side of the receiver module. Because a UHF antenna is not needed, connect a void UHF antenna module directly to the top of the receiver module and attach the GNSS antenna module to the top of the void UHF antenna module.
2. Mount the Z-Max.Net assembly on the survey pole:
   - Remove the brass adapter from the top of the pole and attach it to the base of the Z-Max.Net assembly.
   - Seat the Z-Max.Net onto the pole.

     If no adapter is available, just thread the pole directly on to the base of the receiver.
3. Determine the height of the range pole (see *Hr* opposite). If you are using a standard pole, this height is given by the pole manufacturer so you don't need to measure it.
   You will later have to remember this height when setting the rover (see point *2.* on *page 28*)
4. Mount the field terminal on its field bracket and then secure the assembly onto the survey pole.

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Base

Rover

Bluetooth
Manager
COM3
COM4

Field
Terminal

Establishing Bluetooth Communication with Z-Max.Net

Introduction

This section explains how to control the Z-Max.Net system from a Bluetooth-enabled field terminal (Magellan MobileMapper CE).

Please carefully read these preliminary notes:

- When using Bluetooth communication, **you will be asked repeatedly to enter the Z-Max.Net PIN number** while setting up the base or the rover. By default, the PIN number for all Z-Max.Net units is "12345".

  To enter the PIN number using MobileMapper CE's virtual keyboard, follow the instructions below:

  - To display the virtual keyboard, tap 🖊 in the task bar and then Keyboard. Don't forget to tap inside the Enter PIN field before entering the PIN number.

  - To hide the virtual keyboard, tap 📱 in the task bar and then Hide Input Panel. If the task bar is hidden by the virtual keyboard, first tap and hold the keyboard's title bar and move it upward until the task bar becomes visible, then select Hide Input Panel from the task bar.

- The "Tap and hold an item" instruction mentioned several times in what follows means you have to:
  - Tap on the item using the stylus
  - And keep the stylus in contact with the screen until dots and then a pop-up menu appears. Then you will have to tap one of the functions in the prompted menu.

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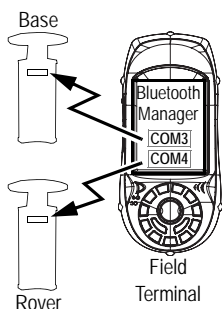
Powering up the Whole Equipment

It is assumed that the base and rover you have set up are next to each other.

1. First of all, turn on each of the Z-Max.Net units you will be using (a base and a rover, or simply a rover) by pressing the power button for about two seconds until a beep is emitted.
2. Press the red Power button on the MobileMapper CE until the Power LED lights up (green).

Detecting Bluetooth-Enabled Devices

In this step, you will run Bluetooth Manager to find the Bluetooth-enabled devices within range of the field terminal.

1. On the MobileMapper CE, tap 🎨 in the task bar, then **Settings** and then **Control Panel**.
2. Double-tap the **Bluetooth Manager** icon.
3. In the Bluetooth Manager window, tap on the **ON** button. Wait until Bluetooth Manager has detected the Z-Max.Net unit(s) you have just turned on. Bluetooth Manager will also detect any Bluetooth-enabled devices present in the vicinity such as cell phones, computers, etc. (The larger the number of Bluetooth-enabled devices, the longer the time to detect all of them.)
4. In the **Authentication Request** window that appears following the detection of the Z-Max.Net units, tap successively the PIN number for each unit ("12345" by default, yours may be different) (see *Introduction on page 18* to do this).
5. Tap **OK**. Bluetooth Manager then updates the list of Bluetooth-enabled devices to show the serial number of the Z-Max.Net units (rather than obscure Bluetooth ID numbers).

Authentication Request ✕
00027800f185

Enter PIN: 12345

OK   Cancel

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Finding Bluetooth Services

In this step, you will list the services available from the detected Bluetooth-enabled devices.

For each detected Z-Max.Net unit, do the following:

⊞ ● ZMAXZMAX30009___

1. Tap and hold the now green Z-Max.Net icon in the list and then tap **Find Services** from the pop-up menu. Wait until a "+" sign appears before the icon.

⊟ ● ZMAXZMAX30009___
  ✗ Bluetooth Serial Port

2. Expand the Z-Max.Net icon by tapping on the "+" sign. This unveils **Bluetooth Serial Port** that is currently red crossed. ("**Bluetooth Serial Port**" is the only Bluetooth service available from the Z-Max.Net units.)
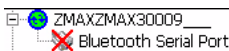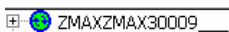
Assigning Virtual Ports to Bluetooth

In this step, you will ask Bluetooth Manager to assign a virtual port in the field terminal for each Bluetooth connection you need.

For each detected Z-Max.Net unit, do the following:

1. Tap and hold **Bluetooth Serial Port** and then tap **Configure**. This opens the **Configure Serial Port** window.
2. Select a free virtual port (**COM3:** for the base, **COM4:** for the rover) and then tap **OK** to close the window.
3. Tap and hold **Bluetooth Serial Port** and then tap **Connect**. Re-enter the PIN number if requested. Wait until the Bluetooth Serial Port line appears with a green mark meaning that the Bluetooth connection with the Z-Max.Net is now established.

⊟ ● ZMAXZMAX30009___
  ✅ Bluetooth Serial Port
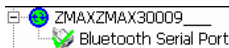
Saving Bluetooth Serial Port Settings

You will save much time when next starting your system if you follow the procedure below the first time you set up the required Bluetooth connections.

For each detected Z-Max.Net unit, do the following:

1. Tap and hold Bluetooth Serial Port and then tap successively Auto Connect and then Save Settings.

   With these options activated, and **provided you do not turn off Bluetooth Manager before shutting down the field terminal**, Bluetooth Manager will automatically restore the Bluetooth connections when you next turn on your field terminal.

   Obviously, Bluetooth Manager will only be able to restore connections with the Z-Max units that are present in the vicinity and powered up at that time.

   You will then simply be asked to re-enter the PIN number for each of these units.

   Before moving on to FAST Survey, do the following:.

2. Tap OK in the upper-right corner to close the Bluetooth Manager window. This does not turn off Bluetooth Manager but simply frees the screen for other tasks.

3. For the same reason, close the Control Panel window.

   Note the presence of the Bluetooth icon ( ) in the task bar meaning that Bluetooth continues to be active.

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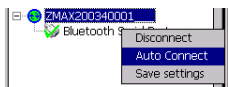
## Defining/Saving Bluetooth Settings for FAST Survey

FAST Survey can communicate with only one Z-Max.Net unit at a time. This step provides the procedure to let FAST Survey communicate with the desired Z-Max.Net unit via Bluetooth and save these settings in a configuration file so these settings can quickly be restored whenever necessary.
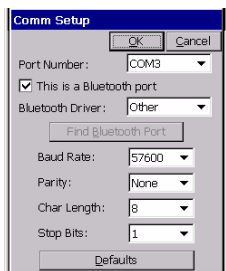
1. Run FAST Survey on the field terminal
2. In FAST Survey, tap on the **Equip** tab and then on the **Comm Setup** function.
3. In the **Port Number** field, select "COM3" (for communicating with the base)
4. Check the **This is a Bluetooth port** option and then select "Other" as the **Bluetooth Driver**
5. Tap **OK** to close the window. FAST Survey is now communicating with the base through COM3. At this stage, you can communicate with the base for configuration or monitoring purposes.
6. Tap [icon] on top of the screen
7. Tap the **Save** button
8. Name the configuration file (for example "Z-Max Base")
9. Tap **OK** and then **Close**
10. Repeat the above steps 2 to 9 for the Z-Max.Net rover you are using. This time you will select "COM4" and not "COM3" in the Comm Set up window (point 3.) and you will enter "Z-Max Rover" as the name for the configuration file (point 8.).

Toggling Bluetooth Between Base and Rover

Now that you have saved the two ways FAST Survey can communicate with your Z-Max.Net system, it's easy to toggle Bluetooth communication from the base to the rover or the other way around:
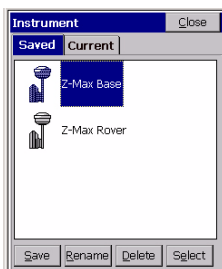
1. Tap on top of the screen
2. Tap on the name of the configuration corresponding to the unit you wish to communicate with and then tap Select. As a result, FAST Survey automatically updates the settings in the Comm Setup function to let you communicate with the chosen unit.
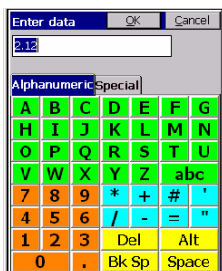
Configuring the RTK Base

Launching FAST Survey
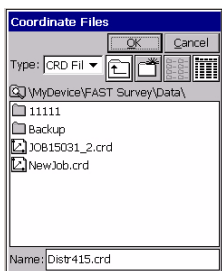
1. On the field terminal, launch the FAST Survey software by double-tapping on the FAST Survey icon.
2. Choose Select New/Existing Job. A new screen is now displayed.
3. In the Name field, type in the name of the job you wish to create. For example, type in "Job1.crd".

New Job screen

FAST Survey virtual keyboard

Note that FAST Survey has its own, large, virtual keyboard (see opposite). If you tap inside the Name field, FAST Survey will automatically display its virtual keyboard. You just have to type in a name using this keyboard and then tap OK.

4. Tap OK to create the job. The screen then displays the Units tab.
5. On the Units tab, set the desired units and parameters for the job.

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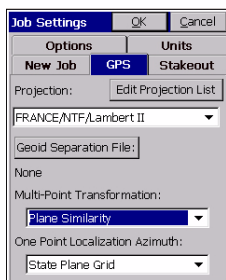
GPS tab screen

6. Tap on the **GPS** tab.

7. On the **GPS** tab, choose the coordinate system to be used in the job as well as the geoid model. Note that the coordinate system and the geoid model may have been uploaded earlier to the field terminal using one of the GNSS Solutions tools (see *GNSS Solutions Reference Manual* for more information). A large number of coordinate systems are stored in FAST Survey. To select one of them, tap on the **Edit Projection List** button and then **Add Predefined**.

8. After selecting all the desired parameters, tap **OK** (located on top of the screen).

Configuring the Base and the Data Link

Reminder: In this example, you will be configuring a UHF data link to provide the rover with RTK corrections data in CPD (DBEN) format.

1. Tap on the **Equip** tab, then the **Instrument** function, select "Magellan Professional and Ashtech" from the scroll-down menu and finally tap **OK**.

2. Tap 🔲 on top of the screen

3. Tap on the name of the configuration corresponding to the base (e.g. "Z-Max Base") and then tap **Select**. As a result, FAST Survey automatically updates the settings in the **Comm Setup** function to let you communicate with the base.

   Alternately, you can tap on the **Comm Setup** button on the **Equip** tab and then, in the **Port Number** field, select the port you assigned to communicate with the base (see point *2.* in *Assigning Virtual Ports to Bluetooth on page 20*). Also, enable "This is a Bluetooth port" and select "Other" as the **Bluetooth Driver**. Then tap **OK**

4. Tap on the **Configure Base** button and then choose "Z-Max" from the **Receiver Type** scroll-down menu.
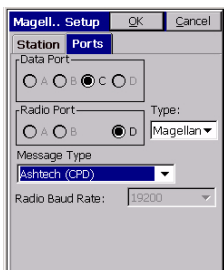
5. Enter the antenna height you measured previously (see point *5. page 15*) as well as the method you used for this measurement. If you used the method described on *page 15*, check Slant.

6. Select the type of GPS antenna used, i.e. "[Z-Max GPS] Magellan Professional" as you are using the Z-Max.Net antenna directly connected to the receiver.

7. Tap on the Ports tab. With Bluetooth and the Magellan radio used, make the following choices:
   • Type: "Magellan" (Magellan Radio)
   • Data Port: "C" (Bluetooth connection to field terminal)
   • Radio Port: "B"
   • Message Type: "Ashtech CPD".

8. Tap OK to send these parameters to the Z-Max.Net receiver. Re-enter the PIN number. The Z-Max.Net emits a beep. A new menu appears asking you to enter the initialization position for the base.

Entering the Base Position and ID

Up to six different options are possible to enter this position:
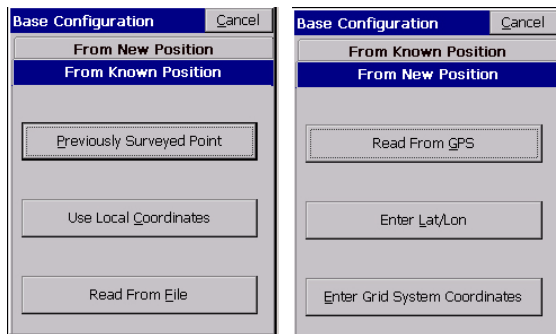
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Base coordinates screen

Base Station ID screen

9. Choose the option that suits you best. For example, to enter the coordinates of the base:
   - Tap successively on From New Position, then Enter Lat/Lon
   - Type in the latitude, longitude and altitude and then tap OK. FAST Survey then displays the WGS84 coordinates of this position after making the transformation to WGS84 if necessary.
   - Tap Yes.
10. FAST Survey then asks you to enter the Reference Station ID (4 characters max.).
11. Enter the ID you would like to assign to the base and then tap OK. The message "Connecting to Receiver" is displayed and a beep is emitted meaning that the Z-Max.Net is being configured. After a few seconds, FAST Survey prompts you to check the radio settings:

Setting the Radio

12. Tap Yes. In the US, a channel/frequency table will be shown. In Europe, a single channel will be displayed along with the corresponding frequency.
13. For example, if the frequency must be set to 444.125 MHz (it's always a multiple of 12.5 kHz), type in "444.125" in the Frequency to Set field and then tap Set Radio.
14. Wait until FAST Survey displays the "Base Configuration Successful" message and the Z-Max.Net emits a beep.

15. Check the LEDs on the Z-Max.Net front panel to make sure the system is functioning correctly (refer to *page 4* to read the meaning of each LED). Typically, two LEDS should blink green as shown opposite.

    You can also monitor the Z-Max.Net rover from the MobileMapper CE screen using FAST Survey's **Equip** tab>**Monitor Skyplot** function (see figure below).

Monitor/Skyplot		Back
SATView	SATInfo	Ref
Monitor		Lat/Lon

Current position —
Northing: 262579.5559
Easting: 309229.6089
Elevation: 98.0100

Computation uncertainties —
HRMS: 3.500
VRMS: 4.300

GPS constellation geometry —
PDOP: 1.9
HDOP: 1.2
TDOP: 1.1

Status: AUTONOMOUS

Number of received satellites —
SATS: 8

Reset RTK

Tap **Back** to return to the menu.

16. You can now let the base operate on its own and move on to the rover configuration. Keep the field terminal on. Also, keep FAST Survey running and leave the job open as this is needed to configure the rover (see hereafter).

Configuring the RTK Rover

1. Tap 🛠 on top of the screen
2. Tap on the name of the configuration corresponding to the rover (e.g. "Z-Max Rover") and then tap **Select**. As a result, FAST Survey automatically updates the settings in the Comm Setup function to let you communicate with the rover.

Alternately, you can tap on the **Comm Setup** button on the **Equip** tab and then, in the **Port Number** field, select the port you assigned to communicate with the rover (see point *2.* in *Assigning Virtual Ports to Bluetooth on page 20*). Also, enable "This is a Bluetooth port" and select "Other" as the **Bluetooth Driver**. Then tap **OK**.

Case #1: Rover Using a UHF Radio Data Link

1. Tap on **Configure Rover**
2. In the **Rod Hgt** field, type in the height mentioned earlier (*Hr*; see point *3.* on *page 17*) and then check the **Vertical** option.
3. Tap on the **Receiver** tab and check that the receiver used is "Z-Max". Also, as you are using a UHF antenna module - although a void one- between the GNSS antenna and the receiver module, select the "[Z-Max GPS UHF] Magellan Professional" antenna in the **Antenna Type** field.
4. Tap on the **Ports** tab and make the following choices:
    - **Base Config** field (at the bottom): "Manual"
    - Type: "Magellan" (Magellan radio)
    - Data Port: "C" (Bluetooth connection to field terminal)
    - Radio Port: "D"
    - Message Type: "Ashtech (CPD/DSNP LRK)"
5. Tap the **OK** button located on top of the screen. The message "**Connecting to Receiver**" is displayed and the Z-Max.Net emits a beep meaning that it's being configured.

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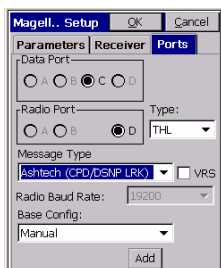
6. After a few seconds, another message is displayed prompting you to check the radio settings:

FAST Survey

Would you like to check additional Radio Settings?

Yes   No
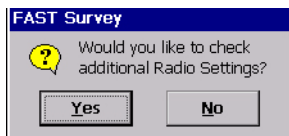
7. Tap Yes. In the US, a channel/frequency table will be shown. In Europe, a single channel will be displayed along with the corresponding frequency.
8. For example, if the frequency must be set to 444.125 MHz (it's always a multiple of 12.5 kHz), type in "444.125" in the Frequency to Set field and then tap Set Radio.
9. Wait a few seconds. A beep is emitted by the Z-Max.Net once it has been configured as a rover.

The survey can now begin.

You can first check the LEDs on the Z-Max.Net front panel to make sure the system is functioning correctly (refer to *page 4* to know the meaning of each LED).

You can also monitor the Z-Max.Net rover from the field terminal screen using FAST Survey's Equip tab>Monitor Skyplot function.

Case #2: Rover Using a GSM/GPRS Data Link

Reminder: You do not need to install and run your own base as in this case you will be using RTK corrections data from a provider using the NTRIP protocol. This means you just have to set up and use your rover. Below is the key information you need to know in this case of use:

• A GPRS data link is used to receive RTK corrections data from an NTRIP caster. The GPRS provider is assumed to have delivered the following information so you can start your modem:

Modem SIM PIN number (if any)
Access Point Name
Log in for GPRS connection
Password for GPRS connection

• The NTRIP service provider is assumed to have delivered the following information so you can access the NTRIP service:

Caster IP address (xxx.xxx.xxx.xxx)
IP port number
Log in for access to NTRIP caster
Password for access to NTRIP caster

Follow the instructions below to set up the rover:

1. Tap on **Configure Rover**
2. In the **Rod Hgt** field, type in the height mentioned earlier (*Hr*; see point *3*. on *page 17*) and then check the **Vertical** option.
3. Tap on the **Receiver** tab and check that the receiver used is the Z-Max.Net. Also, select the "[Z-Max GPS UHF] Magellan Professional" antenna in the **Antenna Type** field.
4. Tap on the **Ports** tab and make the following choices:
   - **Base Config** field (at the bottom): "Manual"
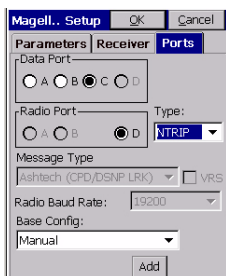
- Type: "NTRIP"
- Data Port: "C"

5. Tap the **Add** button located at the bottom of the screen.

6. Enter the properties of the GPRS provider. The screen opposite only gives examples of what these properties might be.

   By appropriately naming this set of information (**Name** field on top), you will be able to directly select this configuration from the **Base Config** field on the previous screen.

7. Tap the **NTRIP Settings** button and enter the properties of the NTRIP service you want to use. The screen opposite only gives examples of what these properties might be.

8. Tap **OK** three times.

9. The message "**Connecting to Receiver**" is displayed and a beep is then emitted indicating that the Z-Max.Net is being configured.

   A new screen appears on which you can see the current status of the com module's modem (READY; see screen opposite).

10. Tap **Connect**. The **Connecting to Caster** message is displayed. Then a new screen appears from which you can see all the stations available from your NTRIP provider

11. From the drop-down list associated with the **Mount Point** field, select the base station you would like to work with.

    The rest of the screen provides information on the selected station. The **Format** field is automatically preset following the selection of a station but you can still change it if the pre-setting is incorrect (see screen opposite).

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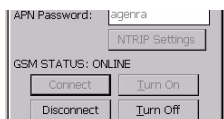
12. Tap **OK**. After a while, The GSM STATUS switches to ONLINE (see screen opposite) and the Z-Max.Net should start receiving corrections data. After a few seconds the RTK Solution LED (far left) should blink green meaning that the RTK position solution is fixed and so you can start surveying.

13. Tap **Close** and proceed with the survey as such (see next chapters).

    You can monitor the Z-Max.Net rover from the field terminal screen using FAST Survey's **Equip** tab>**Monitor Skyplot** function.

Saving Base and Rover Settings

When you configure your base or rover from FAST Survey, a Save operation is automatically performed at the end of the procedure and so you don't need to save anything manually.

After a power cycle, your base or rover will therefore continue to operate according to the last loaded configuration.

Running an RTK Survey

If you have followed all the instructions provided in this *RTK Surveying* chapter, your rover is now fully configured and so you can start your survey using your field-terminal-controlled rover.

NOTE: To start the survey with the correct antenna height when using FAST Survey, the rover should always have been set up last.
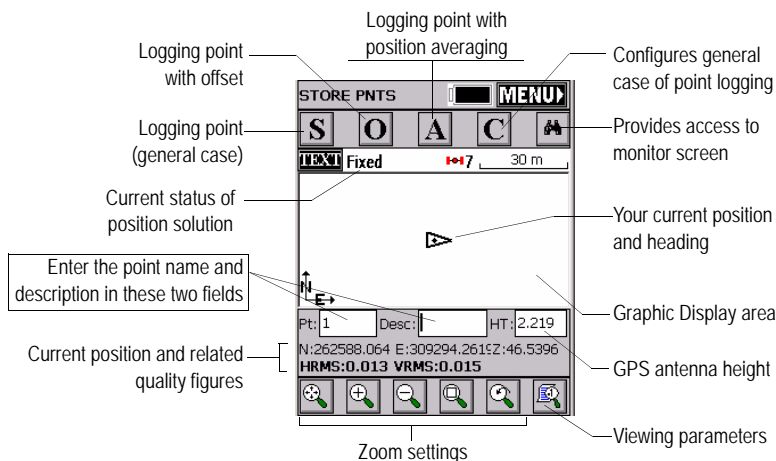
The present section describes the main types of surveys you can perform with FAST Survey and your Z-Max.Net, namely:

- RTK point logging (Stop & Go survey)
- RTK point logging in continuous mode (trajectory survey)
- RTK staking out.

Logging RTK Points

1. Tap on the **Surv** 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.

Logging point with position averaging

Logging point with offset

Configures general case of point logging

Logging point (general case)

Provides access to monitor screen

Current status of position solution

Your current position and heading

Enter the point name and description in these two fields

Graphic Display area

Current position and related quality figures

GPS antenna height

Viewing parameters

Zoom settings

STORE PNTS — MENU
S O A C
TEXT Fixed 7 30 m
Pt: 1 Desc: HT: 2.219
N:262588.064 E:309294.2619 Z:46.5396
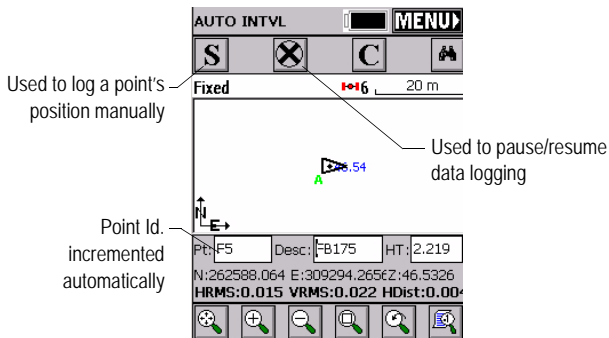HRMS:0.013 VRMS:0.015

For example, you are on a point that you want to log. Do the following:

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 **OK**.

   Messages follow successively indicating that the system is taking the 5 requested readings. Then FAST Survey displays the average coordinates it has determined.

5. Tap **OK** 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 **MENU** in the upper-right corner of the screen to return to the menu.

Logging RTK Points in Continuous Mode

1. On the **Surv** 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. You do not need to define a name finishing with a figure. FAST Survey will place one anyway when incrementing this field.
4. Press **OK** to switch to the graphic screen (see figure below) and start logging the first point.

Used to log a point's position manually

Used to pause/resume data logging

Point Id. incremented automatically

The **S** button lets you instantly log the position of a point.
The **X** 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 X button again (changed into a right arrow during pause) to resume data logging in continuous mode.
If you come back to the main menu by tapping on MENU, then data logging in continuous mode is automatically stopped.

Staking out RTK Points

1. Tap on the Surv tab and then select Stakeout Points. The screen now displayed allows you to stake out your points.
2. 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>List Points). You can also, define graphically this point by tapping on the point on the graphic screen, or define that point according to azimuth, slope and horizontal distance.

Name of point to be staked out

Coordinates of point to be staked out

Provides access to points list.
Example of points list:

Provides access to graphic screen

Stakeout Points

OK   Cancel

Point ID: F0004

Source: Current Job

Add To List   Pick From List

Northing: 262588.0646
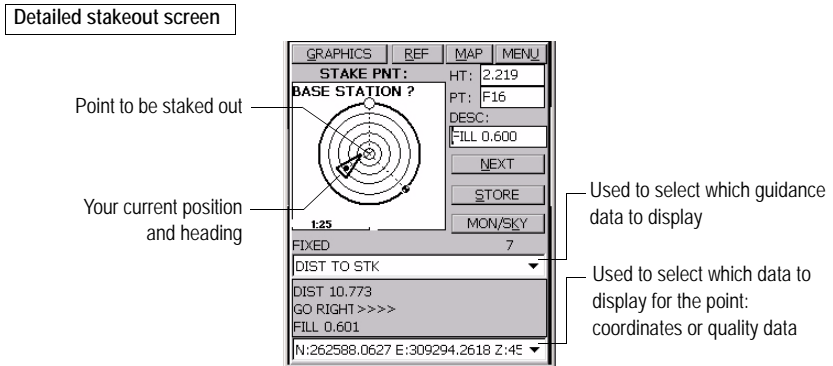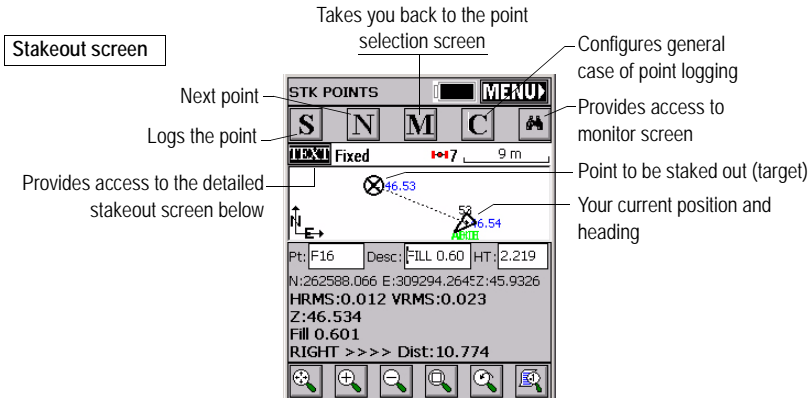Easting: 309294.2619
Elevation: 46.5336
Description: FB175

Point by Dir.
Azimuth:
Slope:
H. Distance:

Point Details

Settings   Find   OK   Close

Pt ID	Northing	Easting
✳ 52	262588.06	309294.26
✳ 53	262588.06	309294.26
✳ 54	262588.06	309294.26
✳ F0004	262588.06	309294.26
✳ F5	262588.07	309294.26
✳ F6	262588.07	309294.26
✳ F7	262588.09	309294.27
✳ F8	262588.07	309294.27
✳ F9	262588.06	309294.26
✳ F10	262588.06	309294.26

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3. Once you have chosen a point, tapping on the **OK** button will display a graphic screen from which you can easily stake out your point:

Takes you back to the point selection screen

Stakeout screen

Configures general case of point logging

Next point

Provides access to monitor screen

Logs the point

Point to be staked out (target)

Provides access to the detailed stakeout screen below

Your current position and heading

Detailed stakeout screen

Point to be staked out

Your current position and heading

Used to select which guidance data to display

Used to select which data to display for the point: coordinates or quality data

The target radius is automatically changed as the distance from you to the point changes.

When getting closer to the point, markers appear at the four corners of the target (see below left) informing you that you have arrived at the target. You can now materialize and log the position of this point.

4. Tapping on the **STORE** button allows you to start performing measurements to determine the target position.

The number of measurements will depend on the value entered earlier through the **File** tab>**Configure Readings** function. Once the position has been determined, FAST Survey displays the results of the computation so that you can check them (see below right).

5. Tap **OK** if you are satisfied with the results. FAST Survey will then save these results and will take you back to the stakeout screen for the next point.
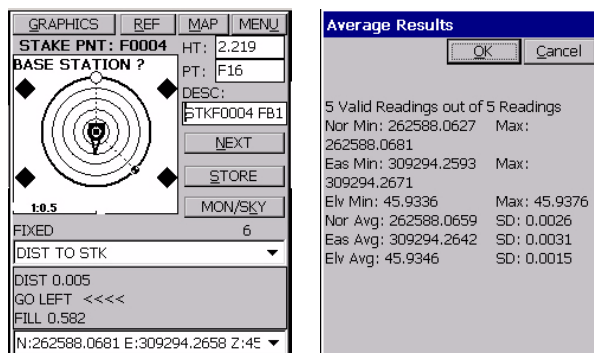
Downloading RTK Results to GNSS Solutions

Back at the office, do the following to download and view the RTK results stored in the job you have just finished.

1. Prepare your field terminal for data downloading. With MobileMapper CE, do the following:
   - Clip the I/O module at the back of the unit.
   - Connect the MobileMapper CE's I/O module to the PC using the USB cable provided.

2. Switch on the field terminal and then launch FAST Survey
3. Select **File**>**6. Data Transfer**>**Carlson SurvCadd/Carlson Survey**.

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4. On the PC:
   - Launch GNSS Solutions and then click Create a new Project
   - Name the project and click OK
   - Select the spatial reference system that was used during your RTK survey, select the appropriate time zone and then click OK
   - Click Do Not Import Anything Now. A new empty project opens in GNSS Solutions.
   - Select Tools>Preferences and make sure Show RTK functions is enabled otherwise check it and then click OK
   - From the menu bar, select Project>Download Positions from External Device
   - In the dialog that opens, select RTK Results in the left pane and then FAST Survey data collector in the right pane
   - Click OK. This opens the Data Transfer dialog box.
   - To be able to configure the connection to the MobileMapper CE the first time you download RTK results, clear the Automatic transfer option and then click OK. Two error messages may appear in the next step. Just click OK when this happens. The SurvCom window then appears on the screen.
   - In the SurvCom window, click on the Options button and then select the ActiveSync option in the upper-right combo box (this option is last in the list)
   - Click OK
   - Select the "Data" folder on the MobileMapper CE and click Exit
   - In the new dialog that appears, you can now see the list of jobs stored in the MobileMapper CE
   - Click on the job you want to download. The name of the selected job appears in the upper field.
   - In the Directory field, choose the folder on your PC where you would like to store this job
   - Click OK. RTK results are now downloaded to the project open in GNSS Solutions. At the end of the transfer, these results can be seen on the project's Survey view.

NOTE: When next downloading RTK results, the connection to the field terminal does not need to be re-configured. This means you can skip this step by checking the Automatic Transfer option in the Data Transfer dialog box.

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4. Post-processing Surveying

This chapter only discusses the static mode of surveying. For more information on Continuous (Trajectory) or Stop&Go kinematic methods, please refer to the *Z-Max.Net Reference Manual*.

## Reminder on the Static Surveying Method

Typical Use: Surveying a New Control Point.

⚠️

Make sure the base is sited in a clear area giving the best possible view of the sky!

When this is possible, avoid trees, buildings or any high obstacles in the vicinity of the base.

Having a clear view of the sky will allow the base to collect data from a maximum of visible satellites, which is highly recommended to perform a successful, accurate and fast survey.
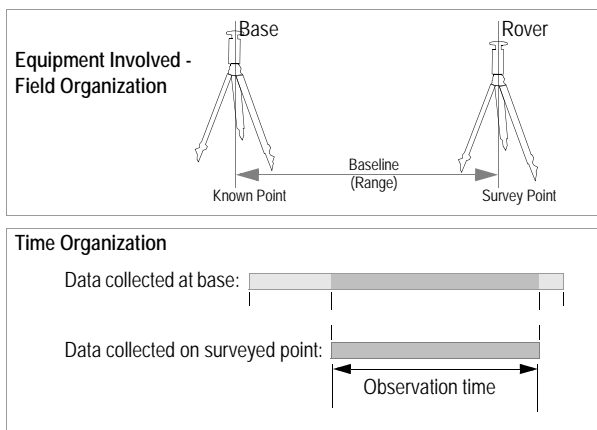
Key Instructions:

1. Two units needed: one (the base) operated on an accurately known position and the other (the rover) on the point to be surveyed. There can be several rovers logging data at the same time.
2. Approximate distance between the two units (baseline) must be known.
3. Data must be collected simultaneously by the two units. Use the same logging interval on both units.
4. Observation time is determined by last unit set up (start) and first unit turned off (end). We recommend that you start the base first and you turn it off last.
5. Required observation time mainly depends on distance between the two units (+ reception conditions). Rover unit estimates observation time needed.
   When **Estimated Base Line Len** on the Z-Max.Net front panel decreases down to "000km", you can stop collecting data.

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Running a Static Survey

A typical survey is described in this chapter using a conventional tripod. No field terminal is used as controlling system operation from the Z-Max.Net front panel is quite easy in this case.

Equipment Setup

The equipment setup instructions are the same for both the base and the rover. Install and run the base first.

In both cases, the installation site should offer the best possible GPS reception conditions. The antenna should have a clear view of the sky in all directions. There should be no, or a minimum of satellite obstructions in the vicinity.

1. Make sure the chosen point is suitable for GNSS observations.
2. Connect the system components as explained on page *9*. For postprocessing surveys, a V-module, and not a communication module, should be attached to the right side of the receiver module.
3. A memory card is required to log raw data. Insert this card as explained on *page 10*. Formatting a memory card for the Z-Max.Net requires that you re-initialize the Z-Max.Net with the SD card inserted (see *page 11*).
4. Position the tripod over the chosen point
5. Insert the brass tribrach adapter through the hole in the HI measurement plate and screw the adapter/plate into the 5/8" threaded receptacle in the bottom of the Z-Max.Net receiver module.

"Hb" read
on tape

Up key   Down key

Enter key

Cancel key

6. Once the tripod is accurately centered and leveled over the point, and the tribrach adapter and HI measurement plate are attached to the receiver module, carefully place the assembly into the tribrach mounted on the tripod over the point.

7. Use the tape measure to measure from the center of the point to the measurement point of the Z-Max.Net (see *Hb* opposite). Later on, you will have to enter the value read on the tape (see point *4.* on *page 42*).

Getting the Z-Max.Net Unit Started in Static

1. Press the Power button on the receiver module front panel for 2 seconds until a beep is emitted.

2. Configure the system to perform a static survey: By default, the Z-Max.Net system is configured to perform a static survey. When turned on and once enough satellites are received above 10 degrees of elevation, the receiver automatically begins to collect and store data in a new data file with a data recording interval of 10 seconds.

   In the event the Z-Max.Net would not be configured to run in static, do the following to re-configure the Z-Max.Net:

   • Press the Down key until **SURVCONF** is displayed
   • Press the Enter key
   • Press the Down key and then the Enter key again
   • Press the Down key until **STATIC** is displayed
   • Press ENTER The screen now displays **MODE:STATIC**.

   (The front panel interface is thoroughly described in the *Z-Max.Net Reference Manual*. See also *page 48* in this guide.)

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3. Enter the Site ID:
- Press the Cancel key to return to **SURVCONF**
- Press the Down key until the screen displays **SURVEY:STATIC**
- Press the Enter key. **SITE ID:???** is displayed. You can now enter the site ID:
- Press the Enter key again
- Enter the first of the four characters making up the Site ID pressing the Up or Down arrow until the desired character is displayed, then press Enter. Set the second character using the same Up or Down key, etc.
- After defining the last character, press the Enter key to validate the site ID. The screen displays the entered site ID (e.g. "SITE ID:0005")

4. Enter the *Hb* height measured earlier with the tape (see point *7.* on *page 41*):
- Press the Up key. The screen displays **ANT HT:**...
- Press the Enter key
- Enter the first character of the antenna height measured previously using the Up or Down key, then press Enter. Set the second character using the same Up or Down key, etc.
- After defining the last character, press the Enter key to validate the HI. The screen displays the entered HI (e.g. "ANT HT:01.5703m")

5. Set the recording interval:
- Press the Cancel key to return to **SURVEY:STATIC**
- Press the Up key until **SURVCONF** is displayed
- Press the Enter key. You can now enter the recording interval:

Up key   Down key

Enter key

Cancel key
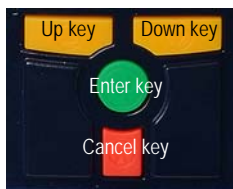
- Press the Enter key
- Enter the first character of the recording interval using the Up or Down key, then press Enter. Set the second character using the same Up or Down key, etc.
- After defining the last character, press the Enter key to validate the recording interval. The screen displays the entered interval (e.g. "REC INT:20.0s")

6. For the static "rover" only, enter the approximate length of the baseline:
   - Return to the SURVEY:STATIC root menu, press Enter, press the Up key twice and then enter this length (ESTIMATED BASELINE LEN:xxxkm). This parameter is very important as it will be used by the Z-Max.Net to help you determine the end of data collection.

Starting Data Collection

1. Start raw data logging as follows:
   - Return to the root menu and then press the Down key until SESSIONS is displayed
   - Press Enter. START SESSION is now displayed.
   - Press Enter again. Start Session? is now displayed.
   - Press Enter again. DONE is displayed for a few seconds. Data logging is now in progress as indicated on the Data Log LED which should blink green once at the frequency of the data recording interval.

End of Data Collection

1. Return to the SURVEY:STATIC root menu, press Enter, press the Up key twice. The screen should now display the ESTI-MATED BASE LINE LEN parameter.

2. Let the Z-Max.Net rover collect data until this parameter goes down to "000 km". A message is then displayed informing you that you can stop data collection. But always use your own judgement to decide the moment when to stop data collection.

Remember the amount of data required is dependent on a number of factors including:

- The quality of the satellite geometry (PDOP),
- The number of satellites above the elevation mask,
- Any obstructions between the satellites and the GPS antenna
- The distance (or vector length) between the receivers collecting data simultaneously.

3. To end data collection, just turn off the Z-Max.Net system by pressing the Power button for 2 seconds. When the receiver is powered down the active measurement file is automatically closed.

When the receiver is powered back up a new measurement file will be automatically created.

After data collection is complete, take all Z-Max.Net systems used in the survey to the office and download the data to an office computer as described in *Downloading Field Data to your PC on page 45*. The data is now ready for post-processing using GNSS Solutions.

Downloading Field Data to your PC

The easiest and fastest way to download your field data is to use the card reader attached to the office PC. This procedure is described in the present section. It is assumed that GNSS Solutions has already been installed on your PC.

After downloading your field data, do not forget to re-insert the SD card into the Z-Max.Net before taking it back to the field!

If you don't have a card reader, you can download your field data directly from the Z-Max.Net via a USB or RS 232 link. This procedure is described in the *Z-Max.Net Reference manual*. Please refer to this manual for more information.

Back in your office, do the following to download your field data.

1. On the Z-Max.Net:
    - Remove the SD card from the Z-Max.Net
    - Insert the SD Card in your local SD card reader.
2. On the PC:
    - From the Windows task bar, select Start>Programs>GNSS Solutions>Tools>Download.

      (Double-click 🔼·· in the right side of the window if you want to change to the parent directory and open another folder on your PC.)
    - In the Download window, click on the drive combo box (see below) in the left-hand pane and select the letter corresponding to the local SD card reader (example: SD card reader is "F:").

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The left side of the Download window then lists the files present on the SD card.

- Select the files you want to download. If necessary, hold down the Ctrl key to make a multiple selection.
- Press the **F5** key. A Copying file dialog appears during data transfer.

  After the transfer is complete, notice in the right side of the Download window that each downloaded file has been split into different files named with a prefix as explained opposite.
- Close the Download window.

3. Repeat the previous two steps for each of the Z-Max.Net units involved in the project to download their respective files to the same project folder on your office computer.

Files resulting from the downloading of an observation file are named as follows: X<Downloadedfilename> *where prefix X = "E" for Ephemeris Data, "B" for Position Data, "D" for GPS Raw Data and "W" for SBAS Data.*

Post-Processing Field Data

1. On your office computer, launch GNSS Solutions
2. Click Create a New Project, enter a project name and then click OK.
3. Click Import Raw Data from Files.
4. Browse your computer to change to the folder containing the data files you have just downloaded.
5. Select the files you want to import and click Open.

The **Importing GPS Data** dialog lists the files you want to import (top). Each row describes one of these files (file-name, associated Site ID, etc.)
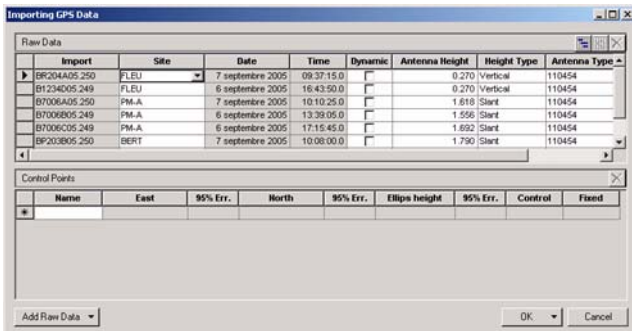
6. At the bottom of the window, define which of the sites is the control point (base) and enter or check its known coordinates. You can also fix the control point if necessary by selecting one of the options available in the **Fixed** column. If you select <**Blank**>, the point won't be fixed.
7. Click **OK**>**To Import** to import the data into the project. Depending on the type of survey, you can go even faster by running, in one operation, the Import, Process and Adjust functions.

For more information on GNSS Solutions, please refer to the *GNSS Solutions Reference Manual*.

5. Front Panel Interface Function Diagram

SYSINFO	SURVEY: Current Mode	SURVCONF	SESSIONS	SETTINGS	COM OPTN

RCVR VERSION

STATIC
- SITE
- ANT HT
- BASELINE
- STATUS

STATIC
- REC INT
- ELEV MASK
- SBAS
- Select SURVEY MODE

STOP SESSION

START SESSION

MEMORY RESET

MAGELLAN RADIO

RCVR S/N

OR

KINEMATIC
- SITE
- ANT HT
- STATUS

OR

KINEMATIC
- EPOCH CNTR
- MIN SV
- REC INT
- ELEV MASK
- Select SURVEY MODE

LIST SESSION

RESET TO FACTORY DEFAULTS

PDL

OPTIONS

OR

RTK BASE
- SITE
- ANT HT
- ANT RAD
- BASE POS
- STATUS

OR

RTK BASE
- PORT/TYPE
- REC INT
- ELEV MASK
- Select SURVEY MODE

NEW SESSION

BAUD RATE

GSM ROVER

BAT

MEM

OR

RTK ROVER

OR

RTK ROVER

DELETE ALL

LANGUAGE

GSM BASE

BEEP

SAVE

Symbology:

Thin arrow - Enter or Cancel Key

Thick Arrow - Up or Down Key

See Reference Manual

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