MAGELLAN®

P R O F E S S I O N A L

MobileMapper™ CX

Getting Started Guide

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FCC Notice
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 to correct the interference by one or more of the following measures:
 • Reorient or relocate 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.
Changes or modifications not expressly approved by Magellan Navigation could void the user's authority to operate this equipment.
CAUTION: To comply with FCC RF exposure compliance requirements, a separation distance of at least 20 cm must be maintained between the antenna of this device and all persons.

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In the presence of RF field, the receiver's satellite signal strength may degrade. When removed from the RF field, the signal strength should return to normal.

This device has been found compliant with the Canadian RSS-210 specification, issue 5, November 2001 which stipulates that operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

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

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

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http://professional.magellangps.com/en/support/rma.asp. The purchaser must return the product postpaid with a copy of the original sales receipt to the address provided by Magellan Navigation with the RMA number. Purchaser's return address and the RMA number must be clearly printed on the outside of the package.

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

authorized Magellan Navigation Service Center will void this warranty.

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This warranty gives the purchaser specific rights. The purchaser may have other rights which vary from locality to locality (including Directive 1999/44/EC in the EC Member States) and certain limitations contained in this warranty, including the exclusion or limitation of incidental or consequential damages may not apply.

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

Magellan Navigation, Inc., 960 Overland Court, San Dimas, CA 91773, Phone: +1 909-394-5000, Fax: +1 909-394-7050 or

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

Magellan Professional Products Limited Warranty (Europe, Middle East, Africa)

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

1. MAGELLAN NAVIGATION WARRANTY

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

In the event of a defect, Magellan Navigation will, at its option, repair or replace the hardware product with no charge to the purchaser for parts or labor. The repaired or replaced product will be warranted for 90 days from the date of return shipment, or for the balance of the original warranty, whichever is longer. Magellan Navigation warrants that software products or software included in hardware products will be free from defects in the media for a period of 30 days from the date of shipment and will substantially conform to the then-current user documentation provided with the software (including updates thereto). Magellan Navigation's sole obligation shall be the correction or replacement of the media or the software so that it will substantially conform to the then- current user doc-

umentation. Magellan Navigation does not warrant the software will meet purchaser's requirements or that its operation will be uninterrupted, error-free or virus-free. Purchaser assumes the entire risk of using the software.

2. PURCHASER'S REMEDY

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

3. PURCHASER'S DUTIES

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

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

4. LIMITATION OF IMPLIED WARRANTIES

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

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

5. EXCLUSIONS

The following are excluded from the warranty coverage:

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

(2) batteries;

(3) finishes;

(4) installations or defects resulting from installation;

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

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

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

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

(9) any damage due to accident, resulting from inaccurate satellite transmissions. Inaccurate transmissions can occur due to changes in the position, health or geometry of a satellite or modifications to the receiver that may be required due to any change in the GPS. (Note: Magellan Navigation GPS receivers use GPS or GPS+GLONASS to obtain position, velocity and

time information. GPS is operated by the U.S. Government and GLONASS is the Global Navigation Satellite System of the Russian Federation, which are solely responsible for the accuracy and maintenance of their systems. Certain conditions can cause inaccuracies which could require modifications to the receiver. Examples of such conditions include but are not limited to changes in the GPS or GLONASS transmission.).

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

6. EXCLUSION OF INCIDENTAL OR CONSEQUENTIAL DAMAGES

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

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

7. COMPLETE AGREEMENT

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

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

8. CHOICE OF LAW.

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

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

Magellan Navigation SA - ZAC La Fleuriaye - BP 433 - 44474 Carquefou Cedex - France.

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

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Introduction

Thank you for purchasing a MobileMapper CX from Magellan. This Getting Started guide will give you useful information about your Windows CE GPS handheld computer. It will also guide you in your first steps using the system.

MobileMapper CX is a handheld device that integrates sub-meter GPS with Microsoft Windows CE in a rugged design suitable for mobile mapping applications.

Being an open-platform Windows CE device, MobileMapper CX allows you to choose the GIS software that is right for you.

Key Features

- Integrated GPS with real-time, sub-meter accuracy using SBAS.
- Ready for real-time RTCM corrections.
- Integrated Bluetooth wireless technology.
- Integrated WiFi driver for US Robotics model 5421.
- Mail Client.
- Full color, daylight readable, transflective TFT display with 320 x 240 resolution and touch screen.
- Integrated Secure Digital (SD) memory card slot.
- SD card up to 4 GBytes.
- Rugged and waterproof design.
- Built-in alphanumeric keyboard.
- Built-in speaker.
- Advanced power management.
- All-day rechargeable, removable Li-ion battery.
- Embedded Microsoft Windows CE 5.0 operating system.
- Support for off-the-shelf mobile GIS software applications.

Software Provided as Standard

- **Communication** tool (Terminal)
- **Magellan GPS utilities**, including DGPS Configuration, GPS Initialization, GPS Port Configurations, GPS Reset, GPS Settings, GPS Status and Mission Planning.
- **Microsoft File Viewers**, including Docviewer, Pdfviewer, Presviewer and XLS.
- **Miscellaneous Microsoft tools**, including Command Prompt, Inbox, Internet Explorer, Media Player, Windows Explorer and WordPad.
- **Bluetooth Manager**, a utility program controlling Bluetooth wireless communication.
- Software for WiFi driver.
- **Software Development Kit** (SDK) and **GPS Application Programming Interface** (API) delivered free of charge after a Business Partner Agreement has been approved. Please contact Magellan to discuss your software development project.

Optional Software

- Magellan GIS application (Mobile Mapping).

About Windows CE

Windows CE is a version of the Windows operating system designed for small devices such as personal digital assistants (PDAs) or handheld PCs. The Windows CE graphical user interface (GUI) is very similar to desktop Windows operating systems. MobileMapper CX is embedded with the Windows CE 5.0 version.
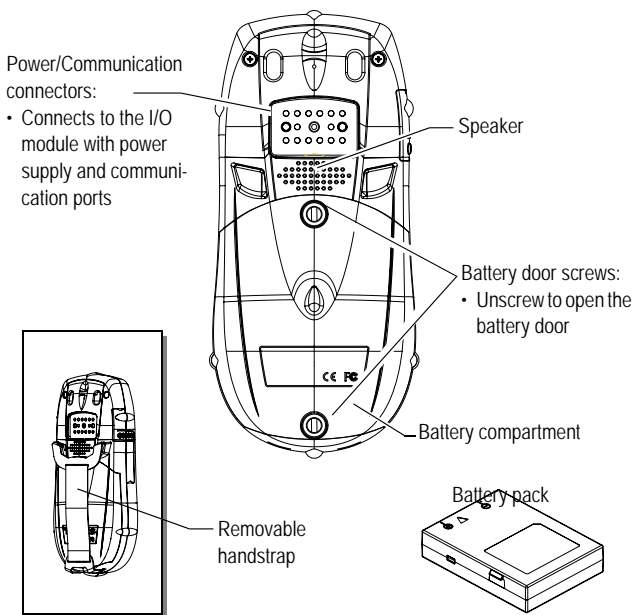
Like most Windows CE devices, the MobileMapper CX handheld has a touch screen. To interact with the MobileMapper CX, use the stylus to tap on the touch screen.
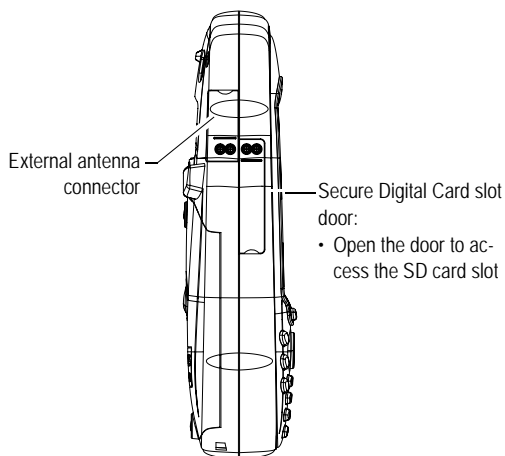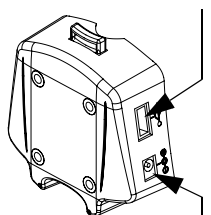
Receiver Description

Front Panel

GPS receiver includes:
• Integrated GPS accurate to sub-meter with WAAS/EGNOS
• Ready for RTCM real-time corrections
• Internal antenna.

Touch screen display:
• Full-color transflective liquid crystal display (LCD)
• ¼ VGA

Scrolling button

Power button

Power indicator

Battery indicator

Alphanumeric keypad

Back Panel

Power/Communication connectors:
• Connects to the I/O module with power supply and communication ports

Speaker

Battery door screws:
• Unscrew to open the battery door

Battery compartment

Removable handstrap

Battery pack

Side Panel

External antenna connector

Secure Digital Card slot door:
• Open the door to access the SD card slot

I/O Module

USB host port (Type A) for connection to a WiFi key, USB flash drive, card reader etc.

Mini USB (Type B) port

DC power input connector
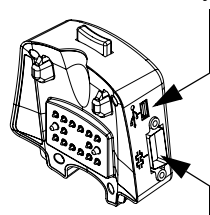
Serial port (COM1) DB-9 connector

Setting the Mini-USB Port (I/O Module)

The mini-USB port located on the I/O module can be set to operate in one of the following two configurations:

- USB port emulating a conventional serial port. When set in this configuration, the USB port is made available as "COM6" in the GPS Port Configurations utility.
- USB port especially intended for use in conjunction with Microsoft ActiveSync.
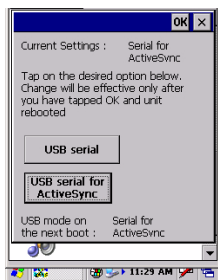
To change the USB port settings, do the following:

- Tap on , then Settings>Control Panel.
- Browse the items listed in the control panel to find the USB device switcher icon.
- Double-tap this icon. This opens a new dialog showing the possible two settings:
    • USB serial: Tap this button to set the USB port as a serial port.
    • USB serial for ActiveSync: Tap this button to set the USB port for use with Microsft ActiveSync.

    Warning! The change will be effective only after you have re-booted the unit. A message at the bottom of the dialog indicates the future status of the USB port, once the unit has been re-booted. If you keep the USB port setting unchanged, then the message indicates the current setting of the USB port.
- Tap OK to close the dialog.

Resetting MobileMapper CX

To reset MobileMapper CX, hold down the ESC, Enter and Power keys simultaneously until the screen goes blank. The MobileMapper CX switches off. You can then power on the device by pressing the power button.

Note that using this key combination does not reset the GPS receiver. To reset only the GPS receiver, see *GPS Reset on page 46*.

Preparing for First-Time Use

Charging the battery

Before using your MobileMapper CX handheld PC, you must charge the battery:

1. Locate the removable battery in the product shipping box.
2. Open the battery door by turning the two screws one-quarter turn counterclockwise.
3. Insert the battery into the battery compartment in the back of the MobileMapper CX handheld as shown below:
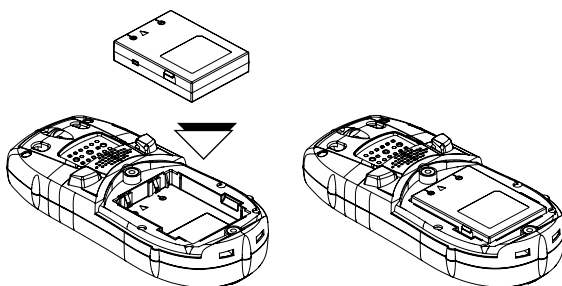
4. Close the battery door and tighten the screws.
5. Attach the clip-on I/O module to the MobileMapper CX handheld as shown below (insert lower part first and snap in the top hooks):
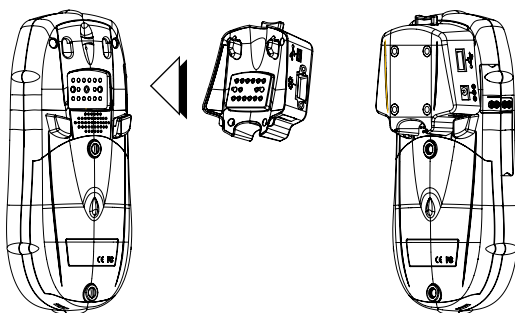
6. Connect the DC power cable from the AC adapter (see below) and then let it charge the battery for approximately six hours.

Connect DC power cable to this input

7. To detach the clip-on I/O module, press the release button on the module.
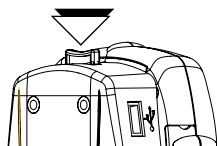
Turning the Receiver On

Once you have charged the battery in your MobileMapper CX, press the red power button until the green LED turns on.

Power button

Green power light

Calibrating the Screen

The MobileMapper CX touch screen is used both for display and user input. The first time you use your MobileMapper CX you will need to align the display with the touch screen function. Tap each target that appears on the Calibration screen with the tip of the stylus. Tap anywhere on the display, or press ENTER, when finished.

You can re-calibrate your screen at anytime:

- Tap 🍡 , then select Settings>Control panel
- Double-tap the Stylus icon
- Select the Calibration tab and tap the Recalibrate button.

Automatic System Time Update

MobileMapper CX will automatically update the system date & time using the GPS time determined by the integrated GPS receiver and the time zone that you specify. To set the time zone:

• In the task bar, double-tap the clock icon:

This opens the Date/Time Properties screen.

• Set the time zone field (see opposite) and then select OK on top of the screen. Please note that the MobileMapper CX must track at least one GPS satellite before it will update system time.
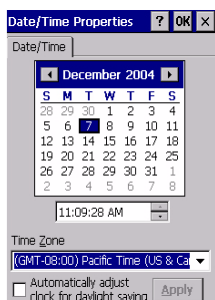
Adjusting the Backlight

To switch the backlight on/off for both the keypad and display, or to adjust the brightness and screen contrast, double-tap the Backlight Control icon in the control panel.

To conserve battery power, we recommend you turn the keypad backlight off by sliding the keypad brightness indicator all the way to the left. You should need to backlight the keypad only at night. We also recommend you set the LCD panel brightness as low as possible for your work environment.
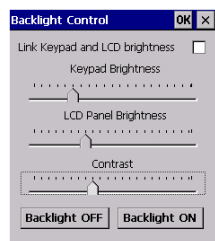
Regional Settings

MobileMapper CX supports code sets and languages support-ed by the Windows CE operating system. These include Euro-pean languages as well as multibyte languages such as simplified Chinese and Japanese.

- From the MobileMapper CX Companion CD, copy the appropriate language installation files (.CAB) to your device. Use either a card reader to copy the files to an SD card for transfer to the MobileMapper CX or download the files directly to the device using ActiveSync and the unit's USB cable and I/O module.
- On the device, double-tap on the .CAB file.
- The default location for installation is "\MyDe-vice\Intl\####\" (where #### is the language number). **You must install to this default location when the dialog box appears asking where you wish to install the files**.
- Tap 🏁 , then select Settings>Control Panel
- Double-tap the Regional Settings icon.
- Select your preferred locale and language as shown on the screen (below, left).
- Once the language is installed, shut down the unit by selecting successively the 🏁 tab, Shut Down then OK on the Shut Down screen (below, right).
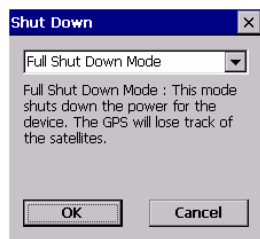
- Next time you boot the MobileMapper CX device, the selected language will be used.
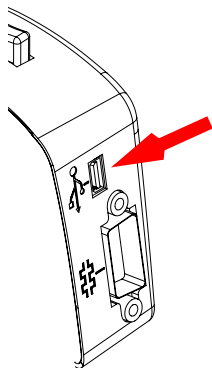
Establishing a Connection with your PC

Using Microsoft ActiveSync, you can connect a desktop computer to your MobileMapper CX handheld via the USB data cable. This allows you to install software and transfer files to/from MobileMapper CX. **Magellan recommends you always use the lastest version of ActiveSync**.

Prerequisite: Make sure the USB device switcher is set to "Serial for ActiveSync". See *Setting the Mini-USB Port (I/O Module) on page 5*.

To connect to a PC:

1. Install ActiveSync on the desktop computer. (Microsoft ActiveSync is included on the MobileMapper CX Companion CD). You may also download the latest version by going to the Microsoft web site at www.microsoft.com/windows-mobile/default.mspx and clicking on the ActiveSync link.
2. Attach the I/O module to the MobileMapper CX handheld. Connect the USB data cable to the USB port (the mini-connector) on the I/O module (see opposite).
3. Connect the other end of the USB data cable to a USB port on the desktop computer.
4. Follow the ActiveSync instructions to establish a connection.

Installing Software

Once the connection is established with a PC using Active-Sync, you may install any supported software you need. It is very important to make sure you install your program in the non-volatile memory, under "MyDevice" or on an SD card.

Installing off-the-shelf Windows CE software: Please refer to the software documentation for more information and detailed instructions.

Working in the Windows CE Environment

User Interface For Text Input

MobileMapper CX comes with an integrated physical keypad and as with most Windows CE devices, you may also use an on-screen keyboard to enter text. To activate the on-screen (or "virtual") keyboard, tap the keyboard icon in the taskbar and then tap Keyboard. The virtual keyboard appears on the screen.

Using the Integrated Alphanumeric Keypad

MobileMapper CX uses a telephone-style alphanumeric keypad. The cursor keys are used to move the cursor left, right, up and down on the screen.

Buttons 2-9 contain alphanumeric characters. By pressing the key continuously, all characters on that key will be scrolled. For example, the letters a, b and c are associated with the "2" key. Tapping the key once enters an "a," twice enters a "b," three times enters a "c" and four times enters a "2."

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Dot-Shift Key

Keyboard Properties

The keyboard default is lower-case alphanumeric letters.

- Press the **Dot-Shift** key to toggle from numeric lock to caps lock and default mode.
- Press the **Dot-Shift** key twice to lock the keypad in numeric mode.

  The [1] icon appears in the task bar indicating that the numeric lock mode is enabled.
- Press the **Dot-Shift** key three times to activate the upper-case lock.

  The [A] icon appears in the task bar indicating that the caps lock mode is enabled.
- Press the **Dot-Shift** key four times to bring it back to the default lower-case alphanumeric mode.
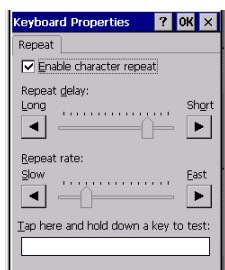
  NOTE: You can repeat letters by holding the button down for a certain length of time. To adjust the amount of time it takes the keyboard to recognize the Repeat command and the speed with which it repeats letters, tap, Settings, Control Panel, Keyboard.

  An easy way to practice using the keyboard is to tap, Programs, Microsoft WordPad and write your address.

Using the Stylus

The stylus is used for menu selection or data input on the touch-screen.

- **Tap**: Touch the screen once with the stylus to select the item, tap twice to open the selected item.
- **Drag**: Hold the stylus on the screen and drag it across to select text and images. Drag in a list to select multiple items.
- **Tap and hold**: Tap and hold the stylus on an item to see a list of functions available for that item. On the pop-up menu that appears, tap the function you want to perform. In Bluetooth Manager, the "Tap and Hold" action is slightly different: you must remove the stylus to let the menu pop up.

When you operate the touch screen of the MobileMapper CX, use the supplied stylus.

If the tip of the stylus is damaged, do not use it. If you operate the touch screen with a damaged stylus or a ballpoint pen, the touch screen may be damaged.

When the stylus is damaged, please use the extra stylus or buy a new one.

Initializing GPS

The first time a new GPS receiver is turned on, it might have difficulty calculating its position. To help the receiver calculate its first position, you should "initialize" it. You should do this when:

- The receiver is brand new.
- You have moved more than 500 miles from the last place you were using it.
- GPS receiver has been reset.
- Or the receiver has not been used for more than a few months.

Take the MobileMapper CX to a location where there is a clear view of the sky, then:

- Tap ![icon], then select **Programs**>**GPS Utilities**>**GPS Initialization**
- Initialize the receiver using one of the two methods below:
    1. If you do not know even the rough coordinates of your current position, check the **Choose Country** option (see screen opposite), select your region (or country) and then your country (or state or province) in the two fields underneath, enter the date and time (bottom of the screen) and then tap **OK** to start the initialization process. This closes the GPS Initialization window.
    2. If you have a rough idea of the coordinates of your current position, directly enter these coordinates in the **Latitude** and **Longitude** fields (see screen opposite), enter the date and time (bottom of the screen) and then tap **OK** to start the initialization process. This closes the GPS Initialization window.

- If you want to check that initialization has been successful, run the GPS Status utility (see *Viewing Current GPS Status on page 15*).

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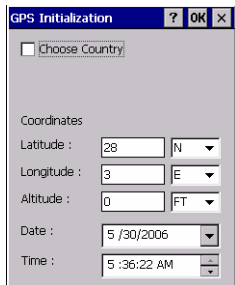
Setting Up GPS Positioning

The *GPS Settings* tool is used to set the environmental conditions in which the unit is to be used. These settings have an impact on both the availability and accuracy of the position computed by the unit.

Tap 🦋 , then select **Programs**>**GPS Utilities**>**GPS Settings** to run the GPS Settings utility. The following parameters are displayed (see screen opposite):

- **Open Sky**: Check this option if you are working in an open sky area.
- **Tree Canopy**: Check this option if you are working in a forested area.
- **Urban Canyon**: Check this option if you are working in an urban area with high buildings in the vicinity.
- **Custom**: Check this option if you want to set each of the GPS parameters individually. Do not use this option unless you are very familiar with these parameters. When checking this option, a new dialog box opens (see opposite) in which you can set the following parameters:
  - **DOP type**: Choose the DOP type on which to set an upper limit (see next field).

    The position of GPS satellites in orbit determine the DOP values for a given site. The higher the DOP value, the less accurate the position solution. PDOP (Position Dilution of Precision) is the DOP value for the three-dimensional position solution. HDOP (Horizontal Dilution of Precision) is the DOP value for the two-dimensional horizontal position.
  - **Maximum DOP** [PDOP or HDOP]: DOP values considered "good" are less than 3. Values greater than 5 are considered poor. Thus, small DOP is associated with widely separated satellites. No position will be computed when the selected DOP type exceeds the entered **Maximum DOP**.

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- **Minimum SNR**: SNR stands for Signal-to-Noise Ratio. Ensure your SNR mask is not set too low (less than 20). GPS signals with lower SNRs will be very noisy and contribute to accuracy degradation.
- **Elevation Mask**: Angle that specifies that any satellite must be at least a specified number of degrees above the horizon (typically 5 to 10°) before the signals from the satellite are to be used. Ensure that the elevation mask set in your receiver is high enough to avoid using satellites near the horizon as they are often noisier than satellites higher overhead.

Tap **Apply** after making your choice and then tap **OK** to close the GPS Settings utility. By default, the GPS is configured to track satellites in normal conditions of reception (Open Sky).

NOTE: The first three options (**Open Sky**, **Tree Canopy** and **Urban Canyon**) use preset values for **Maximum DOP**, **Minimum SNR** and **Elevation Mask**.

Viewing Current GPS Status

The *GPS Status* utility allows you to quickly see if the GPS receiver is calculating a position from the currently visible GPS constellation. It can also be used to log and playback NMEA data. Do the following to launch *GPS Status*:

- Tap 🏁 , then select **Programs>GPS Utilities>GPS Status**. This opens the GPS Status window.

| Differential GPS | 3D | No Log | 🔵 |
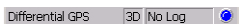
Regardless of the displayed tab, the bar at the bottom of the screen displays the following, from left to right:

- The type of position being calculated (**Fix Not Available**, **Autonomous GPS** or **Differential GPS**).
- The data logging status (**No Log** or **Log:x.. xK** where **x.. x** is the current size of the file being logged, in kbytes).
- Position indicator light (Blue: Differential GPS position computed; Green: Autonomous GPS position computed; Red: No position computed).

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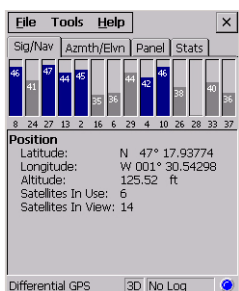
Signal Quality/Navigation Window (Sig/Nav)

This window allows you to monitor Signal/Noise ratios for received satellites. This information is shown in graphical form (see opposite).

The signal quality window will grow or shrink to accommodate the number of satellites in view.

The Position pane provides the coordinates of the current GPS position, including altitude and the number of satellites (in view and used).
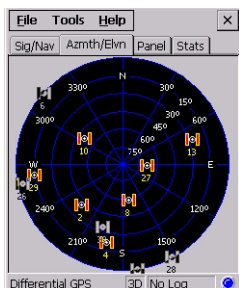
Azimuth and Elevation Graph (Azmth/Elvn)

This graph shows all the satellites currently in view.

Each satellite is identified by its Pseudo-Random Number (PRN), its azimuth and elevation angles.
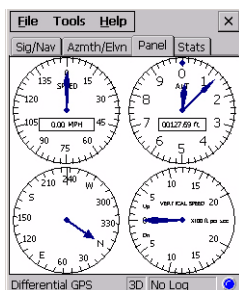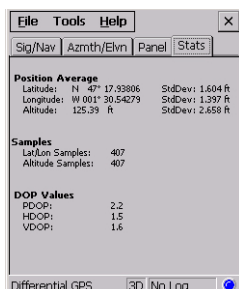
Panel Window (Panel)

This window displays the following parameters relevant to the MobileMapper CX unit:

- Speed
- Altitude
- Heading
- Vertical speed.

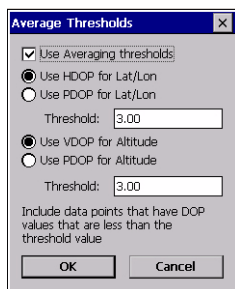These parameters are updated every 45 seconds.

Statistics Window (Stats)

This window provides the averaged coordinates of the computed position and shows the accuracy figures corresponding to the GPS receiver used in static mode. The Dilution of Precision (DOP) values are also displayed.

The data displayed on this tab may be controlled from the Log menu (see *page 17*).

GPS Status Menu Bar

Menu	Sub-Menu	Function
File	Configura-tion>Units	Allows you to set the units used for distance and speed, for altitude/elevation and the format for latitude and longitude.
	Exit	Use this command to quit the GPS Status utility.
Tools	Log>Start	Starts logging of NMEA data. Asks for a log file to be created before starting logging data.
	Log>Stop	Stops data logging and closes the log file.
	Stats>Enable	When checked, this option enables the Statistics window to display data.
	Stats>Reset	Resets the data shown in the Statistics window (zeroes all results).
	Stats>Setup Avg Thresholds	Sets data thresholds used for calculating the averaged positions displayed on the Stats tab (see screen opposite).
Help	About GPS Status...	Displays the current software version of the GPS Status utility.

Average Thresholds

☑ Use Averaging thresholds
◉ Use HDOP for Lat/Lon
○ Use PDOP for Lat/Lon
Threshold: 3.00
◉ Use VDOP for Altitude
○ Use PDOP for Altitude
Threshold: 3.00
Include data points that have DOP values are less than the threshold value
[OK]   [Cancel]

Connecting the Internal GPS Receiver to your Application

As explained in *GPS Ports Configuration on page 46*, the COM2 port in MobileMapper CX is a virtual COM port named "GPS VSP Output" and has fixed settings: 57600 bauds, 8 data bits, 1 stop bit and no parity bit.

This virtual port will input GPS positions to off-the-shelf Windows CE mobile mapping applications running on MobileMapper CX. To do this, you just have to select "COM2" in your mobile mapping application as the source of GPS data.

COM2 can therefore provide the mobile mapping application with NMEA-formatted data coming from the internal GPS receiver. You can define the NMEA sentences you would like to output through this port from the **NMEA** tab in the GPS Ports Configuration utility (see *page 46*).

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Step-by-Step Procedure for Establishing a GPRS Connection Via Bluetooth

Introduction

You will use a cell phone associated with MobileMapper CX to operate in NTRIP or Direct IP mode via a GPRS connection. The cell phone should be a Bluetooth-enabled device fitted with a "full IP" SIM card[1] that allows a GPRS connection to be established with the provider.

When first implementing a GPRS connection, you will have to go through a relatively long procedure. But if you strictly follow this procedure, re-establishing this connection next time you use your MobileMapper CX will only take a few seconds.

Entering the right GPRS call number is essential to establish a GPRS connection. Three cases are possible:

- GPRS connection profile known
- GPRS connection profile unknown
- Special cases wherein a modem command is needed.

In all cases, you may have to get in touch with your provider in order to settle the connection issue.

Connection Profile Known

The GPRS connection profile you want to use is already stored in your cell phone. Your GPRS provider put it there. In this case, you will just have to refer to this profile when setting the GPRS connection. Referring to this profile will be made by simply using the adequate GPRS call number. This number is in the form:

`*99***<Profile_No.>#`

Where <Profile_No.> is the rank of the desired profile in the list of available GPRS connection profiles. To list the connection profiles stored in your cell phone, refer to its instructions manual.

---

1. A SIM card that can access all TCP ports.

Connection Profile Unknown

The GPRS connection profile you want to use is not stored in your cell phone, or your cell phone does not let you list the profiles stored in its memory or SIM card.

In this case, you will have to enter the parameters of the connection profile in the Dial-Up Connection window.

One or several of the following parameters (APN parameters) may be required, depending on your provider:

Parameter	Definition
User Name	APN Login
Password	APN password
Domain	APN domain

In this case, there is only one possible GPRS call number, which is:

*99#

Special Cases

For some cell phone models, entering a GPRS call number and the required APN parameters is not enough to establish a GPRS connection.

In this case, when configuring the connection, a Hayes modem command, instead of the APN parameters, should be entered to perform the connection. The modem command should be entered in a dedicated field, on the **Call Options** tab of the "Network and Dial-up Connections" utility, (see command example on the left).

The command is in the form:

+CGDCONT=<**cid**>,<**PDP_type**>,<**APN**>,<**PDP_addr**>,<**d_comp**>,<**h_comp**>

(more information on this command at http://www.phone-star.com.my/s_at_10.html).

When used, the modem command replaces all the APN parameters, which means you should leave the **User Name**, **Password** and **Domain** parameters as set by the utility.

Finally, when a modem command is used, use the following GPRS call number:

*99#
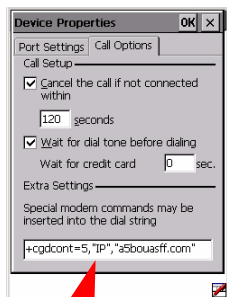
The First Time You Use MobileMapper CX

Please carefully read the procedure outlined in the table below. This procedure is described in detail in the continuation of this chapter. Please strictly follow the order in which the instructions are given.

Note that the procedure was tested for several popular mobile phone brands and for a European GPRS operator. The procedure should normally apply for any other manufacturer, phone model and GPRS operator although this cannot be guaranteed.

Step	Task	Detail
1	Ask MobileMapper CX to be paired with the cell phone.	On MobileMapper CX: - Start Bluetooth Manager - Detect the cell phone - Ask for a paired Bluetooth link - Enter a PIN code.
2	Allow the cell phone to be paired with MobileMapper CX	On the cell phone, select the appropriate command and then enter the same PIN code as in Step 1.
3	Re-boot Bluetooth Manager on MobileMapper CX	On MobileMapper CX, exit from Bluetooth Manager and then re-launch this program.
4	Establish a Bluetooth link between MobileMapper CX and the cell phone	On MobileMapper CX: - List the cell phone's local services - Establish a Bluetooth link - Create a shortcut for future connections.
5	Prepare the GPRS connection	On MobileMapper CX - Start creating a new connection icon - Enter the GPRS call number - Finish creating the new connection icon.
6	Establish the GPRS connection	On MobileMapper CX: - Double-tap the new connection icon - Enter GPRS operator identification data - Start the GPRS connection.

Step1: Ask MobileMapper CX to Be Paired with the Cell Phone

Start Bluetooth Manager
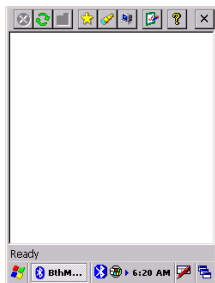
1. On MobileMapper CX, tap 📇 >Settings>Control Panel and then double-tap the Bluetooth Manager icon. The Bluetooth window appears on the screen after a few seconds.

   Note the presence of the 🔵 icon in the task bar. For a quick overview of the Bluetooth Manager toolbar, please refer to *Bluetooth Manager Toolbar Functions on page 74*. For more details about Bluetooth Manager, please refer to *Bluetooth Manager Module on page 50*

Detect the Cell Phone

Caution! MobileMapper CX and the cell phone should not be too close to each other. Keep a minimum distance of 60 cm (2 feet) between the two devices.

1. Turn on your cell phone.
2. Activate its Bluetooth device. Refer to your cell phone's manual for instructions on how to do this.
3. Make its Bluetooth device discoverable from external Bluetooth devices such as MobileMapper CX. Again, refer to your cell phone's manual for instructions on how to do this.

4. On MobileMapper CX, tap 🟡 to search for any nearby Bluetooth-enabled devices, including your cell phone. At the end of this sequence, the icon representing your cell phone should be visible in the Bluetooth Manager window (see example opposite). Other Bluetooth devices may have been detected during this search sequence.

   NOTE: Tap 🔄, not 🟡, if for any reason you need to resume the search sequence.

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Ask for a Paired Bluetooth Link

This procedure is for securing and quickly re-establishing the Bluetooth connection between the two units.

1. Tap and hold the cell phone icon.
2. When a dotted circle appears, remove the stylus and, in the menu that pops up, select Pair. A new window opens in which you should enter a PIN number to secure the connection to the cell phone (see below).

Enter a PIN Code

1. Tap inside the Pin field and type in any number. A two- to four-figure number is recommended. (Press the Shift key twice to lock the keypad in numeric mode.) You will have to remember this number in step 2 below.

   Note that this number may be different from the one entered in the Bluetooth Properties dialog (see *PIN Code, Detectability & Authentication on page 52*).
2. Tap OK to enter the PIN code and close the dialog box. This causes the cell phone to display a message or menu confirming the pairing request from MobileMapper CX.

Step 2: Allow the Cell Phone to Be Paired with MobileMapper CX

On the cell phone, after the message triggered by the pairing request from MobileMapper CX, allow a new pair of Bluetooth devices to be created between MobileMapper CX and the cell phone:

1. Select the appropriate function depending on the cell phone used. For example on the Sony/EricssonT68i, select "Add to Paired".
2. You will then be asked to enter the pin number you have previously defined in MobileMapper CX (see Step 1).

   When the units have successfully been paired, a yellow circle containing a padlock will appear on the cell phone icon on MobileMapper CX (see example opposite).

Step 3: Re-Boot MobileMapper CX's Bluetooth Manager

This step is required for all the changes you have just made to take effect.

1. In the task bar, tap 🔵 and then select **Exit**. This instantly stops Bluetooth Manager and closes the window.
2. Double-tap the **Bluetooth Manager** icon in the still open Control Panel window. The Bluetooth window appears on the screen after a few seconds.

NOTE: Keep the cell phone on during this step.

Step 4: Establish a Bluetooth Link Between MobileMapper CX and the Cell Phone

List the Cell Phone's Local Services

1. Tap 🖊. The cell phone icon appears instantly and you can see a yellow circle included indicative of an active pair of Bluetooth devices.
2. Double-tap the cell phone icon. The Bluetooth Manager window now shows the Bluetooth services offered by your cell phone (see example opposite).

Establish a Bluetooth Connection

1. Double-tap the Dial-Up Networking icon. As a result, a connection is automatically implemented using the first Bluetooth virtual port available on MobileMapper CX. The message "Connection succeeded on communication port COMx:" is displayed.

   NOTE: COM1 is the only physical COM port on MobileMapper CX. COM2 is an internal virtual port and COM3 is automatically assigned as the first Bluetooth virtual port at power on. So when you double-tap the Dial-Up Networking icon, COM4 is normally the port used for that connection.

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2. Tap OK to close the message window. Note the presence of a plug in a green circle on the Dial-Up Networking icon showing that the connection has been made (see opposite).

Create a Shortcut for Future Connections

This shortcut will allow you to save time for future connections as you won't have to list the local services of the cell phone to re-activate the Bluetooth link. Instead you will just have to double-tap the shortcut.

1. Tap and hold the Dial-Up Networking icon. When a dotted circle appears, remove the stylus and, in the menu that pops up, select Create Shortcut. A message "Shortcut successfully saved" appears after a few seconds.
2. Tap OK to close the message window.
3. Tap 🌟 to view the shortcut you have just created.
4. Tap ✕ to minimize the Bluetooth Manager window.

Step 5: Prepare the GPRS Connection

1. In the task bar, tap 🪟 >Settings>Network and Dial-up Connections.
2. In the window that opens, double-tap the Make New Connection icon.
3. Name the new connection (for example "My Cell Phone") using the virtual keyboard, keep Dial-Up Connection checked on and then tap Next>.

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4. In the **Select a modem** field, select the port used on MobileMapper CX (i.e. the port assigned previously) to communicate with the Bluetooth modem of the cell phone (see screen example opposite; the selected modem should be in the form "BT Modem on <CellPhoneName> COMx").

5. Tap **Configure** and then enter the data line settings on the **Port Settings** tab. Choose a baud rate that is greater than the one used by the GPRS connection.

6. Tap **OK** to close the Device Properties window. Ignore the warning message, if any. Simply tap **OK** to close this message.

7. In the Modem window, tap **Next>**.

8. In the **Phone Number** field, type your *GPRS call number* (see *Introduction on page 18*).

9. Tap **Finish**. A new icon appears in the Connection window (see example opposite).

Step 6: Establish the GPRS Connection

1. Double-tap the icon you have just created in the connection window.

2. If you don't need to enter your connection profile, skip to step 3 (see page 18). If you need to enter your GPRS connection profile, enter the three parameters below and enable the **Save password** option:
   • *User Name*
   • *Password*
   • *Domain*

3. Tap on the **Dial Properties** button and then on the **Edit** button. This opens the Edit Dialing Patterns window.

4. Correct the content of this window in order to read "G" in the three fields.

5. Tap **OK** twice to return to the Dial-up Connection window.

6. Tap on the **Connect** button. The following messages appear successively: "Opening Port", "Dialing...",... "User Authenticated" and "Connected". The GPRS connection is now established.

7. Tap **Hide** to close the message window.

8. Tap [X] to close the Connection window.

9. Now it's time to select your DGPS mode (refer to *Selecting a DGPS Mode on page 29*).

Troubleshooting

You may encounter problems when attempting to establish the GPRS connection (Step 6 above). The table below may help you solve the problem.

Message	Action
"No Carrier Detected. Verify phone number and then try again."	- Double-tap connection icon - Tap Dial Properties button - Tap Edit button - Reset all fields to "G".
"You have been disconnected from the remote computer you dialed. Retry the connection."	On the cell phone, check that the GPRS connection capability is activated.
"The port is not available: it is either configured incorrectly or another program is using it."	Check all data entries performed during steps 5 and 6.

NOTE: The Password and Domain fields (see Step 2) are intentionally corrupted when next opening the Dial-up connection. This is done for safety purposes. You don't need to retype these parameters. The correct values are stored in the unit.

Subsequent Uses

Standard Re-Start Procedure

Next time you turn on MobileMapper CX and the cell phone, the procedure for re-establishing the GPRS connection will be significantly shorter, as explained below. Because the two devices were paired when first using them, you don't need to make the cell phone discoverable.

1. On MobileMapper CX, tap ![icon] >Settings>Control Panel and double-tap Bluetooth Manager to re-start Bluetooth Manager.

2. Tap ![icon] to list the existing shortcuts.

3. Double-tap the Dial-Up Networking icon. This re-establishes the Bluetooth connection between the cell phone and MobileMapper CX. Tap OK to close the message window.

4. Tap ![icon] to minimize the Bluetooth Manager window.

5. Tap ![icon] >Settings>Network and Dial-up Connections.

6. Double-tap the "My Cell Phone" icon you have created in the initial procedure (see *page 24*).

7. Tap on the Connect button. The following messages appear successively: "Opening Port", "Dialing...",... "User Authenticated" and "Connected". The GPRS connection is now established.

8. Tap Hide to close the message window.

9. Tap ![icon] to close the Connection window.

10. Select your DGPS mode (see *Selecting a DGPS Mode on page 29*).

Disconnecting GPRS

You may want to disconnect the GPRS connection. Follow the instructions below to do this from the MobileMapper CX:

1. In the task bar, tap 🥾 >**Settings**>**Network and Dial-up Connections**.
2. Tap on the icon representing the currently active GPRS connection.
3. Do one of the following:
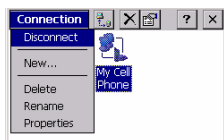
    - Tap 🔌 in the menu bar (top of the screen).
    - Or Tap **Connection** in the menu bar (top of the screen) and then select **Disconnect**. This instantly cuts off the GPRS connection.

Selecting a DGPS Mode

Introduction

MobileMapper CX can be operated in one of the following DGPS modes:

1. **SBAS**: Differential corrections from SBAS satellites (SBAS) are received by MobileMapper CX itself through one of its GPS reception channels. This is the most straightforward technique to implement DGPS in MobileMapper CX.
   IMPORTANT! SBAS is the only real-time DGPS mode that can be used simultaneously with raw data recording.

2. **Beacon**: Differential corrections are received by the belt-carried Magellan MobileMapper beacon. This unit is connected to the MobileMapper CX via Bluetooth or a serial cable.

3. **Direct IP**: Differential corrections are taken from the Internet at a fixed IP address. They are routed to MobileMapper CX via a GSM/GPRS cell phone and Bluetooth.

4. **NTRIP** (=Networked Transport of RTCM via Internet Protocol): Same as Direct IP except that the provider uses the NTRIP protocol to deliver its differential corrections.

5. **Other RTCM Source**: Differential corrections are received by third-equipment delivering RTCM2.x message type #1. This third equipment is connected to MobileMapper CX via a serial cable or Bluetooth.

The table below summarizes the connection and identification data needed when operating in the NTRIP or Direct IP mode.

Parameter	Direct IP	NTRIP
Host IP Address	•	•
Port Number	•	•
Login		•
Password		•

The table below lists the different steps you have to go through before MobileMapper CX can operate in a given DGPS mode, depending on whether the mode relies on the use of a COM port, Bluetooth or GPRS.

Step # DGPS Mode	Step 1	Step 2	Step 3	Step 4
SBAS	Select SBAS mode	Enable SBAS mode		
Beacon via Bluetooth	Establish Bluetooth Connection	Select and set (tune) beacon	Enable Beacon mode	
Beacon via COM1	Connect Serial Data Cable	Select and set (tune) beacon	Enable Beacon mode	
Direct IP	Establish Bluetooth Connection	Establish GPRS connection	Select and set Direct IP	Enable Direct IP
NTRIP	Establish Bluetooth Connection	Establish GPRS connection	Select and set NTRIP	Enable NTRIP
Other RTCM Source via COM1	Connect Serial Data Cable	Select and set RTCM source	Enable Other RTCM Source mode	

To choose and enable a DGPS mode, use the *DGPS Configuration* utility as explained in detail in the continuation of this chapter.

Once a DGPS mode is used, any accidental disruption in the flow of incoming data packets will trigger a warning message of the type "**No differential corrections received over xx sec! Correction age limit** = **xx** sec". This will happen after a time tied to the value you will have assigned to the **Real Time Correction Age Limit** parameter. When this warning message appears, MobileMapper CX will automatically switch to Autonomous GPS mode.

SBAS
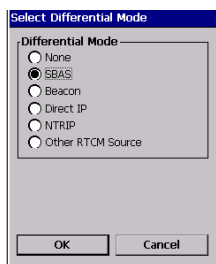
- Tap on 🏁 , then **Programs**>**GPS Utilities**>**DGPS Configuration**.
- Tap on the **Select Mode** button.
- In the Select Differential Mode window, enable the **SBAS** option.
- Tap **OK** to close the window. This takes you back to the DGPS Configuration window where you can read the choice you have just made.
- Tap **OK** again. The window is closed and MobileMapper CX starts operating instantly in SBAS DGPS mode, which means it will dedicate two of its reception channels to SBAS satellites, whenever visible and received, and only the best one will be involved in the DGPS processing.
- Start your application.

Beacon

Two different connections to MobileMapper CX are possible with MobileMapper Beacon: via Bluetooth (preferred) or using a wire connection (RS232). For more information about MobileMapper Beacon, please refer to its *Getting Started Guide.*

1. If you are using Bluetooth:

- Place MobileMapper Beacon between 60 cm (two feet) and 10 meters (about 30 feet) away from the MobileMapper CX. Do not stand squarely between the two. Bluetooth requires line of sight, though you may place the Beacon on your belt.
- Switch on both MobileMapper Beacon and MobileMapper CX.
- On MobileMapper CX, tap on 🏁 , then **Settings**>**Control Panel** and double-tap **Bluetooth Manager**. The Bluetooth window appears on the screen after a few seconds.

- Tap ![icon]. Bluetooth Manager starts searching for any Bluetooth device present in the vicinity. At the end of the search sequence, a MobileMapper Beacon icon should be present in the list of found devices.
- Double-tap the MobileMapper Beacon icon. The screen lists the only service available from MobileMapper Beacon which is its Serial Port service.
- Double-tap the Serial Port service icon. A dialog box opens prompting you to associate MobileMapper CX's COM4 with MobileMapper Beacon.
- Just tap OK. A message box appears confirming that a link is now established with MobileMapper Beacon via Port COM4 on MobileMapper CX. On MobileMapper Beacon, the blue indicator light is on.
- Tap OK.
- Tap ⊠ to minimize the Bluetooth window.
- Tap ⊠ again to close the Settings window.
- Then go to point **3.** below.

2. If you are using COM1 on MobileMapper CX to communicate with MobileMapper Beacon (RS232 wire connection):
- Attach the I/O module to MobileMapper CX.
- Connect the serial cable provided with MobileMapper Beacon between the two units. See diagram below.

COM1 on I/O module
Data Connector
DB9-female
Round 7-pin connector
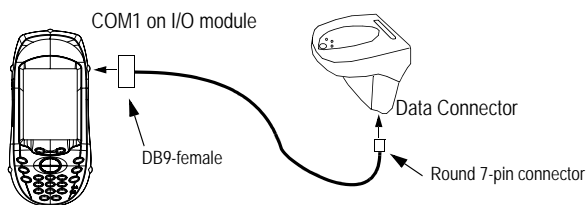
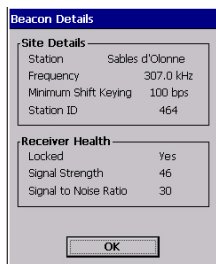- Switch on both MobileMapper Beacon and MobileMapper CX.
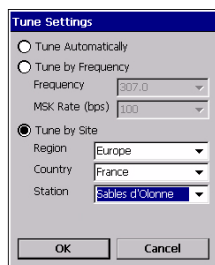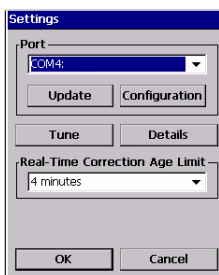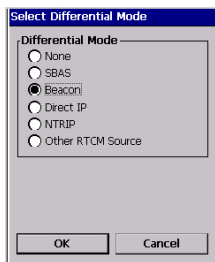
3. Choose MobileMapper Beacon as the DGPS data source:

- Tap on 🪟 , then **Programs**>**GPS Utilities**>**DGPS Configuration**.
- Tap on the **Select Mode** button.
- In the Select Differential Mode window, enable the **Beacon** option and then tap **OK**. The Settings window opens to let you configure both the beacon and the connection to this beacon.
- In the **Port** field, on top of the screen, set the port through which you will communicate with the MobileMapper beacon. Typically, you will select:
    • COM1, if you are using a wire connection to MobileMapper Beacon.
    • COM4, if you are using Bluetooth.
  Note that the **Update** button allows you to update the list of available ports attached to the **Port** field. When selecting **Beacon** and tapping **OK**, this update function is automatically run so you don't need to tap this button. Typically, you need to use this button after you have changed the virtual port in Bluetooth Manager and the Settings window is already open.
  Note that the **Configuration** button allows you to display the settings of the selected port. But when selecting **Beacon** as the DGPS data source, the settings of the selected port are in fact forced to 4800 Bd, no parity, 8 data bits and 1 stop bit.
- Tap on the **Tune** button.
- Choose one of the following options to tune the MobileMapper Beacon receiver:
    • **Tune Automatically** (automatic method; default choice).
    • **Tune by Frequency** (manual method: you have to specify the frequency to which you want the receiver to tune).
    • **Tune By Site** (manual method: you have to specify the region, country and name of the DGPS source, i.e. the reference station, you want MobileMapper Beacon to receive) (see screen example opposite).
- Tap **OK**.

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Beacon Details

Site Details
Station   Sables d'Olonne
Frequency   307.0 kHz
Minimum Shift Keying   100 bps
Station ID   464

Receiver Health
Locked   Yes
Signal Strength 46
Signal to Noise Ratio 30

OK
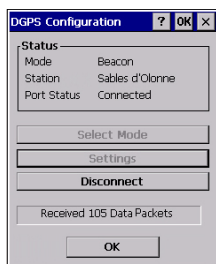
- Tap **OK** again after the message "**Beacon Tuned Success-fully!**" appears. This takes you back to the previous screen.
- Tap **Details** to read the current settings and performance indicators of the MobileMapper Beacon. The current tuning settings include reception frequency, MSK rate and station ID of the reference station being received. The performance indicators are the lock status (No/Yes), the signal strength, measured in dBµV, and the Signal-to-Noise Ratio (SNR) in dB. See screen example opposite. Refer to *page 73* for more detail.
- Tap **OK** to close this window and return to the previous screen (Settings screen).
- On this screen, set the **Real-Time Correction Age Limit** parameter (see recommendations on *page 72*).
- Tap **OK** for all the settings to take effect. The DGPS Configuration screen is now displayed.

DGPS Configuration   ? OK ×

Status
Mode   Beacon
Station   Sables d'Olonne
Port Status Connected

Select Mode
Settings
Disconnect

Received 105 Data Packets

OK

- Tap **Connect** to allow MobileMapper Beacon to send its correction data. When connection is effective and corrections are being sent, the **Connect** button is changed into a **Disconnect** button and the status bar at the bottom of the screen indicates the amount of incoming data packets since you tapped the **Connect** button. The top of the screen gives general status information on the DGPS mode currently selected.

  NOTE: If you had to use the now inactive **Select Mode** and **Settings** buttons, you should have first to re-activate them by tapping on the **Disconnect** button. This would disconnect the source of DGPS data from MobileMapper CX and so would stop the flow of incoming data packets.
- Tap **OK** to close the DGPS Configuration window. The following two messages are displayed successively: "**Please wait...**" and "**Processing incoming data packets...**".
- Tap **OK** to close the message window.
- Run GPS Status (see *Viewing Current GPS Status on page 15*) and check that MobileMapper CX is now operating in GPS Differential mode.
- Start your application.

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Direct IP

Warning! Using Direct IP requires that you have previously followed the entire procedure described in *Step-by-Step Procedure for Establishing a GPRS Connection Via Bluetooth on page 18*.

Important Notice! Once you are familiar with the GPRS connection procedure described on *page 18*, you don't need to accurately follow this procedure. Instead, make your Bluetooth and GPRS connections directly from within the DGPS Configuration utility, using the following buttons located on the Direct IP Settings window:

- for Bluetooth Manager
- for GPRS
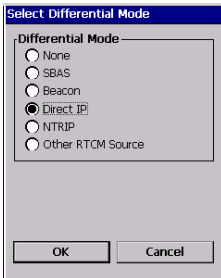
Assuming the GPRS connection is now active, do the following to implement the Direct IP DGPS mode:

- Tap on , then **Programs>GPS Utilities>DGPS Configuration**.
- Tap on the **Select Mode** button.
- In the Select Differential Mode window, enable the **Direct IP** option.
- Tap **OK**. The Direct IP Settings window opens in which you can store several Direct IP configurations. [With an already active GPRS connection, note that the Bluetooth and Dial-Up fields have been filled in accordingly.].

  Each Direct IP configuration holds the key information allowing MobileMapper CX to connect to a given corrections provider. Having the capability to save several Direct IP configurations in MobileMapper CX will therefore allow you to quickly change the corrections provider without having to re-enter the relevant connection parameters each time you do that.

- To enter your first Direct IP configuration, tap

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- Select **New** selected in the **Direct IP Configuration** field, tap on the **Add** button and then enter the following parameters:
  - **Name**: Direct IP Configuration Name (freely choose a name)
  - **Host**: IP address
  - **Port**: Port number
    (The last two parameters should have been passed on to you by the correction provider.)
- Tap **OK**. The name of the configuration you have just created is now pre-selected in the **Direct IP Configuration** field. Two new buttons (**Edit** and **Delete**) are shown under this field allowing you to respectively edit or delete this configuration. When you edit an existing configuration, note that you cannot change its name.

  To create a second Direct IP configuration, you would tap the down arrow to the right of the **Direct IP Configuration** field and select **New**. The **Add** button would appear again under the field. You would then tap this button, enter the three parameters of the second configuration and tap **OK** to save this new configuration.

- After selecting the desired configuration from the **Direct IP Configuration** field, tap **OK**. This takes you back to the DGPS Configuration window. On top of the screen, you can read part of the settings you have just made.
- Tap the **Connect** button. The DGPS Configuration screen now indicates the amount of incoming data packets (bottom of the screen) as well as the status of the DGPS mode (top of the screen).
- Tap **OK** to close the DGPS Configuration window. The following two messages are displayed successively: "**Please wait**…" and "**Processing incoming data packets**…".
- Tap **OK** to close the message window.
- Run GPS Status (see *Viewing Current GPS Status on page 15*) and check that MobileMapper CX is now operating in DGPS mode.
- Start your application.

NTRIP

Warning! Using NTRIP requires that you have previously followed the entire procedure described in *Step-by-Step Procedure for Establishing a GPRS Connection Via Bluetooth on page 18*.

Important Notice! Once you are familiar with the GPRS connection procedure described on *page 18*, you don't need to accurately follow this procedure. Instead, make your Bluetooth and GPRS connections directly from within the DGPS Configuration utility, using the following buttons located on the NTRIP Settings window:

- ![Bluetooth Manager icon] for Bluetooth Manager

- ![GPRS icon] for GPRS

Assuming the GPRS connection is now active, do the following to implement the NTRIP DGPS mode:
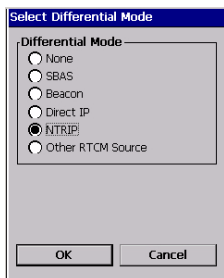
- Tap on ![icon], then **Programs>GPS Utilities>DGPS Configuration**.
- Tap on the **Select Mode** button.
- In the Select Differential Mode window, enable the **NTRIP** option.
- Tap **OK**. The first time you select NTRIP, the message **No NtripCaster specified** appears.
- Tap **OK** to close the message window. This opens the NTRIP Settings window from which you can store several NTRIP configurations. [With an already active GPRS connection, note that the Bluetooth and DialUp fields have been filled in accordingly.]
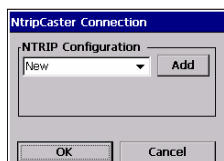
- Tap ![icon]. The NtripCaster Connection window opens in which you can store several NTRIP configurations. Each NTRIP configuration holds the key information allowing MobileMapper CX to connect to a given NTRIP caster. Having the capability to save several NTRIP configurations in MobileMapper CX will therefore allow you to quickly change the NTRIP caster without having to re-enter the relevant connection parameters each time you do that.

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- To enter your first NTRIP configuration, with **New** selected in the **NTRIP Configuration** field, tap on the **Add** button and then enter the following parameters:
 - **Name**: NTRIP Configuration Name (freely choose a name)
  - **Host**: Host IP address
  - **Port**: Port number
  - **Login**: User name
  - **Password**: User password
    (The last four parameters should have been passed on to you by the NTRIP provider.)
- Tap **OK**. The name of the configuration you have just created is now pre-selected in the **NTRIP Configuration** field. Two new buttons (**Edit** and **Delete**) are shown under this field allowing you to respectively edit or delete this configuration. When you edit an existing configuration, note that you cannot change its name.

  To create a second NTRIP configuration, you would tap the down arrow to the right of the **NTRIP Configuration** field and select **New**. The **Add** button would appear again under the field. You would then tap this button, enter the five parameters of the second configuration and tap **OK** to save this new configuration.

- After selecting the desired configuration from the **NTRIP Configuration** field, tap **OK**. MobileMapper CX connects to the NTRIP caster. The NTRIP Settings window is displayed again on which you can choose a network and station (corrections source) from the caster. The **Get Table** button is for downloading the new list of available stations in the case you select a new provider from the **Caster** field.

- The best choice is to use the station the nearest to your current location. Tap on the **Find Nearest** button to find and select this station. This causes the **Network** and **Station** fields to be automatically updated. The distance to this station is indicated just underneath the **Station** field. A second parameter in the same line tells you whether the selected station provides VRS corrections data or not (VRS for "Virtual Reference Station"; if VRS, the station provides corrections data for a virtual station that would be located where you are. If not VRS, the corrections data are computed for the true location of the station).
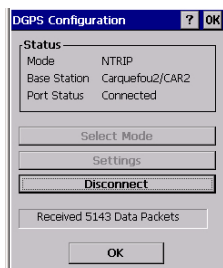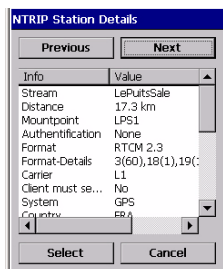
Note that the screen includes a **More Details** button allowing you to view the properties of the selected station. Tap on this button. The NTRIP Station Details screen is displayed on which you can use the following buttons:

- **Previous** and **Next** to view the properties of respectively the previous and next stations from the list of stations provided by the caster.
- **Select** to select the station whose properties are currently displayed. This takes you back to the NTRIP Settings screen on which you can now see the name of this station in the **Station** field.
- **Cancel** to return to the NTRIP Settings screen without changing the choice made in the **Station** field.

- Tap the **Connect** button. The DGPS Configuration screen now indicates the amount of incoming data packets (bottom of the screen) as well as the status of the DGPS mode (top of the screen).
- Tap **OK** to close the DGPS Configuration window. The following two messages are displayed successively: "**Please wait**…" and "**Processing incoming data packets**…".
- Tap **OK** to close the message window.
- Run GPS Status (see *Viewing Current GPS Status on page 15*) and check that MobileMapper CX is now operating in DGPS mode.
- Start your application.

Other RTCM Source

- Switch on the external device providing RTCM corrections data.

  If you want to use COM1 on MobileMapper CX to communicate with the external device, connect the adequate serial cable between the two units.
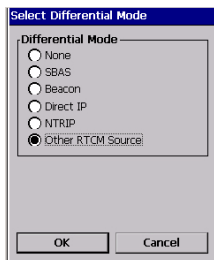
- Tap on 🐱 , then Programs>GPS Utilities>DGPS Configuration
- Tap on the Select Mode button
- In the Select Differential Mode window, enable the Other RTCM Source option. The Settings window opens to let you configure the connection to the external source.
- In the Port field, on top of the screen, set the port through which you will communicate with the external device. By default, two ports are available:
  - COM1, the only "physical" COM port available on the MobileMapper CX. Note that COM1 will not be available from the list if it's used by another application
  - COM3, a Bluetooth port that is automatically set at power on (see also *Local Services on page 53*).

  Note that the Update button allows you to update the list of available ports attached to the Port field. When selecting Other RTCM Source and tapping OK, this update function is automatically run so you don't need to tap this button. Typically, you need to use this button after you have changed the virtual port in Bluetooth Manager and the Settings window is already open.
- Tap the Configuration button to edit or view the settings of the selected port. A Test button allows you to test the availability of the port.
- Tap OK to close the Port Configuration window. This takes you back to the Setting window.
- On this screen, set the Real-Time Correction Age Limit parameter (see recommendations on *page 72*)
- Tap OK and then Connect.
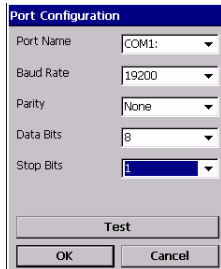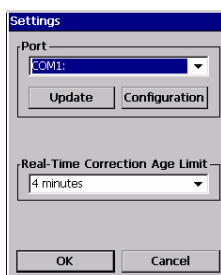
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- Tap **OK** to close the DGPS Configuration window. The following two messages are displayed successively: "**Please wait...**" and "**Processing incoming data packets...**".
- Tap **OK** to close the message window.
- Run GPS Status (see *Viewing Current GPS Status on page 15*) and check that MobileMapper CX is now operating in DGPS mode.
- Start your application.

Returning to Autonomous GPS Mode
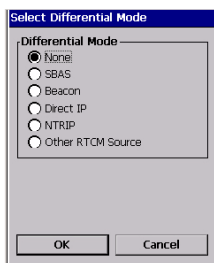
- Tap on 🟦, then **Programs>GPS Utilities>DGPS Configuration**.
- Tap on the **Select Mode** button.
- In the Select Differential Mode window, enable the **None** option.
- Tap **OK** to close the window. This takes you back to the DGPS Configuration window where you can read the choice you have just made.
- Tap **OK** again. The window is closed and MobileMapper CX starts operating instantly in Autonomous GPS mode.

Subsequent Uses

Next time you turn on MobileMapper CX and you run the DGPS Configuration utility, you will be prompted to run the same DGPS mode as the one you last used. If it was Direct IP or NTRIP, the configuration you last used is preset. If it was MobileMapper Beacon, the last used station is preset.

This means the only thing you will have to do to get the MobileMapper CX running, and provided you agree with all the default choices, is to tap on the **Connect** button and then start using the corrections received by tapping **OK**.

CAUTION! For Direct IP or NTRIP, you will have to re-establish the GPRS connection via Bluetooth (see *Subsequent Uses on page 27*) before running the DGPS Configuration utility. For MobileMapper Beacon via Bluetooth, you will have to re-establish the Bluetooth link before running the DGPS configuration utility.

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Power & Memory Management

Power Modes

MobileMapper CX comes with a removable/rechargeable battery, which provides enough energy for a full working day –provided you start your day with a fully charged battery. In order to ensure a longer battery life, use the external power whenever possible. When used, the external power source also automatically recharges the internal battery.

The built-in advanced power saving features also help to optimize power consumption while the system is idle. The MobileMapper CX system has three power saving modes when the battery power is used:
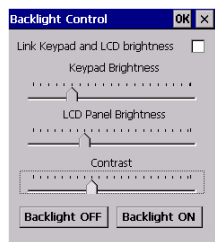
1. **User Idle** mode: Backlights for both the display and keypad are switched off. Press any key or tap on the screen to switch on the backlights again.

   To switch off the backlights, tap ▤ (backlight) in Control Panel. In the Backlight Control dialog that opens (see figure opposite), tap the Backlight OFF button.

2. **System Idle** mode: The display as well as the backlights are switched off, but all the processes are still running. The power LED is on. Press any key or tap on the screen to switch on the display again.

3. **Suspend mode**: The display and backlight are turned off and the computer is idle but the GPS receiver still tracks satellites. The Power LED is on but flashing.

   NOTE: The internal battery CANNOT be recharged while the receiver is in Suspend mode. The battery can ONLY be recharged when the receiver is fully on, in User Idle or System Idle mode or fully shut down.
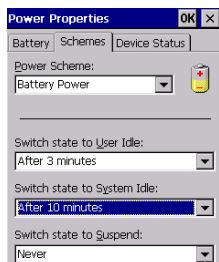
You can configure the MobileMapper CX handheld to automatically enter each mode when it has been idle for a specified time.

To change the idle time, tap 🔧 Power in the Control Panel. Then make the necessary changes in the Schemes tab (see opposite.)

NOTE: The amount of time displayed in the User Idle field must be less than the amount of time displayed in the System Idle field. And the amount of time displayed in the System Idle field must be less than the amount of time displayed in the Suspend field.

Turning Off MobileMapper CX Manually

Tap 🔳, then Shut Down. In the Shut Down window that opens, just tap OK. After a few seconds, the MobileMapper CX will shut down.
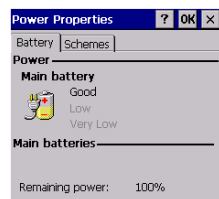
Checking Battery Status

To check the battery level, tap 🔳, then Settings>Control panel>Power. See screen example below.

LED Indicators

Power LED (Green)	Indicates:
Off	Device Switched Off
Solid Green	Power On

Charge LED (Amber)	Indicates:
Off	Not charging
Solid Amber	Battery is fully charged
Blinking Amber	Battery is charging

The charge LED will give charging information only if the receiver is on.

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Memory Management

The MobileMapper CX has three types of memory:

- The Nand Flash memory ("MyDevice"), a non volatile memory.
- The removable SD Card memory, a non-volatile memory.
- The RAM (volatile memory), mainly used for running programs.

Programs or data that are saved in the RAM will be erased when the system is switched off!

We recommend that you install programs on "MyDevice" and store your data on SD card.

GPS Utilities

The set of GPS utilities provided in the Start menu allows you to configure and monitor MobileMapper CX's internal GPS receiver. This chapter describes the full set of GPS Utilities, which includes the following items:

- DGPS Configuration
- GPS Initialization
- GPS Ports Configuration
- GPS Reset
- GPS Settings
- GPS Status
- Mission Planning

Note that some of these utilities have been described earlier in this guide (see *Preparing for First-Time Use* chapter).

DGPS Configuration

The *DGPS Configuration* utility contains the latest MobileMapper CX enhancements. It is indeed through this utility that you can implement the .NET capabilities of the unit, namely NTRIP and Direct IP.
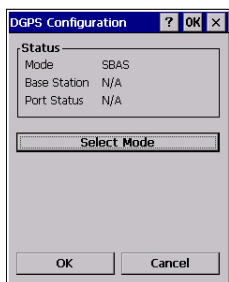
- Tap on 🏁 , then **Programs**>**GPS Utilities**>**DGPS Configuration**. The DGPS Configuration window opens showing the current status of the DGPS configuration (top of the screen; see example opposite).

  At the bottom of the screen, a message indicates whether correction data is being received or not.

- Tap on the **Select Mode** button. A new screen is displayed on which you can select the Differential mode you would like to use. For more information about DGPS Configuration, see *Selecting a DGPS Mode on page 29*.

GPS Initialization

See *Initializing GPS on page 13*.

GPS Ports Configuration

Using the *GPS Ports Configuration* utility, you can ask MobileMapper CX to output NMEA messages to another device through the GPS auxiliary output port (COM1 or a virtual COM port, or USB serial), or to the application running on MobileMapper CX, through the GPS VSP output port (VSP=Virtual Serial Port). The VSP port is also known as "COM2" and is always active. See also *MobileMapper CX Port Allocation on page 75*.

Using this utility, you can therefore:

- Choose, enable or disable the GPS auxiliary output port.
- Change the settings of the GPS auxiliary output port.
- Read the settings of the GPS VSP output port (these settings cannot be changed).
- Define the content of the unique output message sent to both the GPS VSP output port (this port is always enabled) and the GPS auxiliary output port (if enabled).

For more information about MobileMapper CX data output, refer to *NMEA Data Output on page 64*.

GPS Reset

Use the *Reset GPS* utility to cause the internal GPS receiver to re-initialize. You may need to run this utility if for example you want to force the GPS receiver to acquire new almanac data from the GPS constellation and then use this data in the position computation process.
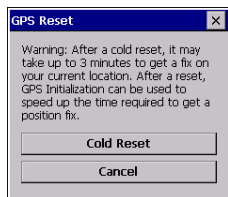
- Tap on , then **Programs**>**GPS Utilities**>**GPS Reset**. A warning message appears explaining that you are about to run a cold reset (see screen opposite).
  When you use this utility, in fact you clear the GPS receiver's memory. That's why the time to first fix will be longer after a cold reset than after a normal reset. Normal reset takes place every time you turn on the unit.
- Tap on **Cold Reset**.
- After a few seconds, the message "**Reset successful**" is displayed. Tap **OK** to close the GPS Reset utility.

As explained in the GPS Reset window, you may reduce the time to first fix by running the GPS Initialization utility (see *Initializing GPS on page 13*). Until a new almanac file is received from the GPS constellation, MobileMapper CX uses a non-erasable almanac file stored in its memory to start the satellite acquisition process.

GPS Settings

See *Setting Up GPS Positioning on page 14*.

GPS Status
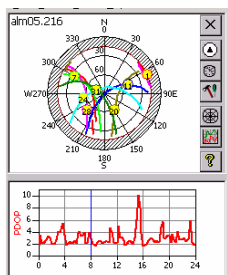
See *Viewing Current GPS Status on page 15*.

Mission Planning

The Mission Planning utility enables you to view the visibility and availability of the constellation of satellites and determine the dilution of precision (DOP) for any location on the Earth. It allows you to plan the best time of the day for data collection and maximize productivity.
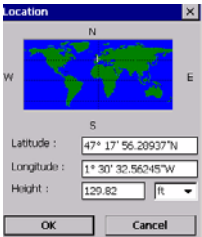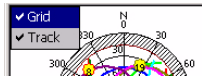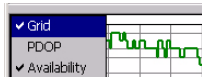

To be able to determine the configuration of satellites, an almanac file is used in Mission Planning. This file is generated and loaded automatically when you get the first GPS fix.

- Tap on 🔳 , then **Programs**>**GPS Utilities**>**Mission Planning**. The Mission Planning window appears (see opposite) with the sky plot and PDOP (satellite geometry) graphs. Top left of the screen is the name of the almanac file used to make the satellite prediction (alm<year (last two digits)><day in year (1-366)>).
- Instructions for proper use of Mission Planning are summarized in the table below.

Icon	Function	Screen
✕	Tap this icon to close the Mission Planning utility window.	
⬛	- Tap this icon to choose the location on Earth for which Mission Planning will determine the GPS constellation. - You can key in the exact coordinates of your site or directly tap on the map to indicate where this site is (see screen example opposite). Tapping on the map automatically updates the coordinates in the Latitude and Longitude fields. - Then tap OK to validate these coordinates. This takes you back to the Mission Planning window on which you can see the GPS constellation for this location.	
⬛	Tap this icon to set the exact date & time for which you want Mission Planning to determine the GPS constellation for the selected location.	
⬛	Tap this icon to open the Setup window. This window allows you to set the cut-off angle, the maximum PDOP value and whether or not to include elevation for the GPS position (2D or 3D).	
⬛	Tap this icon to access the sky plot graph settings. The following two items can be shown or hidden: - Grid: Grid lines intersecting at the center of the graph - Track: Color curve showing satellite orbit versus time.	
⬛	Tap this icon to access the PDOP graph settings. The following three items can be shown or hidden: - Grid: Grid lines - PDOP: PDOP value versus time - Availability: Count of visible satellites versus time.	
⬛	Tap this icon to read the software version of the Mission Planning utility.	

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Switching Between Two Utilities

Use the icon located at the far right in the task bar to switch from a running application to another.

For example if *DGPS Configuration* and *GPS Status* are both running in the background while using *Mission Planning*, the menu opposite will pop up when you tap this button.

Just tap the name of the application you want to go to.
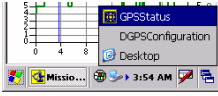
Bluetooth Manager Module

This chapter gives general information on MobileMapper CX's Bluetooth Manager module. For detailed information on how you can establish a GPRS connection via Bluetooth Manager, please refer to *Step-by-Step Procedure for Establishing a GPRS Connection Via Bluetooth on page 18*.

Introduction

MobileMapper CX is equipped with built-in Bluetooth technology that allows short-range connections to other Bluetooth-enabled devices such as cellular phones, personal digital assistants (PDA), desktop or notebook computers.

Bluetooth offers fast, reliable, and secure wireless communication.

Host and Inquiring Devices

In any communication between two Bluetooth-enabled devices, one of them is the *inquiring device* and the other the *host device*:

• The *inquiring* device is the one that detects and uses one of the local services of the other device.
• Reciprocally, the *host* device is the one that is discoverable and that makes its local services available for the inquiring device.

Here are two typical examples in which MobileMapper CX is successively the inquiring device and the host device:

• When you operate MobileMapper CX in NTRIP or Direct IP DGPS mode, the cell phone used is the host device and MobileMapper CX is the inquiring device. The local service used in the cell phone is the *Dial-Up Networking service*.
• When you output GPS data via the auxiliary port, MobileMapper CX is the host device and the external device receiving the data via Bluetooth is the inquiring device. The local service used in MobileMapper CX is the Serial Port Service.

Bluetooth Range

The maximum range in class 2 devices is 10 meters (30 feet) typically. A minimum distance of about 60 cm (two feet) should be observed between any two Bluetooth-enabled devices.

First Steps with Bluetooth Manager

Starting Bluetooth Manager
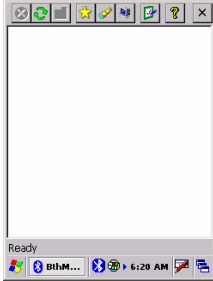
- Tap 🎨 >Settings>Control Panel and double-tap Bluetooth Manager. The Bluetooth window appears on the screen after a few seconds.

  Note the presence of the 🔵 icon in the task bar.
  For a quick overview of the functions accessible from the Bluetooth Manager toolbar, please refer to the table in *Bluetooth Manager Toolbar Functions on page 74*.

Minimizing/Maximizing the Bluetooth Window

- Tap ⊠ in the upper-right corner. This minimizes the Bluetooth window (but Bluetooth is still running).

- In the task bar, tap 🔵 and then select Show from the pop-up menu. This opens the Bluetooth window on the screen.

Turning Off Bluetooth

- In the task bar, tap 🔵 and then select Exit from the pop-up menu. This turns off Bluetooth.

Detecting Bluetooth-Enabled Devices

Use the following two buttons to let MobileMapper CX's local Bluetooth controller detect the Bluetooth-Enabled devices present nearby:

- Tap ![icon] the first time you run a search. The message "**Searching**…" is displayed in the status bar (bottom of the screen) during the search.

  The search sequence first focuses on paired peripherals and then searches for distant peripherals. "**Ready**" is displayed at the end of the search. When next tapping this button, you will just list all the Bluetooth-enabled devices that were detected during the last search, regardless of whether these devices are still present or not.

- Tap ![icon] every time you need to refresh the list of Bluetooth-enabled devices present nearby.

  NOTE 1: ![icon] is only active after ![icon] has been tapped.
  NOTE 2: At the end of a search, the name or class of a detected device may not have been found. In this case, tap and hold the "Unknown" icon and then select **Update** in the pop-up menu to let Bluetooth Manager determine these parameters.

PIN Code, Detectability & Authentication
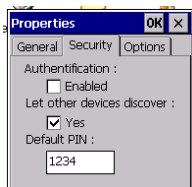
- Tap ![icon] in the Bluetooth Manager toolbar. This opens the Properties window on which you can read or edit the properties of the local Bluetooth controller.
- Tap on the **Security** tab. The bottom of the window shows the default PIN code. This code should be entered in any remote device that attempts to pair itself with MobileMapper CX.
- *To change the PIN code*, enter the desired code in the **Default PIN** field.
- *To make the device discoverable (or detectable)*, enable the **Let other devices discover** check box. Otherwise disable this option (default setting: enabled).

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- *To demand that a remote device be allowed to access the local services only after pairing itself with MobileMapper CX*, check the Enabled box underneath Authentication. Otherwise keep this option disabled (check box cleared).

  Caution! This option is automatically disabled every time you start Bluetooth Manager.
- Tap OK on top of the window for the changes to take effect.

Local Services

Introduction

The local services offered by MobileMapper CX's Bluetooth controller are the following:

- *Serial Port Service*. The Serial Port service allows you to exchange data with a remote device via a virtual Bluetooth serial port. This service is used when outputting GPS data via an auxiliary output (see *GPS Ports Configuration on page 46*).
- *File Transfer Service*. This service allows any two Bluetooth-enabled devices to exchange files.
- *Object Push Service*. This service is required to run the File Transfer Service but is not usable as such in MobileMapper CX.

To list the local services offered by MobileMapper CX:
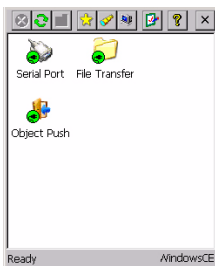
- Tap [icon] located in the Bluetooth Manager toolbar. The Bluetooth window shows the three icons representing its three local services.

  Note that all the services are made active at power up (a small green circle containing a plug symbol is visible on each active service; see screen opposite).

To deactivate a local service:

- Tap 🖳 in the Bluetooth Manager toolbar.
- Tap and hold the icon representing the local service you want to deactivate and then select Stop. This instantly stops the concerned local service.

  Note that when you deactivate the File Transfer Service or Object Push Service, you automatically deactivate these two services.

To re-activate a local service:

- Tap 🖳 in the Bluetooth Manager toolbar.
- Just tap and hold the concerned icon and then select Start.

  When you re-activate the Serial Port Service, Bluetooth Manager asks you to select the COM number you want to assign to the virtual port. Choose any available port from the list and then tap OK. A message indicates that the port is now ready. Tap OK to close the message window.
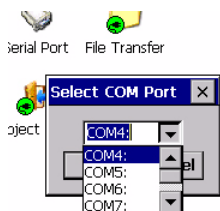
To change the identification of the Bluetooth virtual port used by the Serial Port service, the Serial Port Service must be stopped first. When you re-start it, you can change the port used as explained above.

Using the Serial Port Service

Assuming you want to send the NMEA messages coming out from your MobileMapper CX to a computer screen, follow the procedure below, based on the use of MobileMapper CX's Serial Port Service:

- On MobileMapper CX, make sure:
  - The Serial Port Service is activated and a COM port is assigned to it (COM4 typically).
  - NMEA messages are enabled (see *Defining the NMEA Message on page 64*).

- • GPS output is enabled via the COM port assigned to the Serial Port Service (COM4 in our example) (see also *Outputting the NMEA Message on COMx on page 64*).
- • Write down all the COM4 settings as you will need them on the computer (see GPS Port Configuration, *page 46*).

- On the computer:
  - • Run Bluetooth.
  - • Detect MobileMapper CX.
  - • If required, pair the two devices (you'll need to enter the PIN code defined in the MobileMapper CX Bluetooth properties; see *page 52*).
  - • List the local services offered by MobileMapper CX
  - • Use the listed Serial Port Service icon to connect the computer to the MobileMapper CX Serial Port Service through one of its virtual ports (COM4).
  - • Run HyperTerminal, name the session, select the computer port used to communicate with the external device (COM4 in our example). Click OK.
  - • Enter the same port settings as those used by the COM port on MobileMapper CX (COM4 in our example). Click OK. You can now see the NMEA messages in the HyperTerminal window as they are output from MobileMapper CX.
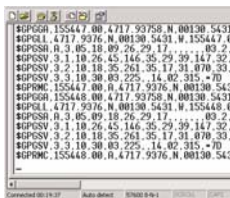
Using the File Transfer Service

Assuming you want to transfer files between two MobileMapper CX units, follow the procedure below, based on the use of MobileMapper CX's File Transfer Service:

- On the **host** MobileMapper CX, make sure:
  - • Its File Transfer Service is activated.
  - • Its File Transfer Service properties include the path and name of the folder containing the files you want to transfer to the inquiring MobileMapper CX (for example the folder path and name are: \Application Data\Job101\).

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To change the source folder, tap and hold the File Transfer Service icon and then select **Properties**. A window opens in which you can use the Browse button to select the desired folder.

- On the inquiring MobileMapper CX:

    • Run Bluetooth.

    • Display the properties of its File Transfer Service as explained above for the host device.

    • Enter the path and name of the local folder through which files will be exchanged with the host (for example the path and folder name are: \Application Data\Job547\).

    • Detect the host MobileMapper CX. Note that MobileMapper CX is detected as a WindowsCE PDA.

    • If required, pair the two devices (you'll need to enter the PIN code defined in the host MobileMapper CX Bluetooth properties; see *page 52*).

    • List the local services offered by the remote (host) MobileMapper CX.

    • Double-tap the remote File Transfer Service icon to connect the inquiring unit to the host's File Transfer Service. As a result the Bluetooth Manager window now lists the content of the remote folder (in our example, the window would show the content of \Application Data\Job101\ on the host MobileMapper CX). If the remote folder contains a sub-folder (\Application Data\Job101\Day1\ for example), you can double-tap on the sub-folder icon to list the content of this sub-folder and then download files from this subfolder.

    Tap 🗁 in the toolbar when you want to go up to the initial folder (\Application Data\Job101\).

- **To download files from the host to the inquiring device**, tap and hold the icon corresponding to the file you want to download and then select **Get file**. This starts the file transfer. Once the transfer is complete, the downloaded file can be found in the preset folder on the inquiring device (in our example, the file would be found in \Application Data\Job547\).

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- **To upload files from the inquiring device to the host**, tap and hold the stylus on a blank area (i.e. not on a file icon) within the Bluetooth Manager window. When a dotted circle appears, remove the stylus and then select Add file in the pop-up menu. This opens a browser.

  Open the local folder containing the file you want to upload, select this file and tap OK. This starts the file transfer. Once the transfer is complete, the uploaded file can be found in the selected folder on the host MobileMapper CX (in our example, in \Application Data\Job101\). As the inquiring MobileMapper CX is still listing the content of this remote folder, the name of the uploaded file is now also visible in the Bluetooth Manager window (new file icon added following the file transfer).

Creating Shortcuts for Remote Services

Once a service in a detected remote device has been found, you can create a shortcut for this service. This means you will no longer have to ask MobileMapper CX to find this service to be able to use it.

- To create a shortcut, tap and hold the service icon and then select Shortcut in the popup menu. This instantly creates the shortcut.

- To view the shortcut icon, tap .

Web Tools

Introduction

The Magellan MobileMapper CX unit comes with standard programs allowing Internet access and email exchange while being still in the field.

MobileMapper CX lets you go to the Internet using one of the following two connections:

- Via a Bluetooth-enabled, GPRS-enabled cell phone.
- Via a WiFi network using the WiFi-certified USB adapter model 5421A from U.S.Robotics. This adapter should be purchased separately.

While a GPRS connection can be established from virtually anywhere, as far as mobile phone networks are available, WiFi-type local area networks on the other hand require that your location be within range of a WiFi access point.

Once you get an Internet connection, you can:

- Use *Internet Explorer* to access web sites, including webmail services. Note that with some webmail services, you cannot attach files to your emails.
- Use *Inbox* to access your personal email account, receive and send emails, possibly with attached files (your GIS jobs for example).

GPRS Connection

Please refer to *Step-by-Step Procedure for Establishing a GPRS Connection Via Bluetooth on page 18* for details. Then run Internet Explorer to access your Internet services or Inbox to send emails.

WiFi Connection

IMPORTANT! Only model 5421A from U.S.Robotics can be used with MobileMapper CX. The driver of this adapter being pre-installed, no installation phase is needed (the device is fully plug-and-play). You will however find an Installation Guide in the box but remember you don't need to go through any of the procedures described in this Guide.

⚠ Always plug in the adapter into the I/O module's USB host port *before* turning on MobileMapper CX.
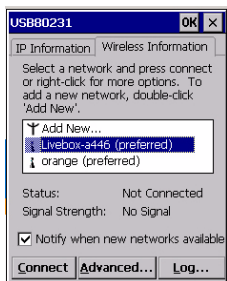
- After plugging in the adapter, turn on the MobileMapper CX. The WiFi driver window appears automatically at the end of the boot sequence.
- Let the driver detect the WiFi access points available nearby. The list of available WiFi networks is displayed in the middle of the screen.
- Move the cursor vertically to highlight the WiFi network you wish to use.
- Tap **Connect**. The unit will then respond according to the type of WiFi provider you have selected:
  - For some providers such as Orange, the unit will immediately try to connect to the selected WiFi network. At the end of this phase, the WiFi status shown at the bottom of the screen should read "Connected to..." combined with a correct signal strength (Good, Very Good or Excellent) reported just underneath. Tap **OK** to close the connection window.
  The first time you run Internet Explorer, you will be prompted to open the WiFi access provider home page to choose your internet provider name and personal identification (username and password). After making these choices, you will have full access to the Internet.

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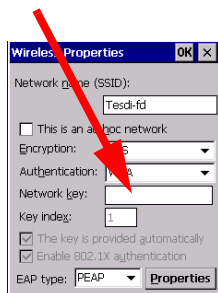
- For some other providers, a new dialog will open right after tapping Connect asking you to enter a *network key.*

  Among these providers are for example the hotels that include a WiFi connection in their own services. Customers will get the keys for both their hotel room and WiFi connection (i.e. network key) when they check in.

  The network key will allow the unit to connect to the local WiFi network and then have full access to the Internet.

  Enter this key and tap OK. At the end of the connection phase, the WiFi status shown at the bottom of the WiFi driver screen should read "Connected to..." combined with a correct signal strength (Good, Very Good, Excellent) reported just underneath. Tap OK to close the connection window.

NOTE: Tap in the task bar to re-open the WiFi driver window.

Using the Inbox Program

Setting Up an Email Service

Below are a few instructions to help you set up an email service in Inbox. Before going any further, make sure you have the following information available for the email account you want to connect to:

1. POP3 or IMAP4 email server web site.
2. User ID and password.
3. SMTP host web site.

Note that only email accounts using POP3 or IMAP4 protocols for receiving emails can be accessed using Inbox.

Follow the procedure below:

- Tap >Programs>Inbox. This launches Inbox.
- Tap Services>Options. This opens the Options dialog.
- Drag the dialog to the left using the stylus until you see the Add button.

- Tap **Add**. This opens the Service Name dialog.
- Select the service type used by the email account you want to connect to. There are two possible service types:
  - IMAP4 Mail
  - POP3 Mail
- Name the service or keep the default name (the default name is the same as the service type name).
- Tap **OK**.
- Enter the parameters listed below (see also POP3/IMAP4 comparative flowchart below). For settings on screens 1/3 and 3/3, please drag the window to the left so you can access the settings shown in the right part of the window.

| POP3 Server Type Settings	IMAP4 Server Type Settings

Screen 1/3

- **Connection**: Choose the alias corresponding to the physical connection (i.e. GPRS or WiFi) you will use (Example: select "My Connection" for GPRS). Always select "Network Connection" for WiFi.
- **POP3 Host** or **Server**: Enter the POP3 or IMAP4 web address of your email provider.
  (Example: imap.fr.aol.com)
- **User ID**: The User ID of the email account.
  (Example: Pete.Smithetz)
- **Password**: The password of the email account.
  (Example: wcrbeac)
- **Domain**: Leave this field blank.
- **SMTP host for sending mail**: Enter the SMTP web address used by your email provider.
  (Example: smtp.fr.aol.com)
- **Return address**: Some email providers don't need one, some others do, even if they don't actually use it. If you notice that the Inbox does not work although it has been configured properly, then you may suspect that the program needs a return address. In this case, enter any valid email address. Note that this address will not be affected by the email traffic from/to your MobileMapper CX.
  (Example: Pete.Smithetz@fcs.com)

Screens 2/3 and 3/3: Miscellaneous settings about how Inbox handles and filters emails (see screen examples above).

- Tap the **Finish** button to create the email service. This takes you back to the Options screen from which you can now view and edit the Inbox options (Compose, Read, Delete, Storage). See screen examples below.
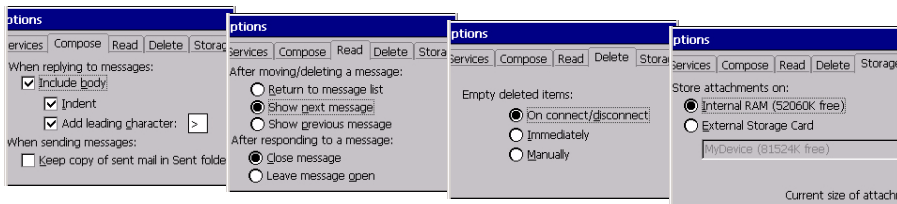
Using Inbox

Once an Internet connection has been established via GPRS or WiFi and an email service has been created In Inbox, do the following to use the email box:

- In the Inbox menu bar, select **Service** and make sure the the name of the email service you have just created is listed and enabled in the popup menu.
- In the same popup menu select **Connect**. Let Inbox access the email account. When it's done, you can use the email box.
- To create new messages, use the **Compose**>**New Message** command
- To attach files to your messages, use the **File**>**Attach-ments**>**Add Attachment** command.

NMEA Data Output

Introduction

MobileMapper CX can output an NMEA message on its physical and virtual ports (COM1, USB serial and COM2). The content of the NMEA message is user-defined.

Defining the NMEA Message
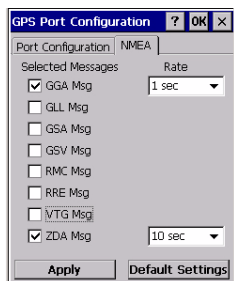
- Tap , then **Programs>GPS Utilities>GPS Ports Configuration**.
- Tap on the **NMEA** tab.
- Check on all the NMEA data strings you want to include in the output message and for each of those strings, choose an output rate in seconds. Clear all the NMEA data strings you do not want to include in the output message (see screen example opposite). The available messages are: GGA, GLL, GSA, GSV, RMC, RRE, VTG and ZDA.
- Tap **Apply** and then **OK**. This closes the GPS Port Configuration window. MobileMapper CX is now set up to output a NMEA message on its virtual port and the chosen auxiliary output port (see below).
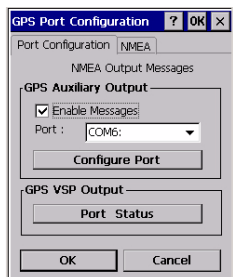
Outputting the NMEA Message on COMx

NOTE: To output NMEA data from MobileMapper CX to another computing device via COM1, you must connect the two devices using a null modem cable.
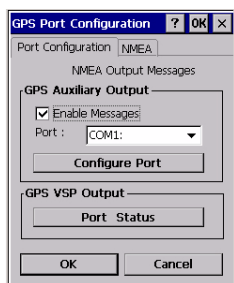
- Tap , then **Programs>GPS Utilities>GPS Ports Configuration**.
- In the GPS Auxiliary Output pane, check on the **Enable Messages** option and then select the desired COM port in the **Port** field (COM1 for example, or the virtual COM port assigned to Bluetooth's Serial Port Service -COM4 typically).
- Tap **Configure Port** to configure the selected port. Enter its baud rate, number of start and stop bits and set its parity and flow control parameters.
- Tap **OK**. MobileMapper CX will now deliver the NMEA message you have defined on the chosen COM port.

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Outputting the NMEA Message On USB

The USB port must be configured to emulate a serial port. Follow the instructions in *Setting the Mini-USB Port (I/O Module) on page 5* to do this. Then:

GPS Port Configuration ? OK ×
Port Configuration | NMEA
NMEA Output Messages
GPS Auxiliary Output
☑ Enable Messages
Port : COM6: ▼
Configure Port
GPS VSP Output
Port Status
OK | Cancel

- Tap 🎨 , then Programs>GPS Utilities>GPS Ports Configuration.
- In the GPS Auxiliary Output pane, check on the Enable Messages option and then select "COM6" in the Port field.
- Tap Configure Port to configure the selected port. Enter its baud rate, number of start and stop bits and set its parity and flow control parameters.
- Tap OK. MobileMapper CX will now deliver the NMEA message you have defined on its USB port.

Outputting NMEA Data on Virtual Port COM2

From the moment a non-empty NMEA message is defined (see *page 64*, MobileMapper CX will output this message on its virtual port (COM2), independently of whether the message is enabled on the auxiliary output port or not.

The COM2 settings can be displayed by tapping Port Status. These settings cannot be changed:

- Baud rate: 57600 Bd
- Data bits: 8 data
- Parity: None
- Stop bit: 1
- Flow control: None.

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Optimizing Accuracy

General Guidelines

There are five basic rules for recording MobileMapper CX rover data so as to achieve the optimal accuracy:

1. Allow the receiver to have full "view" of the sky the entire time a job is open, not just when logging data to a feature. There are three things you can do to improve signal reception:
   - While you do not need a survey-grade external antenna for sub-meter accuracy, using one will yield better accuracy in all environments.
   - If you are not using an external antenna, keep the MobileMapper CX receiver at a 45-degree angle the entire time a job is open (or as long as possible).
   - If you are not using an external antenna, keep the MobileMapper CX receiver as high as possible the entire time a job is open (or as long as possible).
2. When you record a point feature, remain stationary for 10 seconds both before opening the feature and after closing the feature.
3. Average all point features for at least 30 seconds.
4. Make sure you are using the latest firmware (both the Operating System firmware and GPS firmware) for the MobileMapper CX receiver and the latest version of MobileMapper Office).
5. Adjust the SNR, PDOP and Elevation masks on the receiver to reflect your environment.

Recording Data for Post-Processing

There is one additional rule for optimizing MobileMapper CX accuracy when recording rover data that will be differentially corrected by MobileMapper Office in post-processed mode: All features must be logged while the receiver is continuously tracking at least 5 satellites with a PDOP less than 4 *for at least 20 minutes*.

You need to record only a single "epoch" of GPS data to get a position, but you need to record at least 20 minutes of data to post-process it for sub-meter accuracy. All features recorded within a 20-minute portion of a job file will be correctable to submeter accuracy.

For example, if you record a job over a one-hour period and lose lock on (i.e. fail to continuously track) the available GPS satellites at Minute 20 and Minute 40, all of the features in this job were recorded during a 20-minute period of continuous GPS signal lock, and so all can potentially be post-processed for submeter accuracy.

But if you record a 60-minute job and lose lock at Minute 20, Minute 30 and Minute 40, any feature recorded between Minute 20 and Minute 40 may not be sub-meter because they were recorded during 10-minute periods of continuous satellite tracking.

Without knowing a lot of other factors, it is hard to say how accurate a feature recorded during a 10-minute period of continuous lock will be, but it will be more accurate than a real-time corrected position.

IMPORTANT! Only the SBAS mode can be used while recording raw data to let MobileMapper CX deliver real-time DGPS positioning.

If the period of continuous lock is less than 5 minutes, the SBAS-corrected position may be more accurate.

When recording a job for post-processing, the receiver records GPS measurements the entire time the job is open – not just when you're recording data into a feature.

Therefore, you do not need to record each feature for more than 20 minutes. Each feature has to be recorded during a portion of the job file where you maintained lock on the satellites for at least 20 minutes.

If you open a job, open a point feature 19 minutes later, record the point feature for 60 seconds and close the feature and the job, the feature will be recorded during a period lasting 20 minutes and you should have sub-meter accuracy.

For this reason, it is best to open the job as soon as you are in a position to maintain constant satellite lock and close it more than 20 minutes later.

Appendices

Updating MobileMapper CX OS Firmware

The current version of MobileMapper CX Operating System (OS) firmware can be downloaded from ftp.magellangps.com in the /Mobile Mapping/MM CX/Firmware/OS/ folder.

1. Turn on MobileMapper CX and either attach it to external power or make sure that there is at least a 25% charge in the battery (tap Start>Settings>Control Panel>Power).

2. Copy the OS firmware file with the *.nbx file extension (e.g., NK_x_xx.nbx) to an SD card.
   Note that OS firmware must be loaded from an SD card. Do not copy the *.nbx file to MobileMapper CX's MyDevice folder.

3. With the SD card inserted into MobileMapper CX, double-tap the My Computer icon on the desktop and then the Windows folder.

4. Scroll to the bottom of the Windows folder and double-tap the OSLoader icon to launch the program (OSLoader.exe).
   You will see a message saying: "Please choose a new image file. The image file cannot be in the MyDevice directory."

5. Tap OK.

6. On the Open file screen, browse to the SD card, tap the OS firmware file and tap OK in the upper right of the screen.

7. When you see the "Are you certain that you want to update the operating system?" message, tap Yes.
   You will now see a progress bar on the OS Loader screen. It takes a few minutes to upload the firmware.

8. When you see a message saying, "**Operating system updated successfully,**" tap **OK** on the OS Loader window.

9. Tap ☒ in the upper right of the Windows screen to exit back to the desktop.

10. Turn off the receiver by tapping 🔳 , then **Shut Down** and then the **OK** button.

11. After a few seconds, MobileMapper CX's green LED will shut off. You may then press the power button to turn the receiver back on.

12. You may verify that the new OS firmware has been successfully uploaded by tapping:

    🔳 >**Settings**>**Control Panel**

13. Scroll down to the **Magellan System Info** icon. Double-tap on this icon. Confirm that the **OS F/W Version** is that which you just uploaded.

Updating MobileMapper CX GPS Firmware

1. Go to ftp.magellangps.com and copy the GPS firmware zip file (beginning with an "E" such as "EO32.zip") from the /Mobile Mapping/MM CX/Firmware/GPS/ folder to any folder on your PC.

2. Open the GPS firmware zip file and extract the two compressed files to the same directory on your PC.

3. Copy the extracted files to MobileMapper CX's SD card by using either a card reader or ActiveSync[1]. To use Active-Sync, turn on MobileMapper CX and connect it to your PC using the USB cable that runs between MobileMapper CX's I/O module and your PC's USB port. This causes ActiveSync to launch on your PC and connect to MobileMapper CX as a "Mobile Device." Do NOT set up a partnership when connecting to the PC with ActiveSync.

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1. Make sure the USB device switcher has been set to operate in "USB Serial for ActiveSync". See *page 5*.

4. Copy all the files extracted from the GPS firmware zip file from your PC to the MobileMapper CX's SD card using ActiveSync's Explore utility. The Explore button is located in Microsoft Active Sync window's taskbar (third button from the left).

5. Some versions of ActiveSync require that you click the Explore utility's Folders button (in the task bar) in order to copy/paste files from one location to another.

6. With the files copied to the SD card, tap the **My Computer** icon on the desktop and select the SD card.

7. Double-tap baldur.exe (located on the SD card) to launch the firmware loader.

8. On the firmware loader screen, tap the "Connect GPS" button and wait until the message "GPS connected at 4800" is displayed in the firmware loader's white message field.

9. Tap the GPS firmware loader's "Load" button and wait until the message "FLASH upload complete" is displayed at the bottom of the screen.

10. Tap "X" on the top right corner of the GPS firmware loader to close the application.

11. Tap "X" on the top right corner of Windows Explore.

12. Completely turn off MobileMapper CX by tapping:

   🏁 >**Shut Down** and tapping **OK**.

13. Once MobileMapper CX's power light goes off, restart it,

   tap 🏁 >**Settings**>**Control Panel** and scroll down to the **Magellan System Info** icon.

14. Double-tap the **Magellan System Info** icon and confirm that the **GPS F/W version** is that which you just uploaded.

15. To update another MobileMapper CX receiver with the latest GPS firmware, remove the SD card and insert it into the other receiver. Repeat Steps 6 through 14.

About Almanac Files

When first using your MobileMapper CX, and because there is no recent almanac file available yet in the unit, the internal GPS receiver (or Mission Planning if used at that time) will use a default almanac file stored in its protected memory.

After receiving GPS satellites for about 12 to 25 minutes, the internal GPS receiver will be able to create a new almanac file.

This file will be stored in the "Windows" folder and named as follows:

almyy.ddd

Where **alm** indicates this is an almanac file

yy are the last two digits of the year ("07" for 2007)

ddd in the file extension represents the Julian day number (001 to 366).

You can also store your own almanac files in the "Windows" folder using the same naming convention as the one described above.

The internal GPS receiver and Mission planning will always use the most recent almanac file stored in the Windows folder.

To force the use of a certain almanac file, rename this file (or rename the others) so that it can be seen as the most recent almanac. If you do that, don't forget to rename the files after use.

Choosing the Appropriate Real-Time Correction Age Limit

When selecting a DGPS mode, you have to set a parameter called Real-Time Correction Age Limit. Here are a few recommendations to help you set this parameter to the appropriate value.

The default value is 2 minutes. This is a good value to work with in most cases. If for any reason, the reception of DGPS corrections is of poor quality, you can increase this time limit up to 10 minutes without significantly impairing the position accuracy normally achieved with DGPS.

Assessing MobileMapper Beacon Reception Quality

As long as the green lock indicator light on MobileMapper Beacon stays on, you can be certain that MobileMapper CX can readily deliver a DGPS solution using the incoming correction data packets from MobileMapper Beacon.

You can verify this by running the GPS Status utility (see *Viewing Current GPS Status on page 15*; In the status bar at the bottom of the screen, "Differential GPS" should be displayed and the indicator light should flash in blue.)
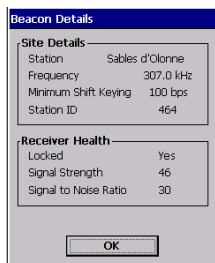
Differential GPS	3D	No Log	●
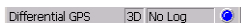
But if you notice that the green indicator light on MobileMapper Beacon sometimes temporarily turns off, this means the signal received is not as strong as it should be. The reasons for this are the following:

- Too many obstructions between you and the station. See how you can limit these obstructions.
- Or you are nearly out of range of the station. Consider working with a closer station, if possible.
- Or atmospheric noise has significantly increased thus reducing the SNR. Consider working with a station that would give a better SNR.

MobileMapper CX gives you the ability to analyze the key reception parameters of the MobileMapper Beacon. You can do this anytime, when setting the DGPS beacon mode, or later while using the beacon provided you first ask MobileMapper CX to stop processing the incoming correction data packets. This is done by tapping the **Disconnect** button in the DGPS Configuration window. You can then tap on the **Settings** button and then on the **Details** button to view the Beacon Details screen. (See also *page 33*.)

Among all the parameters displayed on this screen is the **Signal to Noise Ratio** (SNR). This is the most important parameter to look at.

Beacon Details

Site Details
Station	Sables d'Olonne
Frequency	307.0 kHz
Minimum Shift Keying	100 bps
Station ID	464

Receiver Health
Locked	Yes
Signal Strength	46
Signal to Noise Ratio	30

OK

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The table below gives indications on how safe DGPS operation with MobileMapper Beacon will be, depending on the value of the SNR.

SNR	DGPS Data Reception Quality
SNR<10 dB	Very Critical; DGPS mode steadiness is very unlikely.
10 <SNR<20 dB	Good but critical; if signal deteriorates, even slightly, MobileMapper CX won't be able to maintain DGPS mode.
SNR>20 dB	Excellent; there is signal level "in reserve", which means even if the signal slightly deteriorates, DGPS mode will be maintained.

Bluetooth Manager Toolbar Functions

Icon	Function
	Terminates the search sequence in progress.
	Launches a search sequence ("Searching..." is displayed in the status bar) to find all the Bluetooth devices present in the vicinity. New icons appear in the window as new devices are detected. "Ready" is displayed in the status bar at the end of the sequence. NOTE: is only active after has been tapped.
	Allows you to list the content of the parent folder. Valid when using the File Transfer service of a remote MobileMapper CX after you have opened a subfolder.
	Lists the shortcuts you created for the Bluetooth services found in the detected remote devices. Any shortcut can be deleted from the list.
	Is initially used to search all the remote Bluetooth devices present in the vicinity. Tapping this button after a search has been performed simply lists the Bluetooth devices that were detected during the last search sequence. Tap to refresh the list of detected Bluetooth devices.
	Provides access to all Bluetooth local services available in the MobileMapper CX unit.
	Allows you to view or edit the properties of MobileMapper CX's Bluetooth device: General, Security and Options.
	Returns the software version of Bluetooth Manager software.
	Minimizes the Bluetooth Manager window (but keeps Bluetooth Manager running).

MobileMapper CX Port Allocation

Port Number	Assigned to
COM1	RS232
COM2	Internal use (VSP)
COM3	USB ActiveSync
COM4	Bluetooth Serial Service
COM5	Free
COM6	USB Serial
COM7	Free
COM8	Free
COM9	Free

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MobileMapper™ CX

Getting Started Guide

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