



GETTING STARTED GUIDE

TerraSync™ software





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Version 4.00
Revision B
April 2009



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This is the April 2009 release (Revision B) of the *TerraSync Software Getting Started Guide*. It applies to version 4.00 of the TerraSync software.

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Introduction

In this chapter:

- Documentation conventions
- About the TerraSync software
- TerraSync software editions
- Finding additional information
- Technical assistance
- Your comments

Welcome to the *TerraSync Software Getting Started Guide*. This guide provides:

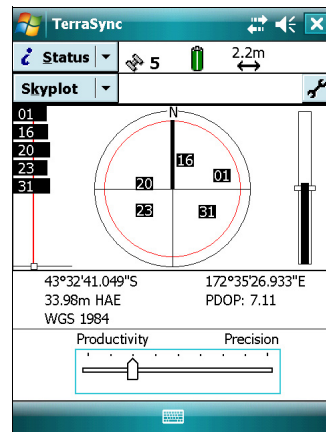
- an overview of the Trimble® TerraSync™ software
- a tutorial on using the TerraSync software
- a guide to the user interface and general operation of the TerraSync software

Even if you have used other Global Positioning System (GPS) products before, Trimble recommends that you spend some time reading this guide to learn about the special features of this product. If you are not familiar with GPS, go to www.trimble.com/gps for an interactive look at Trimble and GPS.

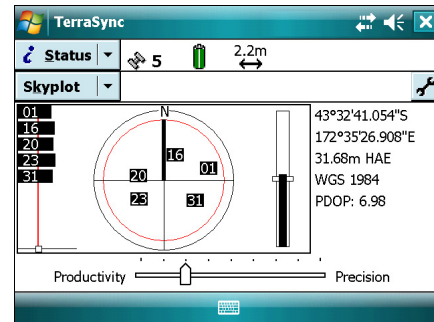
This publication assumes that you know how to use the Microsoft® Windows® operating system that you are using.

Documentation conventions

The documentation shows the TerraSync software as it appears on a portrait orientation handheld with a 480×640 pixel screen. On a larger screen, or in landscape orientation, some software items are displayed differently. However, there is no functional difference between the displays.



Portrait orientation (480 x 640)



Landscape orientation (640 x 480)

About the TerraSync software

The TerraSync software collects and updates geographical data (GIS and spatial data) on a field computer. A **field computer** is a handheld device (for example a device powered by the Microsoft Windows Mobile® operating system) or a computer (for example a laptop or Tablet PC) running the TerraSync software.

You can connect a GPS receiver to a field computer that has the TerraSync software installed and use the software to track GPS status, log new data and update existing data, and navigate in the field.

The TerraSync software acts as the **controlling software**. It communicates with a range of Trimble GPS receivers (see [Compatible GPS receivers, page 48](#)) connected to the field computer, allowing you to set GPS parameters in the receiver, record GPS positions on the field computer, and update existing GIS data.

The software can be used with a wide variety of real-time differential correction sources. If the GPS receiver has an integrated receiver that allows it to receive real-time correction messages from a real-time differential correction source, then the source can be used directly with the GPS receiver. For example, if your receiver has integrated support for Satellite Based Augmentation Systems (SBAS) such as WAAS, EGNOS and MSAS, then SBAS corrections can be used directly by the GPS receiver. If your receiver is not able to receive these types of signals, use an external source to receive the correction messages and provide them to the GPS receiver. For example, you can use an external receiver, a radio link to an external data radio, or use a cellphone to dial an Internet Service Provider and then download the corrections from an Internet server.

The TerraSync software provides mission planning in the field and data dictionary editing tools. Trimble postprocessing software (the GPS Pathfinder® Office software and the Trimble GPS Analyst™ extension for ESRI ArcGIS software) works with the TerraSync software. Use the postprocessing software to create data dictionaries, transfer data, import and export files, and postprocess collected GPS data.

TerraSync software editions

The TerraSync software is available in two editions: Standard and Professional. The TerraSync Professional edition software offers several additional useful features. With the Professional edition you can:

- update imported data files, including:
 - SSF files transferred from TerraSync Standard edition software using the Trimble Data Transfer utility.
 - data files created from Shapefiles.
 - data files received by email.
- display background images or data files in the Map section.
- use an external sensor (including laser rangefinders) when collecting data.
- use a survey receiver to collect RTK data.

If you have purchased the TerraSync Standard edition software and would like to use these additional functions, you can upgrade your software to the TerraSync Professional edition software. For upgrade pricing details, contact your local Trimble reseller.

This manual describes the TerraSync Professional edition software. If a feature or option it describes is not available in the TerraSync Standard edition software, this is indicated with a note at the beginning of the relevant section.

Finding additional information

In addition to the *TerraSync Software Getting Started Guide* (this document), the following documentation is available:


- *TerraSync Software Help*
- *TerraSync Software Quick Start Guide*
- *TerraSync Software Release Notes*


TerraSync Software Help

You can access the *TerraSync Software Help* on your field computer. This screen-by-screen reference explains all of the controls in each screen of the software.

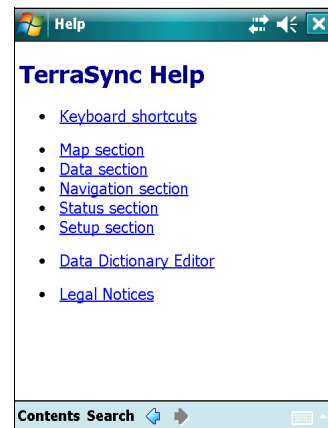
The Help is context-sensitive. If you access the Help while the TerraSync software is running, it opens at the topic that corresponds to the current TerraSync screen.

To access the TerraSync software context-sensitive help from:

- a Windows Mobile powered device, tap  and then select *Help*.

If you tap  and then select *Help* on the device when the TerraSync software is **not** running, the main Help Contents topic appears. Tap **Contents**, select *Help for Added Programs* and then select *TerraSync Help* to open the Contents topic of the TerraSync Software Help.

- an office computer, press **[F1]**. Alternatively, hold down the **[Alt]** key on the keyboard and then press **[H]**.



TerraSync Software Quick Start Guide

The *TerraSync Software Quick Start Guide* provides an overview of collecting GPS data including:

- Starting the TerraSync software
- Connecting to a GPS receiver
- Configuring your required accuracy settings
- Configuring GPS and data logging settings
- Creating a new data file
- Creating a point feature using Log Now
- Creating a line or area feature using Log Later
- Ending the data collection session
- Updating data
- Working from the map
- Common status indicators

The *TerraSync Software Quick Start Guide* is provided as a printed card and is also available as a PDF file on the *TerraSync Software CD*.

Release Notes

The *TerraSync Software Release Notes* describe new features in this version of the software and any changes to the documentation, and provide any information not included in the product documentation. The release notes are provided in the box with the software. They are also provided as a PDF file on the *TerraSync Software CD*.

Technical assistance

If you have a problem and cannot find the information you need in the product documentation, **contact your Trimble reseller**.

Technical support

Go to the TerraSync software technical support page (www.trimble.com/terrasync_ts.asp) for the latest support information about the software, including:

- FAQs
- Support notes detailing the latest support issues
- Documentation
- The latest files available for download

Windows error reporting

If a Microsoft Windows Error Reporting dialog appears, indicating that the TerraSync software has encountered a problem and needs to close, you are asked whether you wish to send an error report to Microsoft.

Trimble recommends that you click **Send** and then click any subsequent links that are used to obtain additional information.

Trimble can access the report that is sent to Microsoft and use it to improve the TerraSync software.

Your comments

Your feedback about the supporting documentation helps us to improve it with each revision. Email your comments to ReaderFeedback@trimble.com.

Software Installation and Activation

In this chapter:

- System requirements
- Registering the TerraSync software
- Installing the TerraSync software
- Activating the TerraSync software
- Updating the TerraSync software
- Compatible GPS receivers

This chapter describes how to install version 4.00 of the TerraSync software onto a Windows Mobile powered device or onto an office computer that is running a Windows operating system.

It also describes how to activate the software on a handheld powered by the Windows Mobile version 5.0 software or version 6 operating system.

To install and run the TerraSync software, you must:

1. Make sure your field or office computer meets the minimum platform requirements for successful operation of the TerraSync software.
2. Register your copy of the TerraSync software and obtain an installation code.
3. Install the software using the *TerraSync Software CD* and the installation code you obtained when you registered your copy of the software.
4. Activate the software, depending on the handheld operating system.

System requirements

Field computer specifications

Version 4.00 of the TerraSync software runs on handheld devices running any of the following Microsoft operating systems:

- Windows Mobile 6 operating system
- Windows Mobile version 5.0 software
- Windows Mobile 2003 software

Version 4.00 of the TerraSync software runs on computers running any of the following Microsoft operating systems, including 64-bit variants:

- Windows Vista® (Ultimate Edition, Enterprise Edition, Business Edition, or Home Edition)
- Windows XP (Professional Edition, Home Edition, or Tablet PC Edition)
- Windows 2000 Professional (SP 3)

For detailed specifications, go to www.trimble.com/terrasync_specs.shtml.

Required software

To install the TerraSync software onto a Windows Mobile powered device and to transfer files between a desktop computer and a Windows Mobile powered device, you must have the appropriate Microsoft software installed on your PC or Tablet PC. The software you use to manage the connection between the device and the computer depends on the operating system the office computer is running. If the computer is running:

- Windows Vista, make sure you have downloaded and installed the Windows Mobile Device Center.
- Windows XP or 2000, make sure you have installed the appropriate version of Microsoft ActiveSync® technology.

For more information, see [Step 1: Install Microsoft connection management software onto the computer, page 28](#).

To transfer files between a desktop computer and a field computer running the TerraSync software, you must also have one of the following installed on the desktop computer:

- the Trimble Data Transfer utility, which is available on the *TerraSync Software CD* or for free download from www.trimble.com/datatransfer.shtml
- version 4.10 or later of the Trimble GPS Pathfinder Office software

Registering the TerraSync software

Before you can install the TerraSync software, you must register your copy of the software to obtain an installation code that you enter during the installation process.

You can only register your copy of the TerraSync software once. For information about obtaining your installation code when the software has previously been registered, see [Obtaining your installation code after registration, page 25](#).

Trimble recommends that you register **before** beginning installation.

To register, you need:

- the Proof-of-Purchase Number (POPN) from the TerraSync software packaging
The Proof-of-Purchase Number (POPN) is labelled “POPN” and is located on the product label affixed to the software folder.
- Internet access (including a valid email address)

Note – If you do not have Internet access, contact your local Trimble reseller for assistance.

To register your copy of the TerraSync software:

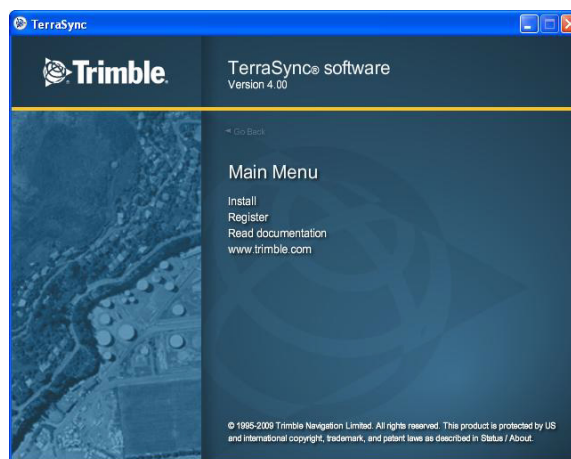
1. Go to the My Trimble account login page.

To do this, open your Web browser and go to www.trimble.com/register.

Alternatively:

- a. Insert the *TerraSync Software CD* in the CD drive of the office computer.

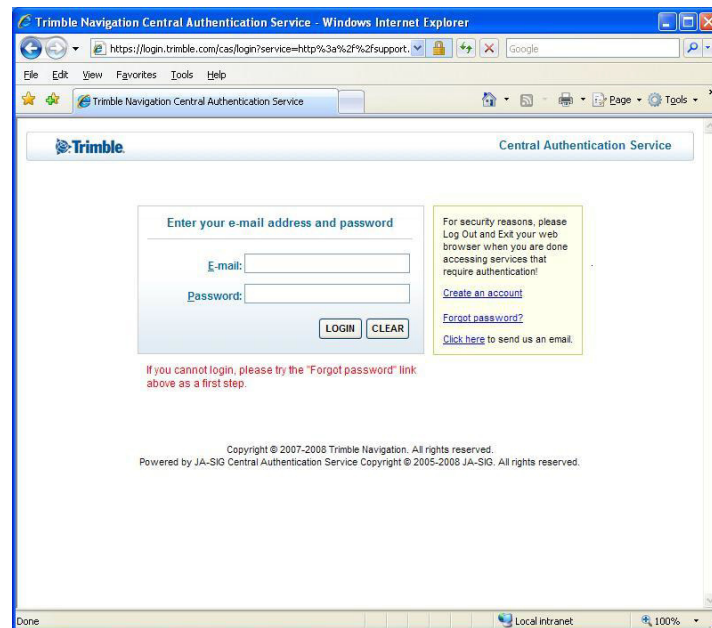
The Setup screen appears:



Note – If this screen does not appear, select *Autorun.exe* from the CD drive folder.

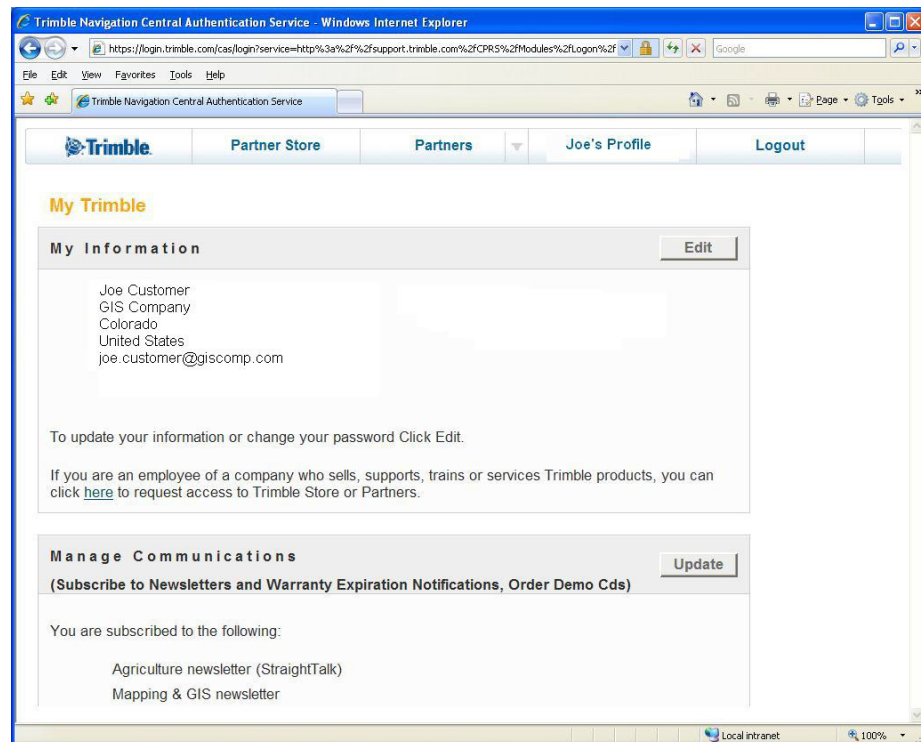
- b. Click *Register*.

Your default Web browser opens and displays the My Trimble account login page:



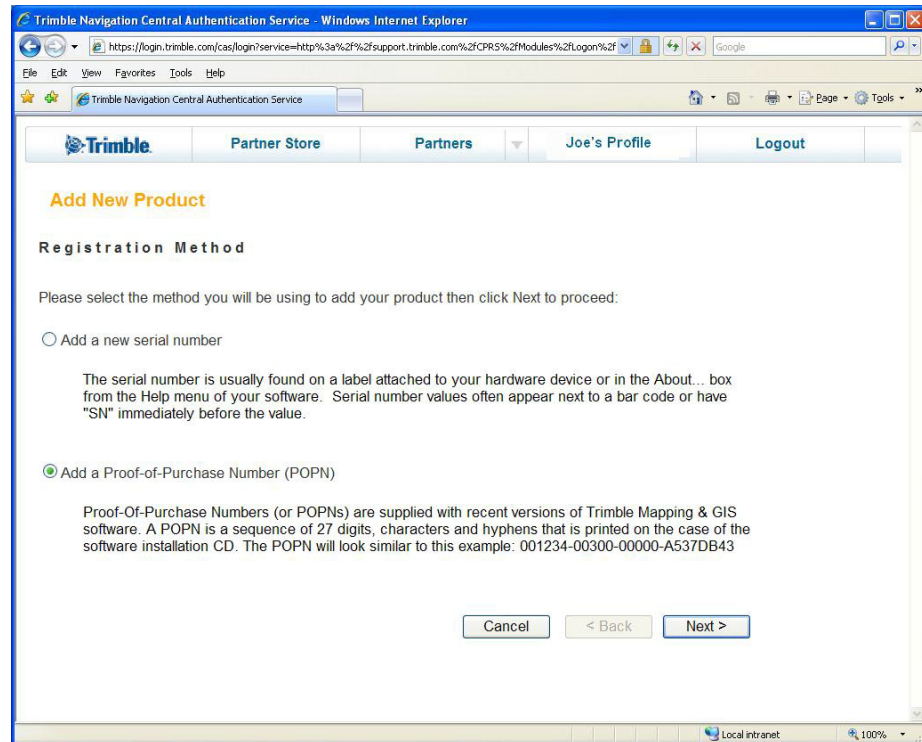
2. If you already have an account, skip this step and go to step 4 to log in.
To create your My Trimble account, click *Create an account*. Enter your contact details and then click **Save**. Your account is created and you are returned to the My Trimble account login page.
3. Enter your email address and password, and then click **Login**.

The *My Trimble* page for your account appears. It will look similar to the one shown below:



4. To register the TerraSync software, scroll to the *My Products* section and then click **Add**.

The *Registration Method* page appears:



5. Select the *Add a Proof-of-Purchase Number (POP)* option and then click **Next**.

The *Proof-of-Purchase Number (POPN) Details* page appears:

6. Enter the Proof-of-Purchase Number (POPN) provided on the TerraSync software packaging. The POPN is located on the product label inside the software folder, below the software CD.
7. If you want to enter your own reference code, for example a sales order number or an asset/inventory number, enter it in the *Your Reference* field.
8. Click **Next**.

Note – If a message warns that the POPN you entered has already been registered, click **Cancel** to cancel the registration process. Then obtain the installation code for your copy of the software and install the software. For more information, see [Obtaining your installation code after registration, page 25](#).

9. If this is the first time that you have registered a Trimble Mapping and GIS product, the *Mapping & GIS Industry Details* page appears. From the drop-down lists, select your organization type and most common market segment and then click **Save**.

You are returned to your My Trimble page, where the software you have just registered now appears in the My Products section:

Trimble Navigation Central Authentication Service - Windows Internet Explorer

https://login.trimble.com/cas/login?service=http%3a%2f%2fsupport.trimble.com%2fCPRS%2fModules%2fLogon%2f

Trimble Navigation Central Authentication Service

Trimble Partner Store Partners Joe's Profile Logout

My Products

Click to see more details about a product.
 Click a Serial Number value to update or extend details for that product.
 Click the associated Your Reference value to add or modify Your Reference for that product.
 Click the associated to remove that product from this list.

You have registered the following products:

Product Name	Serial Number	Your Reference
EZ-Guide Plus with internal GPS lightbar	66178	—
GeoXH 2005 series handheld	0641406064	—
TerraSync Professional field software	510262-00110	TS 18 DEL VALLE, TX

Installation code (points to the Software Installation Code field below)

Software Installation Code	: 510262-00110-05325-FA5824B9
Software Maintenance Expiry Date	: 9/Jun/2008
Activated on Device (Name)	:
Activated on Device (Serial Number)	:
Activation Date	:

10. If the five lines below the TerraSync software do not appear, click the + beside the copy of the TerraSync software that you have just registered.

The *Installation Code* field shows the installation code for your copy of the TerraSync software. Make a note of this code. You must enter this code when you install or reinstall the software.

Note – If you are entitled to an upgrade from a previous version of the TerraSync software, you can install TerraSync version 4.00 using the installation code that you obtained when you first registered the product. If you are **not** entitled to an upgrade, the installation program will not accept your installation code. Contact your local Trimble reseller to purchase a software maintenance option.

Obtaining your installation code after registration

To reinstall the TerraSync software, for example if you performed a factory reset on the device or reinstalled the operating system, you must use the same installation code that you received when you registered the software before installing it for the first time.

If you do not know the installation code, do one of the following:

- If someone else at your company registered the software ask them for the installation code.

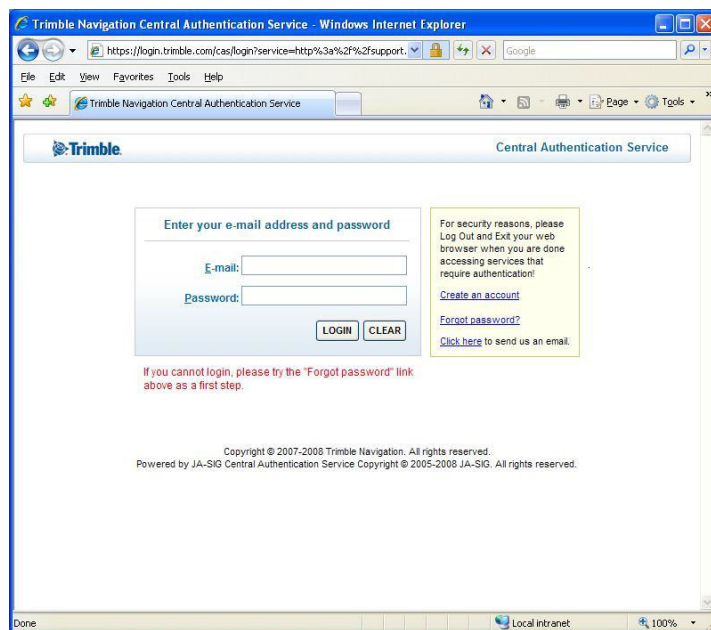
If you cannot find out who registered the software, send an email containing the Proof-of-Purchase Number (POPN) for your copy of the software to Trimble_support@trimble.com.

- If you registered your copy of the software yourself, you can check your installation code from the My Trimble page of the Trimble website.

To do this:

- Open your Web browser and go to www.trimble.com/register.

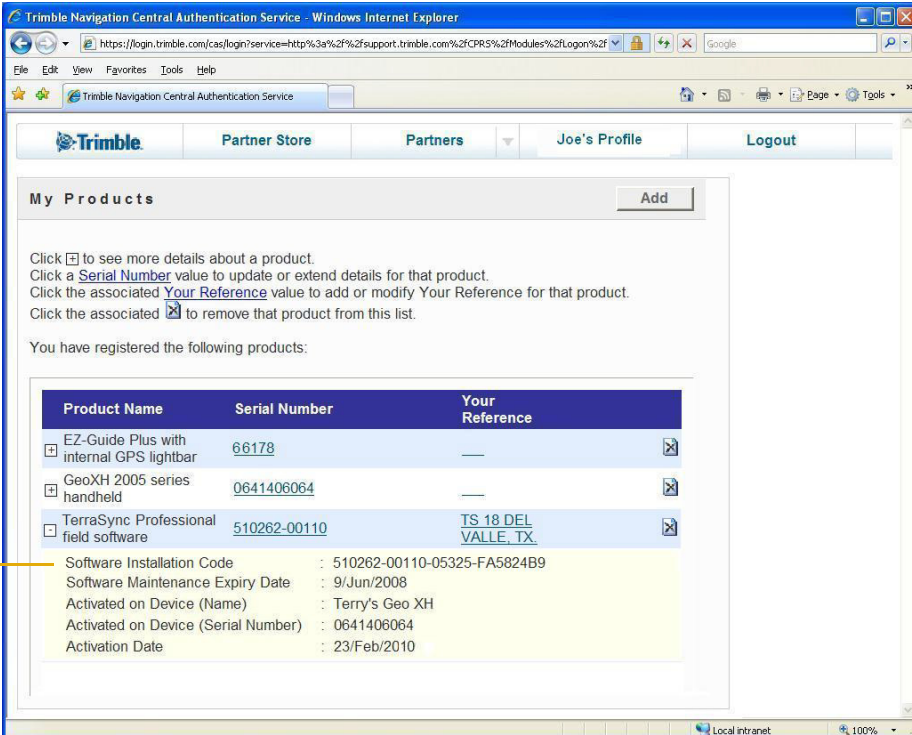
Your default Web browser opens and displays the My Trimble account login page:



Enter your email address and password and then click **Login**.

The *My Trimble* page for your account appears.

- b. Scroll to the My Products section, where any software that you have already registered appears:



The screenshot shows the 'My Products' section of the Trimble Navigation Central Authentication Service. It lists three products: 'EZ-Guide Plus with internal GPS lightbar', 'GeoXH 2005 series handheld', and 'TerraSync Professional field software'. The 'TerraSync Professional field software' entry is expanded, showing details such as the 'Installation Code', 'Software Maintenance Expiry Date', 'Activated on Device (Name)', 'Activated on Device (Serial Number)', and 'Activation Date'. A yellow box highlights the 'Installation Code' field, with a label 'Installation code' pointing to it.

Product Name	Serial Number	Your Reference
EZ-Guide Plus with internal GPS lightbar	66178	—
GeoXH 2005 series handheld	0641406064	—
TerraSync Professional field software	510262-00110	TS 18 DEL VALLE, TX

Installation code

Software Installation Code : 510262-00110-05325-FA5824B9
 Software Maintenance Expiry Date : 9/Jun/2008
 Activated on Device (Name) : Terry's Geo XH
 Activated on Device (Serial Number) : 0641406064
 Activation Date : 23/Feb/2010

- c. If the five lines below the TerraSync software do not appear, click the + beside the copy of the TerraSync software that you have just registered.

The *Installation Code* field shows the installation code for your copy of the TerraSync software. Make a note of this code. You need to enter this code when you install or reinstall the software. You can also check which device the registered Installation Code has been activated on.

Installing the TerraSync software

This section describes how to install the TerraSync software. It provides information about the following options:

- [Installing a translation of the TerraSync software](#) (see below)
- [Installing the TerraSync software onto a Windows Mobile powered device, page 27](#)
- [Activating the software on a field computer powered by the Windows Mobile version 5.0 software or version 6 operating system, page 38](#)
- [Installing the TerraSync software onto a Windows computer, page 44](#)

Installing a translation of the TerraSync software

Trimble recommends that you install a translation of the TerraSync software only on a field computer that has the corresponding language version of the operating system installed. For example, install the Japanese TerraSync software on a field computer that has a Japanese Windows operating system installed.

Note – *The Regional Options applet in the Control Panel changes only the display of date, time, units, and currency information. It does not change the language of the operating system running on the device or field computer.*

System commands (such as the **OK** and **Cancel** buttons) are generated by the operating system, so they appear in the language of the operating system on the field computer. If you use the TerraSync software on a field computer that does not have the corresponding translation of the operating system installed, system commands are not translated. Also, some characters may not be interpreted or displayed correctly.

For best results, make sure that the languages used by the TerraSync software and the operating system match. If they do not, install any font that is supplied with the TerraSync software for that language. For more information, see [Step 7: Install fonts onto the Windows Mobile powered device, page 36](#).

Note – *The fonts that the TerraSync software uses are included with translated Windows desktop operating systems, so you do not need to install them to use the TerraSync software on an office computer.*

The TerraSync software is available in several languages. To install a translation of the TerraSync software, go to the Downloads section on the TerraSync support page (http://www.trimble.com/terrasync_ts.asp).

Installing the TerraSync software onto a Windows Mobile powered device

This section describes how to install the TerraSync software onto a supported Windows Mobile powered device.

The installation procedure comprises the following steps:

1. Install Microsoft connection management software onto the office computer.
2. Connect the Windows Mobile powered device and the computer.
3. Back up any TerraSync software data files.
4. Uninstall any previously installed versions of the TerraSync software.
5. Check that you have enough space on the device to install version 4.00 of the TerraSync software.
6. Install version 4.00 of the TerraSync software.
7. If necessary, install the appropriate font (if you have installed a translated version of the TerraSync software).

More information about each step is provided below.

Step 1: Install Microsoft connection management software onto the computer

Note – You must install the Windows Mobile Device Center or ActiveSync technology onto the computer **before** you connect the device.

To install software onto a Windows Mobile powered device, you must connect the device to the office computer. If the computer is running:

- the Windows Vista operating system, use the Windows Mobile Device Center to manage the connection.
- the Windows XP or 2000 operating system, use Microsoft ActiveSync technology to manage the connection.

Installing the Windows Mobile Device Center

The Windows Vista operating system includes a basic connectivity driver for Windows Mobile powered devices. This driver allows you to transfer files from the device to your PC.

To install software onto a Windows Mobile powered device, or to use the more advanced desktop synchronization features with your device, you must install Windows Mobile Device Center 6 onto your office computer.

You can download the Windows Mobile Device Center from www.microsoft.com/windowsmobile/devicecenter.mspx.

Installing ActiveSync technology

ActiveSync technology may be supplied on a CD with the Windows Mobile powered device, or you can download it from www.microsoft.com/windowsmobile.



Tip – If you are installing a translation of the TerraSync software and you want all installation screens to appear in the translated language, install the corresponding translation of the ActiveSync technology. You can download translated versions of the ActiveSync technology from the Microsoft website.

Step 2: Connect the device to a computer

1. Make sure that the device and the computer are turned on.
2. Connect the device to the office computer using either a USB cable connection or Bluetooth® wireless technology. For more information on connecting the device to a computer, refer to the documentation for the Windows Mobile powered device.

When the device is connected, a window appears on the office computer that enables you to manage the connection.

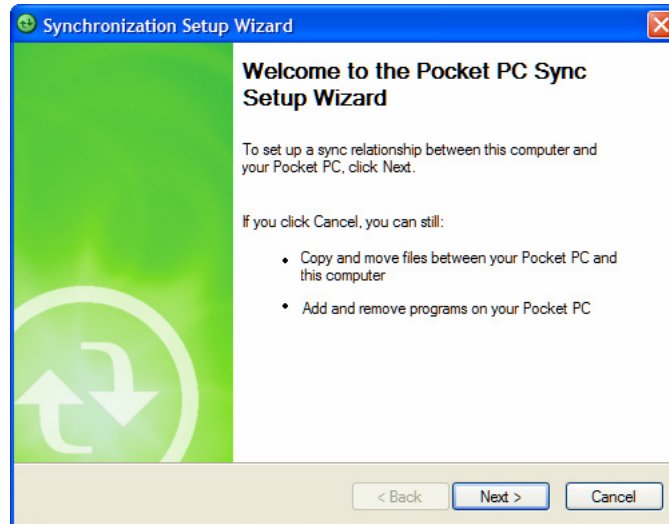
3. If the office computer is running:
 - the Windows Vista operating system:
 - a. If the *Autoplay* window appears, close the window.
 - b. The *Windows Mobile Device Center* window displays the message **Connected:**



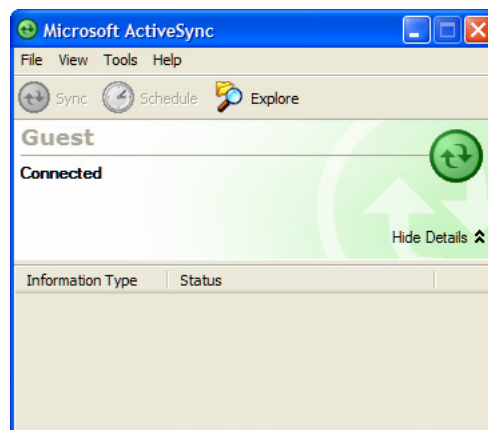
- c. Click *Connect without setting up your device*.
- d. Use the Windows Mobile Device Center to back up data files and uninstall any previous versions of the software (see Step 3, [page 31](#) and Step 4, [page 31](#)).

For more information, refer to the *Windows Mobile Device Center Help*.

- the Windows XP or 2000 operating system:
 - a. If the *Synchronization Setup Wizard* appears, click **Cancel** to close the wizard:



- b. The *Microsoft ActiveSync* window displays the message Connected:



- c. Use ActiveSync technology to back up data files and uninstall any previous versions of the software (see [Step 3](#) and [Step 4](#) below).

For more information, refer to the *ActiveSync Help*.


Step 3: Back up any TerraSync software data files

Before installing a new version of the TerraSync software, Trimble recommends that you transfer any existing TerraSync software data files to the office computer.

To transfer files using...	do the following...
the Windows Mobile Device Center	click <i>File Management</i> and use the Windows Explorer-type window to copy files.
ActiveSync technology	click Explore and use the Windows Explorer-type window to copy files.

Step 4: Uninstall any previous versions of TerraSync software

Before installing a new version of the TerraSync software, Trimble recommends that you uninstall any previously installed versions of the TerraSync software from the Windows Mobile powered device and the office computer.

To remove programs...	do the following:
from the device using the Windows Mobile Device Center	click <i>Programs and Services</i> and then click <i>Add/Remove Programs</i> .
	 Tip – If the <i>Add/Remove Programs</i> option is not displayed below <i>Programs and Services</i> , click <i>More</i> . The <i>Add/Remove Programs</i> option appears.
from the device using ActiveSync technology	select <i>Add/Remove Programs</i> from the <i>Tools</i> menu.
from the office computer	use the <i>Add or Remove Programs</i> tool in the Control Panel.

Step 5: Check that you have enough space on the device

Trimble recommends that you install the TerraSync software to an internal non-volatile storage location, if such a location is available. This leaves more storage and program memory available on the device.

Note – When installing software onto a Windows Mobile powered device, you cannot install to RAM. The default installation location is always an internal non-volatile location.

Before you install the TerraSync software, make sure that you have enough free space on the device. The TerraSync software requires at least 14 MB of free space. If you are installing it to a secondary internal storage location, such as the GeoExplorer 2003 series handheld's Disk, the TerraSync software requires at least 14 MB of free space in that location, plus 5 MB of RAM.

Note – The installation program cannot determine how much memory is available in the non-volatile storage location. You must ensure that 14 MB is free **before** you begin the installation.

If there is not enough memory space on the device, a message appears during installation, indicating the amount of memory left on the device.

Click **Cancel**, remove any unwanted programs or data files from the device, and/or increase storage memory. Then start the installation again.

If memory space in the secondary internal storage location is insufficient, the installation may appear to complete successfully, but error messages may appear when you try to run the TerraSync software. If this happens, make more space available in the secondary storage location and then install the software again.

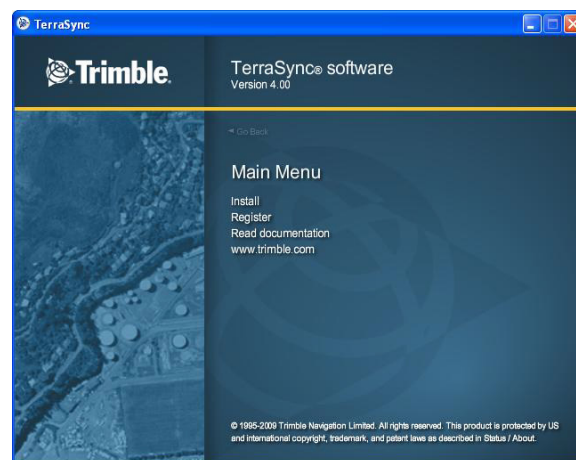
Step 6: Install the TerraSync software onto the device

1. Before you begin, make sure that:
 - you have registered your copy of the software and have made a note of the installation code that you must enter during installation. For more information, see [Registering the TerraSync software, page 19](#).
 - the TerraSync software is not running on the device.
 - you have closed all applications on the device.

2. Insert the *TerraSync Software CD* into the CD drive of the office computer.

Alternatively, if you are entitled to an upgrade from a previous version of the TerraSync to version 4.00, you can download the software from www.trimble.com/terrasync_ts.asp. Click *Downloads* and then click *v4.00 Software*.

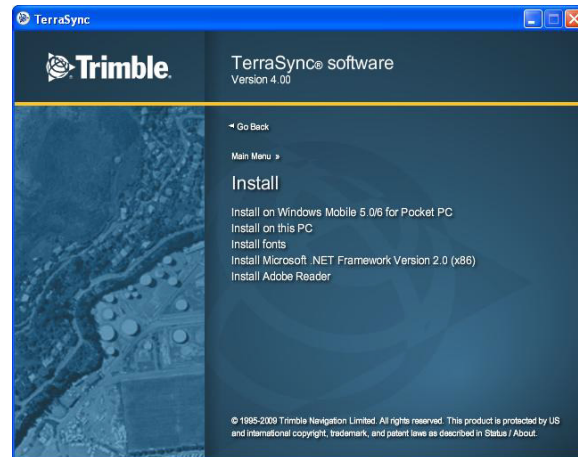
The Setup screen appears:



Note – If this screen does not appear, select *Autorun.exe* from the CD drive folder.

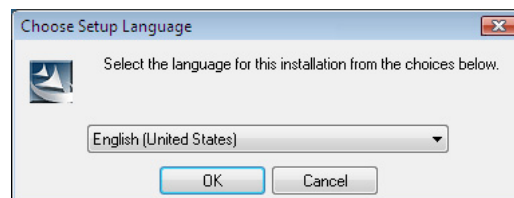
3. Click *Install*.

The Installation screen appears:



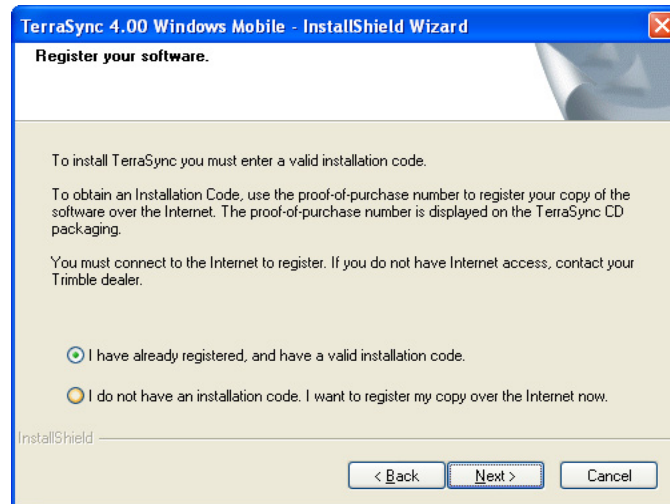
4. Select the install option for the type of device that you have connected.

The *Choose Setup Language* dialog appears:



5. Select the language that you require to run the installation. To run the rest of the TerraSync software in a language other than English, after installing the software you must download the appropriate language update from http://www.trimble.com/terrasync_ts.asp. For more information, see [Step 15](#) below.
6. Click **Next**.
7. The TerraSync software installation wizard appears. Click **Next**.
8. Read the software license agreement and then click **Yes** to accept it.

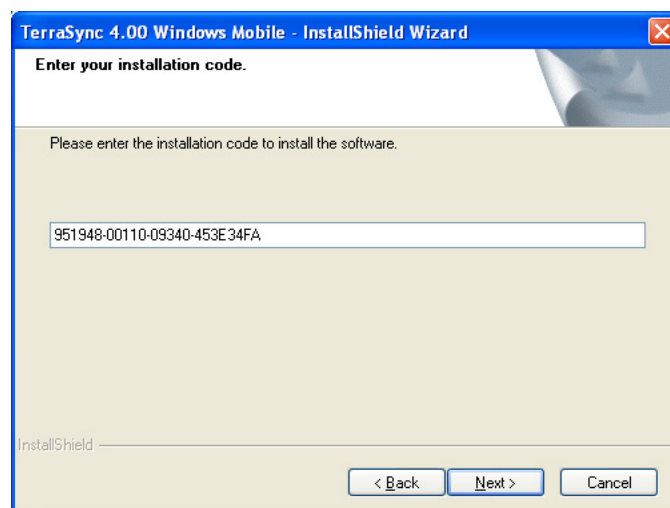
The *Register your Software* page appears:



9. Do one of the following:
 - If you have registered the software and obtained your installation code for the software, select the *I have already registered* option and then click **Next**.
 - If you have not yet registered the software and do not have an installation code for the software, select the *I do not have an installation code. I want to register my copy over the Internet now* option and then click **Next**.

The Register page opens in your default Web browser, displaying the My Trimble account log in. For more information, see [Registering the TerraSync software, page 19](#).

The *Enter your Installation Code* page appears:



10. Enter the installation code assigned to your copy of the TerraSync software when you registered the software and then click **Next**.

11. The *Tutorial* page recommends that you complete the tutorial in Chapter 4 of this guide before using the software. Click **Next**.
12. The *Start Copying Files* page appears. Click **Next**.
13. If prompted, Install “Trimble TerraSync” using the default application install directory?, click **Yes**.

If the device is a Windows Mobile powered device, you cannot install to main memory. The default installation location is the device’s internal non-volatile disk.

If the device has a non-volatile “internal” storage location, this is used as the default installation location, even if you choose to install to main memory. Internal storage locations include the Disk on a GeoExplorer 2003 series handheld and the Built-In Storage on a Trimble Recon handheld running Windows Mobile 2003 software.

If the device has no non-volatile storage, or has only removable secondary storage such as a CompactFlash card, the default installation location is the main memory (RAM).

Note – *If an SD (Secure Digital) memory card is inserted in the handheld, the card appears as an installation location option. Trimble recommends that you install software to the handheld’s internal storage, **not** to an SD memory card. If you install software to a card and then remove the card from the handheld, the software will not be available for use.*

14. If you clicked **No** in [Step 13](#), the *Select Destination Media* dialog appears. Click **OK** to proceed with the installation.

On some Windows Mobile powered devices, such as the Trimble Recon handheld, the message Adding information for “Remove Programs” may remain on the screen for several minutes. **Do not** cancel the installation or reset the device while this message is displayed.

When you install the TerraSync software on a device powered by the Windows Mobile 2003 software, some settings are stored in the main memory (RAM), even if the extension is installed to secondary internal storage. To avoid data loss, the installation program automatically backs up the main memory immediately after installing the TerraSync software.

15. If you installed the software from the CD, Trimble recommends that you download the latest software updates and documentation from the Trimble website (http://www.trimble.com/terrasync_ts.asp).

Step 7: Install fonts onto the Windows Mobile powered device

When you install a translation of the TerraSync software on a Windows Mobile powered device, you must also install a TerraSync language font if both of the following are true:

- You have installed the TerraSync software in one of the following languages:
 - Chinese
 - Japanese
 - Korean
- The language version of the operating system does not match the language of the TerraSync software (for example, if you have installed the Japanese TerraSync software onto an English Windows Mobile powered device)



CAUTION – Do not install the Japanese font onto a Windows Mobile powered device with the Japanese version of the operating system installed. This can cause software errors on the device.



Tip – If you see squares or unusual characters instead of characters from the appropriate language, you need to install a font.

Chinese, Japanese, Korean, or Russian TerraSync software on an *English* (or other foreign) Windows Mobile powered device does not recognize Asian or Cyrillic characters entered using a keyboard. This is because the English device cannot convert the Unicode characters to multi-byte characters. However, Japanese TerraSync software running on a Japanese Windows Mobile powered device recognizes Japanese characters correctly.

Cyrillic characters, from data dictionaries created in the GPS Pathfinder Office software using Russian Windows, are not displayed correctly in Russian TerraSync software. However, this text displays correctly when transferred back to the GPS Pathfinder Office software. Data dictionaries created in the GPS Pathfinder Office software using Chinese, Japanese, or Korean Windows are displayed properly.



Tip – The Trimble GPS Pathfinder font is installed automatically when you install the TerraSync software. This font includes symbols that you can use to represent point features on the map. If you want to use other symbol fonts for point features, install the additional fonts manually.

To install a TerraSync language font onto a Windows Mobile powered device:

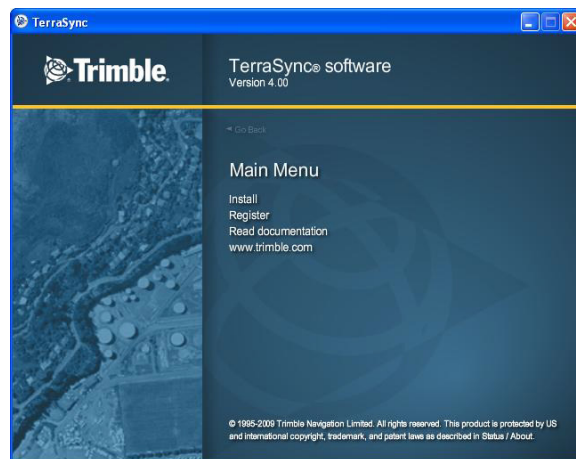
1. Uninstall any previous versions of the font.



CAUTION – On some Windows Mobile powered devices, you cannot delete Asian language fonts in the usual way. To remove such fonts, you may need to perform a hard reset of the device. A hard reset removes *all* software that is not pre-installed on the device by the manufacturer.

2. Make sure that you have enough free memory to install the font. TerraSync language fonts require 9 to 10 MB of free memory. For more information, see [Installing the TerraSync software onto a Windows Mobile powered device, page 27](#).
3. Insert the *TerraSync Software CD* in the CD drive of the office computer.
Alternatively, if you are entitled to an upgrade from a previous version of the TerraSync to version 4.00, you can download the software from www.trimble.com/terrasync_ts.asp. Click *Downloads* and then click *v4.00 Software*.

The Setup screen appears:



Note – If this screen does not appear, select *Autorun.exe* from the CD drive folder.

4. Select the *Install* option.
5. Select the *Install fonts* option.
6. Select the option for the language that you require.
7. Follow the instructions on the screen to install the font.

Note – TerraSync fonts should always be installed to RAM (main memory). Do not install fonts to a secondary internal storage location (such as the Disk on a GeoExplorer series handheld), or to a removable storage device.

8. When the installation is complete, perform a **soft** reset of the device.

For information how to perform a soft reset, refer to the documentation for the device.

Activating the TerraSync software

Activating the software on a field computer powered by the Windows Mobile version 5.0 software or version 6 operating system

The TerraSync software version 4.00 must be activated once it is installed on a field computer that is powered by the Windows Mobile 5.0 software or version 6 operating system.

To do this:

1. If not already started by the installation process, start the Activation Wizard. Click *Start / All Programs / Trimble / TerraSync 4.0 WM / Trimble TerraSync Activator*. The Activation Wizard was installed on your office computer during the TerraSync software installation.

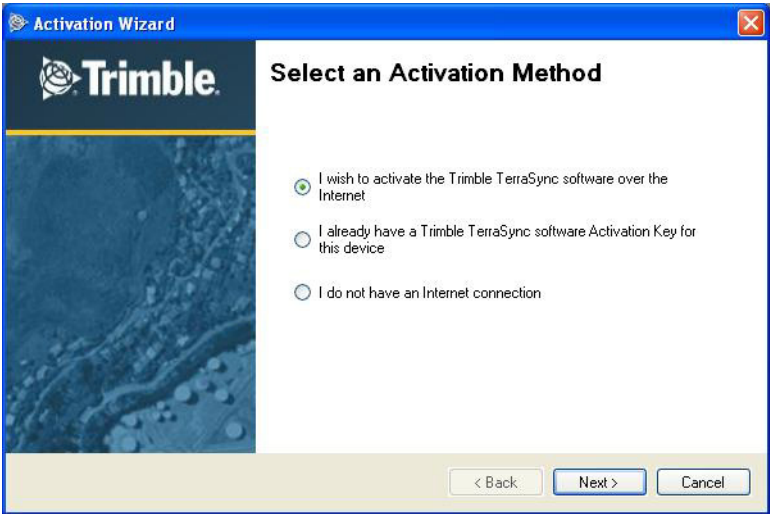
Note – The Activation Wizard is a .NET framework application. If your office computer is running the Windows XP or Windows Vista® operating system, you must also have the latest Service Packs installed.

2. Select your preferred language:



The Activation Wizard connects to the field computer through Microsoft® ActiveSync® technology or the Windows Mobile Device Center.

3. Select an activation method:



Select this method	If...	See...
I wish to activate the Trimble TerraSync software over the Internet	Your office computer is connected to the Internet. Trimble recommends this method.	page 40
I already have a Trimble TerraSync software Activation Key for this device	If your Trimble Reseller has provided you with an Activation Key, or you have previously activated this Installation Code on the same field computer and kept a record of the Activation Key.	page 40
I do not have an Internet connection	You do not have an Internet connection.	page 42

Product information

The Wizard will now extract information about the connected device that will help you identify it at a later stage.

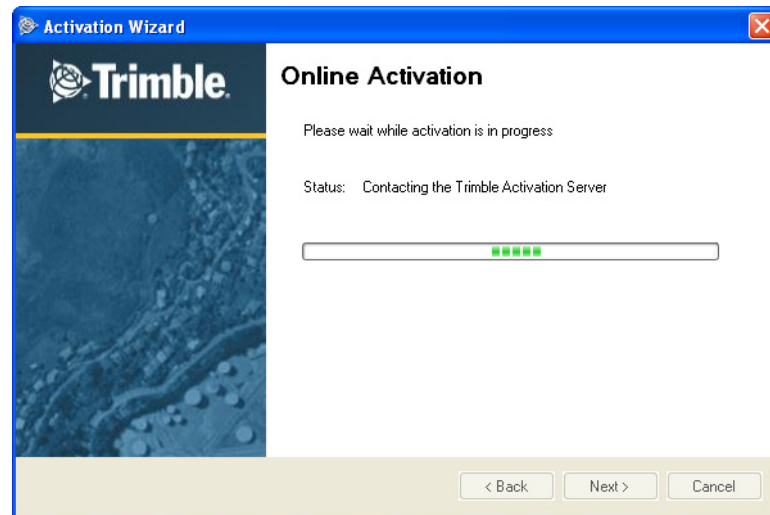


You will be able to edit the Device Name to customize it to your environment.

Depending on the connected device type, you may also be required to enter the device serial number.

Online activation

The Wizard communicates directly with the Trimble Activation server and activates the TerraSync software on your field computer:

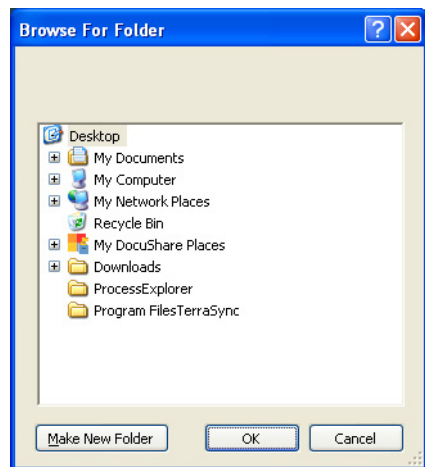


Activation using an existing Activation Key

The Activation Wizard prompts you for the folder where the Activation Key is stored. This could be on a local or network drive, or an external memory card, such as a USB memory stick or SD card:



Use the **Browse** button to navigate to the required folder:



If the Activation Wizard cannot find an Activation Key for the connected device in the selected folder, it will continue to prompt for a different folder.

Activation succeeds only if the Activation Key matches the connected field computer:

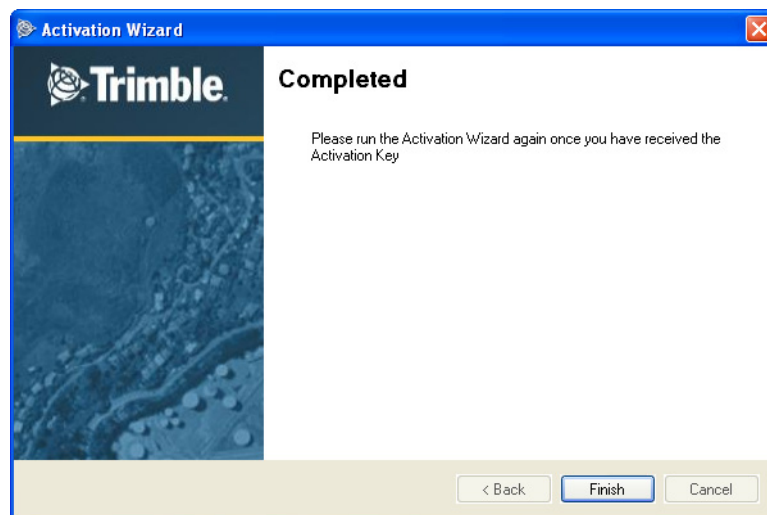


Offline activation

1. Print out or write down the information that appears:



2. Send the information to your Trimble reseller:



Your Trimble reseller will return the Activation Key on an electronic media (diskette, CD, SD card, or USB memory stick).

3. Insert the media into the office computer that is connected to the field computer.

Activation continues as for [Activation using an existing Activation Key](#).

Activation troubleshooting

One of the following issues may occur:

- No valid Installation Code:



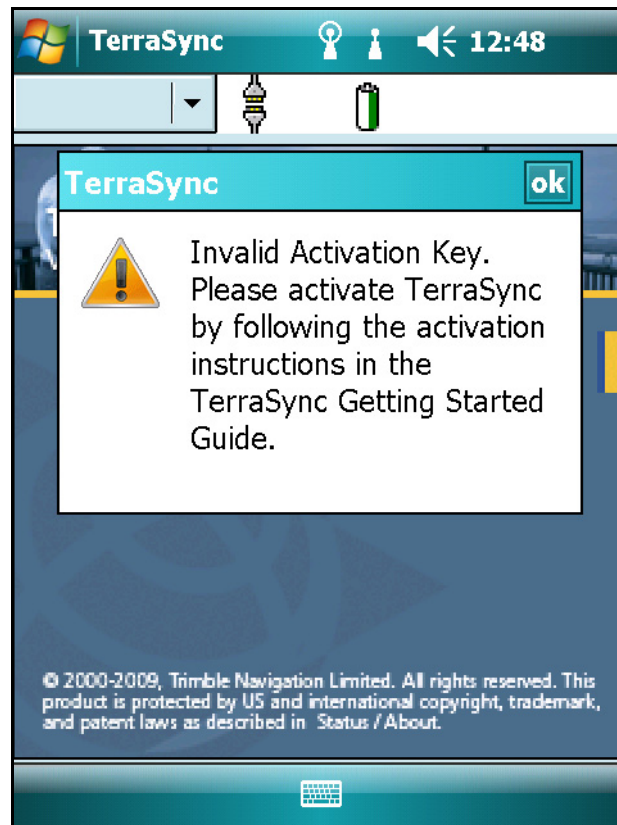
- The Installation Code is assigned to another device:



In these circumstances, enter a valid or previously unused Installation Code. If in doubt, contact your Trimble reseller.

Starting the TerraSync Software on a field computer powered by the Windows Mobile version 5.0 software or version 6 operating system

TerraSync software version 4.00 will run on a field computer only if it is successfully activated. If a valid Activation Key is not found, the following error message appears:



Tap **ok** to exit and then run the Activation Wizard to activate the software, see [page 38](#).

Installing the TerraSync software onto a Windows computer

This section describes how to install the TerraSync software onto an office computer, such as a laptop or a Tablet PC, that is running a Windows operating system.

The installation procedure comprises the following steps:

1. Back up any TerraSync software data files.
2. Uninstall any previously installed versions of the TerraSync software.
3. Install version 4.00 of the TerraSync software.

More information about each step is provided below.

Step 1: Back up any TerraSync software data files

Before installing a new version of the TerraSync software, Trimble recommends that you transfer any TerraSync software data files to a safe storage location.

Step 2: Uninstall any previous versions of TerraSync software

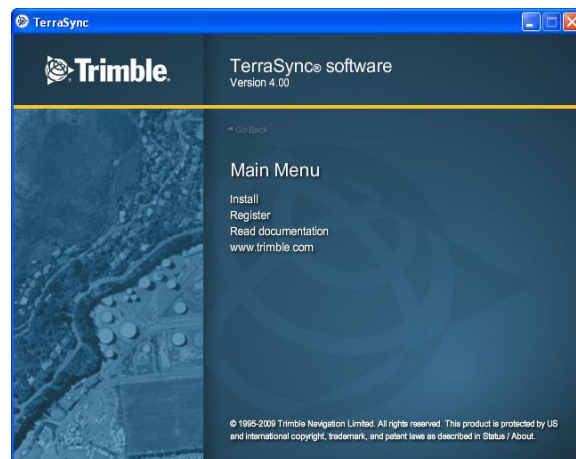
Before installing a new version of the TerraSync software, Trimble recommends that you uninstall any previously installed versions of the TerraSync software.

Step 3: Install the TerraSync software onto the field computer

1. Before you begin, make sure that:
 - you have registered your copy of the software and have made a note of the installation code that you must enter during installation. For more information, see [Registering the TerraSync software, page 19](#).
 - the TerraSync software is not running on the computer.
 - you have closed all open windows programs on the PC.
2. Insert the *TerraSync Software CD* into the CD drive of the office computer.

Alternatively, if you are entitled to an upgrade from a previous version of the TerraSync to version 4.00, you can download the software from www.trimble.com/terrasync_ts.asp. Click *Downloads* and then click *v4.00 Software*.

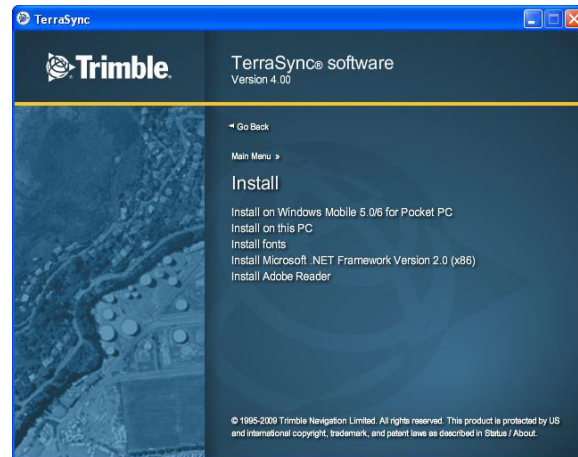
The Setup screen appears:



Note – If this screen does not appear, select *Autorun.exe* from the CD drive folder.

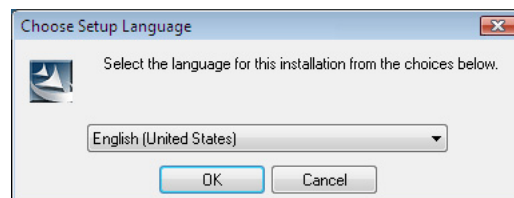
3. Click *Install*.

The Installation screen appears:



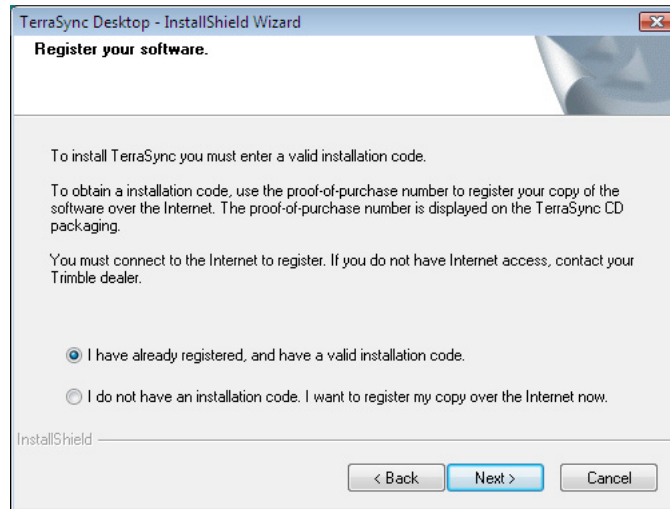
4. Select the *Install on this PC* option.

The *Choose Setup Language* dialog appears.



5. Select the language that you require to run the installation. To run the rest of the TerraSync software in a language other than English, after installing the software you must download the appropriate language update from www.trimble.com/terrasync_ts.asp. For more information, see [Step 14](#) below.
6. Click **Next**.
7. The TerraSync software installation wizard appears. Click **Next**.
8. Read the software license agreement and then click **Yes** to accept it.

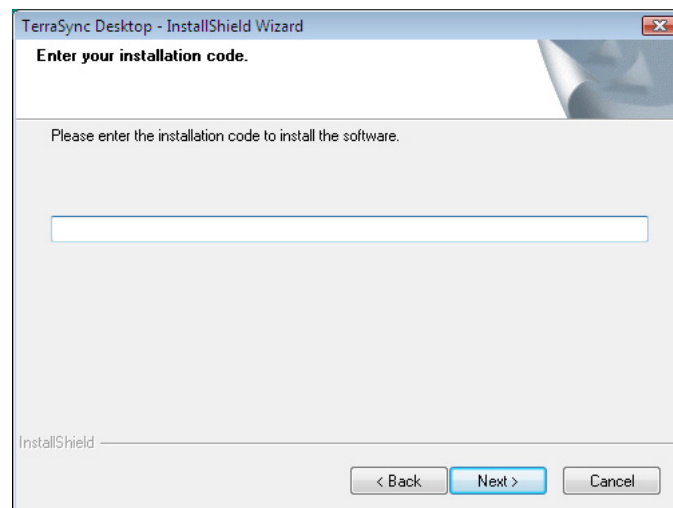
The *Register your Software* page appears:



9. Do one of the following:
 - If you have registered the software and obtained your installation code for the software, select the *I have already registered* option and then click **Next**.
 - If you have not yet registered the software and do not have an installation code for the software, select the *I do not have an installation code. I want to register my copy over the Internet now* option and then click **Next**.

The Register page opens in your default Web browser, displaying the My Trimble account log in. For more information, see [Registering the TerraSync software, page 19](#).

The *Enter your Installation Code* page appears:



10. Enter the installation code assigned to your copy of the TerraSync software when you registered the software and then click **Next**.

11. In the *Choose Desktop Software Location* page, select the folder where the setup will install the program files and then click **Next**.
12. The *Tutorial* page recommends that you should complete the tutorial in Chapter 4 of this guide before using the software. Click **Next**.
13. The *Start Copying Files* page appears. Click **Next**.
The final page of the installation wizard shows *InstallShield Wizard Complete*.
14. If you installed the software from the CD, Trimble recommends that you download the latest software updates and documentation from the Trimble website www.trimble.com/terrasync_ts.asp.

Updating the TerraSync software

Trimble recommends that you check for software and language updates after the installation process, by going to www.trimble.com/terrasync_ts.asp.

Compatible GPS receivers

You can connect a field computer running version 4.00 of the TerraSync software to any of the following:

- Field computers with integrated GPS receivers:
 - GeoExplorer® series handhelds (GeoXH™, GeoXM™, and GeoXT™)
 - Juno™ SB and SC handhelds
 - Juno ST handheld
 - Trimble Nomad™ G series handhelds (800GL, 800GLC, 800GLE, 800GX, 800GXC, and 800GXE)
 - Trimble Nomad handhelds (800L, 800LC, and 800LE purchased prior to January 2009)
 - Trimble Recon® GPS XB and XC editions
- GPS receivers:
 - GPS Pathfinder ProXRT receiver
 - GPS Pathfinder ProXH™ receiver
 - GPS Pathfinder ProXT™ receiver
 - GPS Pathfinder Pro XRS receiver
 - GPS Pathfinder XB receiver
 - GPS Pathfinder XC receiver
- The following Trimble survey receivers:
 - 5800 receiver (firmware version 2.23 or later)

- R8 receiver (firmware version 2.23 or later)
- R8 GNSS receiver (firmware version 3.00 or later)
- 5800 Model II receiver (firmware version 2.23 or later)

Connecting to a GPS receiver

You can connect the GPS receiver to a port on the field computer. using one of the options described below.

Note – To use GPS positions from the integrated GPS receiver when the TerraSync software is installed on a GeoExplorer series handheld, configure the TerraSync software to connect to GPS on COM3.

Port	Connection method
Bluetooth port	Use the Bluetooth management software provided with your field computer and the GPS receiver to configure and then establish the Bluetooth wireless connection.
Standard RS-232 serial (COM) port	Connect the GPS receiver cable to the curly straight-through cable. Trimble recommends that you use the cable with P/N 45052 to protect the field computer from power supplied by the receiver. Connect the curly straight-through cable to the field computer.
Customized serial (COM) port	Connect the GPS receiver cable to the null modem adaptor (P/N 43197). The adaptor changes gender, and also protects the field computer from power supplied by the receiver. Connect the null modem adaptor to the data download cable that was supplied with the field computer. Connect the data download cable to the field computer.
CompactFlash serial port	Connect a CompactFlash serial adaptor to the CompactFlash port. Then connect as for a standard COM port. Note – A field computer uses more power when a GPS receiver is connected to its CompactFlash serial port. This type of connection will discharge the battery in the field computer more quickly.

Powered connections



CAUTION – Using COM port cabling that supplies power to the field computer can cause problems with, or even permanent damage to, the field computer. Some GPS receivers supply power, and some cables transfer power through one or more of their pins. Trimble **strongly recommends** that you protect the field computer by connecting either the null modem adaptor (P/N 43197) or the curly straight-through cable (P/N 45052) to the receiver cable. These two connectors do not supply power, so they will protect the field computer from power output by the receiver.

If a powered connection is acceptable or necessary, you can connect directly to the receiver, or you can use the curly straight-through cable P/N 30236 instead of cable P/N 45052. If you are unsure whether a powered connection will cause damage, refer to the user manual for the field computer or consult the manufacturer before using P/N 30236.

Connecting to external real-time correction devices

To connect to a GPS receiver and an external real-time correction device such as a Trimble GeoBeacon™ receiver, use one of the following options:

- If you are using a serial cable connection to both receivers, use a splitter cable.
- If the field computer has two Bluetooth ports, you can connect to both the GPS receiver and the real-time correction device using Bluetooth connections.
- If the field computer has only one Bluetooth port, use Bluetooth wireless technology to connect the real-time correction device to the GPS receiver and then use Bluetooth wireless technology to connect the GPS receiver to the field computer. Alternatively you can use a combination of Bluetooth wireless technology and cabling.

For more information, refer to the documentation provided with the GPS receiver and the real-time correction device.

User Interface and Data Entry

In this chapter:



- [Getting help](#)
- [Using the Windows operating system](#)
- [Using the Windows Mobile operating system](#)
- [Starting and exiting the TerraSync software](#)
- [Section structure](#)
- [The TerraSync software display](#)
- [Interacting with the TerraSync software](#)

This chapter contains detailed information about the TerraSync software user interface and data entry methods.

Getting help

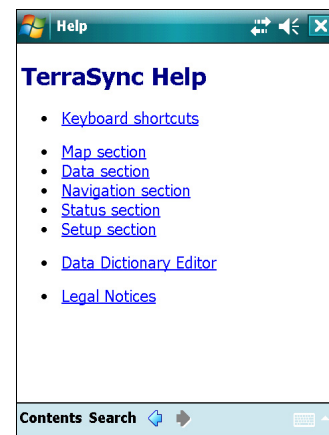
The *TerraSync Software Help* describes the fields and commands for each screen.

To access the TerraSync software context-sensitive help from:

- a Windows Mobile powered device, tap  and then select *Help*.
If you tap  and then select *Help* on the device when the TerraSync software is **not** running, the main Help Contents topic appears. Tap **Contents**, select *Help for Added Programs* and then select *TerraSync Help* to open the Contents topic of the TerraSync Software Help.
- an office computer, press **F1**. Alternatively, hold down the **Alt** key on the keyboard and then press **H**.

The Help for the TerraSync software is displayed in HTML pages. It works in the same way as a Web page. Select any blue underlined text to jump to the topic it describes.

The contents page of the *TerraSync Software Help* lists all the main topics. To access this page, select the *Contents* link at the bottom of any Help page.



Using the Windows operating system

You can install the TerraSync software on an office computer (desktop, laptop, or Tablet PC), instead of on a Windows Mobile powered device.

This manual describes the TerraSync software as it appears on a portrait orientation handheld with a 480 × 640 pixel screen (see [Documentation conventions, page 12](#)). On an office computer, some software items appear differently. The main difference is that on a larger screen the TerraSync software display is arranged in panes, so you can view up to three sections at the same time (see [Panels, page 81](#)).

Except where specified, any information in this manual that relates to the operation of the TerraSync software on a Windows Mobile powered device also applies to its operation on an office computer.

Using the Windows Mobile operating system

This manual assumes that you are reasonably familiar with the Microsoft Windows Mobile operating system you are using. For help on using this software, select *Help* from the *Start* menu on the Windows Mobile powered device.

For information about some Windows Mobile software features that are useful when using the TerraSync software, see:

- [Adjusting the backlight, page 53](#)
- [Working with other applications, page 53](#)
- [On-screen keyboards, page 54](#)
- [Device Lock utility, page 55](#)

Adjusting the backlight


You can change the backlight brightness on any device powered by a Windows Mobile operating system, to adjust to indoor or outdoor operation. For information on changing device settings, refer to the documentation for the device.

Working with other applications


The Windows Mobile operating system is similar to a desktop Windows operating system. You can use the same methods on the device as you would on a Windows computer to start, exit, or switch between programs. For example, to switch from the active application to another application, tap the program icon in the taskbar. Alternatively, if the device has a keyboard, you can use the **[Alt] + [Tab]** key combination.

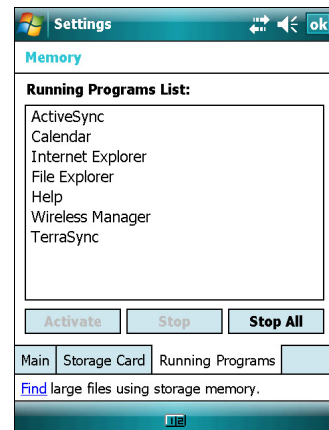
Some programs on a Windows Mobile powered device do not have a close button or a menu command for exiting the program. Instead, you must use system software to shut down a particular program. If the device does not have a keyboard, you must also use system software to switch from the active application to another application.

To shut down or switch to a task that is running on a Windows Mobile powered device:

1. On the Windows Mobile taskbar, tap .
2. Select *Settings / System / Memory*.

3. Select the *Running Programs* tab.
4. Select the task you want, then do one of the following:
 - To shut down the task, tap **Stop**.
 - To switch to the selected task, tap **Activate**.
5. Tap **OK** to close the *Running Programs* dialog.

When the TerraSync software is already running on a device, tapping  / *Programs* / *TerraSync* does not start the software a second time. Instead, the TerraSync software becomes the active program. Use this method to switch back to the TerraSync software from another application.



Tip – Some devices have hardware buttons that start specific applications. You may be able to change the program that is assigned to a particular button, or you can delete the existing program assignment so that pressing the button has no effect. Removing or changing hardware button assignments can be helpful if you frequently activate hardware buttons by accident.

On-screen keyboards

Some devices do not have a physical keyboard. Instead, enter text using an **on-screen keyboard**. To activate an on-screen keyboard, tap the keyboard button in the taskbar. The currently selected on-screen keyboard pops up and partially covers any screen that is open. When you have finished entering text in a field, tap **Enter** to accept the text you have entered and move to the next field. To hide the on-screen keyboard, tap the keyboard button on the taskbar again.

An on-screen keyboard usually consists of rows of “keys”. The default keyboard shows alphabetic or alphanumeric keys, laid out like a real keyboard. As you tap each key, the corresponding character is added to the current text or numeric field in the current program.

Alternatively, an on-screen keyboard may use **character recognition**. Normally, when using a character recognition keyboard, you write with the stylus in a special field. As you draw each shape, it is translated into the corresponding character and entered into the current field. You can correct any text that is incorrectly interpreted.

You can install different on-screen keyboards on the device and switch between them as required. All of these keyboards are available when you use the TerraSync software. For example, you may want to use a character recognition keyboard to quickly enter a long note, an alphabetic keyboard to enter a filename, and the Trimble numeric keyboard (see [page 55](#)) to enter numeric data such as the height of a feature or a distance.

If the device has on-screen keyboards installed, the TerraSync software automatically displays the appropriate keyboard when you select a field that accepts data entry, and hides the keyboard when you select a control that does not accept keyboard input.



Tip – The keyboard button on the taskbar shows the icon of the currently selected on-screen keyboard.

To change the selected keyboard:

1. Tap the arrow on the right end of the on-screen keyboard button.

A list of installed keyboards pops up. The currently selected keyboard is indicated by a bullet or check mark.

2. Tap the name of the keyboard required.

The pop-up list closes automatically.

Trimble numeric keyboard

When you install the TerraSync software on a device that uses on-screen keyboards, the Trimble numeric keyboard is also installed. This keyboard contains numeric and symbol keys that are useful when you enter numeric data or time information.

1	2	3	0	-	←
4	5	6	.	,	+
7	8	9	AM	PM	:

This keyboard is available to other programs on the device as well as to the TerraSync software.


Note – The Trimble numeric keyboard is available only on Windows Mobile powered devices that use on-screen keyboards.

Device Lock utility

The Device Lock utility is installed with the TerraSync software on a Windows Mobile powered device. It lets you lock the device so that accidentally pressing the screen, keys, or hardware buttons has no effect. Locking the device lets you safely clean the screen or exterior of the device, transport it, or to carry it.

To lock the device, tap *Device unlocked* in the *Today* screen. The *Today* screen shows *Device locked*, and *Unlock* appears in the left corner of the menu bar.



Tip – If *Device unlocked* does not appear in the *Today* screen, you may need to add it to the items that appear in the *Today* screen. To do this, tap  / *Settings* / *Personal* / *Today*. Tap the *Items* tab and make sure that the check box next to *Device Lock* is selected.



Once the device is locked, the screen, hardware buttons (including Record and Power buttons), and keypad (if it has one) do not respond until the device is unlocked.

Communication with external devices such as a GPS receiver, or external sensors used by the TerraSync software, is not interrupted by locking the device. This means that you can keep using the TerraSync software when the device is locked. For example, you could lock the device so that you can safely transport it in your pocket between features, but keep the TerraSync software connected to the GPS receiver so that you can collect a continuous block of carrier phase data.


To unlock the device, tap *Unlock* in the left corner of the menu bar of the *Today* screen and then tap **Unlock**.

Starting and exiting the TerraSync software


To start the TerraSync software, do one of the following:

- Tap  / *Programs/ TerraSync*.
- Tap  and then tap the TerraSync icon on the recently-used programs list.

While the software is loading, a Trimble identification screen appears. The software always opens at the Skyplot subsection of the Status section.

To exit the TerraSync software, tap  in the upper right corner of any TerraSync screen.






To switch to the TerraSync software when it is already running, do one of the following:

- Use any of the methods described above for starting the TerraSync software.
- On a Windows Mobile powered device, tap the TerraSync icon  at the bottom of the Windows Mobile Today screen.
- On a Windows office computer, tap the TerraSync button on the taskbar.



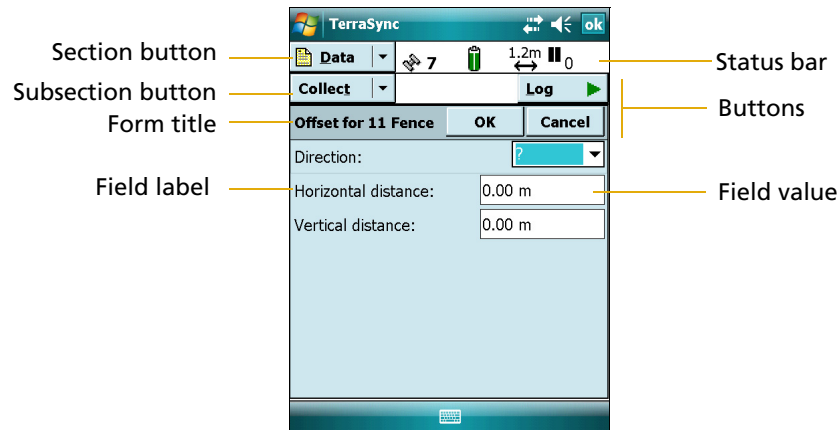
Section structure

The TerraSync software is arranged in five *sections*:

Section	Function
 Map	View features, background files, and the GPS trail graphically.
 Data	Work with data files: <ul style="list-style-type: none"> • create a new data file or open an existing data file • collect new features or maintain existing features • move, copy, delete, or rename data and background files
 Navigation	Navigate to features using the <i>Direction Dial</i> and <i>Close-up</i> screen. Create and edit waypoints.
 Status	View information about: <ul style="list-style-type: none"> • the satellites the TerraSync software is tracking, their relative positions in the sky, and your current position • the GPS receiver and real-time correction source • the TerraSync software version and trademark information
 Setup	Configure the TerraSync software.

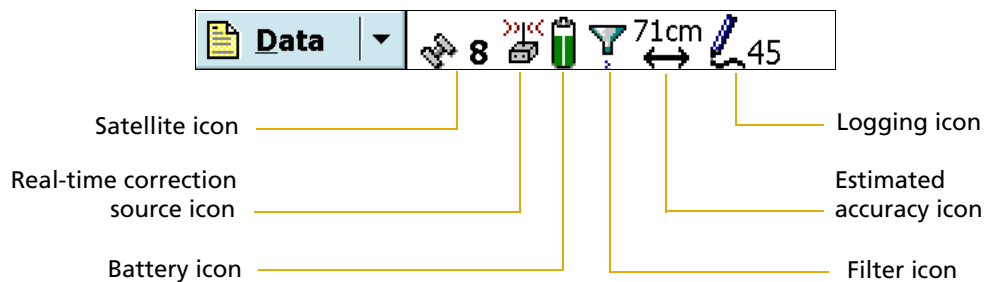
The TerraSync software display

The screen below shows elements that are common to all screens in the TerraSync software:



Status bar

The status bar appears at the top of the TerraSync software screen and provides basic status information about the connected GPS receiver. For information about how to connect to a GPS receiver, see [Connecting to a GPS receiver, page 49](#).



The status bar is always visible, but the icons displayed depend on the current status of the system. [Table 3.1](#) shows the icons that can appear.

Table 3.1 Status bar: Icons



Icon	Name	Description
	Satellite icon	Shows whether the geometry of the satellites is good or bad, as configured in the GPS settings area of the software. The satellite icon flashes when the geometry of the satellites (their PDOP or HDOP) is poor. The number below the icon indicates how many satellites are being used to compute GPS positions. The number flashes when not enough satellites are available. You need at least four satellites to compute GPS positions.
	Connect icon	When the TerraSync software is trying to connect to a receiver, the connect icon appears instead of the satellite icon. If the TerraSync software cannot connect to the GPS receiver, the connect icon flashes.

Table 3.1 Status bar: Icons (continued)











Icon	Name	Description
	Antenna icon	If the TerraSync software connects to the receiver but cannot find a GPS antenna, the antenna icon appears instead of the satellite icon. This icon flashes to warn you that there is a problem. If no icon appears in this position, no GPS receiver is connected.
	Real-time external icon	Shows that the TerraSync software is receiving real-time corrections from an external source, such as a radio.
	Integrated RTK radio icon	Shows that the TerraSync software is receiving RTK corrections through the GPS receiver's integrated radio.
	External RTK icon	Shows that the TerraSync software is receiving RTK corrections through an external radio.
	Real-time external beacon icon	Shows that the TerraSync software is receiving real-time corrections from an external beacon receiver such as a GeoBeacon receiver.
	Real-time beacon icon	Shows that the TerraSync software is receiving real-time corrections from a beacon.
	Real-time satellite icon	Shows that the TerraSync software is receiving real-time corrections from a satellite differential service.
	Real-time SBAS icon	Shows that the TerraSync software is receiving real-time corrections from an SBAS satellite.
Note – If the real-time signal is lost, the current real-time icon flashes. If the icon is flashing and the number of satellites being used is greater than 0, the TerraSync software is using autonomous (uncorrected) GPS to calculate its position. If no icon is visible, the TerraSync software has not been configured to use a real-time correction source.		
	Battery icon	The left half of this icon indicates the charge level of the GPS receiver battery, if one is connected. If the connected receiver does not provide battery status information to TerraSync, the left half of the battery icon is empty. <ul style="list-style-type: none"> The right half indicates the charge level of the field computer battery. When the battery of the GPS receiver or field computer is fully charged, the corresponding half of the battery icon appears green. The level of green drops as the corresponding battery charge level drops. When the power level is low, the corresponding half of the battery is yellow. When the power level is critical, the corresponding half of the icon is red and the icon flashes. If the GPS receiver is powered by the field computer (for example a GPS Pathfinder XC receiver) or is integrated with the field computer (for example a GeoExplorer series handheld), both halves of the battery icon show the same level and indicate the battery status of the field computer.
	Filter icon	Indicates that a filter has been applied to the open data file. When this icon is not displayed, no filter has been set up. For more information, refer to the <i>TerraSync Software Help</i> .

Table 3.1 Status bar: Icons (continued)









Icon	Name	Description
	Estimated Accuracy icon	<p>Shows the estimated accuracy of the current GPS position. The type of estimated accuracy value shown depends on the settings in the <i>Accuracy Settings</i> form. The estimated accuracy value may be the estimated accuracy in the field, or it may be the predicted accuracy after postprocessing. To show the predicted postprocessed accuracy, there must be a data file open and the software must be logging GPS positions. By default, this icon shows the estimated accuracy in the field. For more information about the predicted postprocessed accuracy value, see predicted postprocessed accuracy, page 218.</p> <p>The direction of the arrow indicates whether the estimated accuracy shown is for the horizontal or the vertical accuracy of the current GPS position.</p> <p>Note – The value shown depends on several factors, including satellite geometry and the type of GPS receiver that is connected.</p> <p>The estimated accuracy value flashes if the required accuracy set in the <i>Accuracy Settings</i> form is not met. An arrow with no estimated accuracy value indicates that the software is unable to calculate the estimated accuracy. Tap the icon for more information.</p>
	Logging icon	<p>Shows that the TerraSync software is logging a feature with code accuracy. The number at the bottom of the icon indicates the number of positions logged. The number above the icon indicates the predicted postprocessed accuracy in the configured distance unit.</p> <p>The width of the pen indicates code or carrier logging.</p>
	Carrier logging icon	<p>Shows that the TerraSync software is logging a feature with carrier accuracy. The number at the bottom of the icon indicates the number of positions logged. The number above the icon is the carrier time (see below).</p>
	Carrier time	<p>Shows that the TerraSync software is logging carrier phase measurement data. The number indicates the time, in minutes and seconds, for the current block of carrier data. If a feature is open, the carrier time is displayed above the logging icon.</p>
	Logging static icon	<p>Shows that the TerraSync software is logging a point feature or vertex in static mode, which is available only when the TerraSync software is receiving RTK corrections. In static mode, only the GPS position with the best precision estimate is logged. All other positions are discarded. The number to the right of the icon indicates whether a position has been logged. If the required precision has not been achieved, the number is 0 and no position is logged. If a position with the required precision has been logged, the number is 1. If a position with a better precision is received, it replaces the previously logged position.</p>
	Logging vertex icon	<p>Shows that the TerraSync software is logging GPS position information for an averaged vertex (including point features). The number to the right of the icon indicates the number of positions logged for this vertex or point feature.</p>
	Base logging icon	<p>Shows that the TerraSync software is logging positions to a base data file, or that is generating correction messages.</p>
	Digitizing icon	<p>Shows that the TerraSync software is in Digitize mode and GPS logging is paused, so tapping the map will result in a digitized position being recorded for the open feature. The number to the right of the icon indicates the number of digitized positions logged for this feature.</p>

Table 3.1 Status bar: Icons (continued)



Icon	Name	Description
	Pause icon	When logging is paused, the pause icon flashes.
	Memory icon	When storage space is low, the memory icon appears. If memory gets low while you are logging positions, the memory icon flashes alternately with the logging icon. If you are not logging, the memory icon appears alone and flashes. Note – When no icon appears in this position, memory space is sufficient, and the TerraSync software is not logging position data.

Table 3.2 shows the status bar icons and the tooltips that describe them.

Table 3.2 Status bar: Tooltips
























Icon	Behavior	Tooltip
	Solid	GPS is calculating positions
	Flashing	Poor satellite geometry (PDOP) or Poor satellite geometry (HDOP). Note – The message that appears depends on whether a maximum PDOP or HDOP value is configured.
	Flashing satellite count	Too few satellites.
	Solid	Estimated accuracy in the field and estimated accuracy after postprocessing.
	Flashing	The estimated accuracy value flashes if the required accuracy set in the <i>Accuracy Settings</i> form is not met.
	Animated	Attempting to connect to GPS receiver.
	Flashing	No GPS detected. Check cables and batteries.
	Flashing	Antenna is not connected to GPS receiver.
	Solid	Applying real-time corrections from external source.
	Flashing	Waiting for real-time corrections.
	Solid	Applying real-time corrections from VRS.
	Flashing	Waiting for real-time corrections.
	Solid	Applying RTK corrections from an external RTK source.
	Flashing	Waiting for RTK corrections.
	Solid	Applying RTK corrections from a VRS.
	Flashing	Waiting for RTK corrections.
	Solid	Applying real-time corrections from the external beacon receiver.
	Flashing	Waiting for real-time corrections.
	Solid	Applying real-time corrections from the receiver's integrated beacon differential receiver.
	Flashing	Waiting for real-time corrections.
	Solid	Applying real-time corrections from the receiver's integrated OmniSTAR receiver.
	Flashing	Waiting for real-time corrections.

Table 3.2 Status bar: Tooltips (continued)

Icon	Behavior	Tooltip
	Solid	Applying real-time corrections from the receiver's integrated SBAS differential receiver.
	Flashing	Waiting for real-time corrections.
	Solid	Applying RTK corrections from the receiver's integrated RTK radio.
	Flashing	Waiting for RTK corrections.
	Solid	GPS receiver battery is good (75%). Field computer battery is good (75%).
	Solid	GPS receiver battery is low (25%). Field computer battery is low (25%).
	Flashing	GPS receiver battery is critical (10%). Field computer battery is critical (10%).
Note – The battery icons and tooltips in this table show both batteries at the same level of charge. However, each half of the battery icon can appear in green, yellow, or red, independently of the color and level of the other half.		
	Solid	Filter is applied.
	Animated pen, and number increments	Positions are being logged.
	Flashing pen	GPS is not available.
	Animated pen and number increments	Carrier data is being logged.
	Flashing pen	Carrier data is not being logged.
	Animated circle decreases in size	Vertex/point feature capture in progress.
	Solid	Ready to digitize.
	Flashing	Position logging is paused.
	Flashing	Memory is full.



Tip – A tooltip also appears when you tap a graphical item in the *Skyplot* screen.

Interacting with the TerraSync software

You can interact with the TerraSync software in a variety of ways.

The following topics describe the different types of displays:

- [Screens, page 62](#)
- [Graphical screens, page 63](#)
- [Forms, page 63](#)

The TerraSync software screens also have the following features:

- [Lists, page 64](#)
- [Buttons, page 65](#)
- [Data entry fields, page 69](#)
- [Auto-incrementing attributes, page 73](#)
- [Pop-up messages, page 73](#)
- [Sound, page 75](#)
- [Color, page 77](#)

For more ways to interact with the software if the field computer has a keyboard, see [Keyboard shortcuts, page 66](#).

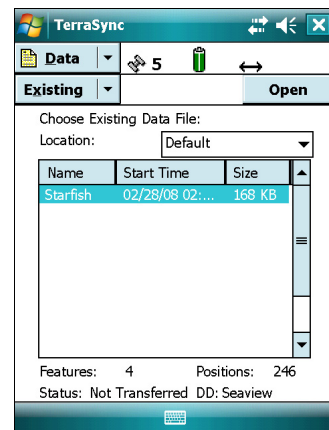
Screens

Use screens to view information in a list or table, or to make selections that provide access to other areas in the software. A screen usually displays information that you cannot edit directly.

Most screens contain buttons, lists, or labels. When a screen contains a field, a default value is supplied in the field.

Examples of screens are:

- The top level screen for each subsection in the Data section, such as the *New File* screen and the *File Manager* screen
- The main screen of the Setup section

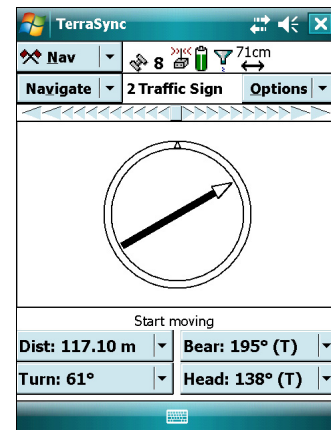


Graphical screens

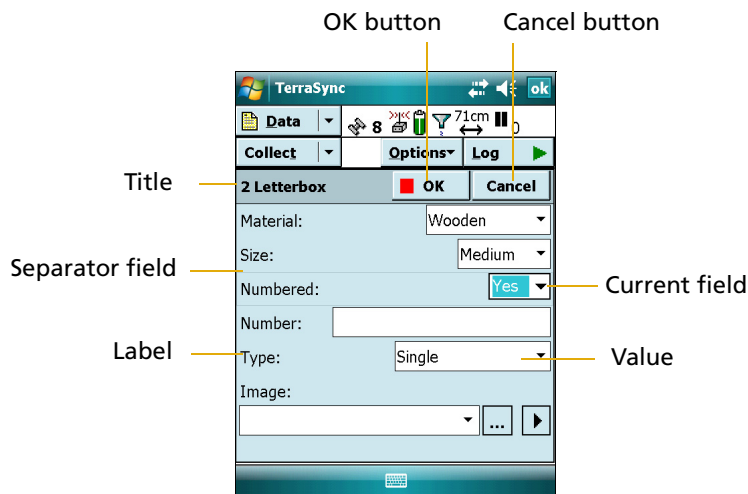
Use graphical screens to view information graphically. You cannot enter data in a graphical screen, and you cannot edit the information displayed.

Examples of graphical screens are:

- The *Skyplot* screen and *Satellite Information* screen in the Status section
- The *Direction Dial* and *Close-up* screens in the Navigation section
- The map display in the Map section



Forms



To enter data in the TerraSync software, you use a form. Like a paper form, a software form has a title and a sequence of lines or fields.

Each field on a form generally has two parts: a label (or name) and a value. A label is followed by a colon (:), which separates it from the value. Some fields are separator fields, which have no value and serve simply to divide a form into sections. If there is a dark rectangle around a field and its label, it is the current field on the form. Any editing operations apply to the current field.

To edit a field, select it. There are several ways to enter data into a form, depending on the keyboard options the field computer has, and the type of data stored in the field. See also [Data entry fields, page 69](#).

To move to the next field on a form, do one of the following:

- Tap the field you want to move to.
- Tap **Enter** on the on-screen keyboard. Tap **Enter** repeatedly to move through all fields on the form.

- Press **Tab** on the physical keyboard. Press **Tab** repeatedly to move through all fields on the form.

To move up or down the form, drag the vertical scroll bar.

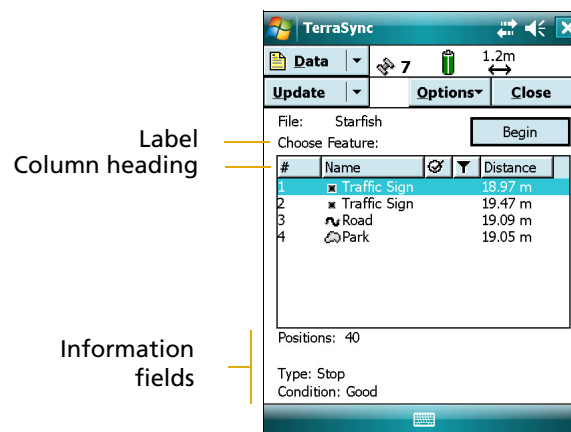
When you finish browsing through the form, or finish editing fields in the form, tap **OK** to accept the changes you made and to return to the previous screen.

Lists

Some forms in the TerraSync software include *lists* from which you select data files or features. A list contains the information that is currently stored.

Each row of the list represents one file or feature. Each column shows information about that item. A list also has a label that describes its contents.

This figure shows the *Choose Feature* list, which displays all feature types in the open data file.



Often, information fields are displayed at the bottom of the screen, below the list. They provide useful information about the item currently selected in the list.

To choose an item from a list, select the item. If the item you want is not visible, drag the vertical scroll bar up or down until it is visible.

Tap a column heading to sort items by that column. For example, to sort the *Choose Feature* list by feature name, tap the *Name* column heading.

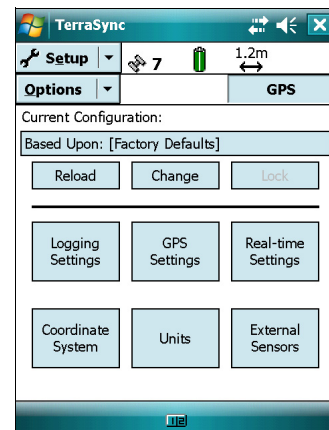


Tip – If the list is already sorted by the column you tapped, tapping the column heading reverses the sort order.

Buttons

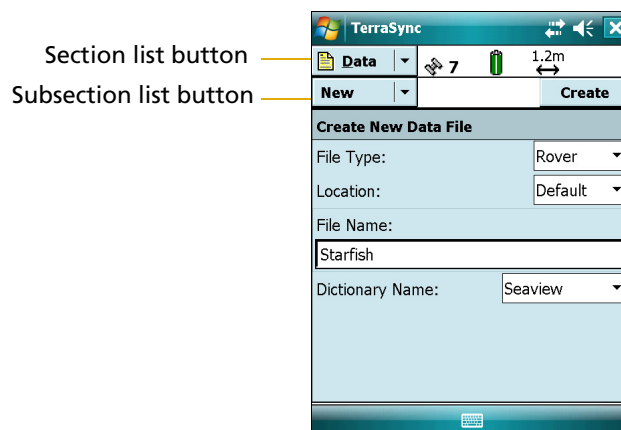
Many forms and screens in the TerraSync software contain buttons. When you tap a button, the TerraSync software carries out the appropriate command or opens a new screen. For example, if you tap **GPS Settings** in the *Setup* screen, the *GPS Settings* form appears.

List buttons and menu buttons are special buttons. They can be identified by the drop-down arrow at the right end of the button. When you tap one of these buttons, a drop-down list of commands appears. See also [List buttons, page 65](#), and [Menu buttons, page 66](#).



List buttons

List buttons are buttons that have a vertical line and a drop-down arrow at the right end of the button.



Use list buttons to move to a different section or subsection of the software, or to change the mode in the current section.

When you tap a list button, a drop-down list appears. Select an option on the list to access the command it describes. The label of the list button changes to match the option you selected.

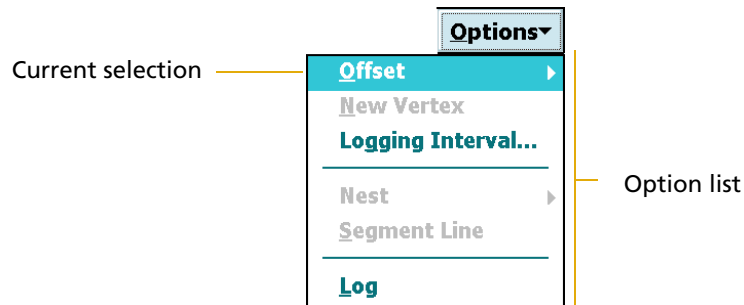
The following list buttons appear in the TerraSync software:

- Section button
- Subsection button
- Map Tools button in the Map section
- Status Mode button in the Status section

Note – List buttons differ from **menu** buttons (such as *Options* buttons) in their appearance, behavior, and function. See also [Menu buttons, page 66](#).

Menu buttons

Menu buttons are buttons that have a drop-down arrow at the right end of the button.



Use menu buttons to access additional functionality and commands. When you tap a menu button, a drop-down list appears. Select an option on the list to select the command it describes.

The label on a menu button does not change when you select a command from the list. (The label on a list button does.)

The following menu buttons appear in the TerraSync software:

- Any **Options** button
- The **Layers** button in the Map section
- The **Edit** button in the *Edit dictionary* form in the Data section

Note – Menu buttons differ from **list** buttons (such as the *Section list* button) in their appearance, behavior, and function. See also [List buttons, page 65](#).

Keyboard shortcuts

If you are using a field computer that has a keyboard, such as a notebook computer, you can use keyboard shortcuts instead of the touch screen.

To use a keyboard shortcut, hold down the **[Alt]** key on the keyboard and press the letter assigned to the shortcut. For example, the shortcut letter for switching to the Map section is M, so press **[Alt]+[M]** to switch to the Map section.

There are two types of shortcuts in the TerraSync software: global and local shortcuts.

Global shortcuts apply wherever you are in the software. They let you perform important actions such as switching quickly between the sections of the software. If you use the shortcut for the current section or subsection, the corresponding list drops down. For example, if you press **[Alt]+[M]** when the Map section is already open, the Section list drops down.

You can also use global shortcuts to close the current file, exit the software, or control data logging from any section or screen of the software

Note – *Global shortcuts do not apply when the Data Dictionary Editor is open.*

Local shortcuts apply only within the current form or screen. They open lists such as the *Options* list or subsection list, or run commands on the open list.

The same local shortcut letter may be used in different screens to perform different tasks. For example, if you press **[D]** when the Option list is open in the Setup section, the TerraSync software disconnects from the GPS receiver. However, if you press **[D]** in the *Options* list of the File Manager subsection, the TerraSync software deletes the selected file.

If the TerraSync software is installed on a desktop or laptop computer, the screen is arranged in panes. Local shortcuts work only for the primary pane (the pane in the top left of the screen).

This table lists the **global** shortcuts in the TerraSync software:

Action	Keyboard shortcut
Open Map section	[Alt]+[M]
Open Data section	[Alt]+[D]
Open Navigation section	[Alt]+[N]
Open Status section	[Alt]+[S]
Open Setup section	[Alt]+[E]
Open Skyplot screen	[Alt]+[K]
Open New File subsection	[Alt]+[T]
Open Collect Features subsection	[Alt]+[T]
Open Update Features subsection	[Alt]+[U]
Start, pause, or resume logging GPS	[Alt]+[L]
Close current data file	[Alt]+[C]
Exit TerraSync	[Alt]+[Q]

This table lists the **local** shortcuts in the TerraSync software:

Action	Section	Keyboard shortcut
Select a command on an open list	All sections	Underlined letter
Open the Options list for the current screen	All sections	[Alt]+[O]
Open the Layers list	Map	[Alt]+[A]
Zoom in	Map	[Alt]+[Z]
Zoom out	Map	[Alt]+[Y]
Zoom extents	Map	[Alt]+[X]
Move up	Map	[Alt]+up arrow key; [Alt]+[8]
Move down	Map	[Alt]+down arrow key; [Alt]+[2]
Move left	Map	[Alt]+left arrow key; [Alt]+[4]
Move right	Map	[Alt]+right arrow key; [Alt]+[6]

Action	Section	Keyboard shortcut
Open Existing File subsection	Data	Alt+X
Open File Manager subsection	Data	Alt+G
Open Satellite Info subsection	Status	Alt+F
Open Receiver subsection	Status	Alt+V
Open Real-time subsection	Status	Alt+A
Open Plan subsection	Status	Alt+P
Open Sensor subsection	Status	Alt+R
Open Comms subsection	Status	Alt+O
Open UTC Time subsection	Status	Alt+I
Open About subsection	Status	Alt+B

Data entry fields

The method you use to enter data in a field on a form depends on the type of field you are entering data into, and on the availability of keyboards.

The following field types can appear:

- Text (see [page 69](#))
- Numeric (see [page 69](#))
- Menu (see [page 70](#))
- Time (see [page 70](#))
- Date (see [page 71](#))
- Filename (see [page 71](#))

If the field computer has a physical keyboard, use it to enter text or numbers, just as you would in any Windows program. If you do not have a keyboard, use the on-screen keyboards for data entry. An on-screen keyboard is a small dialog that pops up from the taskbar when you select a field that allows data entry. You can also manually activate an on-screen keyboard at any time.

Use the on-screen keyboard to specify the text or number you want to enter. As you enter characters, they appear in the selected field. An on-screen keyboard may provide “keys” for you to tap, or may accept handwriting which it interprets as text.

If you use an on-screen keyboard to enter values, the TerraSync software automatically moves the focus to the next field on the form. To move through the fields on a form, repeatedly tap **Enter** on the on-screen keyboard. If the field computer has a physical keyboard, press the **Tab** key to move through the fields. When you reach the end of the form, the focus moves to the first field on the form. See [On-screen keyboards, page 54](#).

Text

To enter a value in a text field, use an on-screen keyboard or the physical keyboard. If you are using a field computer with on-screen keyboards, a keyboard pops up automatically when you select a text field. The keyboard that pops up is the one that was selected when you started the TerraSync software. See [On-screen keyboards, page 54](#).

Numeric

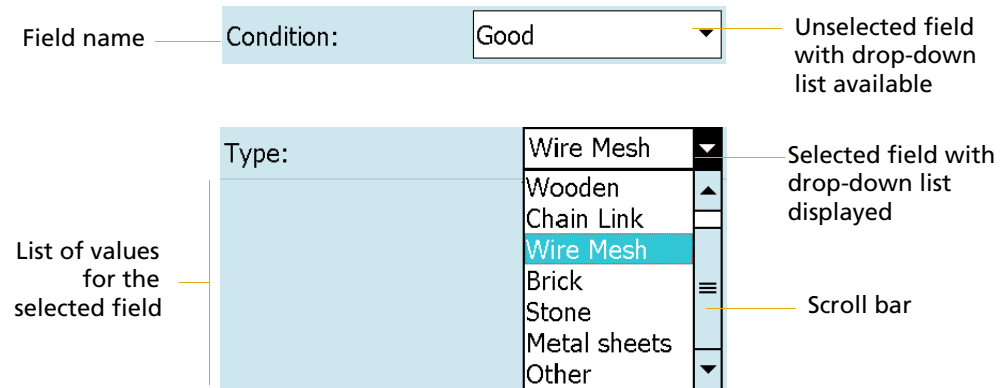
To enter a value in a numeric field, use an on-screen or physical keyboard. If the field computer uses on-screen keyboards, the Trimble numeric keyboard (see [page 55](#)) pops up when you select a numeric field.



Tip – Any text or numeric field can be defined as an auto-incrementing attribute. See also [Auto-incrementing attributes, page 73](#).

Menu

A menu field has a predefined list of values associated with it. To change the selected value, tap the drop-down arrow at the right of the field and select an option from the list.



The current value in a drop-down list is selected. To choose a different value, select the value from the list. If a drop-down list has more options than fit on one screen, a scroll bar appears on the right. Drag the scroll bar or tap the arrow buttons to scroll up and down the list.

Some menu fields can store either a value you enter or a value you select from a list. For example, in the *Data* form in the Setup section, the *Interval* field can accept either an integer 1 through 999, or Off. Enter a value manually using an on-screen or physical keyboard, or select a value from the drop-down list.

Time

Enter time values manually using an on-screen or physical keyboard, or select the current time from a drop-down list. If the field computer uses on-screen keyboards, the Trimble numeric keyboard pops up when you select a time field.

To enter the current time, tap the arrow at the right of the field and select Now from the drop-down list.

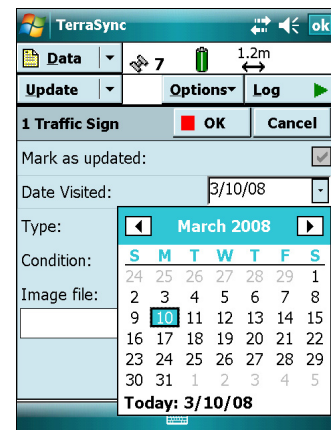
In the data dictionary, you can specify that a time attribute is automatically set to the current time when the feature is created, when the feature is updated, or both.

Date


Enter a date value manually using the physical keyboard, or select it from the drop-down calendar.

To enter a date manually, type it in from the keyboard. To select it from the calendar, tap the drop-down arrow at the right of the date field and select the date required from the calendar.

In the data dictionary, you can specify that a date attribute is automatically set to the current date when the feature is created, when the feature is updated, or both.





Filename

A filename field is primarily used for attaching image files, but this can also be used to attach other files to a feature. If your field computer does not have an integrated camera, use a digital camera to create and save images. When the TerraSync software is running on a Trimble device which is powered by the Windows Mobile 5.0 or 6 operating system, and which has an integrated camera, you can switch to the camera live preview window. Tap on the Camera icon  next to the Filename field to switch to Camera mode.

Note – Note: the Camera button is only displayed if the handheld device has an integrated camera.

Enter a filename


Enter a filename manually using the physical keyboard, or select the filename from the drop-down list for the filename field. The drop-down list shows files in the current working folder. The default location is the My Pictures folder. To change the working folder, tap the Browse button  to the right of the filename field. In the pop-up window that appears, navigate to the folder you need.

For image files, the Browse button  will take you to the thumbnail view for any stored images.

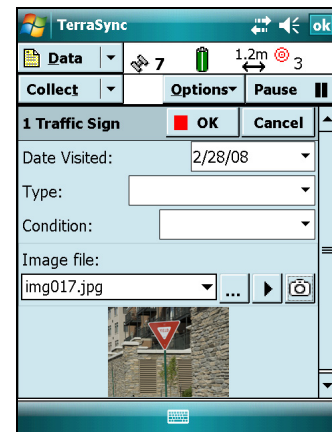


Tip – If you set the working folder to the folder where the files to be attached are stored, you can simply select the appropriate file for each feature from the drop-down list, without having to check or change the working folder each time.

View a file

To view the currently selected file, tap the Preview button  beside the attribute field, or tap on the thumbnail for an image file. The file is opened in the default program associated with its file type. Image files will be displayed full screen in the Pictures & Videos application.

Once you attach a file to a filename attribute in a feature and save the feature, the selected file is moved to the TerraSync software data folder and assigned a unique name. If you open the feature for review later, the actual filename is not displayed, because the file has been renamed. Instead, a message similar to “Attached JPG File” appears in the attribute field.



When you transfer the data file to the office computer using the Trimble Data Transfer utility, any attached files are transferred with the data file, and are stored with the transferred data file. This link is also maintained when you export the data file to a GIS. For more information, refer to the *Data Transfer Utility Help*.



Tip – Sometimes, to save space or to create better quality files, recording software on a Windows Mobile powered device (such as sound recording software that creates .wav files) uses a default file format that is unreadable on a desktop computer. Before going out into the field, test that you can transfer and read files created by the software that you want to use. If necessary, change the settings of the recording software to use a format that is compatible with the desktop computer.

EXIF (Exchangeable image file format) support

When a jpg image file is attached to a feature in TerraSync, and there is a current GPS position, the EXIF header of the image file is populated with the following fields:

- GPS Time (UTC)
- GPS Date (YYYY:MM:DD)
- GPS Longitude (DD_MM_SS.SS)
- GPS Latitude (DD_MM_SS.SS)
- GPS Altitude (Height Above Ellipsoid) (xxxxx.xx)
- GPS Datum
- Feature name
- Labels 1 and 2 as defined in the Data Dictionary.

When a feature is updated and the GPS position is replaced, the GPS Time and GPS Date fields in the EXIF information are updated.

The EXIF fields for Original Date/Time—i.e. when the photo was originally taken—are not updated unless the attached photo is replaced.

Auto-incrementing attributes

Any numeric or text attribute can be defined as an auto-incrementing attribute. When you create a new feature, the TerraSync software automatically fills in each auto-incrementing attribute with a default value. This value is the next value in the auto-incrementing sequence, is based on the step value you specified in the data dictionary and the last value entered in the field. The sequence can increase or decrease, and may advance in any increment (step) value, provided this value is within the acceptable range for the attribute.

Although you can define a text attribute as an auto-incrementing attribute, only numeric values within the text are incremented or decremented. For example, if the last value you entered was 47A, and the step value is 1, the next value generated by the TerraSync software is 48A. However, if the last value was AAA, the next is still AAA, as there is no numeric component to increment.

When the text consists of more than one number interspersed with alphabetic characters, only the last number is incremented. For example, if the step value is 1, and the last value was A100-K9, the next value is A100-K10.

The auto-incremented value is only a default value, so you can edit it if you want. If you do, the next value in the sequence is calculated using the new value you entered, not the original value generated by the TerraSync software.

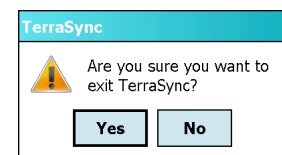
If the TerraSync software cannot generate the next value in the sequence, it creates the attribute without a value. This occurs if:

- the feature is the first of its type to be created in this file and no default value is specified
- the last value for the attribute was blank
- the last value was the maximum value in the range and the sequence is incrementing
- the last value was the minimum value in the range and the sequence is decrementing

To make an attribute auto-incrementing, you must set an increment value in the data dictionary. You can do this in the Data Dictionary Editor utility in the GPS Pathfinder Office software, or data dictionary editor in the Data section. For more information on making an attribute auto-incrementing, refer to the *Data Dictionary Editor Help*.

Pop-up messages

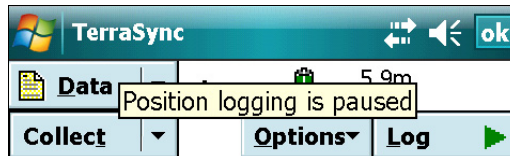
When the TerraSync software asks a question, it displays a pop-up message. You must answer the question before you can continue working with TerraSync. To answer the question, tap one of the buttons in the message. The pop-up message disappears.



Error messages are examples of pop-up messages. Warning and Error messages should be noted, because they contain important information about the task you are trying to perform.

Tooltips

A tooltip is a yellow message that contains information about an item on the screen, or about the current system status.



Tooltips appear:

- when you tap on an icon in the status bar
- as transient messages in the status bar
- when you tap on an item on the map
- when you measure distances and areas on the map

To close a tooltip, tap it, or tap anywhere else on the screen.

If you tap an icon in the status bar (see [page 57](#)), a tooltip appears over it. The tooltip contains information about the current state of the system function the icon represents. For example, if you tap the Filter icon (see [page 58](#)) when a filter is in use, a tooltip appears, showing the message **Filter** is applied.

A transient message shows information that is only important for a few seconds, such as notification that you have successfully recorded an offset with a laser rangefinder, or that the feature has been stored. A tooltip that contains a transient message appears over the status bar for three seconds, or until you tap the tooltip. Other functions in the software are not affected by transient messages.

In the Map section, tap any item to display its Position information in a tooltip. When you use the Measure tool in the map, measurement information appears in a tooltip in the top left corner of the map display (refer to the *TerraSync Software Help*).

Sound

The TerraSync software uses sound to indicate special conditions or events. Often these conditions are accompanied by a change in a status icon. For example, when the battery on the GPS receiver gets low, the battery icon in the status bar (see [page 57](#)) flashes, and the Low GPS battery (see [page 76](#)) sound is played.

Note – The TerraSync software does not monitor the battery status of the GPS Pathfinder XB receiver, and will not audibly warn when the battery for this receiver is low.

The events and conditions that can occur fall into three categories:

Category	Description
Success	An operation has been successfully completed, or a warning condition has been resolved. By default, a success event uses a sound with rising tones.
System	A message, containing a question or information about an error that has occurred, has appeared. Before you can continue working with the TerraSync software, you must tap a button in the message to acknowledge the message.
Warning	A condition exists that could cause loss of data, or could prevent you from collecting data successfully. By default, a warning is indicated by a sound with falling tones.

The following table lists events and conditions in the TerraSync software, and the sounds that are used for them:


Event	Sound category	Description
Feature stored	Success	The feature has been successfully stored.
GPS connected	Success	The TerraSync software has successfully connected to the GPS receiver and is receiving position information.
GPS OK	Success	The GPS quality has increased to the levels you have specified, and the TerraSync software is logging positions again.
Minimum positions stored	Success	The TerraSync software has logged the minimum number of positions for the current feature. You can now safely close this feature and begin logging another feature.
Navigation proximity alarm	Success	The navigation target is within the close-up range you have specified, and the <i>Direction Dial</i> screen changes to the <i>Close-up</i> screen.
Position logged	Success	The TerraSync software has successfully logged a GPS position.
Position snapped	Success	The digitized position has been snapped to a nearby existing position.
Real time OK	Success	The connection to the specified source of real-time differential correction has been regained.
Carrier lock acquired	Success	Carrier lock has been acquired. The TerraSync software has started logging carrier or H-Star™ data.
General error	System	An error has occurred. An error is indicated by the sound the field computer uses for the Critical Stop event.

Event	Sound category	Description
Question	System	The TerraSync software requires some information or a decision from you. The question appears in a message and is indicated by the sound the field computer uses for the Question event.
Dead GPS battery	Warning	The battery in use by the GPS receiver is dead. The TerraSync software continues to operate but no position information is received until the battery is replaced.
Low GPS battery	Warning	This sound plays repeatedly and the battery icon in the status bar flashes when the battery in use by the GPS receiver is running low and needs to be replaced.
Poor geometry	Warning	GPS position quality has dropped below the level you have specified because the visible satellites are too close together in the sky. The TerraSync software has paused logging until geometry improves.
Real time lost	Warning	The connection to the specified source of real-time differential correction has been lost.
Too few satellites	Warning	GPS position quality has dropped below the level you have specified because there are not enough visible satellites. The TerraSync software has paused logging until more satellites become visible.
Carrier lock lost	Warning	Carrier lock has been lost. The TerraSync software has stopped logging carrier or H-Star data.
Required accuracy lost	Warning	The required accuracy (specified in the <i>Accuracy Settings</i> form) has been lost.

Customizing sounds

The TerraSync software is supplied with default sounds for all warning and success events. However, you can customize these sounds or disable any or all of the sounds played by the software.

To enable or disable all sounds as a group:

1. Tap  / *Settings* / *Personal* / *Sounds and Notifications*.
2. From the *Enable sounds for* group, select or clear the *Applications* check box to enable or disable warning and success sounds.
3. Select or clear the *Events* check box to enable or disable sounds for questions and error messages in the TerraSync software.



Tip – All the sounds used in the TerraSync software are wave (.wav) files. A default .wav file is supplied for each warning or success event that occurs in the software. To change any of the sounds used, replace the appropriate .wav file in the Windows folder on the field computer. To disable a sound, delete or rename its .wav file.

The events and their corresponding sound (.wav) files are as follows:

Event	Sound file
Feature stored	FeatureStored.wav
Dead GPS battery	GPSTBatteryIsDead.wav
Low GPS battery	GPSTBatteryIsLow.wav
GPS connected	GPSTIsConnected.wav
GPS OK	GPSTIsOK.wav
Poor geometry	PoorGeometry.wav
Position logged	PositionLogged.wav
Position snapped	PositionSnapped.wav
Real time lost	RealTimeIsLost.wav
Real time OK	RealTimeIsOK.wav
Carrier lock acquired	LockOpened.wav
Carrier lock lost	LockLost.wav
Required accuracy lost	RequiredAccuracyNotAchieved.wav
Minimum positions stored	StoredMoreThanMinimumPositions.wav
Navigation proximity alarm	CloseUpChange.wav
Too Few Satellites	TooFewSatellites.wav
Question	The file that the field computer uses for the Question event. By default, this is Question.wav. Use the Volume and Sounds system setting to replace the sound for this event.
General error	The file that the field computer uses for the Critical Stop event. By default, this is Critical.wav. Use the Volume and Sounds system setting to replace the sound for this event.

Color

The TerraSync software uses color to make it easier for you to distinguish important information, and to distinguish between similar items. Color is always used in conjunction with at least one other feature such as a sound, icon, or bold text.

The following features of the TerraSync software use color to provide extra information or to clarify the display:

- Battery icon (see [page 58](#))
- Map layer colors

Map layer colors

The information displayed in the Map section is arranged in five layers. To make the map display clearer, you can select a different color for each of these Map layers. If a layer contains features, you can either use the feature colors assigned in the data dictionary, or set a single color for all features in the layer.

To select layer colors, tap **Layers** in the Map graphical screen and select *Layer Formatting*. The *Layer Formatting* form appears. You can set each layer to display in a different color. You can also set two or more layers to the same color.

Software Structure






In this chapter:

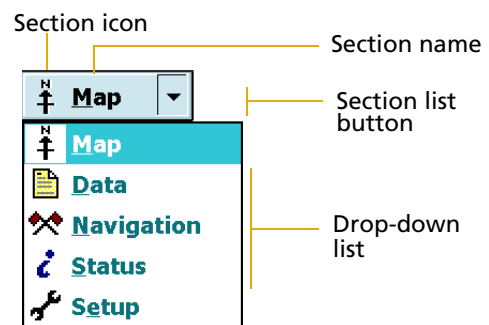
- [Introduction](#)
- [Sections](#)
- [Panels](#)
- [Section structure](#)
- [Section structure lists](#)

This chapter describes the main sections of the TerraSync software and provides an overview of the functionality provided by each section.



Introduction

The TerraSync software is arranged in the following five sections:

-  Map
-  Data
-  Navigation
-  Status
-  Setup



One of these sections is always active and visible. The Section list button shows the section that is currently active. You can move between sections at any time without closing any open forms or screens. To switch to a different section, tap the Section list button and then select the section you want from the drop-down list.

For example, to switch from the Map section to the Data section, tap the Section list button and then select  *Data*. The button now shows  *Data*, and the Data section is active. When you return to the Map section, the screen or form that was open when you left the Map section appears again.



Tip – You can also use shortcuts to move between sections. See [Keyboard shortcuts](#), page 66.

Sections

The main functions of each section in the TerraSync software are described below:

- ***Map***

The Map section shows you all the features in the open data file. Raster or vector map files can be displayed in the background for reference.

Use the Map section with the screens in the Navigation section to navigate to specific locations.

- ***Data***

The Data section provides forms for entering information about features.

Use the Data section to update data from an existing GIS, CAD, or spatial database. You can:

- review, edit, and update the positions and attributes for features
- filter data to identify the features required for data maintenance
- accurately and efficiently collect the attributes and GPS position of geographic points, lines, and areas

- switch to Camera mode, if your device has an integrated camera, to capture images

This information is stored in one or more data files that you can transfer to the Trimble postprocessing software. Data can then be exported into a wide range of GIS-compatible formats.

- **Navigation**

The Navigation section provides forms for collecting and editing waypoints, and screens for navigation.

Use the screens in the Navigation section with the Map section to navigate to specific locations. You can use real-time differential GPS to optimize navigation and provide differential accuracy when in the field.

Use the Turn-by-turn settings to work with turn-by-turn navigation software. When CoPilot Live 7 Professional for Trimble TerraSync software, or TomTom Navigator 6 turn-by-turn navigation software is installed on the device, the TerraSync software automatically switches to the navigation software to navigate to the selected target, then switches back when you have arrived at the destination.

- **Status**

The Status section contains information screens.

Use the Status section to view summary or detailed information about the software, the GPS receiver, any real-time source you have configured, and the location and health of the satellites the receiver is tracking.

- **Setup**

The Setup section provides forms for configuring the TerraSync software.

Use the Setup section to control how the TerraSync software interacts with the GPS receiver and with any real-time correction sources you have configured, and to configure data collection and display settings.

Panes

If you use the TerraSync software on a desktop or laptop computer, the screen is arranged in panes. Each pane displays a section of the software.

Depending on the screen resolution, up to three panes can be displayed. By default, when the TerraSync software opens, the Map, Data, and Status sections are displayed.

To change the size of a pane, drag the resize bar between it and the next pane. Each pane has a minimum size, so if resizing would make a pane smaller than its minimum dimensions, it is automatically hidden. You can use this feature to create three-pane, two-pane, or single-pane layouts.

The Section list button determines which section appears in the *primary* pane. The primary pane is the left pane, or the top pane if only two panes are visible.

To change the section that is displayed in the primary pane, tap the Section list button and select a section from the list. If the section is already displayed in a secondary pane, the two sections switch position.

To change the section that is displayed in a secondary pane, tap the Section list button that appears in the top left corner of the pane. Then select a section from the list.

To move a section to a different pane, tap and hold the Section list button. The icon for the section appears. Drag the icon into the pane where you want the section to be displayed. When you drop the icon, the two sections switch position.

Section structure

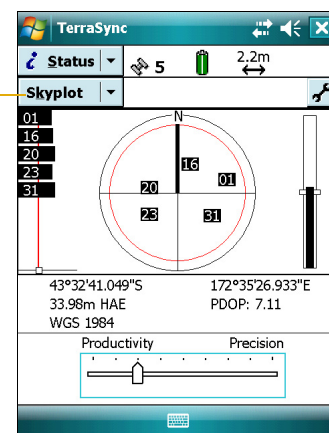
Some sections have a number of *subsections*. If the current section has subsections, the Subsection list button is visible. You can switch to a different subsection of the current section at any time. To do this, tap the Subsection list button and select the subsection you want from the drop-down list.

For example, if you are in the Skyplot subsection of the Status section, the Subsection list button displays *Skyplot*. To switch to the Satellite Information subsection, tap the Subsection list button and select *Satellite Information*.

Some subsections are not always available. For example, in the Data section, you cannot open the Collect Features subsection until you open or create a data file.

Some screens also contain buttons and menu buttons that let you open other screens or forms.

Subsection list button



Section structure lists

The following lists outline the TerraSync software section structure. Use them as a reference until you are familiar with the sections and their subsections.

Map section

Map Tools	Select Zoom In Zoom Out Pan Digitize Measure
Options	Zoom Extents Auto Pan to GPS Position Auto Pan to Selection Filter Update Selected Feature Delete Selected Feature Set Nav Start Set Nav Target Clear Nav Targets Cross-Track Light Bar Enter Coordinates Refresh
Layers	Filtered Features Unfiltered Features Waypoints Background Between Feature GPS GPS Trail Background Files Layer Formatting
Undo	
End Measurement	
Create/End Feature	
Log/Pause/Resume	

Data section

New File	Create			
Existing File	Open			
Update Features	Update Features Form	Options	Show Filtered Features Show Unfiltered Features Filter Delete Undelete Set Nav Start Set Nav Target Clear Nav Targets Logging Interval Continue	
		Attribute Entry Form	Options	Offset New Vertex Logging Interval Nest Segment Line Log Pause Resume External Trigger
			Log/Pause/Resume	
Collect Features	Collect Features Form	Options	Logging Interval Repeat Log Now Log Later Continue	
		Attribute Entry Form	Options	Offset New Vertex Logging Interval Nest Segment Line Log Pause Resume External Trigger
			Log/Pause/Resume	

File Manager	Options	Delete
		Copy to
		Rename
		Move to
		Send via Email
		Receive via Email
		Edit embedded dictionary
		New dictionary
		Read dictionary from data
		Read data from shape
		Write data to shape
		Extract data from file

Navigation section

Navigate	Options	Navigation Options			
Waypoints	Waypoint File List	New	New Waypoint File Form		
		Open			
	Waypoint List	Options	Set Nav Start		
			Set Nav Target		
			Clear Nav Targets		
			Delete		
			Undelete		
			Edit		
			New		
			Close File		
			New Waypoint Form	Create From	GPS
			Map Point		
			Selected Point Feature		
			Selected Vertex		
			Start		
			Middle		
			End		
			Selected Waypoint		
			Edit Waypoint Form		

Status section

Skyplot	
Satellite Info	
Receiver	
Real-time	Summary External External Beacon Integrated Beacon Integrated OmniSTAR Integrated SBAS Integrated RTK Radio
Plan	
Sensor	Sensor 1 Sensor 2
Comms	
UTC Time	
About	System Report

Setup section

Options	Connect to GPS Disconnect from GPS Reset GPS receiver Activate Integrated OmniSTAR Connect to External Source Disconnect from External Source
Ext Source	
GPS	
Reload	
Change	
Lock	
Logging Settings	
GPS Settings	
Real-time settings	
Coordinate System	
Units	
External Sensors	

Tutorial: Collecting Data

In this chapter:

- [Tutorial structure](#)
- [Tutorial scenario](#)
- [Exercise 1: Preparing for data collection](#)
- [Exercise 2: Data collection](#)
- [Exercise 3: Advanced data collection](#)
- [Exercise 4: Processing the data](#)
- [Exercise 5: Preparing for data update](#)
- [Exercise 6: Data update](#)

This tutorial provides step-by-step instructions to help you master the main concepts and tasks involved in using the TerraSync software.

This tutorial will take you approximately two hours to complete.

Tutorial structure

The tutorial is divided into six exercises. Three of the exercises are performed in the office using office processing software, and three of the exercises are performed in the field, using the TerraSync software.





This tutorial uses the GPS Pathfinder Office software as the office processing software. For a tutorial that uses the GPS Analyst extension for ESRI ArcGIS software as the office processing software, refer to the *GPS Analyst Extension Getting Started Guide*.

To successfully complete the tutorial field work, you must have access to an open space outdoors, free of obstructions such as trees and buildings.

The first four exercises of this tutorial relate to data collection. Exercises five and six relate to updating data that has already been collected.

The office processing exercises are indicated by ; field exercises are indicated by .

Data collection:

-  [Exercise 1: Preparing for data collection, page 90](#)
-  [Exercise 2: Data collection, page 92](#)
-  [Exercise 3: Advanced data collection, page 105 \(optional\)](#)
-  [Exercise 4: Processing the data, page 116](#)

Data update:

-  [Exercise 5: Preparing for data update, page 126](#)
-  [Exercise 6: Data update, page 133](#)

Tutorial scenario

The tutorial is based on the following scenario:

The Seaview Authority maintains a GIS of its street signs, streets, and neighborhood parks for inventory purposes. Information needs to be collected about each entity, indicating its condition and other important information. You and your field crew are responsible for collecting new data and updating the existing GIS data for Starfish Bay.



Data collection

In this part of the tutorial you collect new features. First, you create a GPS Pathfinder Office software project and prepare your equipment for data collection. Then you go to Starfish Bay where you record new features and their attributes. When you return to the office, you postprocess the data you collected, to achieve better positional accuracy for your results. Then you export the data to the Seaview Authority GIS.

The data collection part of the tutorial begins on [page 92](#).

Data update

In this part of the tutorial you update existing GIS data. Some time has passed since you collected the features, so you need to update their attributes. Before going back to Starfish Bay, you import data from the Seaview Authority GIS into the GPS Pathfinder Office software, transfer it to your field computer, and prepare for data update. Finally, you return to the field and navigate to existing features to update their attributes. You use the TerraSync software and a real-time differential GPS source to navigate back to features and update their attributes.

The data update part of the tutorial begins on [page 133](#).



Exercise 1: Preparing for data collection

Before going to Starfish Bay to collect data, you need to create a new project in the GPS Pathfinder Office software. Then you need to check your equipment to make sure that you are ready to go out into the field.

This section provides step-by-step instructions that will prepare you for data collection. See:

- [Creating a project, page 90](#)
- [The Seaview data dictionary, page 91](#)
- [Checking the equipment, page 91](#)



Creating a project

The GPS Pathfinder Office software provides a set of tools for processing and managing GPS and GIS data. The GPS Pathfinder Office software lets you plan your data collection session easily and process the GPS data successfully.

Use the GPS Pathfinder Office software to organize work into projects. Dividing the work in this way helps you manage your files. You can give all projects meaningful names, and assign separate folders for base, export, and backup files. You can also set up projects for different groups of data. For example, you could create a project for each subdivision in the city, or for each month.

For this tutorial, you need to create a new project called *TerraSync Tutorial*.

To create a project in the GPS Pathfinder Office software:

1. Start the GPS Pathfinder Office software. To do this, from the Windows Start menu select *All Programs / Trimble / GPS Pathfinder Office / GPS Pathfinder Office*.

The main window of the GPS Pathfinder Office application appears.

2. By default, the *Select Project* dialog appears. If it does not appear, select *File / Projects*.
3. Click **New**. The *Project Folders* dialog appears:

The screenshot shows the 'Project Folders' dialog box. It contains the following fields and buttons:

- Project Name:** An empty text field.
- Comment:** A text field containing 'Thursday, February 28, 2008 9:31:19 am'.
- Project Folder:** A text field containing 'C:\Users\JDoe\Documents\GPS Projects' and a 'Browse...' button.
- Backup Folder:** A text field containing 'Backup' and a 'Browse...' button.
- Export Folder:** A text field containing 'Export' and a 'Browse...' button.
- Base File Folder:** A text field containing 'Base' and a 'Browse...' button.
- At the bottom: 'OK', 'Cancel', 'Default', and 'Help' buttons.

4. In the *Project Name* field, enter **TerraSync Tutorial** and then press the **[Tab]** key.

The *Project Folder* field is updated to show the default folder for the new project.

Note – By default all GPS Pathfinder Office software projects are stored in the GPS Projects folder. The default location of the GPS Projects folder depends on the type of Microsoft operating system running on your computer. For more information, refer to the GPS Pathfinder Office Software Help.

5. Click **OK** to close this dialog and create the new project.
6. In the *Select Project* dialog, TerraSync Tutorial is selected in the *Project Name* field. Click **OK** to open the new project.

The Seaview data dictionary

A data dictionary contains a description of the features and attributes relevant to a particular project or job. You use it in the field to control the collection of a feature and its attributes.

The signs, roads, and parks in Starfish Bay that you need to map are **features**. The different types of information that you record for each type of feature are **attributes**. For example, the condition of a sign, or the name of a park, would be an attribute.

To ensure that the data you collect in the field is in the correct format for the Seaview Authority GIS, you need to use a data dictionary that contains the same features and attributes as the Seaview Authority GIS. The Seaview data dictionary has already been created for this purpose. When you installed the TerraSync software on your field computer, this file was automatically installed.

Checking the equipment

Before going out into the field with the TerraSync software, check that you have all the necessary GPS hardware, batteries, and cables.

Before you leave the office, Trimble recommends that you:

- set up your entire GIS/GPS data collection system and test it to make sure that everything is connected correctly
- make sure that the receiver and field computer batteries are charged
- make sure that the field computer and GPS receiver are communicating correctly



CAUTION – After testing the system, turn off the field computer and any other equipment (such as radios) before proceeding to the start point of your field work. Leaving equipment on wastes battery life, especially if it will be some time before you need to use the equipment.



Tip – When you turn off the field computer, any receiver that is connected to it is automatically turned off.

Exercise 2: Data collection

This part of the tutorial uses the Seaview data dictionary that is already installed on your field computer. You are ready to go to Starfish Bay and collect features. But first there are some tasks that you should complete. This section explains the tasks and gives the step-by-step instructions required to collect point, line, and area features, with a variety of different attributes. See:

- [Initial tasks, page 92](#)
- [Collecting new data, page 98](#)

To complete this part of the tutorial, you must be outside, in a place where you can get good GPS signals.


***Note** – Some TerraSync screens may appear different from the screens shown in this tutorial.*

Initial tasks

Before starting a data collection session, you need to perform certain tasks when you arrive at the collection site. See:

- [Starting the TerraSync software, page 92](#)
- [Connecting to a GPS receiver, page 93](#)
- [Checking the GPS status, page 93](#)
- [Configuring the required logging accuracy, page 95](#)
- [Configuring the antenna height, page 96](#)
- [Configuring GPS quality settings, page 97](#)

Starting the TerraSync software

Tap  and then select *Programs / TerraSync*. By default, the TerraSync software shows the Skyplot screen, which shows the status of the connected GPS receiver.

The TerraSync software is arranged in the following five sections:

- Map
- Data
- Navigation
- Status
- Setup

One of these sections is always active and visible. The **Section list button** in the top left corner of the TerraSync software screen shows the section that is currently active. To switch to a different section, tap the Section list button and then select the section you want from the drop-down list.

If the current section has subsections, the **Subsection list button** appears below the Section list button. Use the Subsection list button to switch to a different subsection of the current section.



Connecting to a GPS receiver

- If the field computer running the TerraSync software has an integrated GPS receiver, the software automatically connects to the GPS receiver when you start the software.
- If you are using a separate GPS receiver:
 - a. Use either a cable or Bluetooth wireless technology to connect the receiver to the field computer running the TerraSync software.
 - b. In the TerraSync software, select *Setup* from the Section list and then tap **GPS Settings**.
 - c. From the *GPS Receiver Port* drop-down list, select the COM port that the receiver is connected to, and then tap **OK**.
 - d. From the Setup section, tap **GPS** to connect the TerraSync software to the receiver.

The Skyplot screen shows the status of the connected GPS receiver.

Note – *GPS positions may not always be available, particularly in or near buildings, in vehicles, or under tree canopy.*



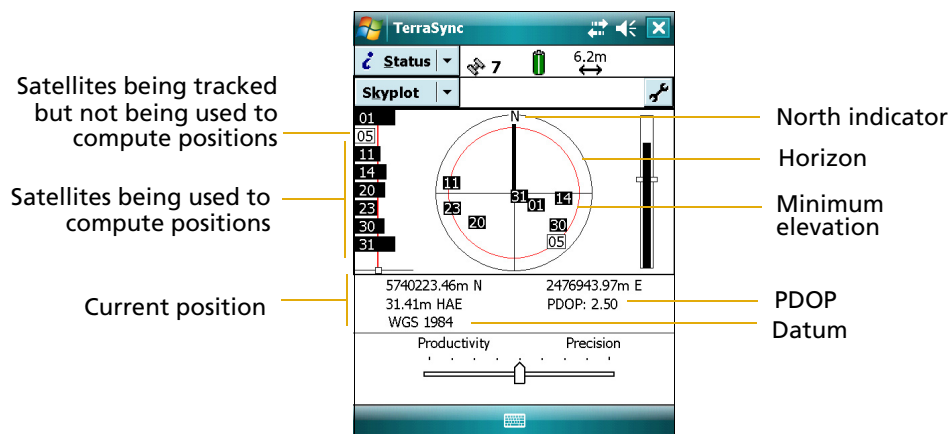
Checking the GPS status

Use the satellite icon on the status bar to check if the receiver is computing GPS positions. This icon provides information about the geometry of the satellites that are being used to compute GPS positions.

Use the Status section to view the satellites currently tracked and those that are being used to calculate the current position.

To view the GPS status:

1. The *Skyplot* screen appears when you first run the TerraSync software. If this screen is not visible, tap the Section list button and then select *Status*. Then tap the Subsection list button and select *Skyplot*.
2. Use the Skyplot to see which satellites are being tracked, and to see your current position.



Filled (black) boxes represent satellites that the receiver is using to compute its current GPS position. Unfilled (white) boxes represent satellites that the receiver is getting signals from but is not using because the signals are too weak. In the example above, eight satellites are being tracked and five of these satellites are being used to compute GPS positions.

Note – Numbers with no box represent satellites that are available, but that the TerraSync software is not receiving signals from.

Satellites that have an “R” prefix are GLONASS satellites. These satellites appear only if the receiver you are using can track GLONASS satellites (for example, the GPS Pathfinder ProXRT receiver), and the *Use GLONASS* option is enabled in the *GPS Settings* form.

Your current GPS position is displayed at the bottom of the screen.



Tip – For detailed information on satellite positions and signal strengths, use the *Satellite information* screen in the *Status* section.

To compute a 3D GPS position, you need a minimum of four satellites with good geometry. When you switch on the receiver, it automatically starts to track visible satellites and to calculate its current position.

Note – If the GPS receiver is new, has not been used for some time, or has been transported a substantial distance since last tracking satellites, it may take up to 10 minutes before the latest satellite orbital position data (ephemeris) has been downloaded from the GPS constellation. Until then, the TerraSync software cannot display your position.

If the receiver is computing GPS positions, the satellite icon in the Status bar and the number beside the icon are solid. If the satellite or its number are flashing, the satellite geometry is poor or there are too few satellites available to compute GPS positions. Adjust the GPS slider bar (see [Configuring GPS quality settings, page 97](#)) or wait until conditions are more favorable.



Tip – For more information about satellite geometry and how this can affect GPS data collection, go to www.trimble.com/gps.


Configuring the required logging accuracy

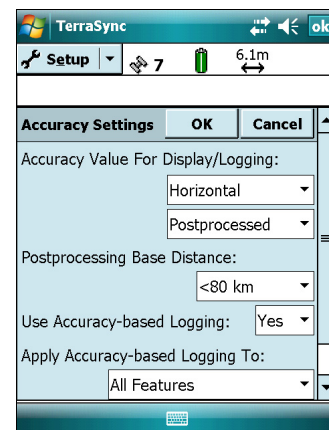
In this tutorial, the Seaview Authority is required to provide geographical positions with an accuracy of 5 meters or better. Using the *Accuracy Settings* dialog in the TerraSync software, you can prevent GPS positions that do not meet this accuracy requirement from being logged. For the tutorial, you will set a required horizontal postprocessed accuracy of five meters. The TerraSync software calculates the predicted horizontal estimated accuracy of each GPS position once the data has been postprocessed in the office. This prediction allows for corrections that will be applied when you postprocess the data back in the office. If the estimated accuracy of any GPS position is greater than 5 meters, the software will not log the position.

Note – The estimated accuracy has a 68% confidence level, which means that 68% of the time, the GPS position has an accuracy equivalent to or better than the estimated accuracy shown. For example, if the estimated accuracy is 5 meters, 68% of the time, the estimated accuracy of the position is in fact 5 meters or better.



Tip – If you need 5 m or better, it would be better to select a tighter required accuracy of 3 m to ensure a higher level of confidence (for example 95%).

1. Tap the Section list button and then select *Setup*.
2. Tap **Logging Settings**.
3. Tap the Setup button  below the *Accuracy Settings* field. The *Accuracy Settings* form appears.
4. From the *Accuracy Value for Display/Logging* fields, select *Horizontal* for the accuracy of the current GPS position and then select *Postprocessed* to use the predicted postprocessed accuracy.
5. From the *Postprocessing Base Distance* field, select *<80 km*, unless you know that the base station you will be using to postprocess your GPS field data is nearer. In that case, enter the estimated distance to the base station.
6. From the *Use Accuracy-based Logging* field, select *Yes*.
7. From *Apply Accuracy-based Logging To* field, select *All Features*.
8. From the *Required Accuracy* field, select *5 m*.
9. Tap **OK** to save the settings and return to the *Logging Settings* form.




The screenshot shows the TerraSync application interface. At the top, there's a status bar with 'TerraSync' and some icons. Below it, a 'Setup' button is visible. The main part of the screen displays the 'Accuracy Settings' dialog. This dialog has several fields: 'Accuracy Value For Display/Logging' with two dropdowns (Horizontal and Postprocessed), 'Postprocessing Base Distance' with a dropdown (<80 km), 'Use Accuracy-based Logging' with a dropdown (Yes), and 'Apply Accuracy-based Logging To' with a dropdown (All Features). At the bottom of the dialog, there's a 'Required Accuracy' field set to '5 m'. The dialog also has 'OK' and 'Cancel' buttons.

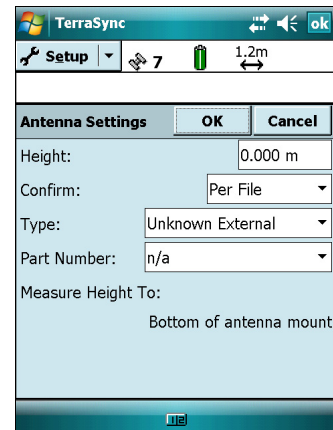
Configuring the antenna height

You must define the antenna type you are using because each type has different mechanical and electrical properties that affect the signal. If the antenna is mounted on a standard or calibrated pole, measure to the bottom of the antenna. If the antenna is mounted on a tripod, measure to the notch.

Use the *Antenna Settings* dialog to define the height of the antenna above the ground.

1. From the *Logging Settings* form, tap the Setup button  beside the *Antenna Height* field. The *Antenna Settings* form appears.
2. In the *Height* field, enter the height of the antenna, for example, 1 meter.
3. In the *Confirm* field, select *Per File*.
4. From the *Type* field drop-down list, select the antenna type you are using, for example *GeoXH Internal*.

Once you select the antenna type, the *Part Number* field is automatically filled in.



5. If you are using an external antenna, select the appropriate *Measure Height To* option.
6. Tap **OK** to save your settings and return to the *Logging Settings* form.
You can leave the rest of the fields at their default settings.
7. Tap **OK** to close the *Logging Settings* form.

Configuring GPS quality settings

Note – If you are using a Juno series handheld or Trimble Nomad handheld, a Trimble Recon GPS XB or XC edition, or a GPS Pathfinder XB or XC receiver, you cannot configure GPS settings. When you open the GPS Settings form, the GPS slider does not appear, and the settings for these receivers are shown as read-only fields.

Use the *GPS Settings* form in the Trimble GPS field software to configure the GPS quality settings you require. The lower the GPS quality settings, the more productive you are likely to be, as the GPS receiver will track more satellites and be better able to calculate a GPS position. The stricter the GPS quality settings, the more precise the GPS positions that are calculated. This means that if you log a series of GPS positions for the same point, they will be less spread out and will result in more precise data.

Because you are using accuracy-based logging, the GPS quality settings are less critical. This is because GPS quality is handled as part of the estimated accuracy calculation for each GPS position. By default, the GPS slider bar is at the middle setting. When using accuracy-based logging, Trimble recommends that you move the GPS slider further to the left, which allows the receiver to use more satellites to calculate the position. However, this results in less stringent GPS quality settings and so may ultimately reduce the precision of GPS positions.

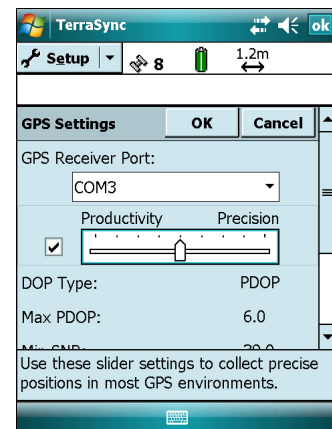
For the tutorial, you will configure the GPS slider bar to enable you to log more positions:

1. Tap the Section list button and then select *Setup*.
2. Tap **GPS Settings**. The *GPS Settings* form appears.
3. Drag the slider control to the left to lower the GPS slider bar two positions. This allows more satellites into the solution. Because there are few obstacles to block your view of the sky, this may provide better overall results. If the slider bar is set too high, the precision of the positions collected is high, but there may be places in the Starfish Bay area that cannot be mapped.



Tip – When you are not using accuracy-based logging, use a high precision setting on the GPS slider bar whenever a project requires the highest level of precision.

4. Tap **OK** to close the *GPS Settings* form.



Collecting new data

Your supervisor has sent you to Starfish Bay to map new road signs, roads, and park assets. This part of the tutorial gives step-by-step instructions for the following tasks:

- Creating a new data file (see [page 98](#))
- Collecting a point feature with Log Now (see [page 99](#))
- Collecting a line feature with Log Later (see [page 100](#))
- Collecting an area feature (see [page 101](#))
- Creating a waypoint (see [page 103](#))
- Ending the data collection session (see [page 104](#))

Creating a new data file

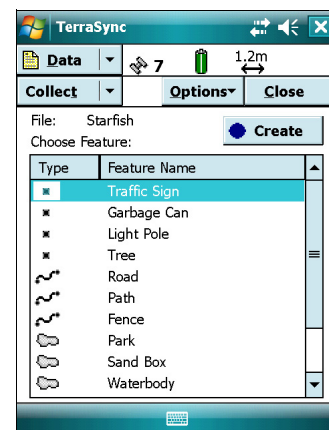
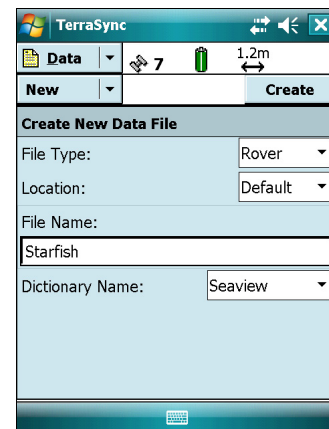
Before starting the data collection session, you must create a new data file to store the new features and attributes you collect. Use the Data section to do this.

To create a new file:

1. Tap the Section list button and then select *Data*.
2. Tap the Subsection list button and then select *New File*. The *New File* screen appears.
3. The TerraSync software automatically enters a default name in the *File Name* field. Replace the default name with **Starfish**.
4. In the *Dictionary Name* field, make sure that the **Seaview** data dictionary is selected.
5. Tap **Create**.
6. The *Confirm Antenna Height* form appears. If necessary, enter the correct antenna height and measurement point and then tap **OK**.

The *Collect Features* screen appears. This screen shows a list of all the features in the data dictionary.

You have now created a new data file and can start collecting features.



Collecting a point feature with Log Now

The first new feature you need to record is a traffic sign. This is a point feature.

To record a point feature, remain stationary while the TerraSync software logs GPS positions. These GPS positions are averaged to compute the final feature position of the point feature.

When the TerraSync software is logging GPS positions, the logging icon appears in the status bar. The number beside the icon indicates how many positions have been logged for the selected feature.

To record a point feature:

1. If the *Collect Features* screen is not already open:
 - a. Tap the Section list button and then select *Data*.
 - b. Tap the Subsection list button and then select *Collect Features*.

By default the TerraSync software begins logging GPS positions as soon as you open a new feature.
2. To make sure that the default logging option is selected, tap **Options** and then select *Log Now*.
3. Move close to the sign.
4. From the *Choose Feature* list, select Traffic Sign and then tap **Create**. The attribute entry form for the Traffic Sign feature type appears.

Note – GPS position logging starts immediately, so try to keep the antenna still during these next steps.

As the software logs GPS positions, the counter beside the logging icon increments (see the illustration to the right).

The *Date Visited* attribute is set to auto-generate on creation, so today's date is automatically filled out. You do not need to enter a value in this field.

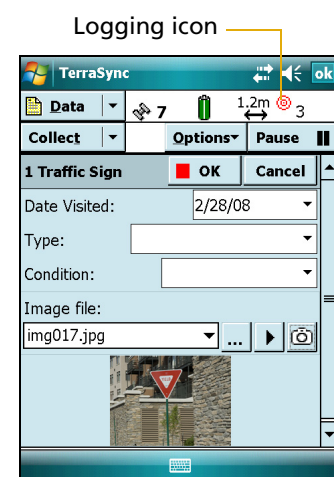
5. From the list of options in the *Type* field, select *Stop*. These options are the values defined in the data dictionary.

This is a new sign, so its condition is good. From the list of options in the *Condition* field, select *Good*.

For information about how to add image file attributes, see [page 185](#).

You have now recorded all the attribute information needed for the traffic sign.

6. Once you finish entering the attributes, tap **OK** to save the feature and return to the *Collect Features* screen.



7. Later in the tutorial, you will navigate back to a sign that needs to be replaced, and update its attributes. You need to collect this traffic sign feature now. Repeat [Step 1](#) through [Step 4](#) to log another traffic sign feature. When you reach Step 4, change the *Condition* field to *Needs replacing*.


Collecting a line feature with Log Later

The next feature you need to record is a road. This is a line feature. To record a line feature, you must travel along the line. As you travel, the TerraSync software records a GPS position at the configured logging interval, which defaults to the value that was set when the feature was created in the data dictionary. These positions are joined together to form a line.

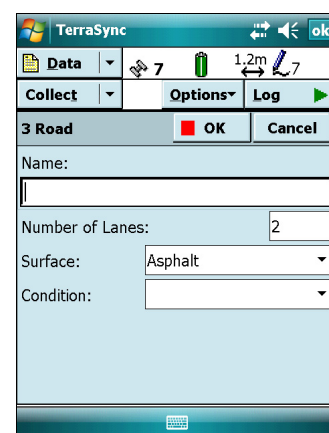
By default the TerraSync software begins logging GPS positions as soon as you open a new feature. For this feature you will use the Log Later option to delay logging of positions until you have entered the attributes for the feature and you have reached the start of the feature.

To record a line feature with the Log Later option:

1. If the *Collect Features* screen is not already open:
 - a. Tap the Section list button and then select *Data*.
 - b. Tap the Subsection list button and then select *Collect Features*.
2. Tap **Options** and then select *Log Later*.
3. From the *Choose Feature* list, select Road.
4. Tap **Create**. The Road attribute entry form appears.

Note – When you use the Log Later option, the pause icon  flashes in the status bar to let you know that the TerraSync software is not logging GPS positions.

5. The *Name* field is already selected. Enter the name of the road—**Seagull St**.
6. Seagull Street has two traffic lanes. The *Number of Lanes* field is set to 2 by default, so you do not need to change this field.
7. Fill out the other attributes as required.
8. Move to the start of the road and then tap **Log** to begin logging GPS positions for the road feature.
The pause icon disappears from the status bar and the number on the logging icon increments as each position is recorded.
9. Continue down the road. When you reach the end of the line you are logging, tap **OK** to save the feature and return to the *Collect Features* screen.



The screenshot shows the TerraSync application interface. At the top, there's a status bar with icons for Data, Collect, Options, and Log. Below this, a dropdown menu shows '3 Road'. The main form has fields for 'Name:', 'Number of Lanes:' (set to 2), 'Surface:' (set to Asphalt), and 'Condition:'. The 'Log' button is highlighted with a green arrow.

Collecting an area feature

Now you need to record the park in Starfish Bay. This is an area feature.

To record an area feature, you must travel around the perimeter of the area. As you travel, the TerraSync software logs GPS positions at the logging interval set in the data dictionary. The first and last GPS positions are joined together to form the perimeter of the area, so there is no need to return to the exact start point.

When you logged the road feature, you recorded the attributes before you started to log GPS positions. For the park feature, you will log GPS positions at the same time as you record the attributes.

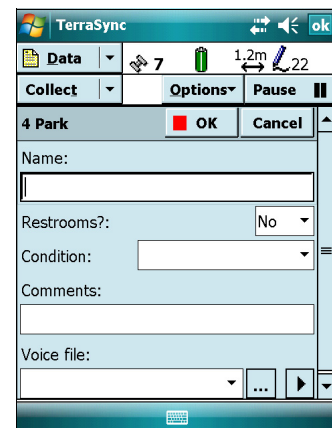
To collect an area feature:

1. If the *Collect Features* screen is not already open:
 - a. Tap the Section list button and then select *Data*.
 - b. Tap the Subsection list button and then select *Collect Features*.
2. Tap **Options** and then select *Log Now*.
3. Move to where you want to record the first perimeter position.
4. From the *Choose Feature* list, select Park.
5. Tap **Create**.

The attribute entry form for the Park feature opens, and the TerraSync software starts to log positions.

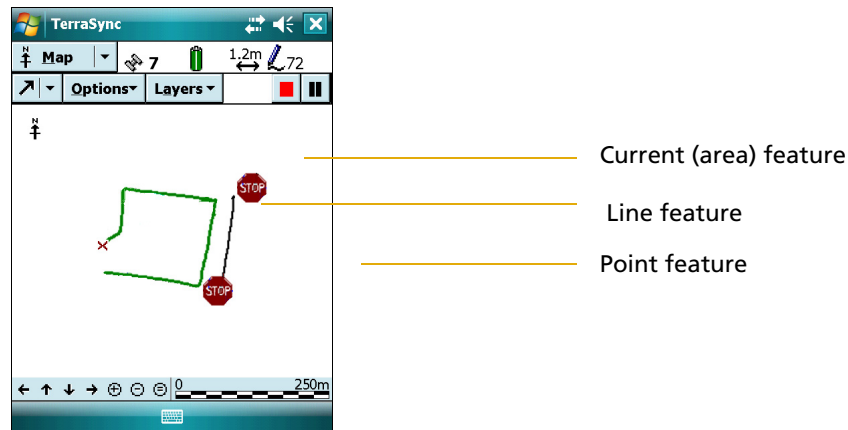
You can pause logging at any time. For example, if you are driving around the perimeter of the park and you want to stop to examine a sign some distance from the park, you can stop logging positions for the park boundary. You can also pause logging if you want some time to enter attribute values.

6. To pause logging, tap **Pause**. The TerraSync software stops logging positions and a pause icon flashes in the status bar. To continue collecting the park feature, tap **Resume** to resume logging. The pause icon disappears.
7. To view the map while collecting features, tap the Section list button and then select *Map*. The features that you have collected are displayed on the map, along with the park perimeter that you are currently collecting.



The screenshot shows the TerraSync application interface. At the top, there's a status bar with 'TerraSync' and various icons. Below it, a navigation bar shows 'Data' and 'Collect' buttons. The main screen displays the '4 Park' feature entry form. It includes fields for 'Name:', 'Restrooms?' (set to 'No'), 'Condition:', 'Comments:', and 'Voice file:'. There are 'OK' and 'Cancel' buttons at the top right of the form. The bottom of the screen shows a map view with a red line indicating the current collection path.

8. If you cannot see your current position on the map, tap **Options** and then select *Auto Pan to GPS Position*:



To view the map at different scales, tap the Zoom In or Zoom Out button on the Command bar.

Alternatively, tap the Map Tools list button, select Zoom In or Zoom Out and then select the point on the map that you want to zoom in to or out from.

Note – Your Map screen may appear different from the one shown.

9. Tap the Section list button and then select *Data* to go back to the Data section. The Park attribute entry form is still active and the TerraSync software is still logging positions for the park.
10. Enter the attributes of the park. In the *Name* field, enter **Starfish Park** and then select *Yes* from the *Restrooms?* field.
11. When you have travelled around the perimeter of the area, tap **OK** to save the feature and return to the *Collect Features* screen.
12. Tap **Close** in the *Collect Features* screen.
13. When prompted to confirm closing the file, tap **Yes** to close the current data file and return to the *New File* screen.

You have finished collecting features for this exercise. Now you will add a waypoint that is stored in a separate file.

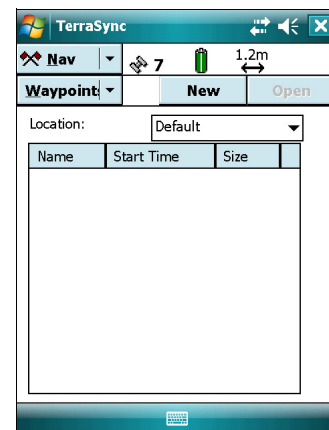
A waypoint is a position coordinate that you can navigate to. For this tutorial, you will use the waypoint to map a position for a future garbage can.

Creating a waypoint

You are in Starfish Park looking for good positions for the new garbage cans. As they are not yet installed, you cannot add them as a feature, but you can locate good positions where they should be installed. These positions are gathered as waypoints. The waypoints will be collected in a single waypoint file and provided to the garbage can installation crew. Once the garbage cans are installed, you can use the same waypoint file to navigate back to these positions and then collect the garbage can features.

Before you can create a waypoint, you must create a waypoint file:

1. Tap the Section list button and then select *Navigation*.
2. Tap the Subsection list button and then select *Waypoints*. The *Waypoint Files* screen appears.
3. In the *Waypoint Files* screen, tap **New**. The *Create Waypoint File* form appears.
4. In the *File Name* field, enter **Garbage Cans** and then tap **OK**.

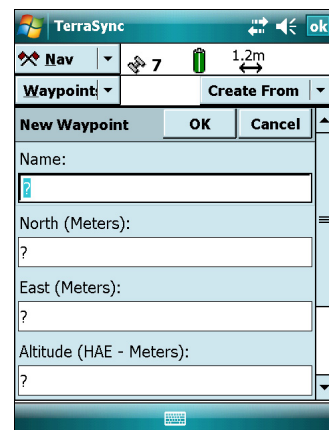


Find a suitable place for the garbage can and then create the waypoint that stores that location:

1. In the *Garbage cans* file, tap **Options** and then select **New**. The *New Waypoint* form appears.
2. In the *Name* field, enter **Garbage Can**.
3. Tap *Create From* and then select *GPS* to automatically fill out the coordinate fields using the your current position.
4. When you finish entering information for the waypoint, tap **OK**.

The waypoint is created and the *Waypoint List* screen appears.

5. To close the waypoint file, tap **Options** and then tap **Close File**.




Later in this tutorial, you will use the waypoint to navigate back to this location. You can then collect the installed garbage can as a feature.



Ending the data collection session

When the data update session is complete, exit the TerraSync software. You do not have to close the data file first. If you exit the software while a data file is still open, the TerraSync software closes the file before exiting.

To exit the TerraSync software:

1. Tap  in the upper right corner of the screen.
2. When prompted to confirm closing the file and exiting the software, tap **Yes**.

Exercise 3: Advanced data collection

This exercise is optional, and gives you practical experience using some techniques for collecting “out-of-the-ordinary” features such as those that are inaccessible places, near trees, or in a high multipath environment. You will also learn other advanced techniques, such as segmenting lines and nesting a collection of features within other features.


For more information about these techniques see [Appendix A, Advanced Datalogging Options](#)

Note – You can choose to skip this exercise, and go straight to [Exercise 4: Processing the data](#) on [page 116](#) to process the data you have already collected.

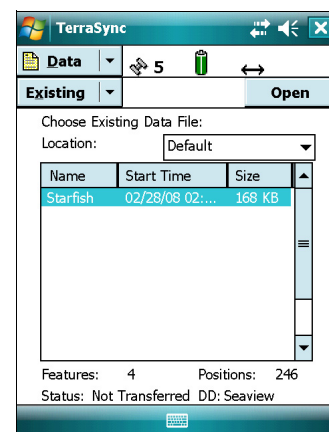
Reopening a data file for continuation of data collection

For this exercise, you return to Starfish Bay to collect new data requested by your supervisor. This means that you will open the Starfish Bay data file you created earlier and make changes and additions to the data previously collected.

To reopen the data file:

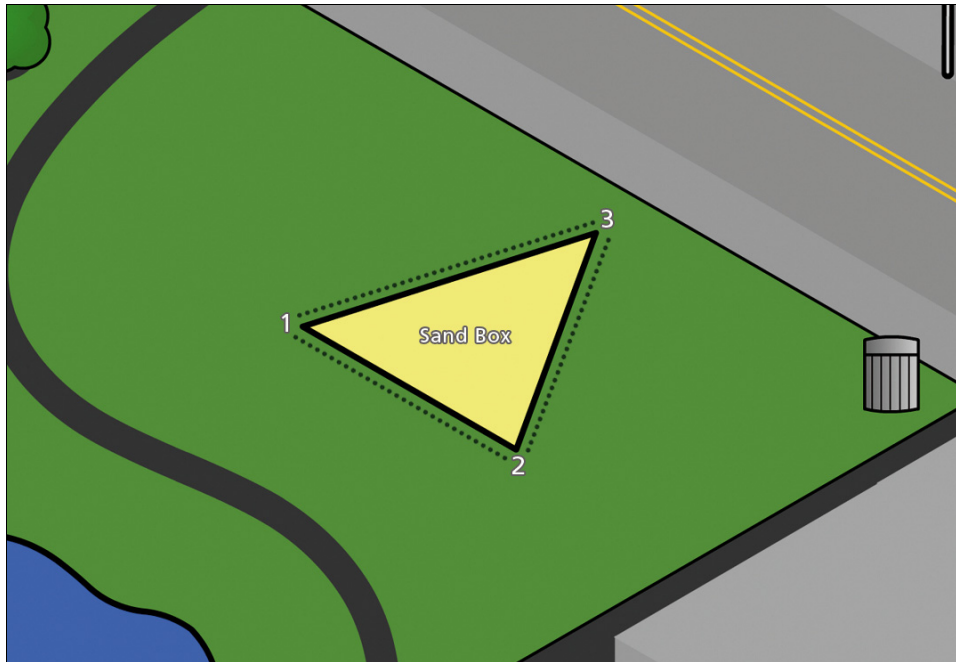
1. Tap  and then select *Programs / TerraSync* to start the TerraSync software.
2. Tap the Section list button and then select *Data*.
3. Tap the Subsection list button and then select *Existing Files*.
4. Tap the **Starfish** file to select it and then tap **Open**.
5. If prompted to confirm the antenna height, tap **OK** or change the settings if you are using different equipment to the equipment you used to collect the previous data.
6. The *Existing Features* screen appears. This screen shows all the features you have already collected in this data file.
7. Tap the Subsection list button and then select *Collect Features*.

You can now record new features in the open data file.



Collecting an area feature using averaged vertices


In Exercise 2, you collected data for the park in Starfish Bay. Now you need to collect data for a new sand box in Starfish Park. The sand box is in the shape of a triangle and can be collected as a series of averaged vertices. You must record GPS positions at each vertex of the feature, which the TerraSync software then averages to compute one position for each vertex.



To record an area using vertices:

1. Tap the Subsection list button and then select *Collect Features*.
2. Tap **Options** and then select *Log Later*.
3. Tap the Sand Box feature and then tap **Create**.
4. Tap **Options** and then select *New Vertex*.

The *Vertex* form that appears contains the same fields as the attribute entry form.

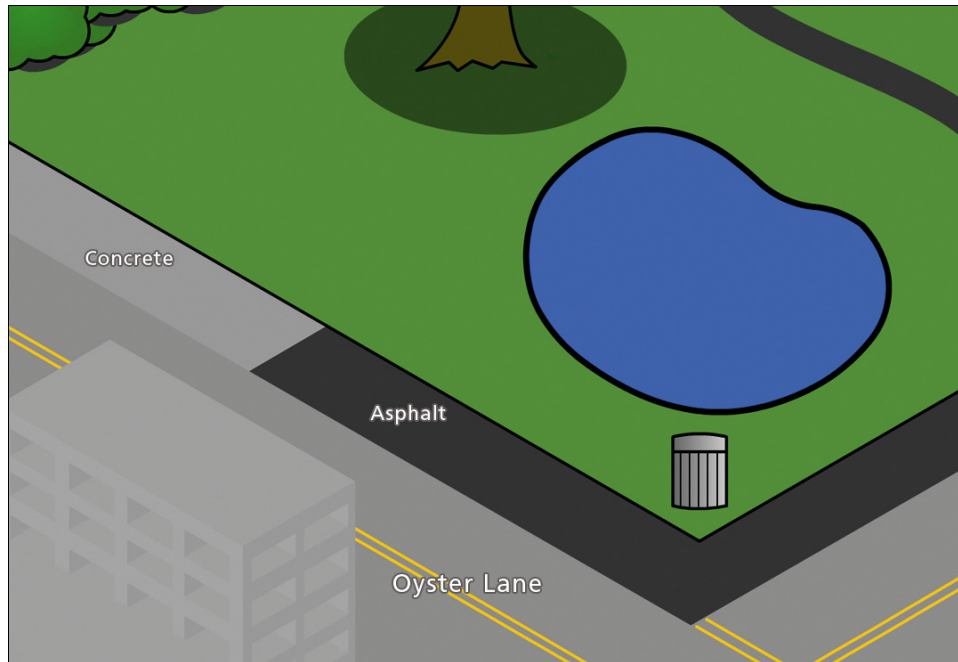
The software starts logging GPS positions for the averaged vertex, and the logging icon in the status bar changes to  4. The number beside it shows the number of positions logged for this vertex.

5. Once you collect enough GPS positions for the vertex, tap **OK**.
6. Repeat [Step 4](#) and [Step 5](#) for each vertex.
7. Enter **Starfish Sand Box** in the *Name* attribute.
8. Tap **OK** to save the feature and return to the *Collect Features* screen.

Collecting a line feature with differing attributes (line segmentation)

You need to collect a new street feature for a street that has two surfaces. The first half of the street surface is concrete and the second half of the street surface is asphalt.

To do this you will record the feature and then *segment* the feature into two segments joined together. Each segment has a different value for the Surface Type attribute..



To segment a line feature:

1. Make sure Log Later is selected. To do this, tap **Options** and then select *Log Later*.
2. In the *Collect Features* screen, select the Road feature and then tap **Create**.
3. Walk to the beginning of Oyster Lane.
4. In the *Name field*, enter **Oyster Lane**.
5. From the *Surface Type* field, select *Concrete*.
6. Tap **Log**.
7. Start walking along the concrete segment of Oyster Lane.

8. Just before you reach the asphalt segment, tap **Options** and then select *Segment Line* where the asphalt segment begins. The TerraSync software ends the current line feature and immediately starts another line feature of the same attribute.



Tip – There is no need to stop walking when segmenting a line. However if you need to stop, tap **Pause**. When you are ready to continue walking, tap **Resume**, tap **Options** and then select *Segment Line*.

9. From the *Surface Type* field, select *Asphalt*.
10. Walk to the end of the asphalt segment.
11. Once you finish logging the last segment, tap **OK** to save the feature and return to the *Collect Features* screen.

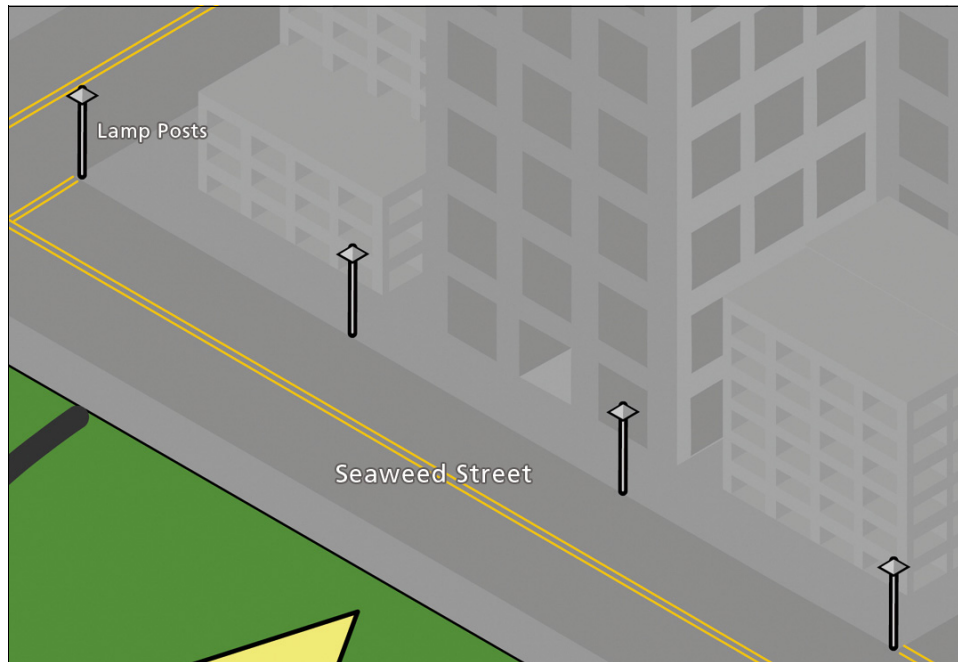
The screenshot shows the TerraSync software interface. At the top, there's a status bar with 'TerraSync' and icons for data, location, and a compass. Below that, a navigation bar has 'Data', 'Collect', 'Options', and 'Pause'. The 'Options' screen is active, showing a title bar '6 Road' with 'OK' and 'Cancel' buttons. The form fields are: 'Name:' with the text 'Oyster Lane', 'Number of Lanes:' with the value '2', 'Surface:' with a dropdown menu set to 'Asphalt', and 'Condition:' with an empty dropdown menu. At the bottom, there's a small 'TerraSync' logo.

Collecting a point feature while collecting a line feature (nesting)

You need to collect the light poles that are on Seaweed Street. You have not yet recorded Seaweed Street, and to save time you will collect the light pole features at the same time as you collect the Seaweed Street feature.

To do this you will *nest* the point features within the line feature.

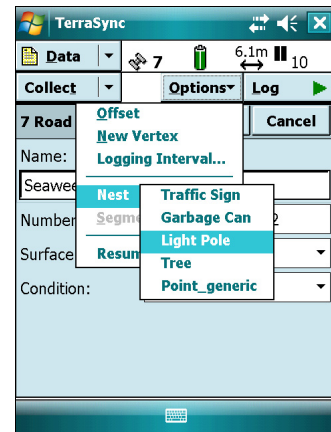
Note – Only point features can be nested in this way. To collect a line or area feature while you are collecting another, you must use the *Continue* option.



To nest a point feature:

1. Make sure Log Later is selected. To do this, tap **Options** and then select *Log Later*.
2. In the *Collect Features* screen, select the Road feature and then tap **Create**.
3. In the *Name* field, enter **Seaweed Street**.
4. Tap **Log**.
5. Walk along Seaweed Street until you reach the first light pole and then tap **Pause**.

6. Tap **Options**, select *Nest* and then select *Light Pole*.
7. Walk up to the light pole and then tap **Log**.
8. In the attribute entry form, enter the attributes for the light pole.
9. Once you collect sufficient positions for the light pole, tap **OK** to return to the Seaweed Street attribute entry form.
10. Return to the line you were walking when collecting Seaweed Street and then tap **Resume**.
11. Continue along Seaweed Street until you reach the next light pole and then tap **Pause**.
12. Repeat [Step 7](#) through [Step 11](#) to log the remaining light poles.
13. At the end of Seaweed Street, tap **OK** to save the Seaweed Street feature and return to the *Collect Features* screen.

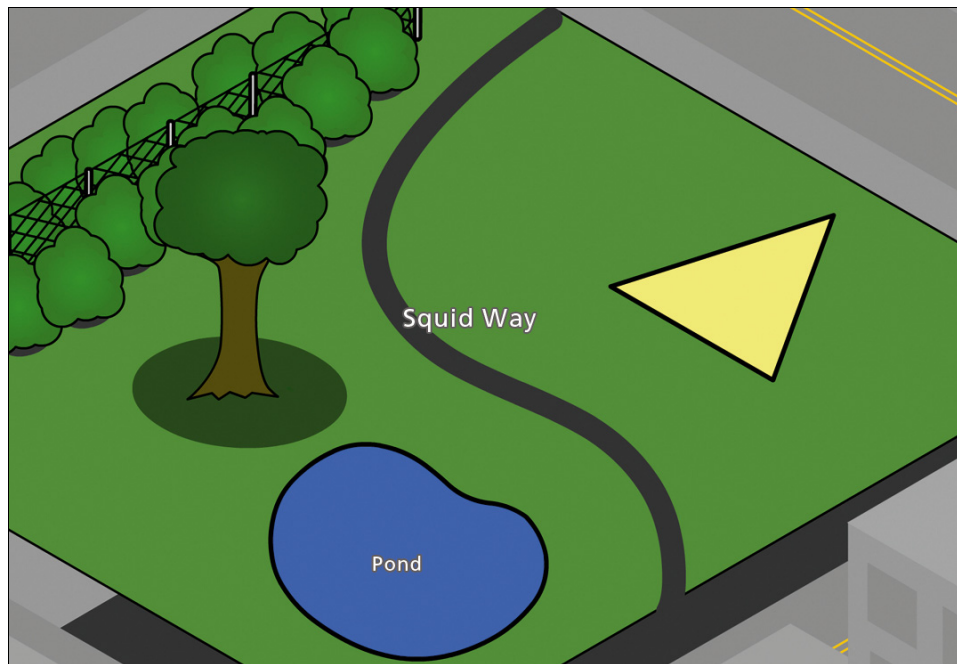




Collecting an area feature while collecting a line feature (continuation)

You need to collect a new line feature for Squid Way that also has a new nearby duck pond. When recording Squid Way, you will pass the new pond that you also need to record. To save time and avoid traveling back to the pond, you will log the line feature, pause and record the area feature, and then *continue* recording the line feature.

Note – You can collect as many features within a line or area as you need. The number is limited only by storage space on the field computer



To continue a line feature

1. In the *Collect Features* screen, select the Path feature.
2. Make sure Log Later is selected. To do this, tap **Options** and then select *Log Later*.
3. Tap **Create**.
4. In the *Name field*, enter **Squid Way**.
5. Tap **Log** and then start traveling along Squid Way.
6. When you reach the duck pond, tap **OK** to close the Squid Way feature. The *Collect Features* screen reappears.
7. In the *Collect Features* screen, select the Waterbody feature and then tap **Create**.
8. Move to the perimeter of the pond and then tap **Log** to begin logging the pond. Walk around the perimeter of the pond. When you reach the starting point, tap **Pause**.
9. In the attribute entry form, enter the attributes for the pond and then tap **OK**.

10. Tap **Options** and then select Continue.

The *Continue Feature* form appears, listing the line and area features that are available for continuation, in the order they were collected.



Tip – The feature name is the name of the feature class. The attributes below the list of features shows the name entered for the feature.

11. In the *Continue Feature* form, select the Path feature and then tap **Continue**. The attribute entry form for Squid Way appears.
12. Return to where you last logged a position for Squid Way and then tap **Resume** to continue to log GPS positions. Enter the remaining attributes for the Squid Way feature.
13. When you reach the end of Squid Way, tap **OK** to save the feature and return to the *Collect Features* screen.

TerraSync

Data 8 1.2m

Collect

File: Starfish

Choose Feature:

#	Name
7	Road
9	Path
10	Waterbody

Name/ID: Squid Way

Condition: ?

Continue Cancel

Collecting a line feature using a centre offset (simple offset)

You want to record a fence that you cannot get close enough to because of dense undergrowth. You must enter an offset for the fence and record it at a specified distance. The fence is in Starfish Park and runs parallel to Seagull Street.



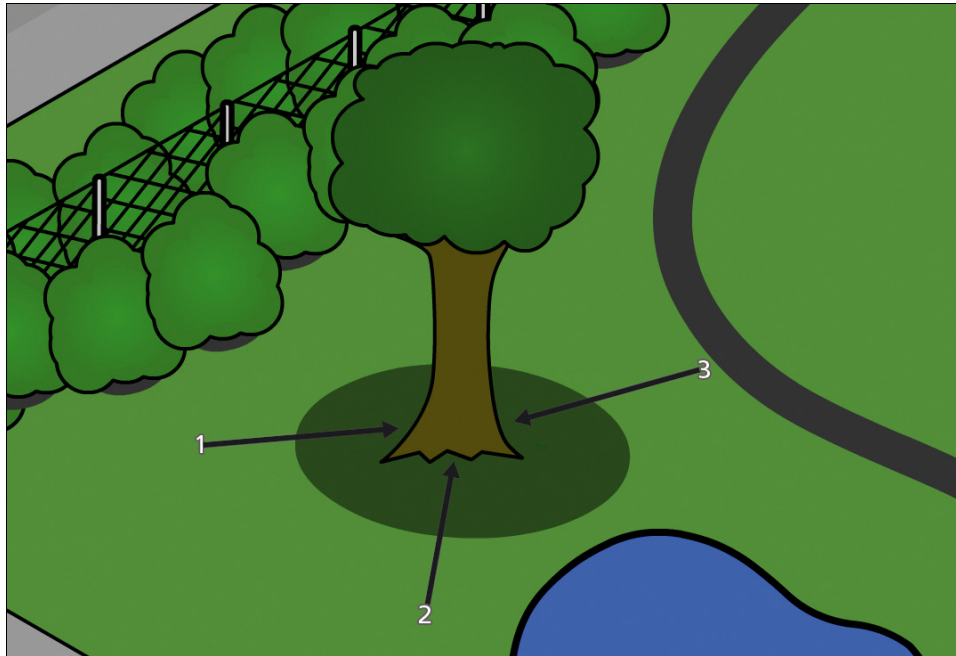
To record an offset for the fence feature:

1. Start walking along the sidewalk on Seagull Street until you reach the fence, which is four meters on your right.
2. In the *Collect Features* screen, tap the Fence feature and then tap **Create**.
3. In the attribute entry form, enter **Seagull Street Fence** in the *Name* field.
4. Tap **Options** and then select *Offset*.
5. From the *Direction* field, select *Right*.
6. In the *Horizontal distance* field, enter *4 meters*. Leave the *Vertical distance* at the default of zero.
7. Tap **OK** to save the offset value.
8. Get ready to walk beside the fence and then tap **Log** to begin. For good accuracy, you must remain four meters from the fence while logging.
9. Once you have logged sufficient GPS positions and have recorded the attributes for the fence, tap **OK** to save the feature and return to the *Collect Features* screen.



Collecting a point feature that you cannot get close to (complex offset)

You want to record data for a tree but there is no GPS signal under the tree canopy. To log a position for the tree, you must record three GPS reference positions and then use a tape measure to measure the distance from each reference position to the tree.



To record a complex point offset:

1. In the *Collect Features* screen, tap the Tree feature and then tap **Create**.
2. In the attribute entry form, tap **Options** and then select *Offset*. The *Point Offset* pull-out list appears.
3. From the *Point Offset* pullout list, select *Triple Distance*.
4. The *Triple Distance Offset* form appears. The top of the form has instructions to help you record the feature.
5. Move to the location of the first reference position.
 - a. Tap **Log** to begin logging. Remain stationary at the reference position while you log GPS positions.
 - b. When you have collected sufficient positions, tap **Next** to stop logging.
 - c. Measure the offset. This is the distance from the reference position to the tree.

The screenshot shows the TerraSync application interface. At the top, there's a status bar with 'TerraSync' and various icons. Below that, a navigation bar includes 'Data', a dropdown menu showing '7', a battery icon, and a signal strength indicator. The main screen displays the 'Triple Distance offset for 12 Tree' form. It has a title bar with 'Triple Distance offset for 12 Tree' and a subtitle 'Move to a suitable location and press Log to begin logging reference position 1.' Below the subtitle are 'Next' and 'Clear' buttons. The main content area shows 'Reference position 1' and 'Not started.' at the bottom.


- d. In the *Horizontal distance* field, enter the offset measurement. You do not need to measure the *Vertical distance*, so leave this at the default of zero.
 - e. Tap **Next** to confirm the measurement for this reference position.
6. Move to the second reference position and then tap **Resume**. This starts logging GPS positions for the second reference position.
 7. Repeat [Step b](#) through [Step e](#).
 8. Move to the third reference position and then tap **Resume**.
 9. Repeat [Step b](#) through [Step e](#).
 10. If prompted to confirm the relative direction of the feature from your reference positions, tap **Next**.
 11. Once the offset is calculated, tap **OK**.
 12. In the attribute entry form, enter the attributes for the tree and then tap **OK** to save the feature and return to the *Collect Features* screen.

The screenshot shows the TerraSync application window. At the top, there's a status bar with 'Data' and 'Collect' buttons. Below that, a header reads 'Triple Distance offset for 12 Tree'. The main area prompts the user to 'Enter the distance from reference position 1 to the feature' with 'Next' and 'Clear' buttons. It also shows 'Reference position 1' as 'Collected', 'Distance A' as '0.00 m', and 'Vertical distance' as '0.00 m'.

Ending the data collection session

When the data update session is complete, exit the TerraSync software. You do not have to close the data file first. If you exit the software while a data file is still open, the TerraSync software closes the file before exiting.

To exit the TerraSync software:

1. Tap  in the upper right corner of the screen.
2. When prompted to confirm closing the file and exiting the software, tap **Yes**.



Exercise 4: Processing the data

After the data collection session, use the GPS Pathfinder Office software to process the data collected and transfer it to the GIS.

This part of the tutorial shows you how to transfer and view the data. The tasks are:

- Transferring data to the office computer (see [page 116](#))
- Differentially correcting data (see [page 118](#))
- Viewing data (see [page 123](#))
- Exporting data to a GIS (see [page 124](#))



Transferring data to the office computer

You must transfer the data you collected in the field from the field computer to the office computer.

1. Switch on the field computer and the office computer and connect the two computers.

If the field computer is a laptop or Tablet PC, for example, make sure that there is a network connection between it and the office computer.

If the TerraSync and GPS Pathfinder Office software are installed on the same computer (for example, a laptop PC), you must still transfer files between the TerraSync software data folder and the GPS Pathfinder Office project folder.

If the field computer is a Windows Mobile powered device, connect the device to the computer (for example using a USB cable or Bluetooth wireless technology).

Use either Microsoft ActiveSync technology or the Windows Mobile Device Center to manage the connection between the device and the computer. The software you use depends on the operating system the office computer is running.

When the device and the computer are connected, one of the following appears on the office computer:

- If the computer is running the Windows Vista operating system, the *Windows Mobile Device Center* window appears and displays the message **Connected**.

For more information, refer to the *Windows Mobile Device Center Help*.

- If the computer is running the Windows XP or 2000 operating system, the *Synchronization Setup Wizard* appears.

For more information, refer to the *ActiveSync Help*.

2. In the GPS Pathfinder Office software, select *Data Transfer* from the *Utilities* menu. The *Data Transfer* dialog appears.

- From the *Device* list, select the appropriate device (GIS Datalogger on Windows Mobile, GIS Datalogger on Windows PC, or GIS Folder if the TerraSync and GPS Pathfinder Office software are running on the same computer). Alternatively, if you have set up a device definition for the field computer, select that device name from the list.

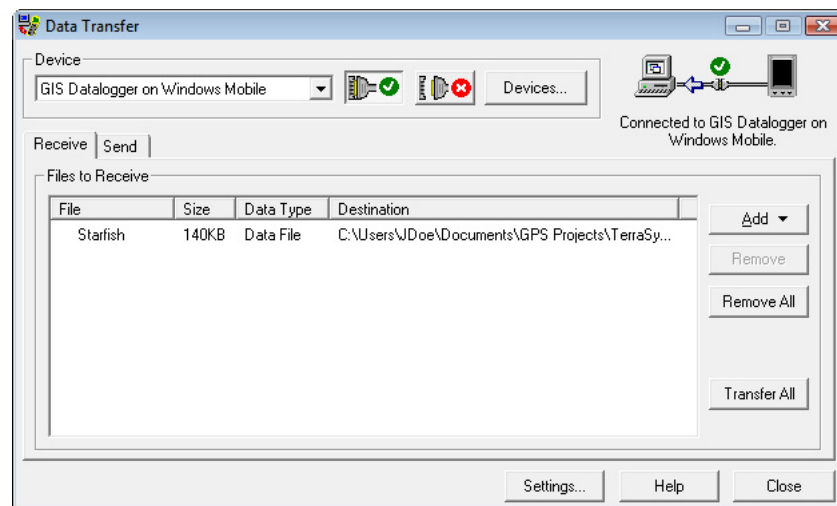
The Trimble Data Transfer utility automatically connects to the field computer.

- Select the *Receive* tab.
- Click **Add** and then select Data File from the drop-down list. The *Open* dialog appears.

Note – The files that appear are those in the TerraSync data folder on the field computer.

- From the list, select the Starfish file.
- Make sure that the *Destination* column shows the correct path to the GPS Projects\TerraSync Tutorial folder you created earlier and then click **Open**.

The *Open* dialog disappears and the Starfish file appears in the *Files to Receive* list:



- Click **Transfer All**. The data file is transferred to the office computer and a message shows summary information about the transfer appears.
- Click **Close** for the message and then click **Close** again to exit the Data Transfer utility.

For more information, refer to the *GPS Pathfinder Office Software Help*.

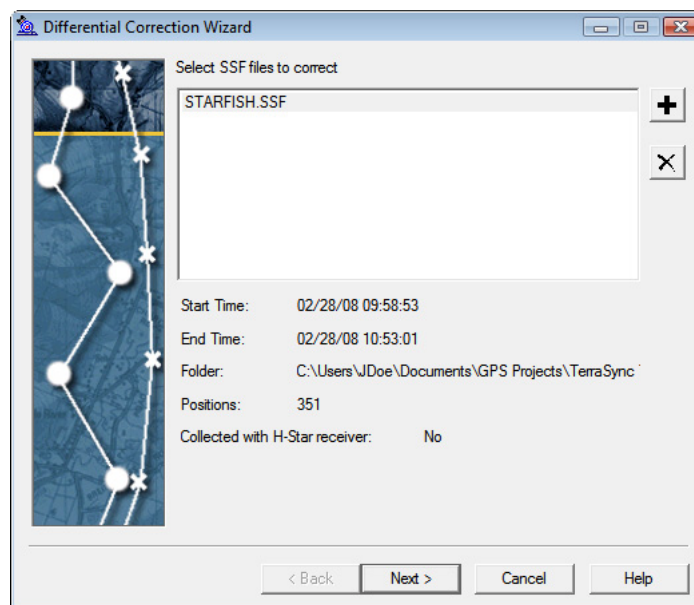
Differentially correcting data

Depending on the base station you are using to postprocess your data, you may have to wait up to 24 hours to proceed with this next step. Usually though, base stations provide the last hour's data at a few minutes past the hour.

The data collected by GPS receivers is subject to errors, including small satellite clock errors, orbit errors, atmospheric noise, and multipath errors. The vast majority of these errors can be removed from the data by differential correction, which improves the accuracy of GPS positions to the specified accuracy of the receiver.

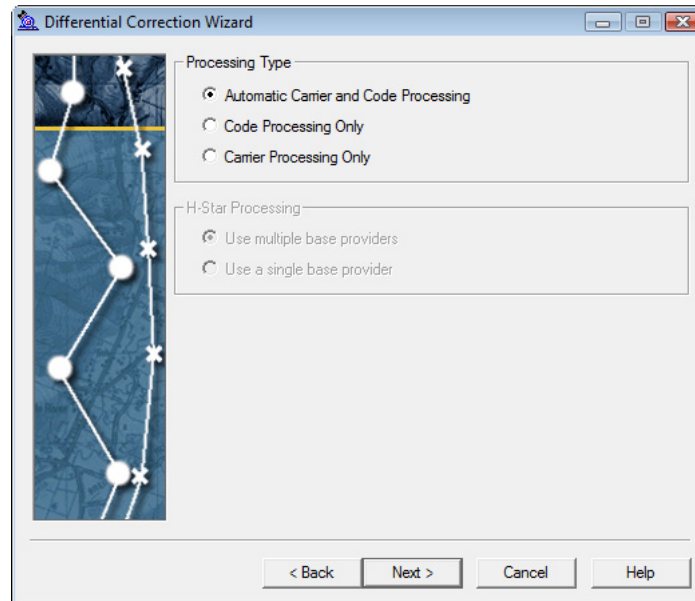
To differentially correct the data file:

1. Start the GPS Pathfinder Office software and then open the TerraSync Tutorial project.
2. Select *Utilities / Differential Correction* to start the Differential Correction wizard. The file you transferred from the field computer appears in the *Selected Files* field.



3. If the SSF file does not appear, click  to locate the file Starfish.ssf and then click **Open**.

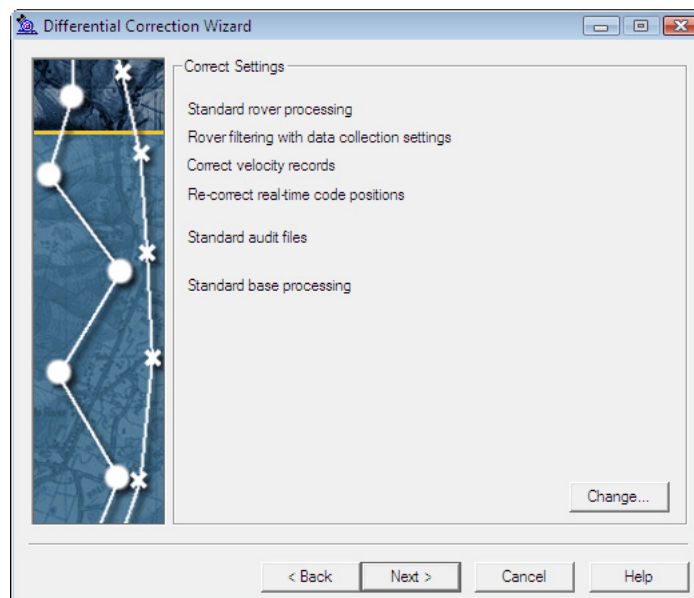
- Click **Next**. The *Processing Type* screen appears:



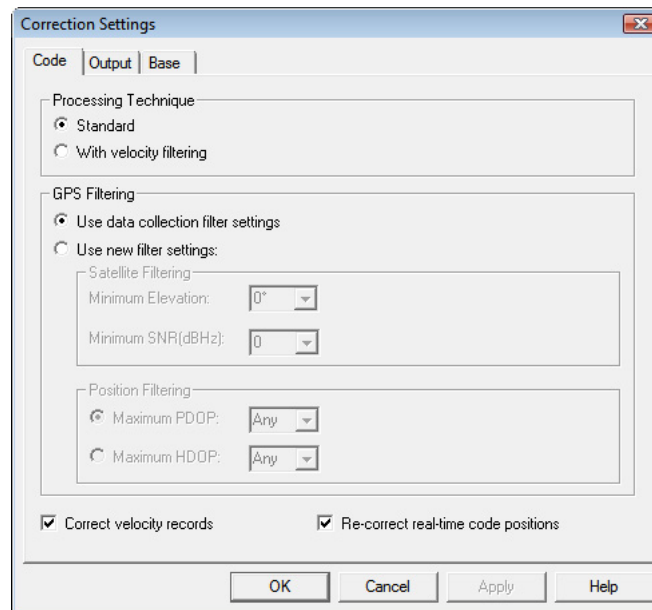
- Select a processing option. By default, the *Automatic Carrier and Code Processing* option is selected.

Note – The *H-Star* processing options are available only if the GPS receiver used to collect the data file has *H-Star* technology. In this example, the tutorial data files were collected with a GPS receiver that does not have *H-Star* technology.

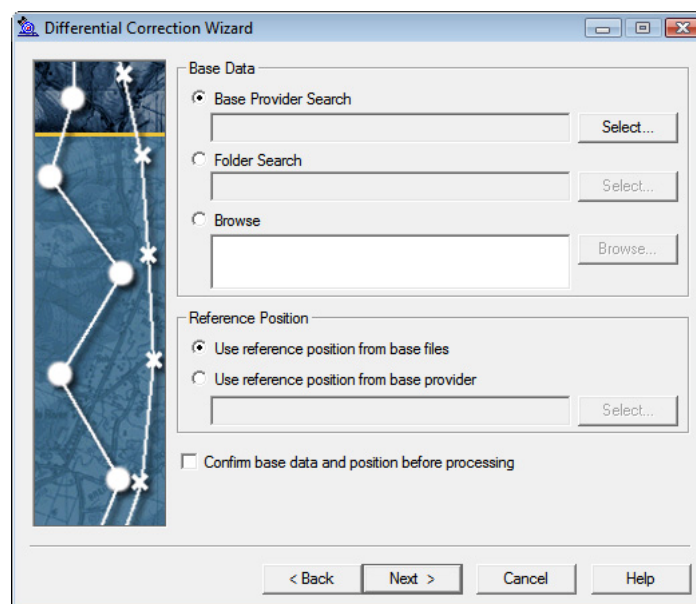
- Click **Next**. The screen that appears specifies the correction settings that will be applied:



7. To change the correction settings, click **Change**. You can change Code, Output, and Base settings in the *Correction Settings* dialog:



8. Click **OK** to use the default settings.
9. Click **Next**. The *Base Data* screen appears:



There are three options for locating base data:

- download files from a base provider using the Internet
- use base files that you have previously downloaded and saved in the base data folder for the project
- browse for base files that you have previously downloaded and saved elsewhere

Do one of the following:

- If you have access to the Internet, download base data files from a base provider:

- a. In the *Base Data* group, select *Base Provider Search*.
- b. Click the **Select** button next to the Base Provider Search text box.

The *Select Base Provider* dialog appears.

The dialog displays a list of available base providers. The list is arranged by distance from the location where the field data was collected, so that base stations closest to the location where the data was collected are at the top of the list.

- c. Click a base provider to select it and then click **OK**.

- If you do not have access to the Internet, use base data files that have been downloaded to a folder:

- a. In the *Base Data* group of the Select Base Data page of the wizard, select *Folder Search*.
- b. Click the **Select** button next to the Folder Search text box.

The *Folder Search* dialog appears.

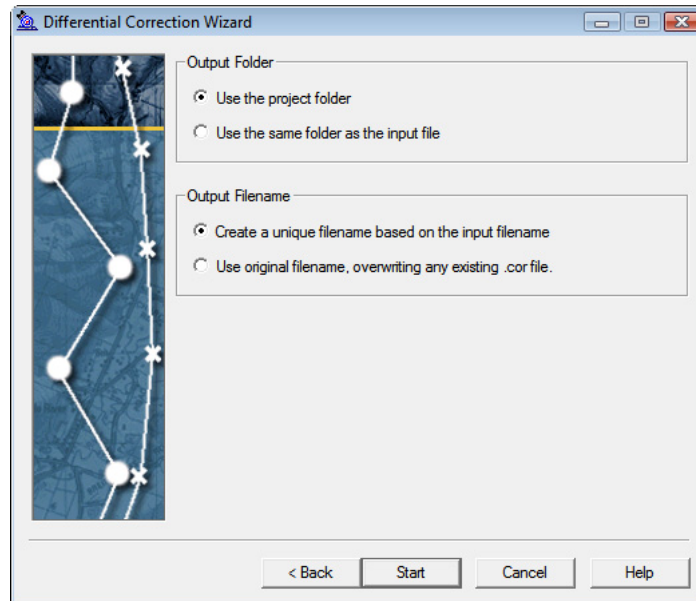
- c. Click **Browse** to navigate to the folder where the base files are stored.
- d. Click **OK**.

The dialog closes and you are returned to the Base Data page of the wizard.

The base provider, or the path of the folder you selected, is displayed in the text box below the Base Data option you selected.

10. In the *Reference Position* group, select *Use reference position from base files*.
11. Select the *Confirm base data and position before processing* option to make sure that the selected base files provide coverage for the rover files and that the reference position is correct.

12. Click **Next**. The *Output* Page of the wizard appears:



This screen enables you to specify the output folder and output filename. Use the default settings shown above.

13. Click **Start** to differentially correct the selected files.

The *Progress* screen details the results of the differential correction. If you selected the *Confirm base data and position before processing* option, the **Confirm** button becomes available once the base files are downloaded or located.

14. Click **Confirm** to proceed with processing.
15. When processing is complete, click **Close** to close the Differential Correction wizard.

For more information about differentially correcting data, refer to the *GPS Pathfinder Office Software Help*.

Viewing data

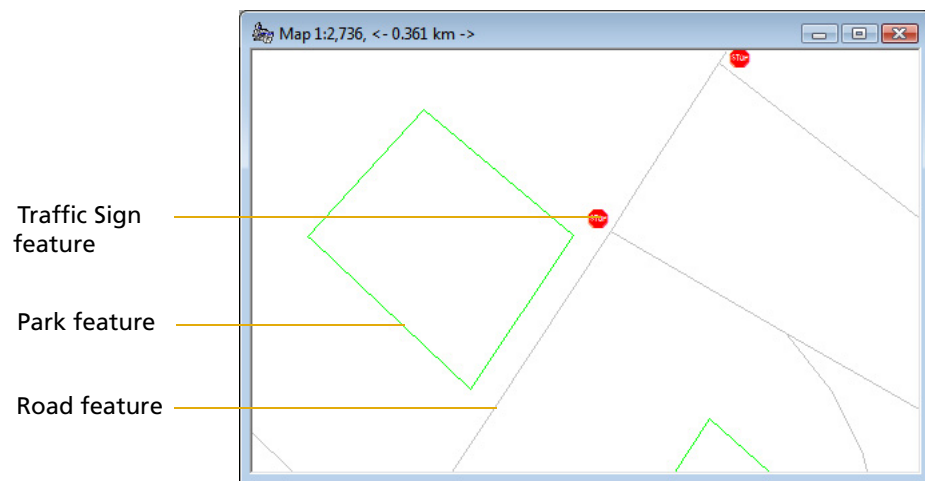
When the data is transferred and differentially corrected, you can display, edit, and plot it using the GPS Pathfinder Office software. The best way to view field data and to verify its integrity is to use the Map window in the GPS Pathfinder Office software. Use the Map window to make graphical queries and measurements on the collected data. You can specify the colors, symbols, and line styles for each feature.

To view the data:

1. In the GPS Pathfinder Office software, select *File / Open*. Select the Starfish.cor file from the current project folder (GPS Projects\TerraSync Tutorial).

Starfish.cor is the differentially corrected version of the file Starfish.ssf, which you transferred from the field computer.

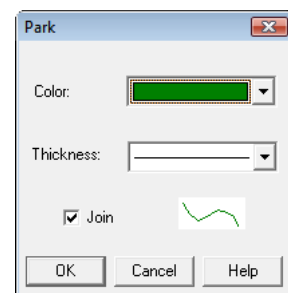
2. If the Map window is not visible, select *View / Map*:



The Map window displays the selected file.

Note – Your Map window may appear different from the one shown.

3. To display the attributes of any feature on the map, double-click the feature. The *Feature Properties* dialog appears. It provides attribute information about the selected feature.
4. To change the color of the Park feature:
 - a. Right-click the Park feature on the map.
 - b. From the shortcut menu that appears, select *Park Layer Style*.
The *Park* dialog appears.
 - c. Use this dialog to change the color of the Park area feature type to dark green.



For more information about the GPS Pathfinder Office software Map window display, search for the topic **Map** in the *GPS Pathfinder Office Software Help*.

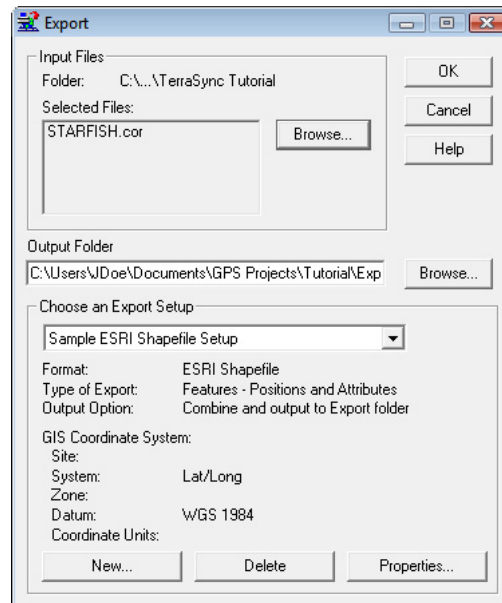


Exporting data to a GIS

The Trimble Export utility in the GPS Pathfinder Office software converts files that are in SSF format to a format that can be read by a GIS, CAD, or database system. It lets you export point, line, and area features, attributes, and positions to a variety of other formats.

To export data to a GIS:

1. In the GPS Pathfinder Office software, select *Export* from the *Utilities* menu to start the Export utility:



2. If the file Starfish.cor does not appear in the *Selected Files* field, click **Browse** to open the *Open* dialog. Browse for Starfish.cor, select it and then click **Open**.
3. Select the output folder. By default, this is the export folder in the current project.
4. In the *Choose an Export Setup* group, select Sample ESRI Shapefile Setup.
5. Make sure that the *GIS Coordinate System* group shows the Latitude/Longitude coordinate system. If the coordinate system is incorrect, click **Properties** and then select the *Coordinate System* tab in the *Export Properties* dialog to change the coordinate system.
6. To export a .prj projection file with your files, click **Browse** next to the *Projection Files* field and then navigate to the location of the .prj file and select it.
If you do not want to export a .prj file, or if you cannot locate a file, then skip this step.
7. Click **OK** to close the *Export Properties* dialog.
8. Click **OK** to export the selected file(s) using the specified export setup.

9. The *Export Completed* dialog details the results of the export. Click **Close** to close this dialog.

The file is now in the format required for you to open it in your GIS.



Tip – Use the Batch Processor utility to increase productivity by automating repetitive tasks such as data transfer, differential correction, and export to GIS. When you return to the office, connect the field computer to the office computer. The Connection Manager utility automatically recognizes that a field computer is connected and runs the Batch Processor utility.

For more information about these utilities, refer to the *GPS Pathfinder Office Software Help*.



Exercise 5: Preparing for data update

Note – You cannot update imported data files using the TerraSync Standard edition software.

With the TerraSync software version 4.00, if you also have CoPilot Live 7 Professional for Trimble TerraSync software, or TomTom Navigator 6 turn-by-turn navigation software installed on the device, the TerraSync software automatically switches to the navigation software to navigate to the selected target, then switches back when you have arrived at the destination.

To continue using the TerraSync software for navigation as covered in this tutorial, go to: *Navigation \ Options \ Turn by turn \ Turn by turn navigation*, and select "Off".

For more information on using Turn-by-turn navigation software with the TerraSync software, refer to the TerraSync help and the version 4.00 release notes. Some time has passed and you must return to Starfish Bay to check the condition of the traffic signs. You will navigate to each sign using the TerraSync software and a real-time correction source. You will then use the Seaview data dictionary to verify and update the attributes for those features.

This part of the tutorial gives step-by-step instructions to follow before you go into the field to update data. See:

- [Creating a data dictionary from existing data files, page 126](#)
- [Importing data from a GIS into the GPS Pathfinder Office software, page 128](#)
- [Transferring data to the field computer, page 131](#)



Creating a data dictionary from existing data files

Note – This step is necessary only for the tutorial. Normally, before collecting any data, you would create a data dictionary on a desktop computer, and then use the Data Transfer utility to copy the data dictionary to the field computer. Alternatively, you would create a data dictionary in the TerraSync software.

Before you can import data from a GIS, you need to recreate the Seaview data dictionary on the desktop computer.

Each SSF file contains a copy of its associated data dictionary. You will use the Starfish data file to recreate the Seaview data dictionary that is on the field computer.

To create a data dictionary from a data file:

1. Start the GPS Pathfinder Office software and then open the TerraSync Tutorial project.
2. Start the Data Dictionary Editor utility. In the GPS Pathfinder Office software, select *Data Dictionary Editor* from the *Utilities* menu. The main *Data Dictionary Editor* window appears.
3. Select *File / Import From Data File*. The *Import From Data File* dialog appears.
4. Select the Starfish.ssf file and then click **Open**.

The *Import From Data File* dialog closes and you are returned to the main *Data Dictionary Editor* window where a new, unsaved data dictionary has been created.

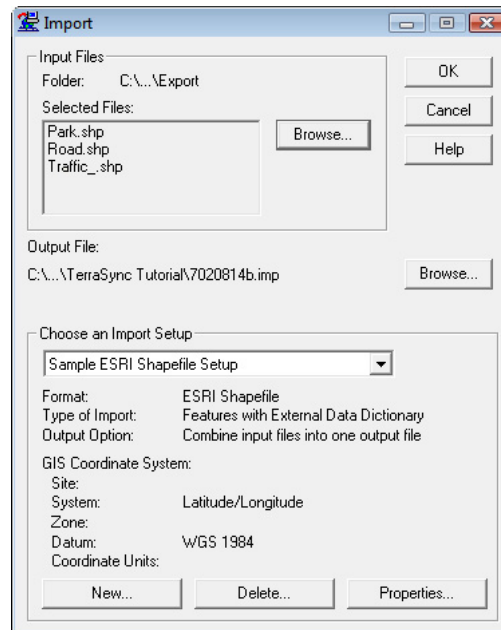
5. Select *File / Save*. The *Save As* dialog appears. The default filename for the new data dictionary is Seaview.ddf.
6. Navigate to the default project folder (GPS Projects) and then click **Save**.
7. In the *Data Dictionary Editor* window, select *File / Exit*.



Importing data from a GIS into the GPS Pathfinder Office software

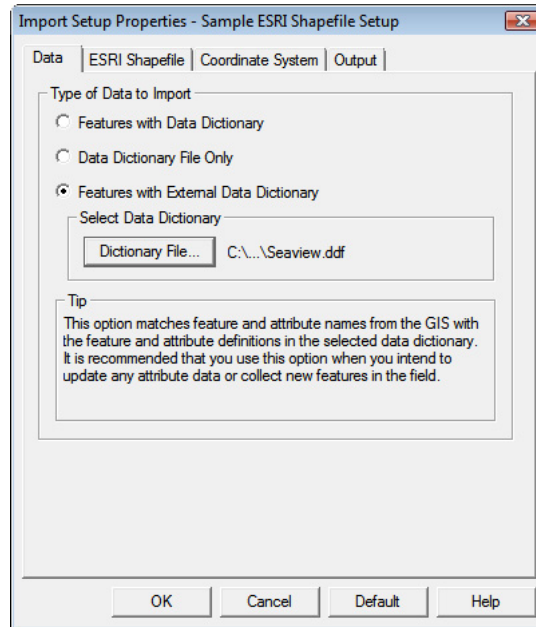
Before going into the field, transfer the required information from the GIS to the TerraSync software. The Import utility in the GPS Pathfinder Office software converts data from a GIS data format into the SSF format required by the TerraSync software.

1. Start the GPS Pathfinder Office software and then open the TerraSync Tutorial project.
2. Start the Import utility. In the GPS Pathfinder Office software, select *Import* from the *Utilities* menu. The *Import Utility* dialog appears:



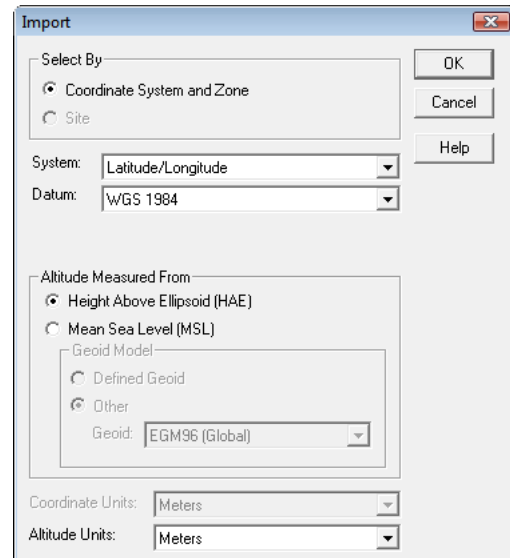
3. The Shapefiles that you exported at the end of the data collection part of the tutorial appear in the *Selected Files* list. If they do not appear, click **Browse** and locate the folder GPS Projects\TerraSync Tutorial\Export. Select the files and then click **Open**.
4. From the *Choose an Import Setup* drop-down list, make sure that Sample ESRI Shapefile Setup is selected.

5. Change the import setup properties:
 - a. Click **Properties**. The *Import Setup Properties - Sample ESRI Shapefile Setup* dialog appears. Make sure that the *Data* tab is selected:



- b. In the *Type of Data to Import* group, select the *Features with External Data Dictionary* option.
 - c. Click **Dictionary File**. Browse for the Seaview.ddf file, select it, and then click **Open**.
 - d. Select the *Coordinate System* tab and then click **Change** to change to the coordinate system the GIS data uses. You must import GIS data using the same coordinate system that the GIS data is already stored in.

- e. Make sure that Latitude/Longitude is selected in the *System* field, and that WGS 1984 is selected in the *Datum* field. Make sure that the *Height Above Ellipsoid* option is selected in the *Altitude Measured From* group. The settings should look the same as those shown:
- f. Click **OK** to return to the *Import Setup Properties* dialog.
- g. Select the *Output* tab.
- h. In the *Output* group, make sure that the *Combine input files into one output file* option is selected.
- i. Click **OK** to return to the *Import* dialog.



6. Click the **Browse** button beside the *Output File* field. The *Specify Output File* dialog appears. The default filename is in the format YMMDDHHR.imp.

Note – A .imp file is a file in SSF format that was created by importing from a GIS, CAD, or spatial database. It is the same as an .ssf file, but has a different filename extension to distinguish it from data files created in the field.

7. In the *File Name* field, enter **Starfish.imp** and then click **Save**.
8. Click **OK** to import the file.
9. A message appears, showing information about the import. Click **Close** to close the message box.

The file Starfish.imp is created from the selected Shapefiles. The next step is to transfer this file to the field computer.



Transferring data to the field computer

You need to transfer the imported Starfish data file to the field computer, so that you can use it in the field to update existing data. Use the Data Transfer utility to transfer data between the office computer running the GPS Pathfinder Office software and the field computer running the TerraSync software.

1. Turn on the field computer and the office computer and connect the two computers.

If the field computer is a laptop or Tablet PC, for example, make sure that there is a network connection between it and the office computer.

If the TerraSync and GPS Pathfinder Office software are installed on the same computer (for example, a laptop PC), you must still transfer files between the TerraSync software data folder and the GPS Pathfinder Office project folder.

If the field computer is a Windows Mobile powered device, connect the device to the computer (for example using a USB cable or Bluetooth wireless technology).

Use either Microsoft ActiveSync technology or the Windows Mobile Device Center to manage the connection between the device and the computer. The software you use depends on the operating system the office computer is running.

When the device and the computer are connected, one of the following appears on the office computer:

- If the computer is running the Windows Vista operating system, the *Windows Mobile Device Center* window appears and displays the message **Connected**.

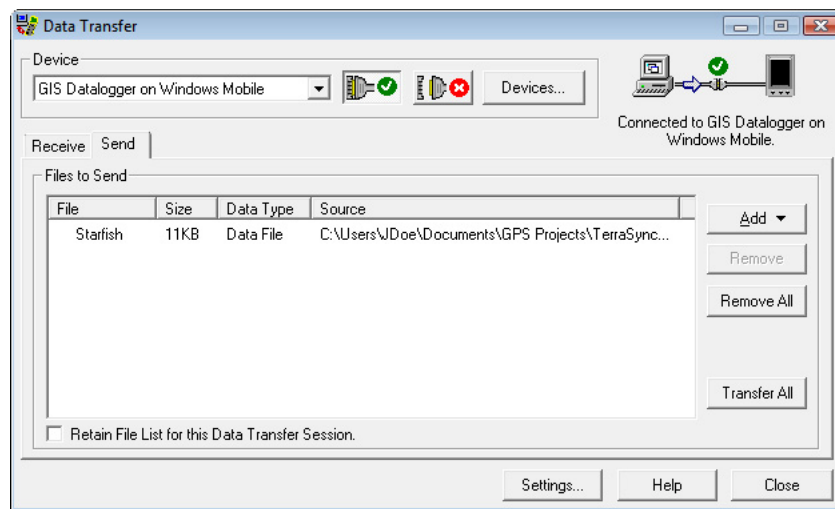
For more information, refer to the *Windows Mobile Device Center Help*.

- If the computer is running the Windows XP or 2000 operating system, the *Synchronization Setup Wizard* appears.

For more information, refer to the *ActiveSync Help*.

2. In the GPS Pathfinder Office software, select *Data Transfer* from the *Utilities* menu. The *Data Transfer* dialog appears.
3. From the *Device* list, select the appropriate device (GIS Datalogger on Windows Mobile, GIS Datalogger on Windows PC, or GIS Folder if the TerraSync and GPS Pathfinder Office software are running on the same computer). Alternatively, if you have set up a device definition for the field computer, select that device name from the list. The Data Transfer utility automatically connects to the field computer.
4. Select the *Send* tab.
5. Click **Add** and then select Data File from the drop-down list. The *Open* dialog appears.

6. From the list of files, select Starfish.imp and then click **Open**. The *Open* dialog closes, and the Starfish data file appears in the *Files to Send* list:



7. Click **Transfer All**. The data file is transferred to the field computer and a message shows summary information about the transfer.
8. Click **Close** for the message and then click **Close** again to exit the Data Transfer utility.
9. To close the GPS Pathfinder Office software, select *File / Exit* in the main GPS Pathfinder Office window.

Exercise 6: Data update

Note – You cannot update imported data files using the TerraSync Standard edition software.


This part of the tutorial uses the data file that you have just transferred to the field computer. You will use real-time differential GPS in this section.

You are ready to go to Starfish Bay and update features. Use real-time differential GPS to navigate accurately to existing features. To navigate back to a selected feature, use the Navigation section or the Map section.

This part of the tutorial gives step-by-step instructions for the following tasks:


- [Checking the real-time status, page 134](#)
- [Updating data, page 135](#)

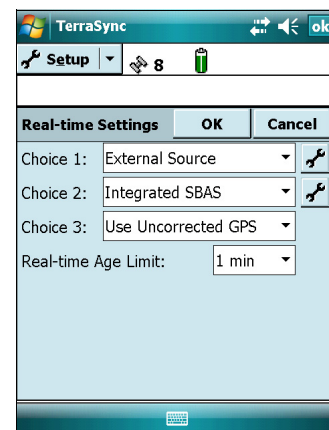
Sources of real-time differential corrections

1. Tap  and then select *Programs / TerraSync* to start the TerraSync software.
2. From the Section list, tap *Setup*.
3. Tap **Real-time Settings**. The *Real-time Settings* form appears:
4. In the *Choice 1* field, specify the real-time correction source you want to use.

Note – If you cannot use real-time corrections, or do not want to use them, select *Use Uncorrected GPS*. No corrections will be applied to your data.

Depending on the type of GPS receiver you are using, and the subscriptions that your organization has to real-time correction services, you can get real-time corrections from any of the following sources:

- External source, such as a VRS™ network, data radio, or external beacon receiver
 - Integrated SBAS receiver
 - Integrated Beacon receiver
 - Integrated OmniSTAR receiver
 - Integrated RTK radio
5. To configure settings for the correction source, tap the Setup button  that appears beside the Choice field. For information on the fields in the settings form, refer to the *TerraSync Software Help*.
 6. Tap **OK** to close the correction source settings form and return to the *Real-time Settings* form.



7. Specify up to four choices for real-time corrections. If your first choice is not available, the TerraSync software automatically uses the second choice until the first choice is available again. This occurs at all levels, so the TerraSync software uses your preferred correction source at all times.
8. Tap **OK** to close the *Real-time Settings* form.

Note – When you use a real-time differential correction source, there may be times when you cannot receive corrections. Any positions logged during these times are uncorrected, and are subject to errors which degrade their accuracy. However, you can also postprocess your GPS data in the GPS Pathfinder Office software to improve the accuracy of the real-time corrected positions.



Checking the real-time status

Always check the real-time status before navigating to existing features.



Tip – Use the status bar to quickly check the real-time status. When the TerraSync software is receiving real-time corrections, a real-time icon appears in the status bar. The icon flashes if there is a problem with the real-time source.

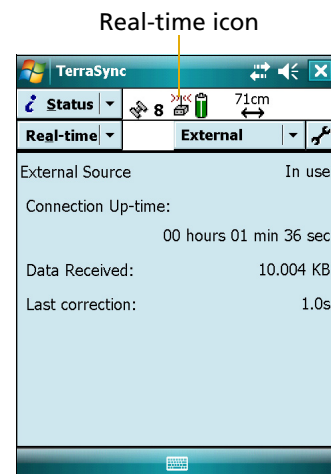
To check the real-time status:

1. Tap the Section list button and then select *Status*.
2. Tap the Subsection list button and then select *Real-time*.

The *Real-time Summary* screen appears.

The TerraSync software is receiving corrections when a real-time icon appears beside the source in use. This icon indicates the type of correction source.

3. To view detailed information about the status of a correction source, tap the **Summary** button and from the list select the correction source.



Updating data

Your supervisor has sent you to Starfish Bay to update information on existing traffic signs.

Because you may not always have recorded the original data, you may not know exactly where features are. You can use the TerraSync software and a real-time correction source (if available) to navigate to them.

This part of the tutorial gives step-by-step instructions for the following tasks:

- Changing the accuracy-based logging settings (see [page 135](#))
- Opening an existing data file (see [page 136](#))
- Filtering features (see [page 137](#))
- Selecting a target in the Data section (see [page 138](#))
- Navigating to a target using the Navigation section (see [page 138](#))
- Updating a feature (see [page 140](#))
- Selecting a target in the Map section (see [page 141](#))
- Navigating to a target using the Map section (see [page 141](#))
- Marking a feature as updated (see [page 142](#))
- Navigating to a waypoint (see [page 143](#))
- Collecting the target as a point feature (see [page 144](#))
- Ending the data collection session (see [page 144](#))

Changing the accuracy-based logging settings

Because you are using real-time differential corrections in the field, you want to use an estimated accuracy that is calculated in the field, rather than after postprocessing. This means that when the TerraSync software calculates the horizontal estimated accuracy of each GPS position, the calculation includes the corrections from the real-time correction source that are applied during data collection.

1. Tap the Section list button and then select *Setup*.
2. Tap **Logging Settings**.

3. Tap **Setup** below the *Accuracy Settings* field. The Accuracy Settings form appears:
4. From the *Accuracy Value for Display/Logging* fields, select *Horizontal* for the accuracy of the current GPS position, and then select *In the field* to use the real-time corrected accuracy.
5. From the *Use Accuracy-based Logging* field, select *Yes*.
6. From *Apply Accuracy-based Logging To field*, select *All Features*.
7. From the *Required Accuracy* field select *5 m*.
8. Tap **OK** to save the settings and return to the *Logging Settings* form.

Opening an existing data file

Before starting the data update session, open the file that contains the GIS data. Use the Data section to do this.

To open an existing file:

1. Tap the Section list button and then select *Data*.
2. Tap the Subsection list button and then select *Existing File*.
3. Select the Starfish file. This is the file that you imported earlier from the Seaview Authority GIS.
4. Tap **Open**.
5. The *Confirm Antenna Height* dialog appears. Click **OK**.

The *Update Features* screen appears:

This screen shows a list of all existing features in the data file.

Now that you have opened a data file, you can start updating features.

#	Name	Status	Distance
1	Road	○	5.18 m
2	Road	○	34.36 m
3	Road	○	278.15 m
4	Traffic Sign	○	341.62 m
5	Traffic Sign	○	51.27 m

Filtering features

Your first task is to locate any traffic signs that need to be replaced by your field crew.

To make it easy to see which signs you must visit, you will use filtering to group the features that must be updated, and then select the features you want from the filtered group.

You can filter features by their:

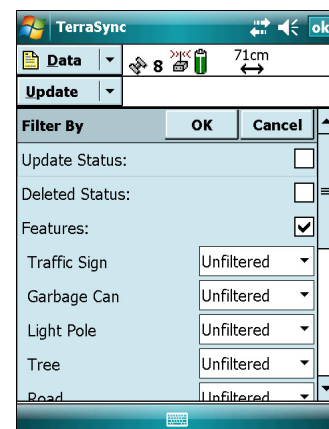
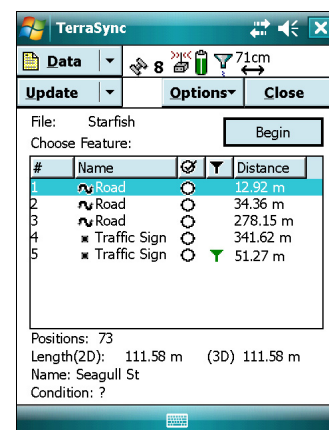
- update status
- deletion status
- feature type
- attribute values






The road signs you want to filter have the value ***Needs replacing*** in the *Condition* attribute. To show only these signs, you must filter by attribute value on the feature type Traffic Sign.

To filter features:

1. Tap the Subsection list button and then select *Update Features*.
2. Tap **Options** and then select *Filter*. The *Filter By* form appears.
3. Make sure that the *Features* check box is selected.
4. In the *Traffic Sign* field, select *Filter By*. The *Attribute*, *Test*, and *Value* fields appear below the *Traffic Sign* field.
5. In the *Attribute* field, select *Condition*.
6. In the *Test* field, make sure that *Equal To* is selected.
7. In the *Value* field, select *Needs replacing*.
8. Tap **OK** to close the *Filter By* form and return to the *Update Features* form.

If a feature in the *Choose Feature* list meets the conditions you specified, the filter icon () appears in the Filter column for that feature. There is one traffic sign that meets the filtering conditions.

#	Name	Filter	Distance
1	Road		12.92 m
2	Road		34.36 m
3	Road		278.15 m
4	Traffic Sign		341.62 m
5	Traffic Sign		51.27 m


Positions: 73
 Length(2D): 111.58 m (3D) 111.58 m
 Name: Seagull St
 Condition: ?

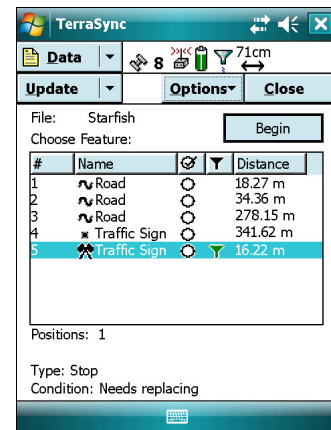
Selecting a target in the Data section

Now that you have filtered the list of features, you have easily found the feature you must update in the list of existing features. To find the feature itself, you must navigate to it. To navigate to a feature, you must select it as your target.

To select a target:

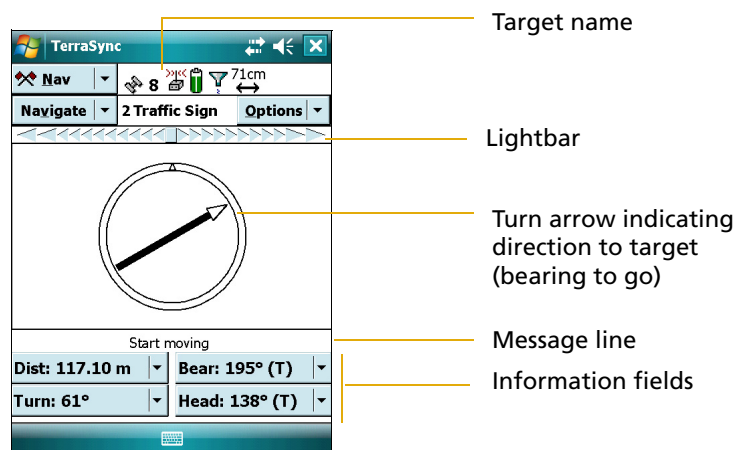
1. In the *Update Features* screen, select the filtered road sign. .
2. Tap **Options**, select *Set Nav Target* and then select *Point Position* from the pullout menu.

The target icon  appears beside the selected feature. This icon replaces the icon usually used for the feature.



Navigating to a target in the Navigation section

1. To open the Navigation section, tap the Section list button and then select *Navigation*. The *Direction Dial* screen appears.
2. Use the information in the *Direction Dial* screen to navigate to the selected target.



This screen displays all the information that you need to navigate to the target. The information fields at the bottom of the screen show different types of navigational information.


Note – In this view, the centre of the screen is your current position. This screen is not depicted “North Up” but is “Heading Up”.

To navigate to the selected target, start moving. This enables the TerraSync software to calculate your initial heading. When the direction dial shows the turn arrow, keep moving and turning until the arrow points to the top of the screen. The top of the screen indicates your current heading. Then move towards the target, adjusting your direction to ensure you are always heading toward the target.

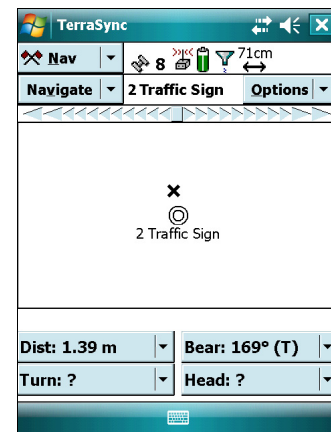
Note – If you are moving very slowly, or are stationary, the direction dial is not updated. The message **Heading locked** appears.

When you are within a few meters of the target, the view switches to the *Close-up* screen.

Note – The top of the screen is the direction you were travelling in when the directional dial changed to the close-up screen. By default in this view the target is at the centre of the close-up screen.

In the *Close-up* screen, your position is indicated by the cross **X** and the target is represented by the bull's-eye .

As you move closer to the target, the position symbol gets closer to the target symbol. You have reached the target when the position symbol is over the top of the target symbol.



Note – If you are using Autonomous GPS, the position may jump around on the screen.



Tip – In the *Close-up* screen, your heading is not updated. Rather than turn, it is best to **face** the direction that you were originally moving in and then **move** sideways, backward, or forward.

Updating a feature

You have opened the existing file and navigated to the road sign feature. Now you can edit the attributes.

To update the attributes for a feature:

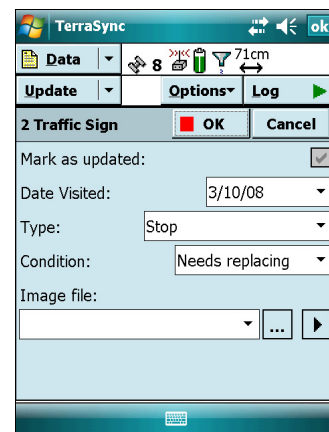
1. Tap the Section list button and then select *Data*.
2. Tap the Subsection list button and then select *Update Features*.

The *Update Features* screen appears.

3. If the traffic sign you navigated to is not the selected feature in the list, select it now.
4. Tap **Begin** to open the attribute entry form for this feature. Use this form to update the attributes for the sign.

The *Date Visited* attribute has been set up to auto-generate on update. As soon as you make any change to the attributes or position of the feature, this attribute is automatically updated with today's date.



5. The next attribute is the sign type. Use the *Type* attribute to verify that you are updating the correct sign. Check that the real sign matches the type recorded in the TerraSync software.
6. You and your field crew have replaced the damaged sign, so in the *Condition* field, select *Good*.
7. Tap **OK** to save the attribute changes and return to the *Update Features* screen.



The screenshot shows the TerraSync software interface. At the top, there's a header bar with 'TerraSync' and some navigation icons. Below that, there's a 'Data' dropdown menu and a status bar showing '8' and '71cm'. The main screen is titled 'Update Features' and has a 'Log' button. Below the title, there's a list of features, and '2 Traffic Sign' is selected. To the right of the list are 'OK' and 'Cancel' buttons. The form below the list has several fields: 'Mark as updated:' with a checked checkbox, 'Date Visited:' with a date picker set to '3/10/08', 'Type:' with a dropdown menu set to 'Stop', 'Condition:' with a dropdown menu set to 'Needs replacing', and 'Image file:' with a text input field and a '...' button. At the bottom, there's a keyboard icon.

For more information, refer to the *TerraSync Software Help*.



Tip – In the *Update Features* screen, the Updated column of the *Choose Feature* list shows the update status of each feature. Any feature that has been transferred from the GPS Pathfinder Office software has an empty circle  in this column. When a transferred feature is updated, a check mark appears in the circle .

Selecting a target in the Map section

Finally, you need to revisit the Road feature called Seagull Street. You will use the Map section to navigate to the beginning of Seagull Street.


Note – Your Map screen may appear different from the one shown.

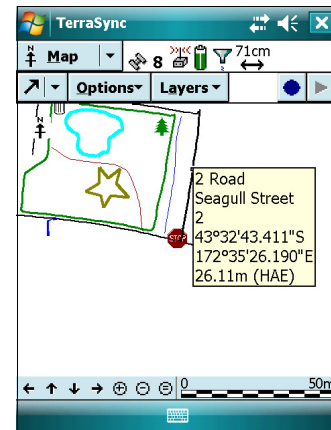
To select a target using the Map section:

1. Tap the Section list button and then select *Map*.
2. If necessary, zoom in or out until all the features in the data file are visible.
3. The Seagull Street feature is the only line feature on the map. Tap any part of the line feature to select it.


A selected line feature has a wider line than an unselected line feature.

When you select a feature, a tooltip shows the number, name, and position of the feature.

4. Tap **Options**, select *Set Nav Target* and then select *3Road - Start* from the pullout menu. The target icon  appears at the start point of the selected road.




Navigating to a target in the Map section

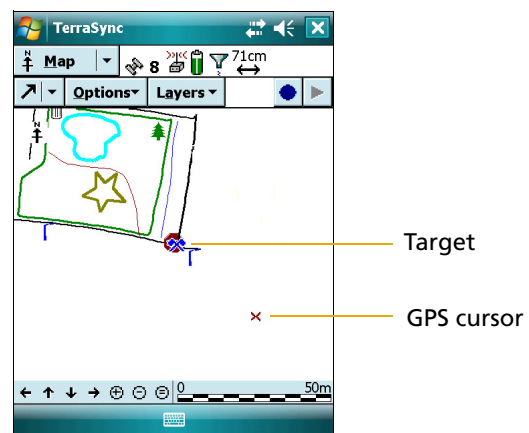
Once you select a target from the map, use the map to guide you to this target. The GPS cursor  shows your current position and heading:

Note – Your Map screen may appear different from the one shown.

To navigate to the target, make sure that the heading arrow on the GPS cursor points toward the target as you move.

You may need to zoom or pan in the map to ensure that both the target and the GPS cursor are visible. When the target is not visible, the bearing arrow  at the edge of the map shows its direction.

When the GPS cursor lies over the target icon, you have successfully navigated to the target.



Marking a feature as updated

You have navigated to the road feature. Now you can check its attributes and change its status to Updated.

To mark a feature as updated:

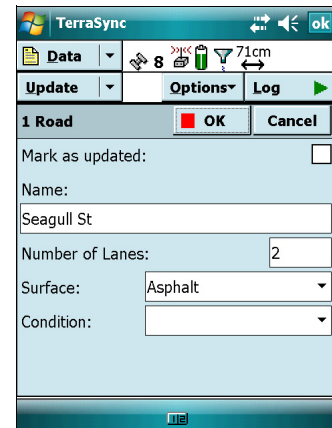
1. Make sure that the Map section is in view. If it is not, tap the Section list button and then select *Map*.

The road you navigated to should be the selected feature.

2. Double-tap the road feature to open its attribute entry form:

Note – If the attribute entry form appears briefly then disappears after you double-tap a feature, and you are using the desktop version of the software, your mouse pointer may be configured to snap to the default control. This setting prevents double-tapping from working correctly. To disable this option, select the Mouse option in the Windows Control Panel, select the Motion tab and then clear the Snap mouse to default button in dialogs check box.

3. All attribute values are correct, so you do not have to make any changes. Instead, select the *Mark as updated* check box.
4. Tap **OK**. The attribute entry form closes and you are returned to the Map section.



The screenshot shows the TerraSync software interface. At the top, there's a status bar with 'TerraSync' and various icons. Below that, a menu bar includes 'Data', 'Update', 'Options', and 'Log'. The 'Update' menu is open, showing a list of features. The first feature is '1 Road'. To the right of '1 Road' are 'OK' and 'Cancel' buttons. Below the list, there's a section for 'Mark as updated:' with a checkbox. Underneath, there are fields for 'Name:' (containing 'Seagull St'), 'Number of Lanes:' (containing '2'), 'Surface:' (a dropdown menu with 'Asphalt' selected), and 'Condition:' (a dropdown menu). At the bottom, there's a small 'JTB' logo.

When you change the attributes, offset, or GPS position of an existing feature, the status of the feature automatically changes to Updated, and the *Mark as updated* check box is selected.

When you manually select the *Mark as updated* check box, the TerraSync software changes the status of the feature only. It does not change any attributes, offsets, or positions. Use the Mark as updated function to indicate the features that you have visited but have not changed.

Navigating to a waypoint

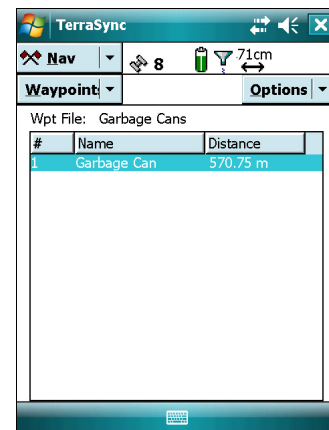
Remember the garbage can location you previously recorded as a waypoint in Exercise 2? In this exercise you will open the waypoint file you created earlier and then use the waypoint to navigate to the GPS position. From this GPS position, you will collect the garbage can feature that was installed by the work gang.

1. Tap the Section list button and then select *Navigation*.
2. Tap the Subsection list button and then select *Waypoints*.
3. From the list of files, select the garbage can waypoint file and then tap **Open**.
4. From the waypoint list, tap the garbage can waypoint to select it.
5. Tap **Options** and then select *Set Nav Target*.
6. Tap the Subsection list button and then select *Navigate*.
7. Use the directional dial to help you navigate to the target.

Note – When you are within the specified close-up range of the target, the navigation proximity alarm sounds and then the Close-up graphical screen replaces the Direction Dial screen.

You are now at the site of the garbage can.

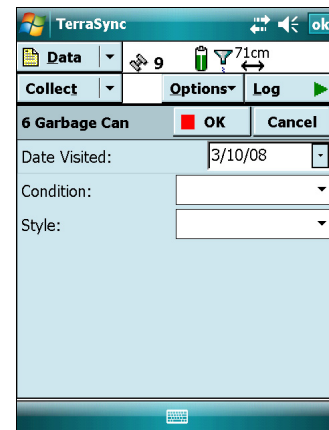
8. Tap the Subsection list button and then select *Waypoints*.
9. Tap **Options** and then select *Close file* to close the waypoint file.



Collecting the target as a point feature

Now that you are at the target, you can collect the GPS position as a garbage can feature and then add it to the Starfish file.

1. If the file is not already open, open the existing Starfish Bay data file.
1. Tap the Section list button and then select *Data*.
2. Tap the Subsection list button and then select *Collect Features*.
3. Select *Garbage_Can* and then tap **Create**. The attribute entry form for the garbage can feature appears:
4. Tap **Log** to log the GPS position.
5. Enter the attributes for the garbage can and then tap **OK** to save the new feature.




The screenshot shows the TerraSync software interface. At the top, there's a status bar with 'TerraSync' and some icons. Below that, a menu bar contains 'Data', 'Collect', 'Options', and 'Log'. The 'Collect' menu is open, showing '6 Garbage Can' selected. To the right of '6 Garbage Can' are 'OK' and 'Cancel' buttons. Below the menu, there are input fields for 'Date Visited:' (showing '3/10/08'), 'Condition:', and 'Style:'. The 'Condition:' and 'Style:' fields are dropdown menus. The background of the form is light blue.

Ending the data collection session

When the data update session is complete, exit the TerraSync software. You do not have to close the data file first. If you exit the software while a data file is still open, the TerraSync software closes the file before exiting.

To exit the TerraSync software:

1. Tap  in the upper right corner of the screen.
2. When prompted to confirm closing the file and exiting the software, tap **Yes**.

High-Accuracy Data Collection

In this chapter:

- Introduction to carrier phase GPS
- Carrier phase techniques compared
- H-Star technology workflow and required infrastructure
- Carrier phase postprocessing workflow and required infrastructure
- Real-time kinematic workflow and required infrastructure
- Using corrections from a VRS network

This chapter contains detailed information about using high-accuracy data collection methods to achieve more accurate GPS positions.

Introduction to carrier phase GPS

To achieve high accuracy for GPS positions, you need to use carrier phase data collection methods. Normally, GPS positions are calculated using code phase measurements: how long it takes for the unique code generated by each satellite to reach the receiver. For greater accuracy, you can use the carrier signal that the PRN code is carried on. Carrier phase measurements are much more accurate, because the carrier signal has a higher frequency than the PRN code, resulting in smaller measurement errors. The disadvantage is that in difficult environments carrier phase measurements are more difficult to collect than code measurements.

The TerraSync software supports three different kinds of carrier-phase operation:

- **H-Star** technology provides subfoot accuracy or better in real time or after postprocessing with as little as two minutes of carrier data.

Receivers capable of real-time H-Star operation are:

- GPS Pathfinder ProXRT receiver
- GeoExplorer GeoXH handheld (2008 series)

Receivers capable of postprocessed H-Star operation are:

- GPS Pathfinder ProXRT receiver
- GPS Pathfinder ProXH receiver
- GeoExplorer GeoXH handheld (2005 and 2008 series)

- **Carrier postprocessing** provides accuracies ranging from 30 cm down to 1 cm, with carrier data spanning from 10 minutes up to 45 minutes.

This technique is supported by many mid- and high-end Mapping & GIS receivers, including:

- GPS Pathfinder ProXH and ProXT receivers
- GeoExplorer GeoXT handheld (2005 series and earlier)
- GPS Pathfinder Pro XR and Pro XRS receivers
- GPS Pathfinder Power receiver

- **Real-time kinematic (RTK)** techniques, using Survey equipment, provide accuracies in the centimeter (sub-inch) range, in real time.

You can use RTK with the following Trimble survey receivers:

- 5800 receiver (firmware version 2.23 or later)
- R8 receiver (firmware version 2.23 or later)
- R8 GNSS receiver (firmware version 3.00 or later)

There are advantages and disadvantages to each of these three techniques. The following section contrasts and compares these techniques, and outlines the equipment and infrastructure required to use each technique.

Carrier phase techniques compared

H-Star technology

H-Star technology offers an easy-to-use, cost-effective solution for obtaining data with subfoot accuracy or better.

Pros:

- Subfoot accuracy or better in real time or after postprocessing, with only two minutes of carrier data.
- Unlike other types of data collection, positions are usable in less than two minutes (although they may not be subfoot).
- Accuracy achievable over longer baselines than when using carrier phase postprocessing or RTK.
- Moderately-priced field equipment.
- Potential to leverage public base station infrastructure and thereby avoid any direct infrastructure cost.

Cons:

- Areas where public base station infrastructure does not exist will require infrastructure investment to achieve subfoot accuracy.
- Requires a period of uninterrupted carrier logging (typically two minutes or less) to achieve subfoot accuracy. In tough GPS environments where satellite signals are interrupted (for example, high multipath or under tree canopy) the required two minutes of carrier lock may be unattainable.

Carrier phase postprocessing

Carrier phase postprocessing provides a cost-effective solution for achieving accuracies ranging from 30 cm down to 1 cm, requiring carrier data spanning from 10 minutes up to 45 minutes.

Pros:

- The highest level of postprocessed GPS accuracy.
- Moderately-priced field equipment.
- Potential to leverage public base station infrastructure and thereby avoid any direct infrastructure cost.

Cons:

- Areas where public base station infrastructure does not exist will require infrastructure investment to achieve centimeter-level accuracy.
- Operational constraints such as limited distance from a base station and precisely surveyed base station infrastructure.

- The requirement for long continuous carrier data durations makes traditional carrier postprocessing impractical in tough GPS environments where satellite signals are interrupted (for example, in high multipath environments or under tree canopy).
- Positions are not usable until the minimum carrier lock time has elapsed.
- Inability to achieve this level of accuracy in real time, making precise relocation applications impossible.
- Accuracy degrades quite rapidly with increasing distance between the base and roving GPS receivers.

Real-time kinematic (RTK)

Survey receivers with real-time kinematic capability achieve centimeter-level accuracy in real time, with no need for subsequent postprocessing.

Pros:

- The highest level of real-time GPS accuracy.
- Accuracy available in the field, making applications such as precise asset relocation possible.

Cons:

- More expensive field equipment.
- Inability to operate in tough GPS environments where satellite signals are interrupted (for example, in high multipath environments or under tree canopy).
- Operational constraints, such as limited distance from a base station, precisely surveyed base station infrastructure, and either radio or cellular data and equipment costs.

Principles of carrier phase data collection

This section outlines some of the underlying principles of carrier phase data collection that apply to all three different carrier phase techniques: H-Star technology, carrier phase postprocessing, and RTK.

Carrier lock

To achieve the target accuracy, carrier phase data collection depends on maintaining carrier lock. Carrier lock is achieved when the receiver is continuously locked onto and tracking the carrier measurements on a minimum number of satellites. The minimum number of satellites required to maintain carrier lock depends on whether you are logging static or dynamic GPS positions. When logging, you must maintain lock on at least five satellites.

Events that cause loss of carrier lock include anything that might interrupt the reception of the satellite signal, such as interference from tree canopy or buildings. Lock is also lost when you disconnect from the receiver or turn off the receiver. When lock is lost, the TerraSync software displays a notification message and adjusts any accuracy estimates to reflect the degradation in accuracy due to loss of lock. In difficult conditions, code processing may be better than carrier techniques.

Initialization

For RTK, carrier lock must be achieved and maintained on five satellites until the receiver can generate a fixed carrier solution. This process is known as initialization. On today's RTK receivers, can be less than 10 seconds with a short baseline and open sky conditions. On older receivers, initialization may take a few minutes.

While carrier lock is maintained, centimeter-level accuracy is also maintained. When carrier lock is lost the receiver must re-initialize. During initialization no positions are output from the survey RTK receiver.

Carrier blocks

For postprocessing techniques, the TerraSync software records blocks of carrier data throughout the data file. Carrier blocks are periods of carrier phase logging over which carrier lock is maintained. [Figure 6.1](#) on [page 150](#) shows how the number of satellites being continuously tracked affects the length of the carrier blocks.

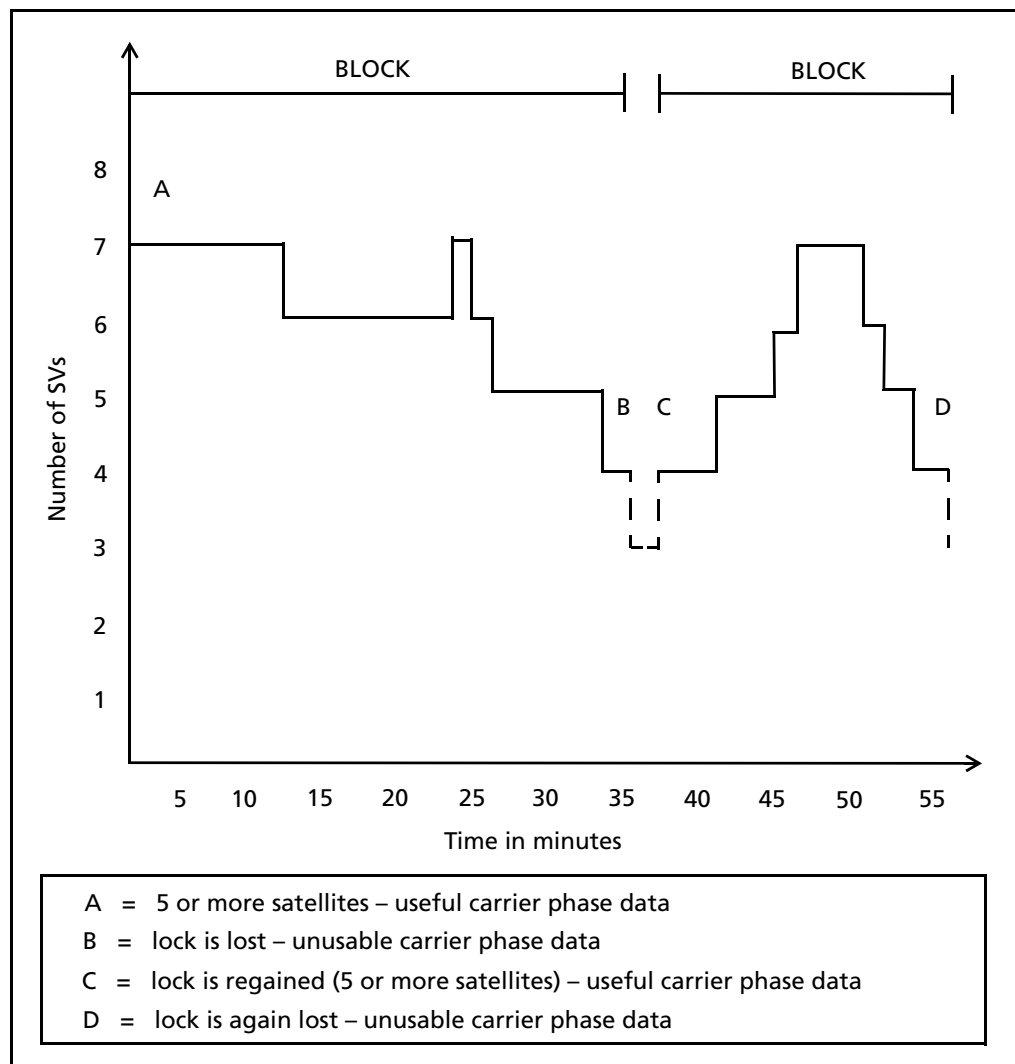


Figure 6.1 Blocks of carrier phase data for static GPS observations, relative to satellite lock

As soon as four (or more) satellites are available, a new block begins. This block continues until lock is lost.

After postprocessing, all the data in a given block has the same level of accuracy. The accuracy achieved depends on the duration of each carrier block.

The relationship between time and accuracy

With all three carrier phase techniques, accuracy improves with the duration of carrier lock.

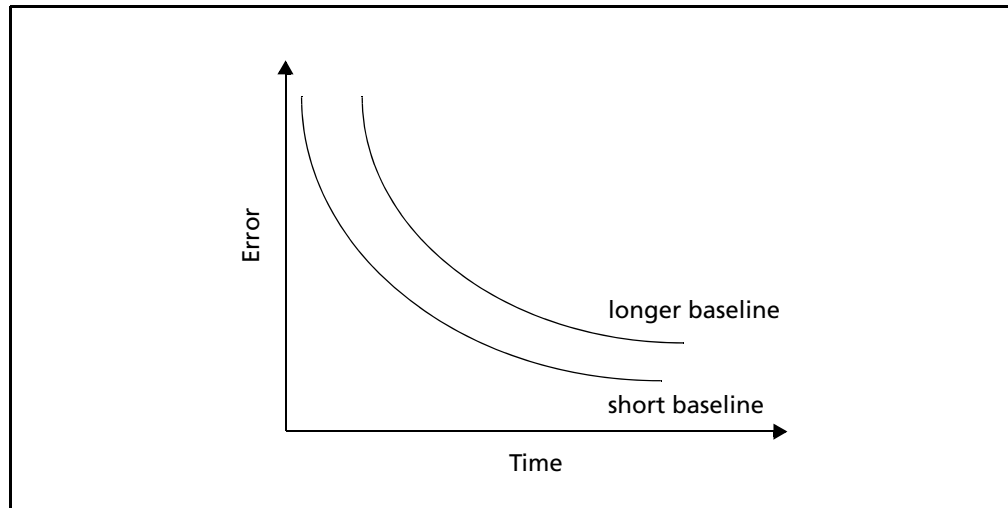


Figure 6.2 Accuracy achieved relative to time elapsed (assuming that carrier lock is maintained)

Figure 6.2 shows that the error decreases quickly at first and then more slowly as time progresses. This is true for both the real-time and postprocessed carrier phase techniques.



Tip – To automatically log data until a pre-specified accuracy level is met, use the accuracy-based logging capability provided by the TerraSync software. For example, you can specify that all positions must have a horizontal accuracy of 10 cm or less. If the GPS receiver calculates a position that does not meet this accuracy requirement, TerraSync does not log that position.

Note – The TerraSync software does not prevent you from closing a feature before the required accuracy is achieved, or before the lock period is complete.

For more information about how the duration of carrier lock affects accuracy for each carrier phase data collection technique see:

- [H-Star technology workflow and required infrastructure, page 152](#)
- [Carrier phase postprocessing workflow and required infrastructure, page 156](#)
- [Real-time kinematic workflow and required infrastructure, page 159](#)

H-Star technology workflow and required infrastructure

This section explains in more detail how to obtain subfoot accuracy using H-Star technology.

H-Star technology enables you to quickly achieve high accuracy with only short periods of carrier data. For example, you can achieve subfoot accuracy or better with two minutes of continuous data. If lock on satellites is maintained, subsequent positions need only minimal occupation times. Unlike RTK, using real-time H-Star technology generates usable positions within the first two minutes of data collection, but they may not meet your accuracy requirements until the receiver has recorded a two minute block of data.

When collecting positions using a VRS network as the real-time correction source, or when postprocessing the data using H-Star processing, the positions are corrected using data from a group of base stations. For real-time H-Star technology, the corrections are calculated from information recorded in the network of base stations by the VRS server and transmitted to the receiver. For postprocessed H-Star technology, each GPS position is corrected using data from each base station in the group, and then the results are averaged. The averaging calculation gives more weight to base stations that are closer to where the original GPS positions were collected and cancels out bias errors.

Required infrastructure for H-Star technology



A receiver capable of real-time H-Star technology uses base station data from a VRS or a single nearby (within 80 km) base station to generate H-Star positions in the field. For real-time H-Star operation, a wireless data link is required between the roving GPS receiver and either a nearby base station or a VRS network.

For postprocessed data to achieve subfoot accuracy, three or more good quality dual-frequency (L1/L2) base stations within 200 km are required. Alternatively, one good quality dual-frequency base station within 80 km is required.

The coordinate of each base station must be in the same coordinate system, datum, and reference frame. Furthermore, if a base station has coordinates in terms of ITRF2000 but your GIS is in terms of NAD83, this can introduce up to a meter of error, unless transformed during the Export process.

Configuring the TerraSync software to collect H-Star data


For real-time H-Star technology

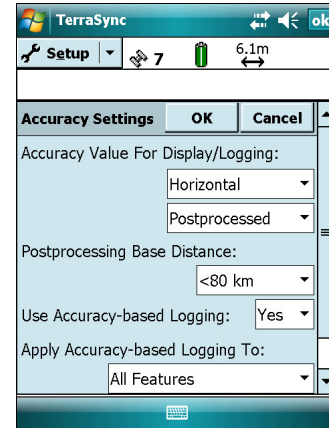
1. Tap the Section list button and then select *Setup*.
2. Tap **Real-time Settings**. The *Real-time Settings* form appears.
3. From the *Choice 1* field, select *External Source*.
4. Tap the Setup button  beside the *Choice 1* field to configure the correction source and then select the appropriate settings depending on the VRS server and the communication method used (see [Using corrections from a VRS network](#), page 162). When you have finished configuring the external source, tap **OK**.
5. From the *Choice 2* field, select *Wait for Real-time*.
6. Tap **OK** to confirm the real-time settings and return to the main *Setup* screen.
7. Tap **Logging Settings**. The *Logging Settings* form appears.
8. Make sure that the *Log H-Star Data* field is set to *Auto*.
9. To use accuracy-based logging:
 - a. Tap the Setup button  below the *Accuracy Settings* field. The *Accuracy Settings* form appears:
 - b. From the *Accuracy Value for Display/Logging* fields, select *In the Field* and whether the TerraSync software should calculate the estimated horizontal or vertical accuracy.
 - c. From the *Use Accuracy-based Logging* field, select *Yes*.
 - d. From the *Apply Accuracy-based Logging To* field, select the feature types that will use accuracy-based logging.
 - e. In the *Required Accuracy* field, enter the accuracy you require.
 - f. Tap **OK** to save the accuracy-based logging settings and return to the *Logging Settings* form.

Note – If your GPS receiver is not H-Star capable, the *Auto* setting corresponds to *No*. Select *No* if you have a GPS receiver that is H-Star capable but you do not want to log H-Star data.

10. Tap **OK** to close the *Logging Settings* form and confirm the changes you have made.

For postprocessed H-Star technology

1. Tap the Section list button and then select *Setup*.
2. Tap **Logging Settings**. The *Logging Settings* form appears.
3. Make sure that the *Log Carrier Data* field is set to *Auto*.
4. To use accuracy-based logging:
 - a. Tap the Setup button  below the *Accuracy Settings* field. The *Accuracy Settings* form appears:
 - b. From the *Accuracy Value for Display/Logging* fields, select *Postprocessed* and whether the TerraSync software should calculate the estimated horizontal or vertical accuracy.
 - c. If you selected In the office, select the distance to the base station from the *Postprocessing Base Distance* field.
 - d. From the *Use Accuracy-based Logging* field, select *Yes*.
 - e. From the *Apply Accuracy-based Logging To* field, select the feature types that will use accuracy-based logging.
 - f. In the *Required Accuracy* field, enter the accuracy you require.
 - g. Tap **OK** to save the accuracy-based logging settings and return to the *Logging Settings* form.



Note – If your GPS receiver does not have H-Star technology, the *Auto* setting corresponds to *No*. Select *No* if you have a GPS receiver that has H-Star technology but you do not want to log H-Star data.

5. Tap **OK** to close the *Logging Settings* form and confirm the changes you have made.

Collecting sufficient high-accuracy data

During GPS data collection where the TerraSync software logs data using a receiver with H-Star technology, the software will show either:

- the estimated accuracy being achieved for that position in real time, or
- a prediction of the accuracy that is likely to be achieved once the H-Star data is postprocessed.

When operating in real-time H-Star mode, configure the Estimated Accuracy icon to show an estimate of the accuracy being achieved for that position in the field. When the value shown in the Estimated Accuracy icon reaches the accuracy you require for the feature, you can stop logging.

When logging data for subsequent H-Star processing, configure the Estimated Accuracy icon to show a prediction of the accuracy that will be achieved after postprocessing. The value of the predicted accuracy is inversely related to the length of time that you have continuously collected H-Star data. The longer the duration of carrier lock, the better the accuracy, which is indicated by a *decreasing* estimate. When the predicted accuracy value shown reaches the accuracy you require for the feature, you can stop logging. The predicted accuracy applies to all positions logged since you acquired carrier lock on the required number of satellites.

The accuracy estimate has a 68% confidence level, which means that 68% of the time the position will be within the estimated value shown when the position was collected, providing that the data is processed against base stations that meet H-Star technology requirements (see [page 152](#)).

***Note** – If you lose carrier lock while collecting a feature, the accuracy estimate increases, and you must reacquire satellites and remain at the feature until the estimated accuracy value decreases to the required accuracy.*

When collecting data for postprocessing, you do not have to remain at the same feature until the required predicted accuracy value is reached. If you are collecting a series of features and you have a clear view of the sky and so are unlikely to lose carrier lock, you can move to the next feature before the required accuracy is reached.

CAUTION – Do not move to another feature before the required accuracy is reached unless you are unlikely to lose lock on the required number of satellites. If you lose lock while collecting a series of features, you will need to re-collect all of the features to obtain features with the required accuracy.

Provided that the predicted accuracy value passes the threshold of accuracy you require for the features, all of the features collected while carrier lock was maintained will achieve the same accuracy after H-Star processing.

Carrier phase postprocessing workflow and required infrastructure

This section explains in more detail how to obtain the accuracies specified for carrier phase data collection and postprocessing.

During GPS data collection where the TerraSync software logs carrier phase data, measurements are collected from each individual satellite. Carrier phase processing corrects the collected GPS positions using the data from individual satellites, so the positions generated during postprocessing are more accurate than positions logged in the field.

By logging carrier phase data, you can achieve accuracies of better than 30 cm after carrier phase processing. The following table is a general guide to accuracies that can be obtained with carrier phase data collection.

Table 6.1 Typical accuracies achieved after carrier phase data collection


Time since acquiring lock	Accuracy
10 minutes	20 cm +5ppm
20 minutes	10 cm +5ppm
45 minutes	1 cm +5ppm

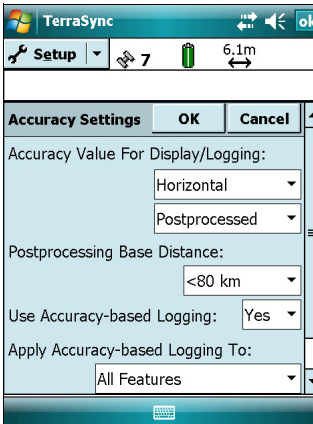
Required infrastructure for carrier phase data

For carrier phase postprocessing, a carefully surveyed base station is essential. This must be within 80 km at all times (and within 10 km if you are aiming for accuracy at the 1-2cm level). The base station must log dual frequency (L1/L2) GPS data at a frequency no lower than 1/30 Hz (once every 30 seconds).

Configuring the TerraSync software to collect carrier phase data

1. Tap the Section list button and then select *Data*.
2. Open the data file that you want to record carrier data to.
3. Tap the Section list button and then select *Setup*.
4. Tap **Logging Settings**. The *Logging Settings* form appears.
5. From the *Log Carrier Data* field, select *Yes*.

6. To use accuracy-based logging:
 - a. Tap the Setup button  below the *Accuracy Settings* field. The *Accuracy Settings* form appears:
 - b. From the *Accuracy Value for Display/Logging* fields, select *Postprocessed* and whether the TerraSync software should calculate the estimated horizontal or vertical accuracy.
 - c. From the *Postprocessing Base Distance* field, select the distance to the base station.
 - d. From the *Use Accuracy-based Logging* field, select *Yes*.
 - e. From the *Apply Accuracy-based Logging To* field, select the feature types that will use accuracy-based logging.
 - f. In the *Required Accuracy* field, enter the accuracy you require.
 - g. Tap **OK** to save the accuracy-based logging settings and return to the *Logging Settings* form.
7. Tap **OK** to close this form and confirm the changes you have made.



Carrier phase data logging is now enabled for all features in the open data file.

Collecting sufficient high-accuracy data

When you open a new data file, the TerraSync software checks whether any features in the data dictionary are set to carrier accuracy. If they are, the TerraSync software starts to log carrier data in the background. This allows the carrier block to start as soon as you open the file, not just when you begin to log a feature. As soon as four or more satellites are available, a **counter** starts. When enough time has elapsed for the GPS positions to obtain the accuracy you require (see [Table 6.1, page 156](#)), all of the carrier phase data recorded during that period can be used during postprocessing.

Note – When you open an **existing** file with carrier features, the TerraSync software does not automatically log background carrier data. Carrier logging only begins when you start logging positions to the file. These may be not-in-feature positions, position records for a new feature, or updated positions for an existing feature.

When you start a new feature that is set to carrier accuracy, the carrier logging icon appears in the Status bar, and shows the carrier time.

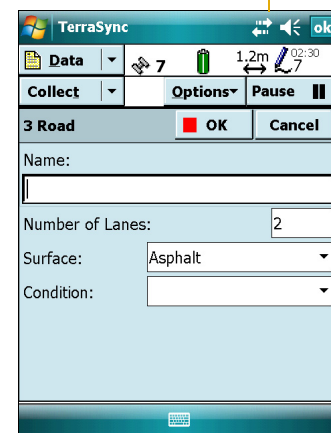
The carrier time is the time elapsed, in minutes and seconds, since the current block of data started. This time also appears in the *Carrier time* field on the *Receiver* screen. When the TerraSync software has logged carrier phase data continuously for the minimum time (10 minutes), the success beep sounds.

If you try to close a file before the minimum time is up, the TerraSync software asks you to confirm that you want to close the file. If you do close the file, you may lose carrier accuracy for some features.

Once the counter is running, you can choose to end the current feature and stay where you are until the minimum time is up. When the success beep sounds, move to the next feature. Using this method, you can be sure that you have sufficient data to generate precise positions.

Alternatively, if you think you are unlikely to lose lock, you can move to the next feature **before** sufficient carrier phase data has been collected. This is possible because all features recorded during a block achieve the precision associated with that block. Provided that a block eventually contains enough useful data, you can generate precise positions for any feature recorded within it.

Carrier logging icon showing carrier time



CAUTION – Do not move to the next feature before the minimum time is up unless you are sure that you will not lose lock.

The Estimated Accuracy icon shows a prediction of the accuracy that will be achieved after postprocessing. The value of the predicted accuracy is inversely related to the length of time that you have continuously collected carrier data. The longer the duration of carrier lock, the better the accuracy, which is indicated by a **decreasing** estimate. When the predicted accuracy value shown reaches the accuracy you require for the feature, you can stop logging. The predicted accuracy applies to all positions logged since you acquired carrier lock on the required number of satellites.

The accuracy estimate has a 68% confidence level, which means that 68% of the time the position will be within the estimated value shown when the position was collected, providing that the data is processed against base stations that meet carrier phase requirements (see [page 156](#)).

Note – If you lose carrier lock while collecting a feature, the accuracy estimate increases, and you must reacquire satellites and remain at the feature until the estimated accuracy value decreases to the required accuracy.

Real-time kinematic workflow and required infrastructure

This section explains how to obtain centimeter-level accuracy using real-time kinematic data collection.

If you are using a survey receiver, you can use real-time kinematic (RTK) data collection to achieve centimeter-level accuracy in real time.

Note – *In RTK mode, the TerraSync software uses only RTK-corrected positions. You cannot configure the software to use uncorrected GPS positions and RTK-corrected positions cannot be postprocessed.*

Required infrastructure for RTK

RTK requires one of the following:

- a local (20km) base station.

This can be another Survey receiver that is set up as an RTK base station. For information about how to use the TerraSync software to set up a second survey receiver as an RTK base receiver. See [Appendix C, Setting up a Base Station](#)



- access to a VRS network that generates RTK messages (in which case the base stations can be up to 70km away)

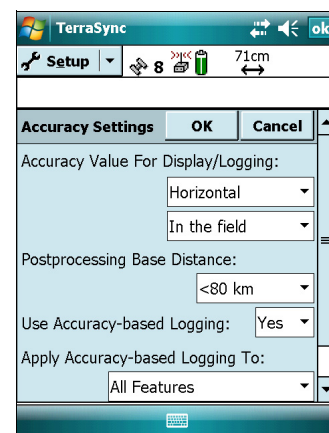
To use RTK corrections, the rover requires a communication link to the RTK source. This can be the receiver's integrated RTK radio or an external data radio connected to the receiver. Alternatively, if you are using RTK corrections from a VRS network, you can use a variety of methods to establish a direct dial or Internet connection between the field computer and the VRS network. See [Using corrections from a VRS network, page 162](#).

Configuring the TerraSync software for RTK data collection


To configure the TerraSync software to use RTK corrections:

1. Open the *Setup* section.
2. Tap **Real-time Settings**. The *Real-time Settings* form appears.
3. From the *Choice 1* field, select the real-time correction source:
 - If the roving receiver has an internal radio, select *Integrated RTK Radio*.
 - If the roving receiver is connected to an external data radio, or the RTK source is a VRS network, select *External Source*.

4. Tap the Setup button  beside the *Choice 1* field to configure the correction source:
 - If you selected Integrated RTK Radio, the *RTK Radio Settings* form appears. Select the radio channel and the base radio type at the correct wireless data rate, and then tap **OK**.
 - If you selected External Source, the *External Source Settings* form appears. To use a data radio connected to the receiver, select *Receiver Port* in the *Connection Method* field, and then select appropriate settings for the other fields. To use corrections from a VRS network, select appropriate settings depending on the server and the communication method used (see [Using corrections from a VRS network, page 162](#)). When you have finished configuring the external source, tap **OK**.
5. From the *Choice 2* field, select *Wait for Real-time*.
6. Tap **OK** to confirm the real-time settings and return to the main *Setup* screen.
7. Configure the required accuracy settings:
 - a. In the main Setup screen, tap **Logging Settings**.
 - b. Tap the Setup button  below the *Accuracy Settings* field. The *Accuracy Settings* form appears:
 - c. From the *Accuracy Value for Display/Logging* fields, select the parameters that the TerraSync software will use to determine the estimated accuracy.
 - d. From the *Use Accuracy-based Logging* field, select *Yes*.
 - e. From the *Apply Accuracy-based Logging To field*, select the feature types that will use accuracy-based logging.
 - f. In the *Required Accuracy* field, enter the accuracy you require.
 - g. Tap **OK** to save the accuracy-based logging settings and return to the *Logging Settings* form.



Collecting sufficient high-accuracy data

To start using data from the RTK receiver, connect to GPS as usual. The appropriate RTK icon appears in the status bar. For example, if the receiver is using its integrated RTK radio to receive corrections, the integrated RTK radio icon  appears.

Once the receiver is connected, it starts initializing RTK mode. While the receiver is initializing, the RTK icon flashes. When the icon stops flashing, RTK mode is initialized, and you can start using positions from the receiver.



Tip – Survey receivers are designed to initialize while moving. Depending on the GPS constellation, and the physical environment you are in, moving around may decrease the time required to initialize. However, if you need to initialize in (for example, if the RTK communications link fails while you are logging a point feature), moving around **increases** the initialization time. To initialize in static mode, remain stationary and hold the GPS antenna still.

The Estimated Accuracy icon in the status bar of the TerraSync software shows the estimated accuracy for the current GPS position. Use the accuracy-based logging capability provided by the TerraSync software to reject any positions that do not fall within the specified required accuracy.

Using corrections from a VRS network

A virtual reference station network consists of GPS hardware, software, and communication links. It uses data from a network of base stations to provide roving receivers with corrections that are more accurate than corrections from a single base station.

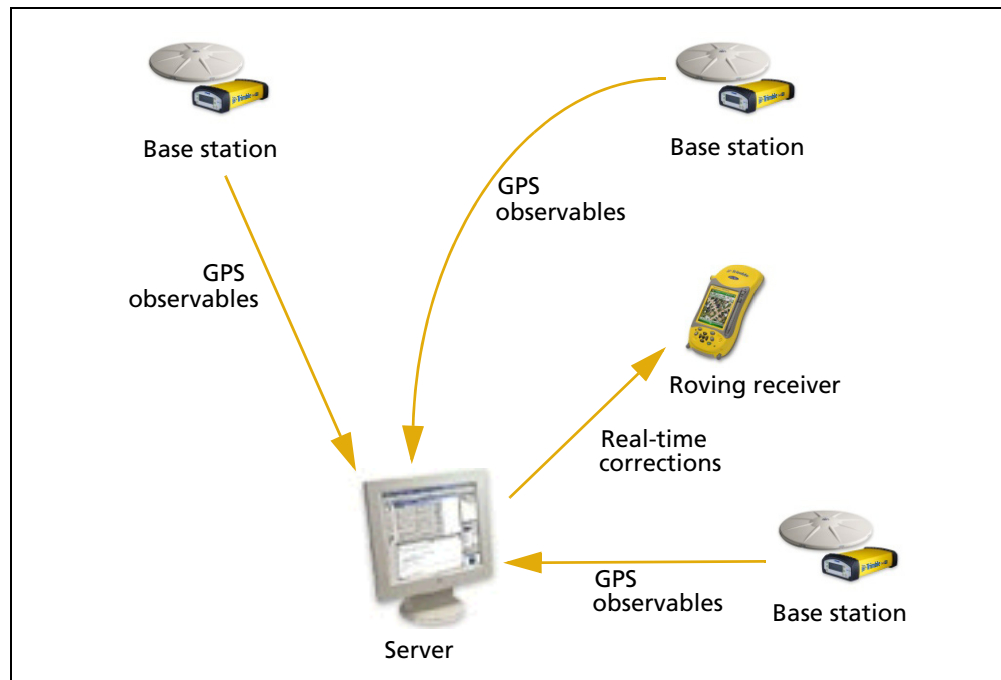


Figure 6.3 Parts of a VRS network

The server is a computer running VRS software such as the Trimble GPSNet™ software. The server uses the base station data to model systematic ephemeris, tropospheric, and ionospheric errors at the roving receiver's position. It then sends interpolated correction messages back to the roving receiver.

Depending on the VRS software, the server may also use the data from the base station network to simulate a base station (or virtual reference station) at the location of the roving receiver.

If no network corrections are available, the server may switch to raw mode. In raw mode the server simply relays the corrections from the single physical base station that is closest to the roving receiver.

Unlike other real-time correction sources, using corrections from a VRS network requires two-way communication between the server and the roving receiver. The roving receiver must send its position to the server, so that the server can calculate corrections for that position, and select the closest base station if necessary. Because the VRS network generates a unique virtual reference station for each roving receiver, the server must send separate corrections to each roving receiver.

Some VRS servers only provide carrier corrections for higher accuracy applications, whereas others provide both DGPS code-corrections and carrier corrections. The accuracy you can achieve depends on the receiver used, and the corrections from the VRS network.

You can use real-time carrier corrections from a VRS network to achieve subfoot (<30 cm) and decimeter (10 cm) accuracy with:

- GPS Pathfinder ProXRT receiver
- GeoExplorer 2008 series - GeoXH handheld

You can use real-time DGPS corrections from a VRS network with:

- GeoExplorer series handhelds:
 - GeoXH handhelds
 - GeoXT handhelds
 - GeoXM handhelds
- GPS Pathfinder Pro series receivers:
 - GPS Pathfinder ProXT receiver
 - GPS Pathfinder ProXH receiver
- GPS Pathfinder Pro XRS receivers with firmware version 1.52 or later

You can use real-time carrier corrections from a VRS network to achieve RTK accuracy with:

- Trimble survey receivers:
 - 5800 receiver (firmware version 2.23 or later)
 - R8 receiver (firmware version 2.23 or later)
 - R8 GNSS receiver (firmware version 3.00 or later)

There are currently two commercial server software products for a VRS network: GPSNet from Trimble, and GNNET from Geo++. Both software products can output RTCM messages in the Trimble VRS network message format.

You can connect the roving receiver to the VRS network using an:

- Internet connection (see [page 164](#))
- Direct dial connection (see [page 169](#))

Connecting to a VRS network using an Internet connection

You can use an existing Internet connection on the field computer to connect to a single base station or a VRS network that is transmitting corrections over the Internet.

You can connect to the Internet in a number of ways, including a wireless LAN (an 802.11b connection) or a Bluetooth wireless connection to a Bluetooth-enabled cellular phone.

Note – *The TerraSync software does not control or configure the Internet connection. In the software, you only specify the IP address or URL of the VRS network, and the port on the server to connect to.*

The rest of this section assumes that you are using the Bluetooth radio in a Windows Mobile powered field computer to connect to a Bluetooth-enabled cellular phone and then connect to the Internet.

Note – *Some cellular phones support the Bluetooth PAN (Personal Area Networking) service as well as the Bluetooth DUN (Dialup Networking) service. Because DUN connections are more common, this section assumes you are making a dialup network connection with the Bluetooth-enabled phone.*

To connect to a Bluetooth-enabled phone using a Bluetooth DUN (Dialup Networking) connection, you must:


1. If required, connect the GPS receiver to the field computer.
2. Connect the field computer to a Bluetooth-enabled phone and then configure the connection to the dialup network.
3. Connect to the Internet using the dialup network.
4. Configure the TerraSync software to use real-time corrections received from the Internet source.

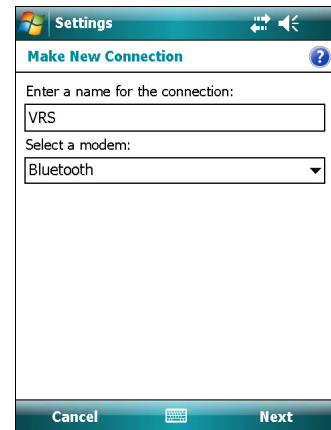
Note – *Before you begin the steps below, Trimble recommends that you confirm that the phone can access the Internet directly. If necessary, contact the cellular phone provider and confirm whether you must enter a user name, password, and domain details when connecting an external device to the phone using Bluetooth dialup networking.*

Step 1: Connecting the GPS receiver to the field computer

If you are not using a field computer that has an integrated GPS receiver, connect the GPS receiver to the field computer. For more information, refer to the documentation provided with the receiver.

Step 2: Connecting the field computer to the phone and configuring the connection to the dialup network

1. Make sure that the field computer and the phone are within five meters of each other, and that the Bluetooth radio in each device is turned on.
2. On the field computer, tap  / *Settings* / *Connections* / *Connections*.
3. Below **My ISP**, tap *Add a new modem connection*.
4. Enter the name for the connection. For example, enter the name of the phone or the VRS network that you will connect to.
5. From the *Select a Modem* drop-down list, select **Bluetooth** and then tap **Next** on the right softkey.
6. If the phone you want to connect to is:
 - listed, go to [Step 7](#) below.
 - not listed:
 - a. Tap *Add new device* or *New Partnership*. The field computer searches for other Bluetooth devices and displays them in the list.
 - b. From the list of available devices, select the phone you want to connect to and then tap **Next** on the right softkey.
 - c. To pair with the phone, enter a passcode of your choice that you will easily remember onto the field computer and then tap **Next** on the right softkey.
 - d. When prompted by the phone, enter the same password and then accept the connection.
 - e. On the field computer, in the *Partnership Settings* screen, make sure that **Dialup Networking (DUN)** is selected and then tap **Finish** on the right softkey.



You have now created a partnership between the field computer and the phone so that they can communicate.

7. From the *My Connections* list, select the phone that you want to configure the connection to and then if required tap **Next** on the right softkey.
8. Enter the GPRS access number for the Internet.

Two of the common GPRS access numbers for cellular phones on GSM networks are *99***1# and *99#. If these access numbers do not work, contact the cellular phone provider to obtain the appropriate number to use.

Note – You do not need to set up dialling rules or change the Internet connection settings on the phone. The connection settings you enter on the field computer are passed to the phone to use for this connection.

9. Tap **Next** on the right softkey.
10. Unless the phone provider confirmed that you must enter user name, password, and domain settings to access the Internet, tap **Finish** on the right softkey without entering any information in this screen.


Otherwise:

- a. Enter the required information.
- b. If the phone provider has told you that you need to change the baud rate or other settings for the connection, tap **Advanced**, configure these settings and then tap **OK** in the top right corner of the screen.
- c. Tap **Finish** on the right softkey.

You are returned to the *Connections* screen.

You have now configured the dialup networking connection.


Step 3: Connecting to the Internet using the dialup network


1. On the field computer, go to the *Connections* screen, if it is not already open (tap  / *Settings* / *Connections* / *Connections*).
2. Below **My ISP**, tap *Manage existing connections*.
3. Tap and hold the connection you want to use and then select *Connect*.
4. Unless the phone provider confirmed that you must enter user name, password, and domain settings to access the Internet, tap **OK** on the left softkey without entering any information in this screen. Otherwise, enter the required information and then tap **OK** on the left softkey.
5. If the phone prompts you for confirmation to connect to the Internet, accept the connection.


The phone dials the configured GPRS access number and then connects to the Internet.


A Connectivity notification appears on the field computer as the connection is being made.

After the connection is made you are returned to the *My ISP* screen.

To confirm that the field computer is connected to the phone, or to check the status of the connection at any time, tap the Connectivity icon  in the title bar. The notification shows the name of the current connection, and the time elapsed since the connection was made. To hide the notification, tap **Hide**.


Note – If you have an active wireless LAN connection, the connectivity icon appears as  instead.


6. Tap **OK** in the top right corner of the screen to close the *My ISP* screen.
7. Tap **OK** in the top right corner to close the *Connections* screen.
8. Tap  in the top right corner to close the *Settings* screen.

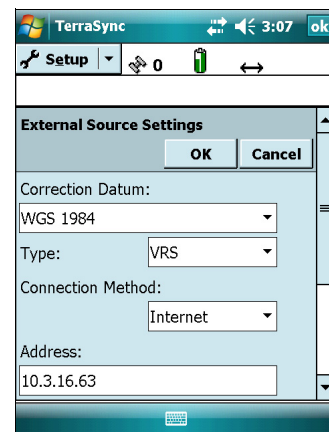
To check the connection status at any time, tap the  or  icon in the title bar.

To end the connection at any time, tap the  or  icon in the title bar and then tap **Disconnect**.

Step 4: Configuring the TerraSync software to use real-time corrections from the Internet source

1. On the field computer, start the TerraSync software and then open the *Setup* section.
2. Tap **Real-time Settings**. The *Real-time Settings* form appears.
3. From the *Choice 1* field, select **External Source**.
4. Configure the external source:
 - a. Tap the Setup button  beside the *Choice 1* field. The *External Source Settings* form appears.
 - b. From the *Correction Datum* field, select the same datum as the VRS network coordinate system.
 - c. From the *Type* field, select:
 - **VRS** if the real-time correction source is a VRS network.
 - **Single Base** if the real-time correction source is a single base station that broadcasts its corrections over the Internet.
 - d. From the *Connection Method* field, select **Internet**.
 - e. In the *Address* field, enter the IP address or URL of the VRS network or the server that is supplying the corrections from the VRS network.

Typically, the IP address or URL of a VRS network has the format 218.101.54.6:5024, where the digits before the colon (:) are the address, and the digits after the colon (:) are the port number.
 - f. In the *Port* field, enter the port number that you will use to connect to the server.
 - g. If you are connecting to a VRS network through an NTRIP server, tap the Setup button  beside the *Source* field. The GPS field software attempts to establish a connection to the NTRIP server. If the connection is successful, the *Select Server* form appears. Select the server that you want to use and then tap **OK** to return to the *External Source Settings* form.
 - h. If you selected a VRS network that requires authentication, the *Name* and *Password* fields appear. Enter the user name and password that you obtained from the service provider.



- i. From the *Connection Control* field, select:
 - **Auto** if you want the TerraSync software to automatically establish and end connections to the VRS network as necessary.
 - **Manual** if you want to connect or disconnect only when you tap **Ext Source** in the *Setup* screen.
 - j. Tap **OK** to confirm the settings and return to the *Real-time Settings* form.
5. Tap **OK** to confirm the real-time settings and return to the main screen of the Setup section.

If you selected **Auto** in the *Connection Control* field, the **Ext Source** button is depressed and the software attempts to connect to the server.

6. If you selected **Manual** in the *Connection Control* field, tap the **Ext Source** button that appears below the Status bar in the Setup section to connect the TerraSync software to the Internet correction source.



Tip – To disconnect or reconnect to the server at any time, tap **Ext Source**. To view the status of the real-time correction source, open the Status section, select the Real-time subsection and then select *External* from the **Summary** list button.

Reconnecting to the Internet

To reconnect to the Internet at any time after setting up the connection, repeat steps 3 through 8 on [page 166](#).

If you selected **Auto** in the *Connection Control* field of the TerraSync software, the software automatically connects to the Internet source that is providing real-time differential corrections.

To **manually** reconnect the TerraSync software to the Internet source that is providing real-time differential corrections, open the software and then tap the **Ext Source** button that appears below the status bar in the Setup section.

Connecting to a VRS network using a direct dial connection

The direct dial connection method uses a cellphone and modem, or a cellular modem, to dial up the base station or VRS network directly. These devices may be connected to the field computer by cable, or using Bluetooth wireless technology. For more information about establishing a Bluetooth wireless link, refer to the manufacturer's instructions for the Bluetooth-enabled device.

Unlike the Internet connection method, a direct dial connection is configured, established, and terminated from within the TerraSync software.

Authentication

If the call is authenticated using Caller ID, you will need to inform the service provider of the cellphone number that you are using. Otherwise, you may need to configure the modem to use a terminal window after dialling.

Before you begin

For a direct dial connection, you need the following information from the service provider:



- The dial-up telephone number of the VRS network
- Your username and password, if the service provider requires you to enter these details when you connect to the VRS network

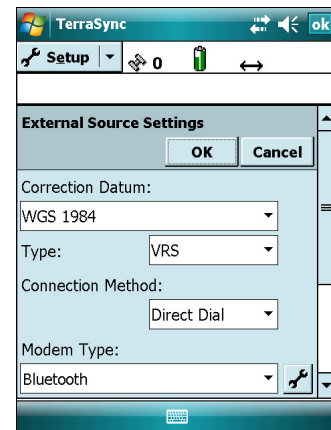
Configuring a direct dial connection to a VRS network

To configure the TerraSync software to establish a direct dial connection to a VRS network:

1. Install any software or drivers for the modem.
2. Start the TerraSync software and then open the *Setup* section.
3. Tap **Real-time Settings**. The *Real-time Settings* form appears.
4. From the *Choice 1* field, select External Source.

5. Configure the external source:

- a. Tap the Setup button  beside the *Choice 1* field. The *External Source Settings* form appears.
 - b. From the *Correction Datum* field, select the same datum as the VRS network coordinate system.
 - c. From the *Type* field, select VRS.
 - d. From the *Connection Method* field, select Direct Dial.
 - e. From the *Modem Type* field, select the modem that you want to use. Then tap the Setup button  to open the *Connection Properties* form.
 - f. Specify appropriate port connection settings. For detailed connection information, refer to the documentation for the cellular phone or modem.
 - g. If the call is authenticated with a username and password, select the *Use terminal window after dialing* check box.
 - h. Tap **OK** to return to the *External Source Settings* form.
 - i. From the *Phone Number* field, enter the telephone number of the VRS network, including any prefix or area code required.
 - j. From the *Connection Control* field, select Auto to automatically connect to and disconnect from the VRS network as necessary. Select Manual to only connect or disconnect when you tap **Options** in the *Setup* screen.
 - k. Tap **OK** to confirm the settings and return to the *Real-time Settings* form.
6. Tap **OK**.



Connecting to the VRS network using a direct dial connection

To connect to the VRS network using the direct dial connection that you have set up:

1. Connect to the VRS network:
 - a. If the TerraSync software is not connected to the GPS receiver, tap the GPS button to connect to the GPS receiver.
 - b. If you selected the Auto option in the *Connection Control* field, the TerraSync software automatically initiates the connection. If you selected the Auto option, you must initiate the connection to the server. To do this, tap **Options** and then select *Connect to External Source*.
 - c. If necessary, enter your username and password in the terminal window that appears.

2. Proceed with data collection. Use the *Real-time Summary* screen in the Status section if you want to check the status of the VRS network.
3. When you have finished using corrections from the VRS network:
 - a. To manually disconnect from the VRS network, in the *Setup* section of the TerraSync software, tap **Options** and then select *Disconnect from External Source*.
 - b. To ensure that the call is ended, use the End Call command on the cellphone.

Advanced Datalogging Options

In this chapter:

- Log Now and Log Later
- Recording between feature positions
- Continuing line and area features
- Offsets
- Using a laser rangefinder to record offsets
- Using an external sensor
- Repeating features
- Segmenting line features
- Recording averaged vertices
- Enhanced support for adding image files as attributes to features.
- Integration with CoPilot Live 7 Professional for Trimble TerraSync, and TomTom Navigator 6 turn-by-turn navigation software.

This chapter contains detailed information about using advanced datalogging options. These options enable you to gain time saving and more accurate results in the field.

Log Now and Log Later

Advanced data collection methods offer time-saving techniques for efficient field work.

The TerraSync software provides two closely-related options for logging GPS data. These options differ in their timing of GPS data collection relative to the start of a feature. The options are:

- Log Now – start a feature and simultaneously start collecting GPS positions.
- Log Later – start a feature, and start collecting GPS positions later.

If you select the **Log Now** option, the TerraSync software begins logging positions for a new feature as soon as you select the feature type and tap **Create**. You can enter attribute values while positions are being recorded.

Log Now is the default logging option. When Log Now is selected, a bullet (•) appears beside it in the option list.

To select Log Now, tap **Options** in the *Collect Features* screen and then select Log Now from the option list.

***Note** – Log Now applies only to new features. When you open an existing feature for update, logging is paused and the pause icon flashes in the Status bar. New positions are logged for an existing feature only after you tap **Log** in the attribute entry form and select the Update position option*

If you select the **Log Later** option, the TerraSync software begins logging positions for a new feature only after you tap **Log** in the attribute entry form. Until you begin logging, the pause icon flashes in the Status bar.

When Log Later is selected, a bullet (•) appears beside it in the option list.

To select Log Later, tap **Options** in the *Collect Features* screen and then select *Log Later* from the drop-down list.

Recording between feature positions

The GPS data collected using the TerraSync software is recorded in files. You can collect positions in a file without collecting feature and attribute data. These positions are called **between feature positions**. They appear in their own layer on the Map graphical screen.

Recording GPS positions only is useful if you do not need to record feature and attribute data. For example, you may want to record a trail of the day's activities to track where you have been. In this case, you would not want to collect feature or attribute information, only the positions. You can also use between feature logging to record the route traveled from one feature to the next.

By default, the TerraSync software does not record between feature positions. Use the *Logging Settings* form to enable between feature logging. If the *Interval* field contains a time or distance value, then between feature logging is enabled. If the *Interval* field is set to Off, then between feature logging is disabled. For more information, refer to the *TerraSync Software Help*.

Between feature positions can be spaced by distance or time. For example, use the distance option to force the TerraSync software to log a position every three meters you travel; or use the time option to log a position every five seconds. To set the logging interval, select the logging style (Distance or Time) in the *Style* field, and then enter the rate in the *Interval* field.

If between feature logging is enabled, the TerraSync software logs positions (at the specified rate) whenever you are not logging positions to a feature.

Continuing line and area features

When recording a line or area feature, you could come across another feature that you need to record. The feature may be adjacent to the line/area feature, or it may be some distance away. When collecting a path (line feature), for example, you might encounter a gate (point feature). You do not have to record the entire path and then return to record the gate. Simply end the path feature, collect the gate feature, and then use the Continue option to resume collecting the path feature.

You can continue any line or area feature, not just the last one collected, provided you have not used the Continue option for any other features since collecting that line or area feature.

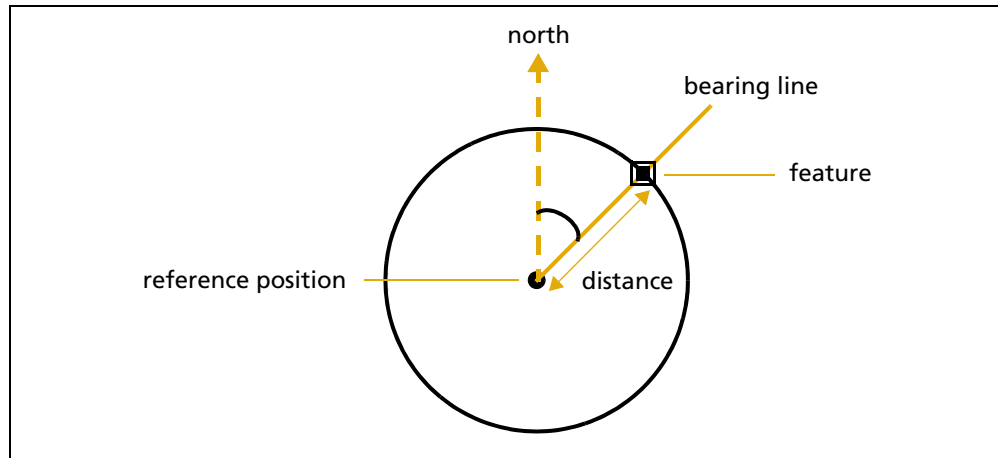
Once you continue a feature, you cannot continue any line or area features collected between the two segments of that feature. These features are now nested within the continued feature. Any features you collected before the continued feature are also unavailable for continuation.

New features that you collect after the continued segment will be available for continuation, because you have not continued any other feature since they were collected. If you replace the positions of an existing feature with new GPS or digitized positions, the Continue option treats the feature as a new feature, so it can be continued.

Note – You can collect as many features within a line or area as you need. The number is limited only by storage space on the field device.

Offsets

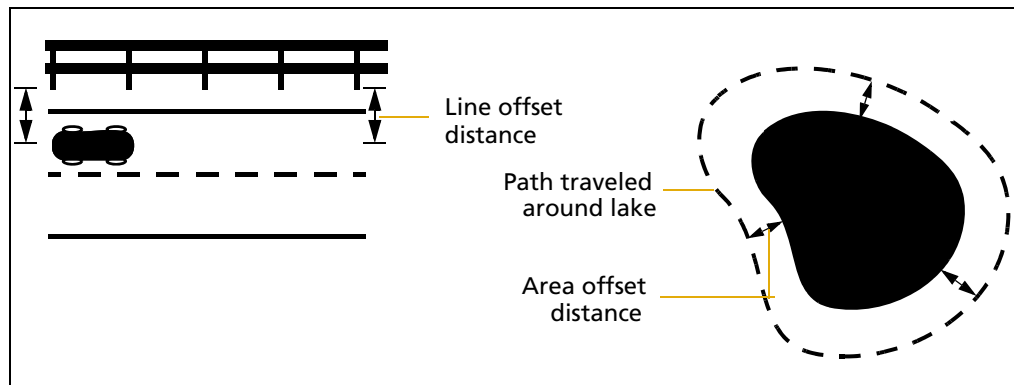
If you cannot travel over the top of, or right next to, a feature, you can enter an offset and record it at the specified distance. When collecting a tree feature, for example, it may be easier to stand some distance (for example, 10 paces to the North) from the tree and record its attributes. This ensures good GPS reception, and lets you see the tree clearly to assess its condition. Specify an offset to the tree of 10 m South. This is an example of an **offset point feature**. Entering an accurate offset ensures that the feature is positioned correctly in the GIS.



Note – The example above is a simple distance-bearing offset. For point features, you can also record **complex offsets**, which use measurements from two or more reference positions to calculate the feature position. See also [Complex offsets, page 178](#).

To view or enter the offset for the feature being collected or updated, tap **Options** in the attribute entry form and then select *Offset*.

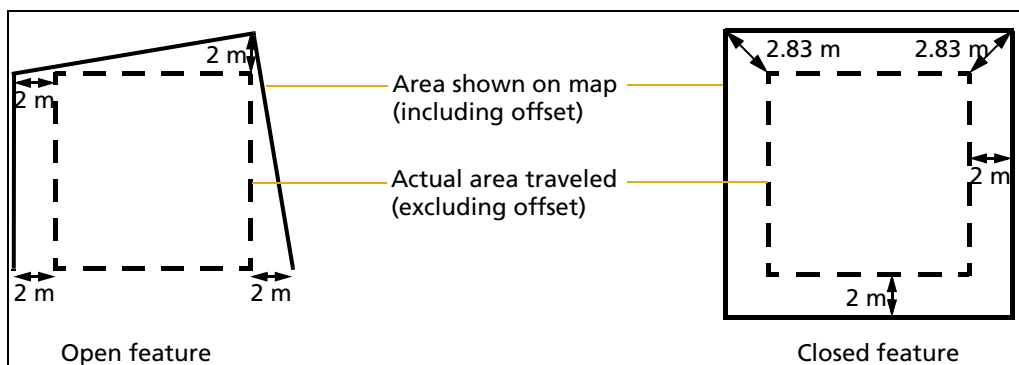
You can also use offsets for line and area features. For example, when collecting a line feature such as a fence, it may be easier to drive along the road beside the fence and record the positions of the fence as an offset. When collecting an area feature such as a lake, you could walk some distance from the lake edge and record its perimeter using an offset.



Note – A feature (point, line, or area) can have only **one** offset associated with it. To collect a line or area feature using offsets, the same offset value must apply to the whole feature. This may require a test run around or along an object to make sure that you can remain a consistent distance from it.

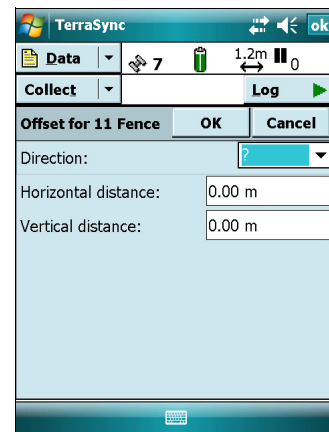
Note – You can record a line feature as a series of joined line segments, each with a different offset. See also [Segmenting line features](#), page 183.

Offsets are added to GPS and digitized positions as they are recorded, and features are displayed in the Map section with their offsets. However, if the currently open line or area feature has an offset, acute angles and corners can appear distorted on the map. This is because exact offset values are not calculated for these positions until the feature is closed. When you close a feature, offsets for these positions are interpolated, and the feature is redrawn more accurately.



To record an offset for a feature:

1. Start the feature.
2. In the attribute entry form, tap **Options** and then select *Offset*.
3. If the current feature is a point feature, select the type of offset you want to record. Then tap **OK**.
The appropriate offset form appears. The fields on the offset form depend on the type of feature you are collecting (point, line, or area) and the type of offset you are collecting.
4. Enter a value in each field as necessary.
Alternatively, use data from a laser rangefinder. See also [Using a laser rangefinder to record offsets](#), page 182.
5. Log GPS positions for the feature.
6. When the offset form is complete, tap **OK**. The attribute entry form reappears.
7. When you have recorded attributes for the feature and logged sufficient GPS positions, tap **OK** to store the feature. The *Collect Features* screen appears.



Note – You can also record complex offsets for point features (see below).

Complex offsets

When you record a complex offset, you do not record any position information for the feature. Instead, you record GPS positions for two or three reference positions and measure the distance or direction from each reference position to the feature. The TerraSync software uses coordinate geometry (COGO) to calculate the location of the feature, in much the same way as a GPS receiver uses the distances to GPS satellites at known locations to calculate GPS positions.

In the TerraSync software, record a complex offset using either two or three reference positions, and specify either the distance to the feature, or the bearing (direction).

You can record the following types of complex offset:

- Distance-distance offset (see [page 180](#))
- Triple distance offset (see [page 180](#))
- Bearing-bearing offset (see [page 181](#))
- Triple bearing offset (see [page 181](#))

To increase accuracy, record each reference position as if it were an averaged vertex. If you log a number of positions at each reference point, the TerraSync software averages these positions to give a more accurate reference position. The principle of [Dilution of Precision](#) applies to complex offsets, so you should choose reference positions that are widely spaced.

For detailed instructions, see [Recording a complex offset, page 179](#).

Recording a complex offset

To record a complex point offset:

1. Start the point feature.
2. From the attribute entry form, tap **Options**, select *Offset*, and then from the pullout menu select the type of offset you want to record.

The appropriate offset form appears.

3. Follow the instructions at the top of the form. When you have completed each step, tap **Next** to move to the next step. For each reference position:
 - a. Move to the reference position.
 - b. Tap **Log** (or **Resume**) to begin logging.
 - c. Remain stationary at the reference position while you log positions.
 - d. When you have collected sufficient positions, tap **Next** to stop logging.
 - e. Measure the offset. This is the distance or the bearing from the reference position to the feature. You can use data from a laser rangefinder. See [Using a laser rangefinder to record offsets, page 182](#).
 - f. Tap **Next** to confirm the measurement for this reference position.
4. If you are recording an offset that uses distances, enter the direction that the features lies in relative to the path between the reference positions.

The software calculates the position of the feature.

5. When the offset form is complete, tap **OK**. The attribute entry form reappears.

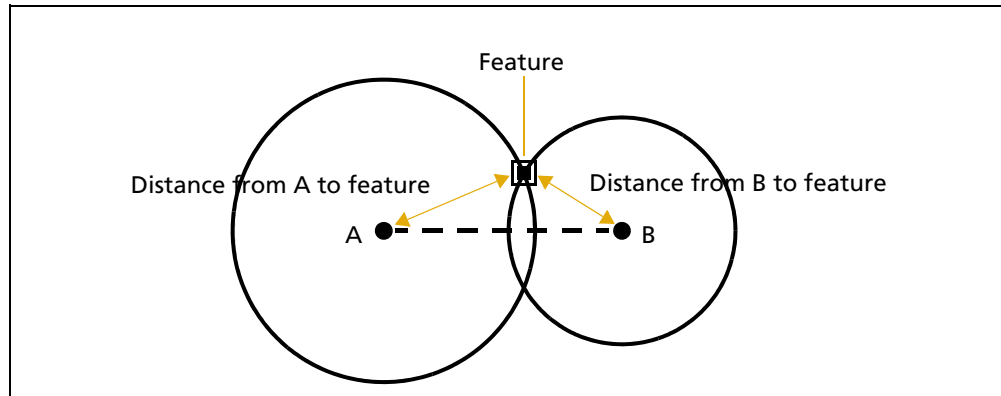
Note – *Logging is paused because you only have to record positions for the reference positions, not the feature itself.*

6. Record attributes for the feature, and then tap **OK** to store the feature. The *Collect Features* screen appears.

The screenshot shows the TerraSync application window. At the top, there's a status bar with 'TerraSync' and some icons. Below that is a toolbar with 'Data', 'Collect', and 'Options' buttons. The main screen displays a form titled 'Triple Distance offset for 12 Tree'. The form has a header section with 'Enter the distance from reference position 1 to the feature' and 'Next' and 'Clear' buttons. Below this, there's a section for 'Reference position 1' with a 'Collected' status. The main body of the form contains 'Distance A', 'Horizontal distance' (0.00 m), and 'Vertical distance' (0.00 m) fields. At the bottom, there's a 'Log' button.

Distance-distance offset

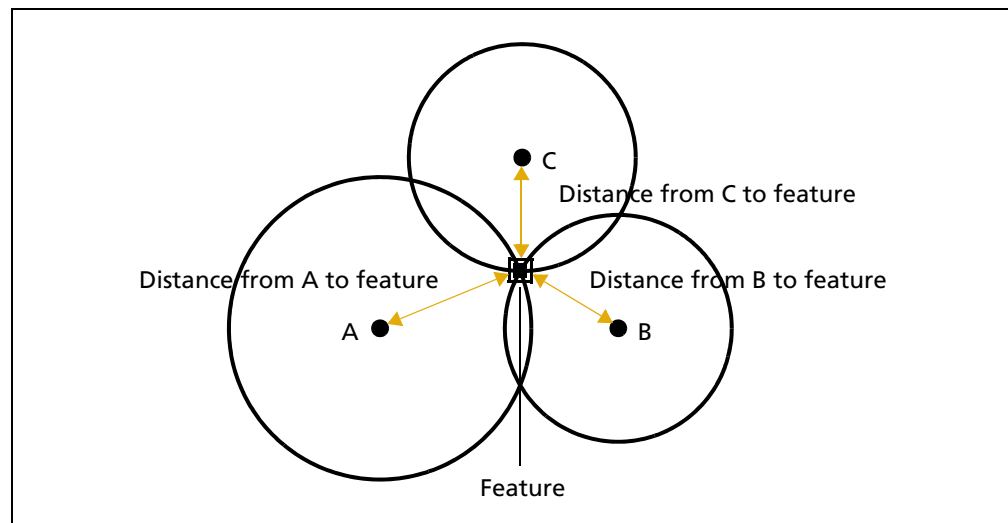
A distance-distance offset uses the distance between the feature and two reference positions (A and B) to specify the position of the feature. The feature lies at the point where the circles centered on A and B intersect. Because there are two points where the circles intersect, you need to specify which direction the feature is in, relative to the path from A to B.



Triple distance offset

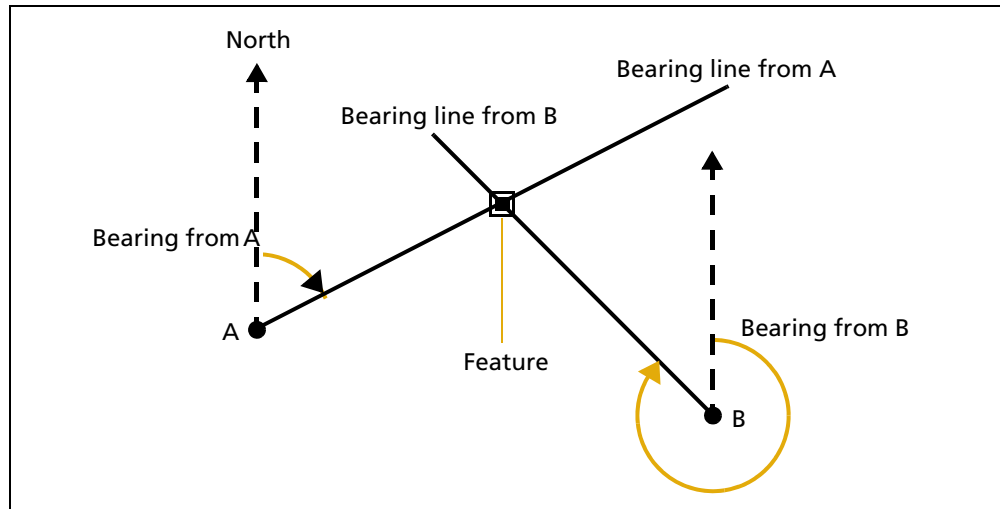
A triple distance offset uses the distance between the feature and three reference positions (A, B, and C) to specify the position of the feature. The feature lies at the point where the circles centered on A, B, and C intersect. There can be only one point where the three circles intersect, so you usually do not need to specify a direction.

A triple distance offset is similar to a distance-distance offset, but a third measurement provides some mathematical redundancy that can improve accuracy.



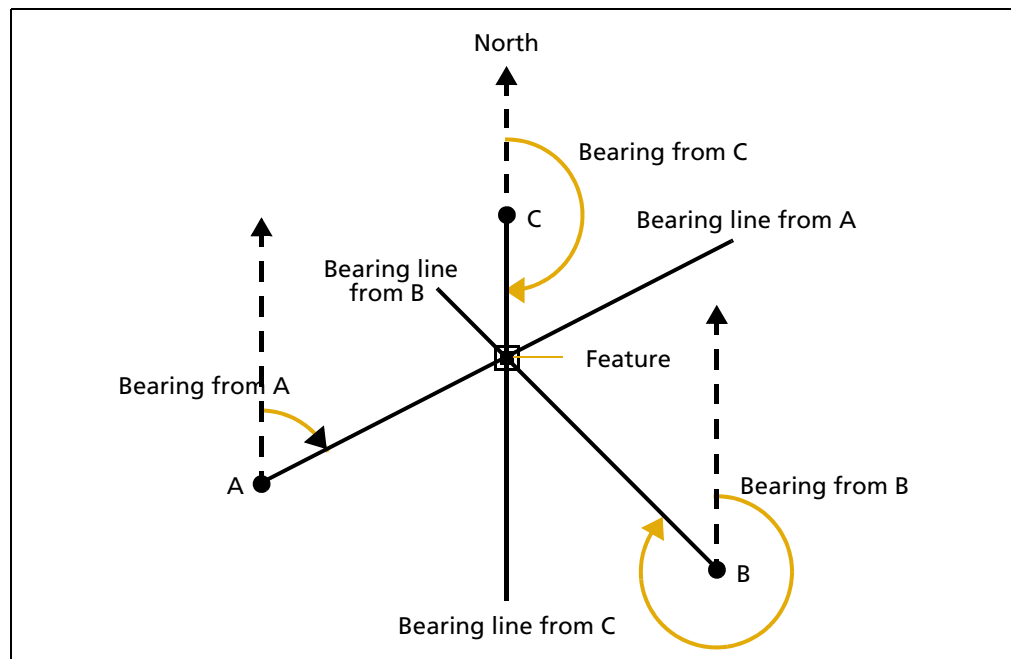
Bearing-bearing offset

A bearing-bearing offset uses the bearing from north from each of two reference points (A and B) to the feature to specify the position of the feature. The feature lies at the point where the two bearing lines intersect.



Triple bearing offset

A triple bearing offset uses the bearing from north from each of three reference points (A, B, and C) to the feature to specify the position of the feature. The feature lies at the point where the three bearing lines intersect. A triple bearing offset is similar to a bearing-bearing offset, but a third measurement provides some mathematical redundancy that can improve accuracy.



Using a laser rangefinder to record offsets

You can use a laser rangefinder to record accurate offsets for a feature. To use a rangefinder with the TerraSync software, you only need to specify which serial (COM) port on the field device the rangefinder is connected to.

For a list of the laser rangefinders that the TerraSync software supports, go to www.trimble.com/terrasync_specs.shtml.

To record an offset from a laser rangefinder, make sure that a feature is open, and that the attribute entry form for the feature, the appropriate offset form, or the Map screen is open. Then fire the laser rangefinder. The TerraSync software stores the distance and, if the laser rangefinder supports it, the bearing, in the appropriate field(s) in the offset form.

Before storing an offset from a laser rangefinder, the TerraSync software subtracts the antenna height from the measurement. The antenna height is specified in the *Setup* section.

An incorrect antenna height can reduce the vertical accuracy of the position of the feature. If vertical accuracy is important, make sure that you do the following:

- Set the antenna height to the vertical distance from the laser rangefinder to the antenna, not to the distance from the ground to the antenna. You can use a configuration file to do this.
- Keep the laser rangefinder as close to the antenna phase center as possible when shooting.
- Shoot at a higher position on the feature to compensate for the antenna height being subtracted from the altitude of the feature.

For more information on configuring a laser rangefinder to work with the TerraSync software, refer to the *TerraSync Software Help*.

You can also use a laser rangefinder as an external sensor (see below).

Using an external sensor

You can use an external sensor with the TerraSync software. The data recorded by the sensor can be stored as an attribute, or it can be stored in the data file as an uninterpreted sensor data record. You can export uninterpreted sensor data from the GPS Pathfinder Office software to the GIS or processing software.

Depending on the way you want to store the sensor data, and the capabilities of the sensor, you can configure the TerraSync software to read data from the sensor at specified intervals, or only when you request it.

Note – A laser rangefinder can be used either as an external sensor, as described here, or to supply data for feature offsets. See [Using a laser rangefinder to record offsets](#), page 182.

Repeating features

Use **Repeat** to efficiently record a sequence of similar features. When you use Repeat, attribute values are copied from the last recorded feature of the same type. You do not have to re-enter values for all attributes. Just check that each attribute value is correct for the new feature, and change only those that are different.

To repeat attributes for similar features:

1. From the *Collect Features* screen, tap **Options** and then select *Repeat*. When Repeat is selected, a check mark (✓) appears beside it in the option list.
2. Select a feature from the *Choose Feature* list and then tap **Create**. The attribute entry form appears. The attribute values that appear are those of the last recorded feature of that type. Edit them if necessary. Tap **OK** to save the attribute values and store the feature.
3. Select another feature. Continue until you want to turn off Repeat mode.

To turn off Repeat mode:

- From the *Collect Features* screen, tap **Options** and then select *Repeat*. The check mark disappears.

Note – When *Repeat* is not selected, the data dictionary determines default attribute values. Where appropriate, the data dictionary specifies a default value for each attribute of a feature.

Segmenting line features

Use segmenting to record a line as several segments that are joined together, each with different attribute values. For example, you can record a road feature that has one surface for part of its length, and a different surface for the rest of its length.

When you segment a line feature, the TerraSync software immediately records a position, even if the logging interval does not require a position at that time. This position becomes the last position in the old line and the first position in the new line. Recording a position at the segmentation point ensures that the two line segments join up in the Trimble postprocessing software and the GIS.

The offset of the new line segment defaults to the offset of the previous line segment, if there is one. The new line feature has the same attribute values as the previous line segment, except that any auto-incrementing attributes are incremented to the next value.

Note – If the line feature has an offset, the two line segments may not “snap” together.

To segment a line feature, see [Collecting a line feature with differing attributes \(line segmentation\)](#), page 107.



CAUTION – If you are logging an averaged vertex when you segment a line feature, the first position of the new segment is located at the last GPS position, not at the calculated position of the last averaged vertex. This can cause a gap between the segments. To ensure that the two segments join, record a single, unaveraged GPS position as the last position in the first segment. Then segment the feature, and start recording averaged vertices for the new segment if required.



CAUTION – If logging has been paused for more than five seconds before you segment the line, the two line segments may not “snap” together.

Recording averaged vertices

A line or area feature consists of a number of positions, joined in sequence from the first position logged to the last. Each position represents a *vertex* (see [page 220](#)) of the feature. For more accurate recording of line and area features, you can record several GPS positions at each vertex, then average these GPS positions to calculate the vertex position.

Logging a line or area feature with averaged vertices is similar to logging a number of averaged point features, and then joining these point features together in sequence.


To record an averaged vertex for a line or area feature, see [Collecting an area feature using averaged vertices](#), page 106.

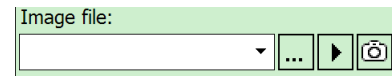
Because an averaged vertex is similar to a point feature, the same limitations that apply to a point feature apply when the *Vertex* form is open:

- You cannot segment a line feature while recording an averaged vertex.
- You can enter or edit the offset of the feature using the line/area *Offset* form.
- While the *Vertex* form is open, you must remain stationary, as though you were recording a point feature. The messages **Vertex # open** and **Remain stationary** appear to remind you to stay still. The number of positions recorded for this vertex also appears in the status bar.

A line or area feature can include both averaged vertices and positions logged normally as you travel. If you want to record only averaged vertices, use the Log Later function to pause logging before you open the feature. Logging starts automatically when you open the *Vertex* form, and returns to its former state when you close the *Vertex* form. Using Log Later ensures that positions are only logged when the *Vertex* form is open. See [Log Now and Log Later](#), page 174.

Enhanced support for adding image files as attributes to features.

On Trimble handhelds with integrated cameras, TerraSync software version 3.30 and later includes a **Camera** button  in the attribute entry form for Image file attributes. The **Camera** button launches the camera directly from within the TerraSync software and the resulting photo is automatically selected as the image to attach to the feature.



On all devices, thumbnails of the selected image are now displayed in the attribute entry form when using an Image file attribute. Tap the thumbnail image to open and review the image.



GPS information is added to the EXIF header when images are attached. When a jpg image file is attached to a feature, and there is a current GPS position, the EXIF header of the image file is populated with the following fields:

- GPS Time and Date
- GPS Latitude, Longitude, Altitude, and Datum
- Feature name
- Labels 1 and 2 as defined in the Data Dictionary

If the GPS position for the feature is updated, the GPS information in the EXIF record is also updated, but the Original Time and Date the photo was taken is not changed unless the photo is also replaced.

Integration with CoPilot Live 7 Professional for Trimble TerraSync, and TomTom Navigator 6 turn-by-turn navigation software.

When CoPilot Live 7 Professional for Trimble TerraSync, or TomTom Navigator 6 navigation software is installed on the device, and a navigation target is selected, the TerraSync software automatically switches to using the navigation software to navigate to the selected target, then switches back when you have arrived at the destination. Features or waypoints can be selected as the navigation target.

If the turn-by-turn navigation software is not already running when the target is set in the TerraSync software, the TerraSync software will also launch the navigation software.

A TerraSync tray icon in the Windows Mobile Today screen assists in switching between the TerraSync software and the CoPilot or TomTom navigation software if required.



Tip – To make switching between applications even easier, use the Windows Mobile Buttons application to program the keypad buttons as shortcuts to each application.

Coordinate Systems

In this chapter:

- [Modelling the earth's surface](#)
- [Transforming and projecting collected GPS positions](#)
- [Coordinate systems available in the TerraSync software](#)
- [Using the Coordinate System Manager utility](#)
- [Transferring coordinate systems](#)
- [Configuring coordinate systems](#)

It is useful to have some understanding of coordinate systems and datums before collecting GPS data.

The GPS receiver computes positions in terms of the WGS-84 coordinate system and stores them as latitude, longitude and height above ellipsoid (LLH) values. However, you may want to work with positions in terms of a different coordinate system.

The TerraSync software transforms GPS positions from the WGS-84 coordinate system to the selected coordinate system. This lets you enter and display coordinates using the coordinate system that best suits you and the location you are working in.

Modelling the earth's surface

Because it is difficult to represent the earth's surface on a flat, rectangular map, mathematical formulas are used to project the earth's surface onto maps. These mathematical formulas are called geoids and ellipsoids. Frameworks called datums and coordinate systems help to further define how the earth is projected onto a particular map.

Geoids and ellipsoids

A **geoid** is an imaginary three-dimensional surface representing mean sea level (MSL) if it was projected to extend through the continents. While we might assume that mean sea level remains constant over the surface of the globe, in fact it does not. Rather, mean sea level varies from place to place due to variations in local gravitational forces, which are in turn caused by local variations in the size, shape, and density of geological features. This means that, unlike an ellipsoid or datum, which has a symmetrical surface, the geoid undulates perpendicular to the force of gravity.

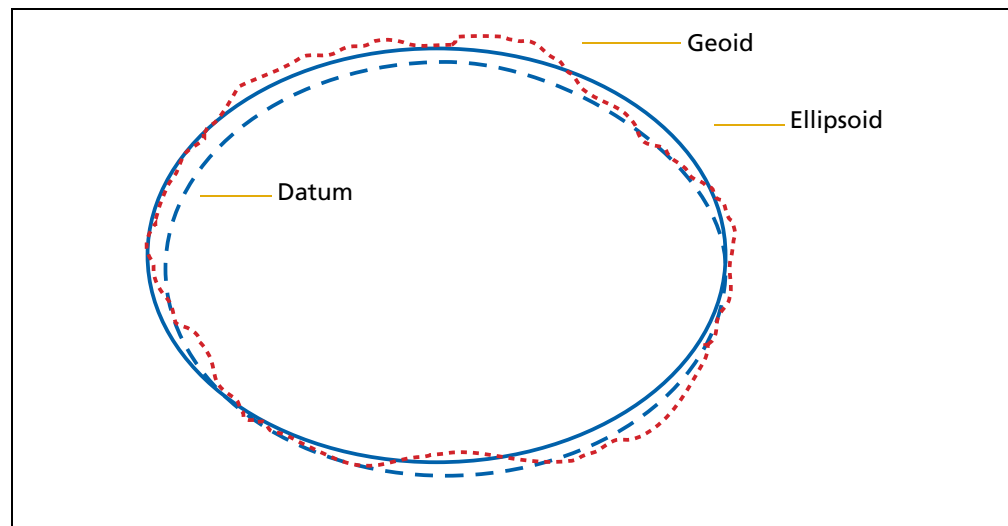


Figure B.4 A geoid

Using a geoid, we can describe a feature of the earth in terms of the earth's actual terrain as well as by measuring gravity. For example, if we say that Mount Everest is 8848 meters above mean sea level, then the vertical location of the feature on the surface of the earth has been identified by measuring gravity and comparing to mean sea level gravity. Unfortunately, a geoid is an extremely complex surface, and is not always suitable for modelling the surface of the earth. However, over limited areas and depending on the accuracy required, a simple ellipsoidal model of the earth's gravity fits quite well.

An **ellipsoid** is a three-dimensional surface shaped like a squashed sphere, which approximately models the shape of the earth.

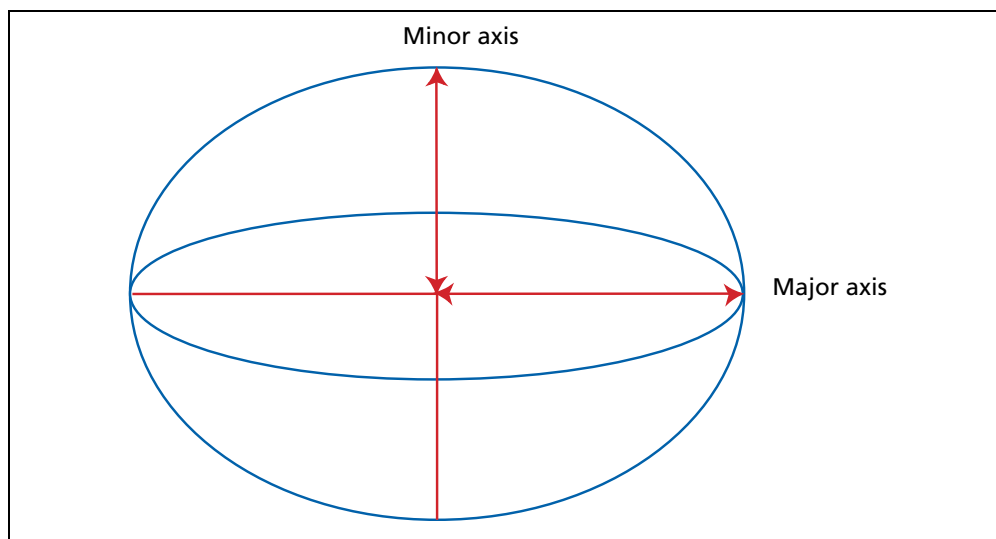


Figure B.5 An ellipsoid

An ellipsoid treats the earth as a smooth, featureless sphere, and approximates the shape of the earth at sea level without regard to land masses. The size and shape of the best fitted ellipsoid, as well as its location relative to the center of mass of the earth, differs from place to place. As a result, many local ellipsoids have been created to fit the geoid in different parts of the world.

Figure B.6 provides a representation of these different models for the earth's surface.

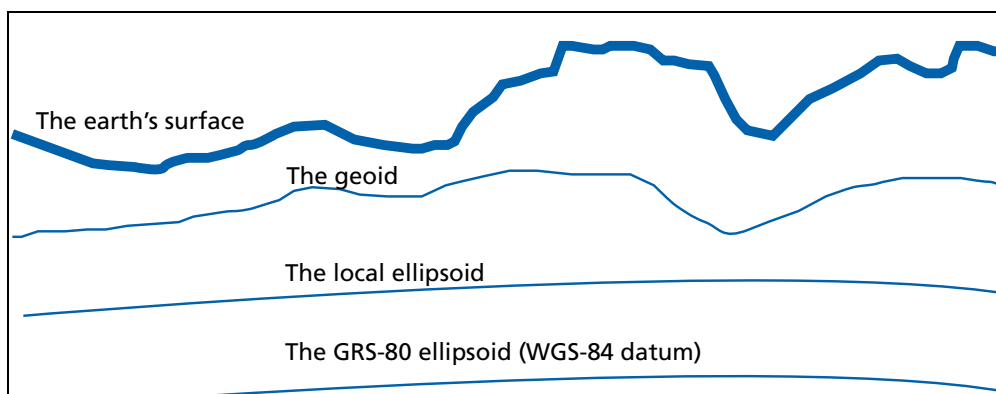


Figure B.6 Models of the earth's surface

A datum transformation and a projection are then used to transform coordinates from this local ellipsoid to the flat-earth model used in maps and in the GIS.

Coordinate systems and datums

A **datum** specifies the ellipsoid used to represent the earth, and the point on the surface of the earth that is used as the origin of the datum. Various datums have been established that best suit particular regions. For example, maps in the United States are often based on the North American Datum of 1927 or 1983 (NAD-27, NAD-83). The only global datum is WGS-84, which is based on the GRS-80 ellipsoid. All GPS coordinates are based on the WGS-84 datum surface.

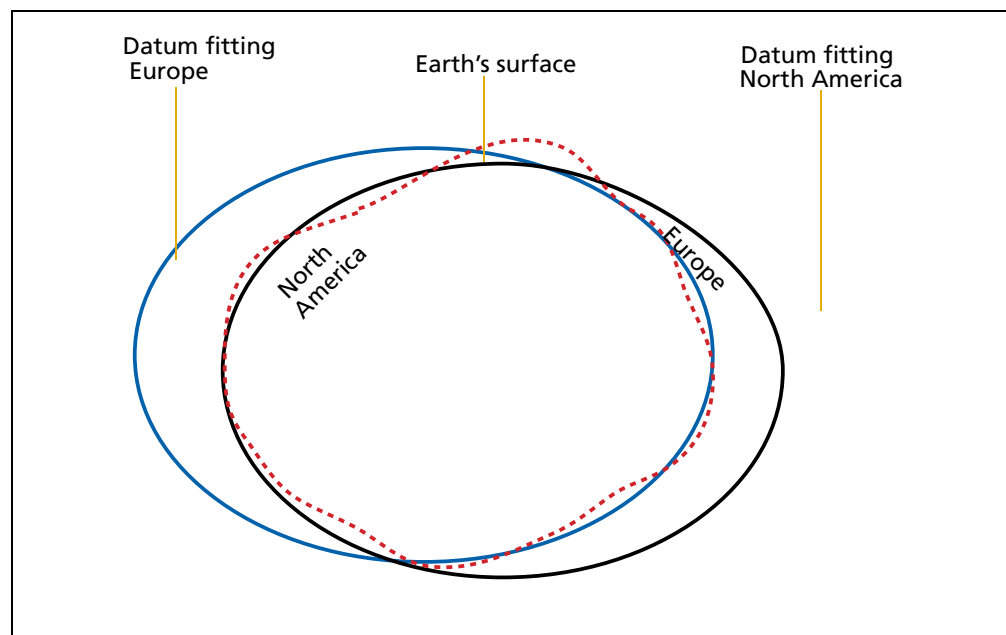


Figure B.7 Comparing datums

A **coordinate system** is a three-dimensional reference frame used to describe the location of objects within a spatial reference system (a datum). There are two types of global coordinate systems:

- Angular coordinates (for example, Latitude and Longitude)
- Cartesian (rectangular) coordinates (for example, Universal Transverse Mercator)

In the Latitude and Longitude coordinate system, position coordinates are based on an angular distance from a known reference point (the Prime Meridian) located at Greenwich. Coordinates are expressed in degrees, minutes, and seconds. Angular coordinates are unprojected as they are perfectly suited to the spherical surface of the earth. Latitude and Longitude is the predominant coordinate system used for nautical and aeronautical navigation.

For most land-based GPS applications, and particularly for GIS data collection applications, latitudes and longitudes are much less convenient. Typically, a GIS represents the coordinates of geographic features in a locality of interest using a rectangular grid (running North and East), and presumes that the earth is locally flat. In a GIS, the spherical coordinates of latitude, longitude and height are translated into planar coordinates of northing, easting, and elevation. Coordinates are expressed in

the unit of measurement defined for the coordinate system, for example meters. Worldwide there are a number of standard grid coordinate systems defined. The US State Plane grids are an example of this kind of grid coordinate system.

Transforming and projecting collected GPS positions

Transforming real-time corrected GPS positions

When GPS positions are differentially corrected, they use the datum (or reference frame) of the correction source. Examples are:

- WAAS, EGNOS: ITRF2000
- NDGPS beacons: NAD83
- Europe beacons: ETRF89
- OmniSTAR VBS (US): NAD83
- OmniSTAR VBS (non-US): ITRF2005
- OmniSTAR HP/XP (worldwide): ITRF2005
- VRS networks: contact the system operator

The usual convention is that SSF files store GPS positions in the WGS-84 datum, which is almost identical to the ITRF2000 or ITRF2005 datums. However coordinates in the NAD83 or ETRF89 datum can be up one meter apart from the same coordinates in the WGS-84 datum. To resolve this issue, the TerraSync software allows you to specify the datum of each real-time correction source, so that the corrected positions can be automatically transformed to WGS-84, before being saved to the SSF file.

In the Setup section, for each real-time correction source you use, assign the appropriate Correction Datum value. Some (such as SBAS) are assigned by default, but if you use other sources such as a VRS network, you need to find out which datum the system uses so that you can assign the correct value.

To send the WGS-84 positions that are stored in the SSF file to a GIS as North, East coordinates, the GPS latitudes and longitudes need to be processed in a number of ways. The remainder of this section describes the steps that are required to perform this processing.

First, the collected GPS positions must be transformed from latitudes, longitudes, and altitudes on the WGS-84 datum into latitudes, longitudes, and altitudes on the local datum. This operation is called a ***datum transformation***.

Once the coordinates are expressed as latitudes and longitudes on the local datum, they must then be projected into North and East values on a flat grid, using an operation called a ***map projection***.

Note – Data files are stored using the currently configured coordinate system. If you change coordinate systems, the coordinates of the current data file are recalculated, which may take some time.

Note – Each background image is associated permanently with a coordinate system. To display correctly when opened, the coordinate system of a background image must match the current TerraSync coordinate system.



Tip – If no coordinate system has been assigned to an image when you open it in the background, the TerraSync software associates it with the current coordinate system. To change the coordinate system that is associated with a background image, change the coordinate system of the image using Trimble postprocessing software and transfer the image to the TerraSync software again. Alternatively, delete the corresponding .cs file in the TerraSync documents folder, change to the required coordinate system in the TerraSync software, and open the image in the Map background.

Finally, if altitudes are to be stored by the GIS, they need to be transformed from heights above the GRS-80 ellipsoid to heights above some other reference level. The most common reference level is the geoid, more commonly referred to as mean sea level. The GPS Pathfinder Office software contains a geoid separation model which enables it to transform altitudes relative to GRS-80 into heights relative to mean sea level.

The geoid separation models used by the TerraSync software and the GPS Pathfinder Office software differ in accuracy. The TerraSync software is necessarily approximate, while GPS Pathfinder Office software is more accurate. If you require altitudes relative to a different reference level, or relative to a more accurate (perhaps local) mean sea level model, you will need to process the heights in GPS Pathfinder Office before exporting them to the GIS.

The TerraSync software lets you specify a datum transformation and a map projection so that you can see your GPS position (and the position of features you may have recorded) in the local coordinate system. This makes it easy for you to check your position or to navigate using a map produced by your GIS. It also lets you specify whether heights will be shown relative to the local ellipsoid, or relative to mean sea level.

For your convenience, the TerraSync software hides the complexities of datum transformations and map projections behind the common names for the coordinate systems with which you may be familiar. Each named coordinate system has an associated datum (which encapsulates an ellipsoid) and a number of zones (each of which is a named instance of a particular map projection).

Coordinate systems available in the TerraSync software

The TerraSync software is supplied with a large number of coordinate systems and datums, including most National Coordinate Systems.

You can also create your own coordinate systems and sites using the Coordinate System Manager utility in the GPS Pathfinder Office software. You can easily load these coordinate systems into the TerraSync software using the Trimble Data Transfer utility.

Note – The default geoid in the TerraSync software is the DMA 10x10 (Global) model. This is different from the default used by the GPS Pathfinder Office software. As a result, MSL heights in the TerraSync software may differ from those displayed in the GPS Pathfinder Office software.

Using the Coordinate System Manager utility

Use the Coordinate System Manager utility in the GPS Pathfinder Office software to create and edit custom coordinate systems and sites for use with the TerraSync software. This data can be saved to a coordinate system export file, which you can then transfer to the field device.

To use the Coordinate System Manager utility:

1. On the office computer, start the Coordinate System Manager utility from the GPS Pathfinder Office software.
2. Use the tabs in the main window to select or edit coordinate systems, zones, and sites.



CAUTION – When you transfer a new coordinate system file to the field device, it replaces all coordinate systems already stored in the TerraSync software. Make sure that the new file includes all the coordinate systems that you want to use in the TerraSync software.

3. Export the coordinate system database file. Select *File / Export*. The *Export* dialog appears.
4. Select the *Selected records only* option in the *Export* dialog.
5. Click **OK**. The *Save As* dialog appears.
6. Specify the filename and click **Save**.

When you have saved the coordinate system database files and the related support files, use the Data Transfer utility to transfer the coordinate system export file to the TerraSync software (see [Transferring coordinate systems, page 193](#)).

For more information on using the Coordinate System Manager utility, refer to the *GPS Pathfinder Office Online Help*.

Transferring coordinate systems

There are two ways to transfer coordinate systems or sites to the TerraSync software:

- You can transfer a single coordinate system or site which you select at the time of transfer (see [page 195](#)).
- You can use the Coordinate System Manager utility to create a coordinate system export file that contains a number of coordinate systems, zones, datums and sites, and then transfer this file to the TerraSync software (see below).

The TerraSync software stores all its coordinate systems in one file. When you load a new coordinate system into the TerraSync software, the new file replaces any existing coordinate system or systems in the software. If you transfer a single coordinate system or site, all existing systems in the software are lost. If you transfer a coordinate system export file, make sure that you include any coordinate systems that you want to keep, plus any new systems that you want to transfer to the TerraSync software.



CAUTION – To prevent the loss of coordinate system information in the TerraSync software, Trimble strongly recommends that you transfer coordinate systems to the field device in a coordinate system export file. This is preferable to selecting and sending a single coordinate system.

Transferring a coordinate system export file

Use the Trimble Data Transfer utility to transfer a coordinate system export file to the TerraSync software. A coordinate system export file can contain a number of coordinate systems and sites.

To transfer a coordinate system export file:

1. Connect the field device to the office computer, start the Data Transfer utility, and connect to the appropriate device definition. For detailed instructions, see the *TerraSync Software Getting Started Guide*.
2. Select the **Send** tab.
3. Click **Add** and select Coordinate System Export File from the drop-down list. The *Open* dialog appears, showing all coordinate system export (.cse and .csw) files in the default location for coordinate system files, C:\Program Files\Common Files\Trimble\Geodata.
4. Browse for the correct drive and folder if necessary, then select a .cse file and click **Open**.

Note – If you select more than one .cse or .csw file to send, only the coordinate systems in the last file you transfer will be loaded into the TerraSync software. Each transferred file replaces any previously transferred files.

5. The *Open* dialog disappears. The selected coordinate system export file is added to the *Send* list in the *Data Transfer* dialog.
6. Click **Transfer**.
7. If coordinate systems or sites in the selected export file reference other files such as geoid grid files, the *Associated Files* dialog appears. Select the appropriate check box to send each file required, and then click **OK**.

The selected coordinate system export file and any associated files are transferred to the field computer, replacing any coordinate systems stored in the TerraSync software.

For more information, refer to the *GPS Pathfinder Office Software Online Help*.

Transferring a single coordinate system

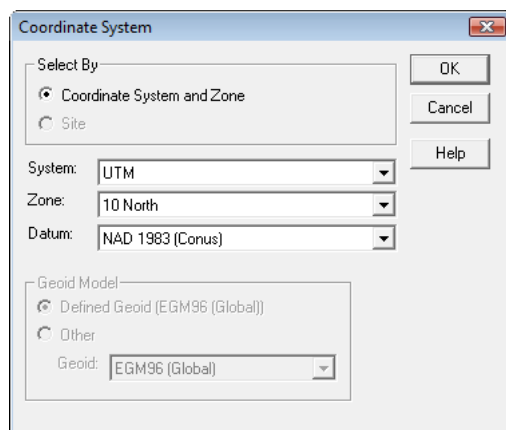


CAUTION – To prevent the loss of coordinate system information in the TerraSync software, Trimble strongly recommends that you transfer coordinate systems to the field device in a coordinate system export file. This is preferable to selecting and sending a single coordinate system.

Use the Trimble Data Transfer utility to transfer a single coordinate system to the TerraSync software.

To transfer a coordinate system:

1. Connect the field device to the office computer, start the Data Transfer utility, and connect to the appropriate device definition. For detailed instructions, see the *TerraSync Software Getting Started Guide*.
2. Select the *Send* tab.
3. Click **Add** and select Coordinate System from the drop-down list. The *Coordinate System* dialog appears:



4. From the *Select By* group, select the appropriate option for sending a coordinate system or a site.
5. Select the options in the *Site*, *System*, *Zone*, and *Datum* fields that match the coordinate data you want to send. Some of these fields are read-only or hidden, depending on the selections in other fields.
6. Click **OK**. The *Coordinate System* dialog disappears. The selected coordinate system or site is added to the *Send* list in the *Data Transfer* dialog.
7. Click **Transfer**.
8. If the selected coordinate system references other files such as geoid grid files, the *Associated Files* dialog appears. Select the appropriate check box to send each file required, and then click **OK**.

The selected coordinate system and associated files are transferred to the field computer, replacing any coordinate systems stored in the TerraSync software.

For more information, refer to the *GPS Pathfinder Office Software Online Help*.

Configuring coordinate systems

Use the *Coordinate System* form to edit the coordinate system, zone, and datum parameters. The TerraSync software lets you specify a datum transformation and a map projection so that you can see your GPS position, and the position of features you collect, in your local coordinate system. This makes it easy for you to check your position or to navigate using a map produced by your GIS.

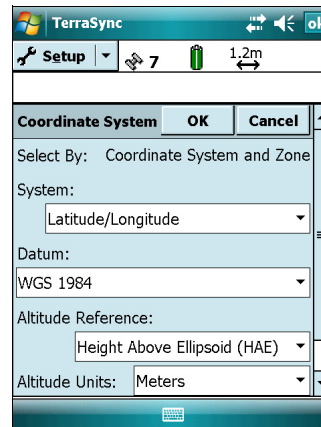
To configure the *Coordinate System* form:

1. From the Setup section, tap **Coordinate System**.

The *Coordinate System* form appears.

2. Use this form to specify the coordinate system, site, zone, datum, and altitude reference. You can also specify the units used to display the coordinates and altitude.
3. Tap **OK** when you have finished.

The *Coordinate System* form closes and any changes made are applied immediately throughout the TerraSync software. If any points in the Map section are not within the selected coordinate system, a warning message appears, asking you to confirm that you want to apply the new coordinate system. If you do, the map points that are outside this system are not displayed on the map.



Setting up a Base Station

In this chapter:

- [Introduction](#)
- [Logging base data to a file](#)

This chapter contains detailed information about setting up a base station.

Introduction

You can use the TerraSync software to configure a GPS receiver as a base station. Depending on the type of GPS receiver you use for the base station, you can set up the base station to:

- Log base data to a file (see below), which can be used to postprocess rover data in Trimble postprocessing software.
- Generate real-time corrections for broadcast to **DGPS** or **RTK** rovers (see [page 199](#)).

The base receiver must be a receiver that is supported by the TerraSync software. It must be capable of carrier phase data collection. [Table C.2](#) on [page 198](#) shows the GPS receivers that can be used, and the base station operations that each receiver supports.

Table C.2 Types of GPS receiver that can be used as a base station

GPS receiver	Log to base file	Output DGPS corrections	Output RTK corrections
GeoXH	Yes	No	No
GeoXT	Yes	No	No
GPS Pathfinder ProXH	Yes	No	No
GPS Pathfinder Pro XRS	Yes	Yes	No
GPS Pathfinder ProXRT	No	No	No
GPS Pathfinder ProXT	Yes	No	No
5700	No	Yes	Yes
5800	No	Yes	Yes
R8	No	Yes	Yes

By default, if you enable real-time output for a GPS Pathfinder receiver, it still logs base data to file. If you only want to output real-time corrections from a supported GPS Pathfinder receiver, or if you are using a survey receiver, you can use the TerraSync software to set up the receiver as an unattended base station (see [page 200](#)).

Logging base data to a file

The following receivers can log base data to a file, for use in Trimble postprocessing software:

- GPS Pathfinder ProXH receiver
- GPS Pathfinder ProXT receiver
- GPS Pathfinder Pro XRS receiver
- GeoExplorer GeoXH handheld
- GeoExplorer GeoXT handheld

To log base data to a file, open the *New File* screen and start a new base data file. Then step through the Base Station Setup wizard. For more information, refer to the *TerraSync Software Help*.

Generating real-time corrections

The following receivers can output real-time corrections:

- GPS Pathfinder Pro XRS receiver
- All supported survey receivers

To broadcast real-time corrections, configure the base receiver to generate real-time correction messages. Then either use the internal transmit radio in an R8 receiver, or connect the base receiver to a data radio, such as a TRIMTALK or TRIMMARK™ radio, which broadcasts the correction messages.

Survey receivers can output **DGPS** corrections in the **RTCM correction messages** message format. These corrections can be used by any rover that can use RTCM corrections from an external source, such as a GPS Pathfinder receiver or a GeoExplorer series handheld.

In addition to DGPS corrections in RTCM format, survey receivers can also output **RTK** corrections, in RTCM, **CMR**, or CMR+ format. RTK corrections can only be used by RTK-capable rover systems, such as a survey receiver connected to a field computer running version 2.40 or later of the TerraSync software.

The correction types and message format that you choose depend on the capabilities of the roving receivers that will use the corrections.



WARNING – Enabling power output can damage some field devices. Trimble recommends that you always select the Auto option unless you require power to the data radio and have protected the field device from power supplied by the GPS receiver. For more information, refer to the *TerraSync Software Help*.

To output real-time corrections:

1. Open the *New File* screen and start a new base data file.
2. Step through the Base Station Setup wizard. In the Real-Time Output step, do the following:
 - a. Set the *Correction Output* field to Receiver Port or R8 Internal Radio.
 - b. Choose an appropriate output format and message settings.
 - c. Tap the **Setup** button beside the *Correction Output* field. The *Receiver Port Settings* form appears. Configure the receiver's communication settings (baud rate, data bits, stop bits, and parity) to match those used by the data radio.

Note – You cannot use the TerraSync software to configure the data radio's communication settings. You can only configure the receiver to use the same settings as the radio. To change the data radio's communication settings, use the configuration software that is provided with the radio.

Unattended base station

If you do not want to log base data for postprocessing, or if the base receiver can only output corrections, you can set up the receiver as an unattended base station. An unattended base station, once set up, continues to operate without any controlling software. After you have used the TerraSync software to configure the base receiver, and the base station has started broadcasting corrections, you can disconnect the field computer and connect it to the roving receiver.

To set up an unattended base station:

1. Connect the field computer that the TerraSync software is installed on to the base receiver.
2. From the Data section, open the *New File* screen and start a new base data file.
3. Step through the Base Station Setup wizard. In the Real-Time Output step, make sure that you set the *Correction Output* field to Receiver Port, to enable real-time output.
4. If the base receiver is a survey receiver, a message appears before the new base file is opened, warning that you cannot collect base data using this receiver. Tap **OK** to continue.
5. To confirm that the receiver is generating correction messages, make sure that the base station icon is visible in the status bar.
6. Disconnect the TerraSync software from the base receiver. Do one of the following:
 - Physically disconnect the field device from the base receiver.
 - In the TerraSync software, disconnect from GPS.
 - Exit the TerraSync software *without* closing the base file.



Tip – Whenever you close the base file while the TerraSync software is connected to the receiver, the receiver stops generating real-time output. If you want the base receiver to continue operating unattended, do not close the base file before disconnecting from the base receiver.

Troubleshooting

In this appendix:

- Communications
- Field computer
- GPS
- Real-time differential correction
- Data files
- Map screen
- Coordinate system
- Position accuracy

This section lists possible causes of, and solutions to, problems you may encounter when using the TerraSync software.

Communications

The following table describes possible causes of communication problems.

Problem	Possible cause	Solution
The ActiveSync technology does not connect to the Windows Mobile powered device.	The device is not connected securely to the cradle or data cable.	Check cabling and then try to connect again.
	ActiveSync technology has timed out.	Lift the device out of the cradle and then replace it.
		Unplug the data cable of the device and then plug it in again.
	The TerraSync software is trying to connect to the GPS receiver using the COM port that ActiveSync technology is using.	Disconnect from GPS (see page 86), or exit the TerraSync software.
	The serial (COM) port is configured in the TerraSync software for use with a laser rangefinder.	Exit the TerraSync software.
		Change the selected port in the <i>Laser port</i> field on the <i>Logging Settings</i> form (see page 86).
	An ActiveSync technology partnership with another Windows Mobile powered device is interfering with connection to the device.	In ActiveSync technology, delete any partnerships with other Windows Mobile powered devices.
		Use a guest relationship, not a partnership.
Data transfer is slow.	The Windows Mobile powered device is not configured to connect at the maximum baud rate available.	Increase the connection speed. See the installation instructions.
The TerraSync software does not list the COM port that you want to use.	You added the COM port after you started the TerraSync software. For example, you inserted a PC card adaptor into a PCMCIA or CompactFlash slot on the field computer.	The TerraSync software only checks which COM ports are defined when it starts up. To force the software to check for new COM ports, exit and then restart the TerraSync software. Note – On a <i>GeoExplorer</i> series handheld, the COM1 serial port is always defined, even if the serial clip is not connected to the handheld.
	The port is a Bluetooth port that is no longer available.	Re-enable Bluetooth to re-configure the COM port.
The desktop computer does not connect to the Windows Mobile powered device.	The device is not set up to establish an office computer connection.	Open the Communications Properties dialog on the device. For information on how to do this, refer to the documentation for the device. Select the PC Connection tab and check that the <i>Allow connection with desktop computer when device is attached</i> check box is selected.
	Another application is using the COM port.	Exit the other application, or disconnect it from the COM port.
You cannot send or receive data files by email from within the TerraSync software.	The TerraSync software cannot connect to your ISP because it does not have your account login details.	In the settings for the email service that you are using, specify the login details for connecting to your ISP.
	The data files attached to emails are not being downloaded from the mail server.	Configure the email service that you are using to download the entire message and any attachments, not just the message header.
	The field computer does not support email.	Use the Trimble Data Transfer utility to transfer files to or from the TerraSync software.

Field computer

This section lists describes problems you may encounter when using a field computer.

Problem	Possible cause	Solution
The field computer does not turn on, or turns off immediately after being turned on.	The field computer's batteries are dead.	Replace or recharge the field computer batteries.
		Connect to an external power source.
The message Not enough memory appears.	Not enough memory on the Windows Mobile powered device is allocated to programs, because too much is allocated for storage.	Adjust the memory allocation. For more information, refer to the documentation for the device.
	There is not enough free memory on the field computer.	Delete unwanted files.
The screen is not visible outside or in bright light.	The backlight brightness is too low.	Adjust the backlight brightness. See page 53 .
A file attached to a filename field does not open or play on a desktop computer.	The file has been recorded in a special file format that is used only on a Windows Mobile powered device, or on a specific brand of Windows Mobile powered device. For example, there are a number of ways of encoding WAV (.wav) audio files that are specific to one brand of device.	In the software that you use to record or create the file, change the settings to record files in a format that can be read on a desktop computer.
A TerraSync software data file has been corrupted.	The field computer was reset or the batteries were removed while the software was logging data.	Open the file in the TerraSync software. The software automatically repairs and rebuilds the file. Note – If you suspect that a file is corrupted, rebuild it before transferring it to the office computer or sending it by email.

GPS

This section lists problems when you use GPS or a GPS receiver:

Problem	Possible cause	Solution
The message No GPS detected appears.	The cable connecting the field computer to the GPS receiver has not been connected, has been connected incorrectly, or is faulty.	Check that the cable is connected correctly. If it appears to be correct and all other equipment appears to be correct, the cable may require servicing.
	The COM port on the field computer is faulty.	Check that the COM port is undamaged. If it appears to be damaged, the field computer may require servicing.
	The GPS receiver's battery has not been connected correctly.	Check that the battery is correctly connected.
	The GPS receiver's battery is dead.	Recharge the GPS receiver's battery. Connect to an external power source.
The receiver has not acquired a satellite within three minutes of starting the TerraSync software.	The receiver is still looking for satellites.	Check the Satellite Information section (see page 86) to see how many satellites are being tracked by the receiver.
	The expected satellites are being obstructed.	The obstruction may be a building, a tree, or a large vehicle. Identify the obstruction and move away from it. Note – GPS does not work indoors.
	The GPS receiver's external antenna (or antenna cable) has not been connected, has been connected incorrectly, or is faulty.	Check that the external antenna is connected correctly. If the receiver still fails to acquire signals from a satellite, then the antenna and/or antenna cable may require servicing.
	The receiver has not been used for a very long time, and the almanac stored in the receiver is outdated.	Wait for up to 15 minutes until a new almanac has been recorded. Subsequent restarts should then be rapid.
	The receiver has been set to Base mode by another application.	Reset the GPS receiver. To do this, open the Setup Section (see page 86), tap Options and then select <i>Reset GPS receiver</i> .
The receiver is not able to compute a GPS position within one minute of starting the TerraSync software.	There are not enough satellites available. Four SVs are required to compute a position.	Use mission planning to check that there are sufficient satellites visible at this time.
		In the <i>GPS Settings</i> form (see page 86), check that the minimum elevation value is not too high.
		In the <i>GPS Settings</i> form (see page 86), check that the minimum SNR value is not too high.
	The current DOP value is too high.	Use mission planning to check for times when the PDOP or HDOP value will be below the configured maximum value. In the <i>GPS Settings</i> form (see page 86), check that the configured maximum DOP value (PDOP or HDOP) is not too low.

Real-time differential correction

This section lists problems you may encounter when using real-time differential corrections or real-time differential correction sources:

Problem	Possible cause	Solution
Not all positions are corrected in real time.	You have chosen to use uncorrected GPS if no real-time corrections are available.	From the last Choice field on the <i>Real-time Settings</i> form (see page 86), select Wait for real-time.
The TerraSync software is not using the first choice real-time correction source.	The first choice correction source is not available, so the second or third choice is being used.	In the Real-time section (see page 86), check the status of your preferred correction source. If necessary, change the configuration in the <i>Real-time Settings</i> form (see page 86), or wait until this source is available again.
	The correction source you expected is not set up as the preferred source.	In the <i>Real-time Settings</i> form (see page 86), select your preferred real-time correction source in the <i>Choice 1</i> field.
The integrated beacon component (Pro XRS receivers only) does not appear to work.	You have set the real-time source incorrectly.	In the <i>Real-time Settings</i> form (see page 86), set one of the Choice fields to Integrated Beacon. If integrated beacon is your preferred correction source, set the <i>Choice 1</i> field to Integrated Beacon.
	You have set the mode or frequency incorrectly.	In the <i>Real-time Settings</i> form (see page 86), select appropriate options in the <i>Mode</i> and <i>Frequency</i> fields.
The integrated OmniSTAR component (ProXRT and Pro XRS receivers only) does not appear to work.	You have set the real-time source incorrectly.	In the <i>Real-time Settings</i> form (see page 86), set one of the Choice fields to Integrated OmniSTAR. If integrated OmniSTAR is your preferred correction source, set the <i>Choice 1</i> field to Integrated OmniSTAR.
	You have entered the incorrect provider, satellite, and/or frequency.	In the <i>Real-time Settings</i> form (see page 86), select appropriate options in the <i>Service Provider</i> , <i>Name</i> , and <i>Frequency</i> fields.
	Your OmniSTAR subscription has expired or has not yet been activated.	In the <i>Integrated OmniSTAR Settings</i> form (see page 86), check the expiry date of the subscription.
The real-time differential correction link does not appear to work.	The telemetry link has been incorrectly installed, powered, cabled or configured.	Install the telemetry link as specified by the supplier. Consult the supplier if necessary.
	You have set the station ID incorrectly.	In the <i>Real-time Settings</i> form (see page 86), check that you have set the <i>Station ID</i> field correctly.
	You have configured the real-time settings incorrectly.	In the <i>Real-time Settings</i> form (see page 86), check that the settings under the <i>External Source</i> heading match the telemetry link and the transmitted RTCM data stream.

Data files

This section lists problems you may encounter with data files.

Problem	Possible cause	Solution
You cannot update a feature, add new features, or open a data file.	You are using the TerraSync Standard edition software, which does not allow you to open imported files. In this edition of the software, any file that you transfer from the office computer, create from Shapefiles, or receive by email is marked Not Usable.	Upgrade to the fully functional TerraSync Professional edition software.
	The file is already open in the background of the Map section.	Set the map background file to None. Select another file for the map background.
	Position updates are not allowed.	Set the <i>Allow Position Update</i> field (see page 86) on the <i>Logging Settings</i> form to Yes or Confirm.
You cannot change settings or use some menu items.	The setting or menu item is locked by the current configuration. A locked icon (🔒) appears beside locked settings and menu items.	Unlock the configuration file.
You cannot unlock a configuration file.	You have forgotten the password for the configuration file.	Use the manager's password, TrimbleTerraSync .
Automatically generated time attributes are incorrect.	The internal clock on the field computer has been set incorrectly, or the selected time zone is incorrect.	Before you open any data files, use the World Clock utility on the field computer to set the local time and time zone correctly. For more information, refer to the documentation for the field computer.
File dates are incorrect.	The internal clock on the field computer has been set incorrectly, or the selected time zone is incorrect.	Before you open any data files, use the World Clock utility on the field computer to set the local time and time zone correctly. For more information, refer to the documentation for the field computer.

Map screen

This section lists problems you may encounter with map files.

Problem	Possible cause	Solution
Some or all features are missing from the <i>Update Features</i> screen or the Map section.	There is no data file open.	Use the <i>New File</i> form to create a new file (see page 84), or the <i>Existing File</i> screen (see page 84) to open an existing file.
	There are no features in the file to display.	Open the <i>Collect Features</i> screen to collect some features (see page 84).
	The layer in the Map section that the features belong to has been turned off, or the group in the Data section that the features belong to has been hidden.	In the Map section, tap Layers and select <i>Filtered Features</i> , or <i>Unfiltered Features</i> , to display the appropriate layer (see page 83).
		In the <i>Update Features</i> screen, tap Options and then select <i>Show Filtered Features</i> , or <i>Show Unfiltered Features</i> , to display the appropriate group (see page 84).
	The background file in the Map section is turned off or has not been selected.	If the data you want to see is in a background file, use the <i>Background File</i> form to check that the map is set to display this file (see page 83). Then tap Layers and make sure that the <i>Background</i> option has a check mark beside it.
	The zoom scale is incorrect.	Check that you are not zoomed in too close or out too far to see the data. If you have distant items to display, the zoom extents of the map will be at a more distant scale.
Some or all features are missing from the <i>Update Features</i> screen or the Map section.	You are viewing the wrong area in the Map screen.	Use the Pan map tool (see page 83) or the Pan button on the Command bar to pan the display to the appropriate area.
		Use the Zoom Extents mode (see page 83) or the Zoom Extents button on the Command bar to zoom to a scale where all features are visible.
	The features have been filtered out.	Open the <i>Filter By</i> form where you can disable or change the criteria for filters (see page 84).
	The features have been deleted.	Deleted features are never shown in the Map section. In the <i>Update Features</i> screen (see page 84), select a deleted feature (a feature with a line through it), tap Options , and then select <i>Undelete</i> .

Coordinate system

This section lists problems you may encounter with the coordinate system.

Problem	Possible cause	Solution
The coordinates displayed by the TerraSync software seem to be incorrect.	You have selected the wrong coordinate system or zone.	In the <i>Coordinate System</i> form, select the correct coordinate system and zone (see page 86).
	You have selected the wrong coordinate units.	In the <i>Coordinate System</i> form, select the coordinate system, then select the correct coordinate units (see page 86).
	You are using the Latitude/Longitude coordinate system and have selected the wrong datum.	In the <i>System</i> field on the <i>Coordinate System</i> form (see page 86), select Latitude/Longitude and specify the correct datum.
	You are using the UTM coordinate system and have selected the wrong UTM zone or datum.	In the <i>System</i> field on the <i>Coordinate System</i> form (see page 86), select UTM, then specify the correct zone and datum. The traditional UTM datum for the U.S.A. is NAD-27.
	You have defined a custom coordinate system, datum and/or zone incorrectly in the Coordinate System Manager utility in the GPS Pathfinder Office software.	Check the definition of the coordinate system, datum and/or zone carefully.
You cannot select some coordinate system datums, zones, or ellipsoids.	You transferred a single coordinate system to the TerraSync software, or a coordinate system export file that did not include all the coordinate systems you want. When you transfer coordinate systems to TerraSync, the transferred data overwrites the existing data, so you must make sure that you transfer all the coordinate systems you require.	Create a coordinate system export file that contains all the coordinate systems that you want to use, and transfer this file to TerraSync.
	The required coordinate system files have been deleted from the field computer.	Transfer the files from the GPS Pathfinder Office software again. To restore default coordinate systems, re-install the TerraSync software.
The target icon is not at the location of the feature you selected as the navigation target.	You re-recorded the GPS position of the feature, or digitized its position. The navigation target remains at the old position of the feature.	Reselect the feature as the navigation target.
The message The system time of this device does not match GPS time appears.	The selected time zone of the field computer is incorrect.	Before you open any data files, use the World Clock utility on the field computer to set the local time zone correctly. For more information, refer to the documentation for the field computer.

Position accuracy

This section lists possible causes of, and solutions to, problems with the accuracy of GPS positions.

Problem	Possible cause	Solution
The accuracy of recorded GPS positions is not as good as expected.	You did not record sufficient positions to achieve the required accuracy.	In the Data Dictionary Editor, increase the value in the <i>Minimum Positions</i> field to make sure that the TerraSync software records enough positions. Collect more positions at each point feature.
	The maximum DOP value was too high. If you record positions when the DOP is high, this has a detrimental effect on the accuracy of these positions.	In the <i>GPS Settings</i> form (see page 86), lower the maximum PDOP or HDOP value to make sure that the TerraSync software only logs accurate positions.
	The minimum SNR or elevation value was too low. If the receiver uses satellites with a low SNR or elevation, this may have a detrimental effect on the accuracy of positions calculated by the receiver.	In the <i>GPS Settings</i> form (see page 86), raise the minimum SNR and/or elevation value to make sure that the receiver uses satellites with a strong signal.
The accuracy of recorded GPS positions is not as good as expected.	You are operating in an area of high multipath.	Move to an area with better GPS coverage and use offsets. Apply velocity filtering: <ul style="list-style-type: none"> Set the <i>Velocity Filter</i> field on the <i>GPS Settings</i> form to Auto to apply velocity filtering to positions as they are recorded. If at least one valid real-time correction source is selected in the <i>Real-time Settings</i> for, and the last Choice field is set to Wait for Real-time, then only real-time positions are filtered. If you intend to postprocess the data, set the <i>Log Velocity Data</i> field on the <i>Logging Settings</i> form to On. Then, when you differentially correct the data in the postprocessing software, use the velocity filtering option to smooth uncorrected positions.
	No configured real-time source is available, so the TerraSync software is using uncorrected positions.	In the last Choice field on the <i>Real-time Settings</i> form, select Wait for Real-time, to use differentially corrected positions only.

Problem	Possible cause	Solution
You are unable to differentially correct GPS positions (either in real time or in postprocessing).	The TerraSync software used satellites that were not visible to the base station.	Make sure that the minimum elevation value in the TerraSync software is set sufficiently high so that the software only uses satellites which are also visible to the base station.
		Try correcting the data using another base station file.
	You reset the receiver and began logging data before a new almanac was collected, causing the TerraSync software to use satellites that were not visible to the base station.	Wait until the receiver has collected a new almanac before you log data.
Real-time corrected GPS positions and known truth points do not coincide.	You have incorrectly configured the real-time correction source datum.	In the Real-time Settings form (see page 167), check that the datum for the real-time source you are using is correctly selected.

Glossary

This section explains some of the terms used in this manual.

almanac	An almanac is data transmitted by a GPS satellite, which includes orbit information on all the satellites, clock corrections, and atmospheric delay parameters. The almanac is stored on the field computer . It is used to facilitate rapid acquisition of GPS signals when you turn on the TerraSync software, or when you have lost track of satellites and are trying to regain GPS signals.
attribute	An attribute is information about a geographic feature in a GIS or database, usually stored in a table and linked to the feature by a unique identifier. Every identifiable feature has attributes. One common attribute of all mapped features is geographic position. Other attributes depend on the type of feature. For example, attributes of a road might include its name, surface type, and number of lanes. Each attribute has a range of possible values, called a domain. The value selected is called the attribute value.
attribute value	An attribute is the particular value for a feature, chosen from the domain of an attribute. For example, for a road feature, surface type is an attribute; bitumen, gravel, and concrete are domains; and gravel is an attribute value.
base station	Also called a reference station. A base station is a GPS antenna and receiver positioned on a known location specifically to collect data for differential correction . Base data needs to be collected at the same time as you collect data on a rover unit. A base station can be a permanent station that collects base data for provision to multiple users, or a rover unit that you locate on known coordinates for the duration of the datalogging session.
baud rate	A baud is a unit used to measure the speed of electronic code transmissions, generally one bit per second. The higher the baud rate, the faster the transfer of data. However, both the input and output device must be configured to the same baud rate for data to be successfully transferred.
bearing	A bearing is the direction from one point to another, usually measured clockwise from north. In the TerraSync software, the bearing indicates the direction from your current position to the target.
broadcast server	A broadcast server is an Internet server that manages authentication and password control for differential correction sources such as virtual reference station (VRS network) networks, and relays corrections from the source that you select. An NTRIP server is an example of a broadcast server.
C/A code	See code phase .
carrier phase	Carrier phase is the time taken for the L1 or L2 carrier signal generated by the satellite to reach the GPS receiver. Measuring the number of carrier waves between the satellite and receiver is a very accurate method of calculating the distance between them.
Cartesian coordinates	The Cartesian coordinate system is a system of coordinates that defines the location of a point in space in terms of its perpendicular distance from each of a set of mutually perpendicular axes. The X direction is 0° latitude (the Greenwich meridian) and the Y direction is 90° east longitude.
centroid	The calculated center of an area feature.

CMR	<p>(Compact Measurement Record)</p> <p>A real-time message format developed by Trimble for broadcasting corrections to other Trimble receivers. CMR is a more efficient alternative to RTCM correction messages, but is not supported by all non-Trimble receivers.</p>
Coarse Acquisition code	See code phase .
code phase	<p>(also known as Coarse Acquisition code, or C/A code)</p> <p>The difference between the pseudo-random number code generated by the TerraSync software and the pseudorandom number code coming in from the satellite. The code phase data is used to quickly compute the distance to a satellite and therefore calculate your position.</p>
coordinate system	<p>A set of transformations that allow GPS positions (in the WGS-84 ellipsoid) to be transformed to projection coordinates with elevations above the geoid. Essentially, a coordinate system consists of a datum transformation, a geoid model allocation, and a projection definition.</p>
cross-track error	<p>The amount and direction by which your current heading differs from the cross-track line.</p>
cross-track line	<p>The shortest direct path from the navigation start to the navigation target.</p>
data dictionary	<p>A data dictionary is a description of the objects to be collected for a particular project or job. It is used in the field to control the collection of the spatial and attribute information about these objects. The elements of a data dictionary could include point, line, and area features.</p>
datum	<p>A datum is a mathematical model of the earth's surface. World geodetic datums are typically defined by the size and shape of an ellipsoid and the relationship between the center of the ellipsoid and the center of the earth.</p> <p>Because the earth is not a perfect ellipsoid, any single datum will provide a better model in some locations than others. Therefore, various datums have been established to suit particular regions.</p> <p>For example, maps in Europe are often based on the European datum of 1950 (ED-50). Maps in the United States are often based on the North American datum of 1927 (NAD-27) or 1983 (NAD-83).</p> <p>All GPS coordinates are based on the WGS-84 datum surface.</p> <p>For more information, see Modelling the earth's surface, page 188.</p>
datum transformation	<p>A datum transformation defines the method and parameters that are used to transform the coordinates of a point defined in one datum to coordinates in a different datum. Trimble software supports several methods of datum transformation including Seven-Parameter, Three-Parameter (also referred to as Molodensky), and grid-based transformations. Typically, you use datum transformations to convert data collected in terms of the WGS-84 datum using GPS methods onto datums used for mapping purposes in individual regions and countries.</p>
declination	See magnetic declination .
DGPS	See real-time differential GPS .

differential correction	<p>Differential correction is the process of correcting GPS data collected on a rover with data collected simultaneously at a base station. Because it is on a known location, any errors in data collected at the base station can be measured, and the necessary corrections applied to the rover data.</p> <p>Differential correction can be done in real time, or after the data has been collected by postprocessing.</p>
differential GPS	See real-time differential GPS .
digitizing	The process of creating positions manually by selecting a point on a map.
Dilution of Precision	<p>(DOP)</p> <p>A measure of the quality of GPS positions, based on the geometry of the satellites used to compute the positions. When satellites are widely spaced relative to each other, the DOP value is lower, and position accuracy is greater. When satellites are close together in the sky, the DOP is higher and GPS positions may contain a greater level of error.</p> <p>PDOP (Position DOP) indicates the three-dimensional geometry of the satellites. Other DOP values include HDOP (Horizontal DOP) and VDOP (Vertical DOP), which indicate the accuracy of horizontal measurements (latitude and longitude) and vertical measurements respectively. PDOP is related to HDOP and VDOP as follows:</p> $PDOP^2 = HDOP^2 + VDOP^2$
DOP	See Dilution of Precision .
EGNOS	<p>(European Geostationary Navigation Overlay Service)</p> <p>A satellite-based augmentation system (SBAS) that provides a free-to-air differential correction service for GPS. EGNOS is the European equivalent of WAAS, which is available in the United States.</p>
ellipsoid	<p>An ellipsoid is the three-dimensional shape that is used as the basis for mathematically modeling the earth's surface. The ellipsoid is defined by the lengths of the minor and major axes. The earth's minor axis is the polar axis and the major axis is the equatorial axis. For more information, see Modelling the earth's surface, page 188.</p>
feature	<p>A feature is a physical object or event that has a location in the real world, which you want to collect position and/or descriptive information (attributes) about. Features can be classified as points, lines, or areas. For example, a road sign is a point feature, a road is a line feature, and a park is an area feature.</p> <p>Features are defined in a data dictionary.</p>
field computer	<p>In the TerraSync software documentation, a field computer is any portable computer such as a handheld device, a laptop, or a Tablet PC running the TerraSync software.</p> <p>See also Windows Mobile powered device.</p>
geoid	<p>A geoid is an imaginary three-dimensional surface representing Mean Sea Level (MSL) if it was projected to extend through the continents. Unlike an ellipsoid or datum, which have a symmetrical surface, the geoid undulates perpendicular to the force of gravity.</p> <p>For more information, see Modelling the earth's surface, page 188.</p>

geoid height	<p>(Also known as geoid separation and geoidal undulation.)</p> <p>The geoid height is the distance of the geoid (MSL) above or below the reference ellipsoid.</p>
geoid model	<p>A geoid model is a mathematical representation of the geoid for a specific area, or for the whole earth.</p>
great-circle distance	<p>The great-circle distance is the shortest distance between two points on the surface of a sphere.</p>
guest	<p>A guest connection lets a Windows Mobile powered device exchange and share information with a desktop computer. You need a guest connection or a partnership to transfer data between the TerraSync software on the device and the GPS Pathfinder Office software on the desktop computer.</p> <p>When you connect as a guest, you can:</p> <ul style="list-style-type: none">• move or copy files between the two computers• back up files on the Windows Mobile powered device• install or uninstall programs on the Windows Mobile powered device <p>However, you cannot synchronize data between the two computers when you connect as a guest. To synchronize data you must set up a partnership.</p> <p>A guest connection is temporary. When the guest Windows Mobile powered device is disconnected from the desktop computer, any settings for the guest connection are lost. The next time you connect the device to the desktop computer, you must set the guest connection again.</p> <p>For more information, refer to the <i>ActiveSync Help</i>.</p>
HAE	<p>See Height Above Ellipsoid.</p>
HDOP	<p>See Horizontal Dilution of Precision.</p>
heading	<p>The heading is the direction you are facing or traveling, usually measured clockwise from north.</p>
Height Above Ellipsoid	<p>(HAE)</p> <p>HAE is a method for referencing altitude. Altitudes expressed in HAE are actually giving the height above the datum, not the ellipsoid. GPS uses the WGS-84 datum and all heights are collected in relation to this surface. It is important to use the same datum when comparing altitudes in HAE.</p>
horizon	<p>The line at which the earth and sky seem to meet.</p>

Horizontal Dilution of Precision	<p>(HDOP)</p> <p>Dilution of Precision (DOP) is a measure of the quality of GPS positions, based on the geometry of the satellites used to compute the positions. When satellites are widely spaced relative to each other, the DOP value is lower, and position accuracy is greater. When satellites are close together in the sky, the DOP is higher and GPS positions may contain a greater level of error.</p> <p>HDOP is a DOP value that indicates the accuracy of horizontal measurements. Other DOP values include VDOP (vertical DOP) and PDOP (Position DOP).</p> <p>The TerraSync software lets you specify either a maximum HDOP value or a maximum PDOP. It uses this maximum value as an upper bound on DOP values. You can configure the desired level of accuracy, and make sure that the positions logged are of a certain quality. When the DOP exceeds this maximum, the TerraSync software stops computing GPS positions.</p> <p>Using a maximum HDOP is ideal for situations where vertical precision is not particularly important, and your position yield would be decreased by the vertical component of the PDOP (for example, if you are collecting data under canopy).</p>
H-Star technology	<p>H-Star technology is a Trimble-patented technology allowing the collection of high accuracy GPS data. A GPS receiver that has H-Star technology logs L1 data or, if used with an external dual-frequency antenna, logs L1 and L2 data. Real-time H-Star technology uses corrections from an external source to provide decimeter accuracy in the field. Postprocessed H-Star technology uses base data from multiple base stations to obtain better postprocessed accuracy for the collected data once back in the office.</p>
IMS	<p>See Web map server.</p>
International Terrestrial Reference Frame	<p>(ITRF)</p> <p>A reference frame defined by the International Earth Rotation Service (IERS), with its origin at the Earth's center of mass. The WGS-84 datum is aligned with the current realization of ITRF, ITRF 2000 (also called ITRF00).</p>
Internet Map Server	<p>(IMS)</p> <p>See Web map server.</p>
ionospheric noise	<p>Ionospheric noise is the effect that the ionosphere has on GPS signals. The ionosphere is the band of charged particles 100 to 200 kilometers (60 to 125 miles approximately) above the surface of the earth.</p>
ITRF	<p>See International Terrestrial Reference Frame.</p>
L1	<p>The primary L-band carrier used by GPS satellites to transmit satellite data. The frequency is 1575.42 MHz. It is modulated by C/A code, P-code, or Y-code, and a 50bps navigation message.</p>
L2	<p>The secondary L-band carrier used by GPS satellites to transmit satellite data. The frequency is 1227.6 MHz. It is modulated by P-code or Y-code, and a 50bps navigation message.</p>
laser rangefinder	<p>An instrument that uses a laser beam to accurately measure the distance to a target. Some rangefinders also measure the bearing to the target. Use a laser rangefinder to measure offsets when you are unable to record positions at the exact location of the feature.</p>

latitude	<p>Latitude is an angular measurement made from the center of the earth to north or south of the equator. It comprises the north/south component of the latitude/longitude coordinate system, which is used in GPS data collection.</p> <p>Traditionally, north is considered positive, and south is considered negative.</p>
local datum	<p>The datum chosen for use in a particular region. Positions on a local datum are commonly called local geodetic coordinates.</p> <p>Coordinates are traditionally given in terms of the local datum. When you survey using the satellite-based Global Positioning System (GPS), however, the coordinates you collect are based on the World Geodetic System 1984. These coordinates are given in terms of the WGS-84 datum. Before you can use WGS-84 coordinates with coordinates measured in terms of the local datum, you must perform a datum transformation.</p>
local ellipsoid	<p>The ellipsoid specified by a coordinate system. The WGS-84 coordinates are first transformed onto this ellipsoid, then converted to grid coordinates.</p>
lock	<p>To track sufficient satellites for logging carrier phase or H-Star data. 'Loss of lock' occurs when the number of available satellites drops below four when logging a static GPS position, or below five when logging a streaming GPS position. Loss of lock can also occur during H-Star data collection if the PDOP rises above 6.</p>
longitude	<p>Longitude is an angular measurement made from the center of the earth to the east or west of the Greenwich meridian (London, England). It comprises the east/west component of the latitude/longitude coordinate system, which is used in GPS data collection.</p> <p>Traditionally, east is considered positive, and west is considered negative.</p>
magnetic declination	<p>Magnetic declination is the difference between magnetic north and true north. Declination is expressed as an angle and differs between locations.</p>
magnetic north	<p>A bearing that is relative to magnetic north uses the north magnetic pole as its north reference.</p>
Mean Sea Level	<p>(MSL)</p> <p>Mean Sea Level is a method of altitude reference. Altitudes expressed in relation to MSL actually give a height above the geoid.</p> <p>It is important to use the same geoid when comparing altitudes in MSL.</p>
MSAS	<p>(MTSAT Satellite-Based Augmentation System)</p> <p>MSAS is a satellite-based augmentation system (SBAS) that provides a free-to-air differential correction service for GPS. MSAS is the Japanese equivalent of WAAS, which is available in the United States.</p>
MSL	<p>See Mean Sea Level.</p>
MTSAT Satellite-Based Augmentation System	<p>See MSAS.</p>
multipath	<p>Multipath is interference that occurs when GPS signals arrive at the receiver having traveled different paths. For example, this may happen if some signals are reflected off a building before reaching the receiver. If a signal takes a longer path it will show a larger distance to the satellite and therefore decrease position accuracy.</p>
NAD-27	<p>North American Datum of 1927. A horizontal datum employing the Clarke 1866 ellipsoid. Height values of this era are expressed in NGVD (National Geodetic Vertical Datum) of 1929.</p>

NAD-83	North American Datum of 1983. A horizontal datum employing the GRS-80 ellipsoid . The original realization of NAD-83 was almost identical to WGS-84. The current realization NAD-83 (CORS96) differs from WGS-84 by up to a meter.
NMEA	<p>Initial letters of National Marine Electronics Association.</p> <p>NMEA 0183 defines the standard for interfacing marine electronic navigational devices. This standard defines a number of strings referred to as NMEA sentences that contain navigational details such as positions. Most Trimble GPS receivers can output positions as NMEA sentences.</p>
NTRIP	<p>(Networked Transport of RTCM via Internet Protocol)</p> <p>NTRIP enables the streaming of DGPS or RTK correction data via the Internet. Data is usually received using a modem and/or a cellphone. An NTRIP server is an Internet server that manages authentication and password control for differential correction sources including base stations and VRS networks, and relays corrections from the source that you select. An NTRIP server can be accessed by a number of users at the same time.</p>
office computer	<p>An office computer is any computer running Trimble postprocessing software. Usually the office computer is a desktop computer located in the office, but if you are running your data collection software on a laptop or Tablet PC then the office computer may actually be the same computer as the field computer.</p>
parity	<p>A digital message is composed of 0's and 1's. Parity is a form of error checking that sums the 0's and 1's of the digital message. A parity error results when one of the bits is changed so that the parity calculated at message reception is not the same as it was at message transmission. Options for parity checking include even, odd, and none.</p> <p>Typically you should have the same parity setting on the Windows Mobile powered device as on the external device you are communicating with.</p>
partnership	<p>A partnership lets a Windows Mobile powered device exchange and share information with a desktop computer. You need a partnership or a guest connection to transfer data between the TerraSync software on the device and the GPS Pathfinder Office software on the desktop computer.</p> <p>A partnership stores information about:</p> <ul style="list-style-type: none">• how to connect to the device• what types of files you can send and receive• what files you can synchronize, and how to manage synchronization• how to convert files for transfer <p>Unlike a guest connection, a partnership is stored on the desktop computer and remains when the device is disconnected from the desktop computer.</p> <p>For more information, refer to the <i>ActiveSync Help</i>.</p>
PC	In TerraSync software documentation, a field computer that is running a supported Windows desktop operating system.
PDOP	See Position Dilution of Precision .

Position Dilution of Precision	<p>(PDOP)</p> <p>Dilution of Precision (DOP) is a measure of the quality of GPS positions, based on the geometry of the satellites used to compute the positions. When satellites are widely spaced relative to each other, the DOP value is lower, and position accuracy is greater. When satellites are close together in the sky, the DOP is higher and GPS positions may contain a greater level of error.</p> <p>PDOP is a DOP value that indicates the accuracy of three-dimensional measurements. Other DOP values include VDOP (vertical DOP) and HDOP (Horizontal DOP).</p> <p>The TerraSync software lets you specify either a maximum HDOP value or a maximum PDOP. It uses this maximum value as an upper bound on DOP values. You can configure the desired level of accuracy, and make sure that the positions logged are of a certain quality. When the DOP exceeds this maximum, the TerraSync software stops computing GPS positions.</p> <p>Using a maximum PDOP value is ideal for situations where both vertical and horizontal precision are important.</p>
postprocessing	<p>Postprocessing is the processing of satellite data after it has been collected in order to eliminate error. This involves using PC software to compare data from the rover to data collected at the base station.</p> <p>Because the base station is on a known location, any errors can be determined and removed from the rover data.</p>
predicted postprocessed accuracy	<p>The predicted postprocessed accuracy is a prediction of the accuracy that will be achieved after postprocessing. When logging H-Star or carrier data, the predicted postprocessed accuracy value applies to all the positions collected since you achieved lock on the required minimum number of satellites. For all other receivers, this value applies only to the current position. The predicted postprocessed accuracy has a 68% confidence level, which means that 68% of the time the postprocessed position will be within the predicted postprocessed accuracy value shown when the position was collected.</p>
PRN	<p>See pseudo-random number.</p>
projection	<p>A mapping of a set of coordinates from a datum to a plane; or a set of mathematical rules for performing such a translation. Projections are used to create flat maps that represent the surface of the earth or parts of it.</p>
pseudo-random number	<p>(PRN)</p> <p>The pseudo-random number is the code of 0s and 1s transmitted by GPS satellites, which appears to be random “noise”, but is actually a complex pattern that can be exactly reproduced.</p> <p>Each satellite has its own unique PRN code, which together are used by the GPS receiver to calculate code phase positions.</p>
raster	<p>A raster graphic is a graphical image consisting of rows and columns of dots. The color of each dot is represented by the value of one or more data bits in the image file. A bitmap (.bmp file) is a type of raster image.</p>

real-time differential GPS	<p>(also known as real-time differential correction, DGPS)</p> <p>Real-time differential GPS is the process of correcting GPS data as you collect it. This is achieved by having corrections calculated at a base station sent to the receiver via a radio link. As the rover receives the position it applies the corrections to give you a very accurate position in the field.</p> <p>Most real-time differential correction methods apply corrections to code phase positions. RTK uses carrier phase measurements.</p>
real-time kinematic rover	<p>See RTK.</p> <p>A rover is any mobile GPS datalogger collecting or updating data in the field, typically at an unknown location. Data collected on a rover can be differentially corrected relative to base station data.</p>
roving mode	<p>During RTK data collection, TerraSync logs line and area features, and between feature positions, in roving mode. Point features and vertices are logged in static mode.</p> <p>In roving mode, the TerraSync software records all RTK-corrected positions that meet the precision tolerances you have specified. All other positions are discarded.</p>
RTCM correction messages	<p>RTCM are the initial letters of the Radio Technical Commission for Maritime Services. This is a commission established to define a differential data link for the real-time differential correction of roving GPS receivers. There are two types of RTCM differential correction message. All Trimble GPS receivers use the version 2.1 or later RTCM protocol.</p>
RTK	<p>(real-time kinematic)</p> <p>A real-time differential GPS method that uses carrier phase measurements for greater accuracy.</p>
SBAS	<p>(Satellite-Based Augmentation System)</p> <p>SBAS is based on differential GPS, but applied to wide area (WAAS, EGNOS, MSAS). Networks of reference stations are used and corrections and additional information are broadcast via geostationary satellites.</p>
signal-to-noise ratio	<p>(SNR)</p> <p>The signal strength of a satellite is a measure of the information content of the signal, relative to the noise of the signal. The typical SNR of a satellite at 30° elevation is between 47 and 50 dBHz. The quality of a GPS position is degraded if the SNR of one or more satellites in the constellation falls below 39 dBHz.</p> <p>The TerraSync software lets you set a minimum SNR value. This value is used to determine whether the signal strength of a satellite is sufficient for that satellite to be used by the GPS receiver. If the SNR of a satellite is below the configured minimum SNR, that satellite is not used to compute positions.</p>
site	<p>A site consists of an existing coordinate system plus an extra set of parameters for horizontal and vertical adjustments. Together these provide the best fit of GPS data to a specific area or site. Because the additional corrections are only valid for a limited area, that area is called a <i>site</i>, or <i>local site</i>.</p> <p>A coordinate system is designed to apply over a large area and does not provide for variations that occur in local coordinates. When you create a site, you shift coordinates obtained using GPS so that they better fit coordinates in the existing map grid that were obtained using traditional surveying methods.</p>

SNR	See signal-to-noise ratio .
SSF	<p>(Standard Storage Format)</p> <p>A Trimble file format. SSF files store GPS data from a Trimble GPS receiver. Usually these files have the filename extension .ssf. A corrected SSF file has a .cor or .phs extension; an SSF file created by importing data has the extension .imp.</p>
static GPS position	A static GPS position is a GPS position logged when the GPS receiver is stationary, as when logging a point feature or an averaged vertex in a line or area feature.
static mode	<p>During RTK data collection, TerraSync logs point features and vertices in static mode. Line features, area features, and between feature positions are logged in roving mode.</p> <p>In static mode, the TerraSync software records only the RTK-corrected position with the best precision. All other positions are discarded.</p>
streaming GPS position	<p>(Also known as dynamic GPS positions.)</p> <p>Streaming GPS positions are GPS positions logged when the GPS receiver is moving. When you are moving along a line feature, or around the perimeter of a polygon feature, you log streaming GPS positions. Your application logs a new vertex for every GPS position received from the GPS receiver.</p>
synchronize	<p>Synchronization is the process where ActiveSync technology compares information on a Windows Mobile powered device with the corresponding information on the desktop computer, and then updates either computer with the latest information.</p> <p>The data stored by the TerraSync software is not synchronized by ActiveSync technology. Use the Trimble Data Transfer utility to transfer data to and from the TerraSync software.</p> <p>For more information, refer to the <i>ActiveSync Help</i> and the <i>Data Transfer Utility Help</i>.</p>
tracking	The process of receiving and recognizing signals from a satellite.
true north	A bearing that is relative to true north uses the north celestial pole as its north reference.
UTC	<p>Universal Time Coordinated.</p> <p>UTC is a time standard based closely on local solar meantime at the Greenwich meridian (GMT). GPS time is directly related to UTC.</p>
UTM	<p>Universal Transverse Mercator Map Projection.</p> <p>A special case of the Transverse Mercator projection. Abbreviated as UTM, it consists of 60 north/south zones, each 6 degrees wide in longitude.</p>
vector	<p>A vector graphic is a graphical image consisting of mathematical descriptions of lines, points, and areas.</p> <p>When you transfer an SSF data file to the TerraSync software as a background file, its attribute information is removed, leaving only the vector information. You can view the features in the map, but you cannot select them, view their attributes, or edit them.</p>
velocity	Velocity is essentially a measure of speed that takes into account direction of travel as well as the distance traveled over a period of time.
vertex	A point on a line or area feature where two adjacent segments of the feature join. Each position that you collect for a line or area feature is a vertex of that feature.

VRS network	<p>A VRS network consists of GPS hardware, software, and communication links. It uses data from several base stations to provide corrections to roving receivers that are more accurate than corrections from a single base station.</p> <p>Unlike other real-time correction sources, using corrections from a VRS network requires two-way communication between the VRS network and the roving receiver. The roving receiver must send its position to the server, so that the server can calculate corrections for that position, and select the closest base station if necessary. The server generates a unique virtual reference station for each roving receiver that connects to it.</p>
WAAS	<p>(Wide Area Augmentation System)</p> <p>WAAS is a satellite based augmentation system (SBAS) that provides a free-to-air differential correction service for GPS. WAAS was established by the Federal Aviation Administration (FAA). Its coverage area includes the continental United States and outlying parts of Canada and Mexico.</p>
waypoint	<p>A waypoint is a geographical point that, unlike a feature, holds no attribute information beyond a name and location. Typically, waypoints are used to denote objects whose locations are of primary interest, such as a survey mark. Waypoints are most often used for navigation.</p>
Web map server	<p>An Internet site that lets users download GIS data, background, and other files for a specified geographical area. The TerraSync software can download raster background files from a Web map server.</p>
WGS-84	<p>WGS-84 is an abbreviation for World Geodetic System 1984. WGS-84 has superseded WGS-72 as the datum used by GPS since January 1987.</p> <p>The WGS-84 datum is based on the ellipsoid of the same name.</p>
Windows Mobile powered device	<p>A small handheld device powered by the Windows Mobile operating system. A Windows Mobile powered device usually has a small screen, and limited memory and storage space.</p>

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