REFERENCE MANUAL

TerraSync™ software

Trimble.

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Version 2.50
Revision A
April 2005

Trimble

Contact Information

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Contents

Introduction

In this chapter:

- **Welcome**
- **About the TerraSync software**
- **Related Information**
- **Technical Assistance**
- **Your Comments**

Welcome

Welcome to the *TerraSync Software Reference Manual.*

The *TerraSync Software Reference Manual* describes the functions of the Trimble® TerraSync™ software. It provides:

- detailed information about the five sections of the TerraSync software

- an overview of advanced functions (advanced data collection and coordinate systems) to provide more accurate and efficient results

- a troubleshooting section

- a comprehensive glossary

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

This publication assumes that you are familiar with the Microsoft® Windows® operating system.

About the TerraSync software

The TerraSync software is designed for collecting and updating GIS and spatial data. The TerraSync software acts as the controlling software. It communicates with a Trimble GPS receiver connected to the field device, allowing you to set GPS parameters in the receiver, record GPS positions on the field device, and update existing GIS data.

Related Information

Getting Started Guide

The *TerraSync Software Getting Started Guide* provides:

- general information about the TerraSync software

- a tutorial with step-by-step instructions for some of the tasks associated with using the TerraSync software

- detailed information about the TerraSync user interface and data entry methods

Online Help

You can access the TerraSync Online Help on the field computer. The TerraSync Online Help is a screen-by-screen reference that explains all screen controls.

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 software screen.

To access context-sensitive help from within the TerraSync software:

- when using a Pocket PC or an H/PC 2000, tap [icon] and select *Help*

- when using a field computer with a physical keyboard, press F1

- when using a field computer with a physical keyboard, you can also hold down the Alt key on the keyboard and then press H
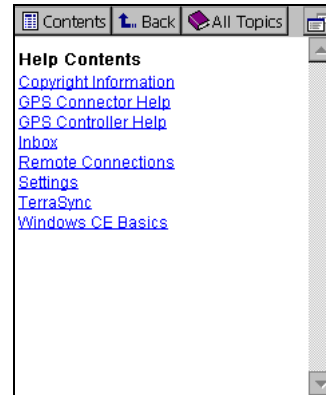
If you tap 🏁 and select Help on an H/PC 2000, or on a Pocket PC when the TerraSync software is not running, the main *Help Contents* appears. Select *TerraSync* to open the Contents topic of the TerraSync Online Help.

Release Notes

The *TerraSync Software Release Notes* are included with the software in printed form and as a PDF file on the CD and provide:

- information on new or changed features

- installation instructions

- cabling diagrams

Trimble training courses

Consider a training course to help you use your GPS system to its fullest potential. For more information, go to the Trimble website at **www.trimble.com/training.html**.

Technical Assistance

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

If you need to contact Trimble technical support:

1. Go to the Trimble website (**www.trimble.com)**.

2. Click the **Support** button at the top of the screen. The Support A–Z list of products appears.

3. Scroll to the bottom of the list.

4. Click the *MGIS Online Technical Assistance forms* link.

5. Do one of the following:

– Click the *Your Authorized Trimble Dealer* link and follow the instructions to obtain a list of authorized dealers.

– Click the *Paid Priority Support* link if you have purchased Priority Support, have purchased your Mapping & GIS products from ESRI, Intergraph or TrimbleStore.com, or are an employee of the US Federal Government. Complete the form and then click **Submit**.

Your Comments

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

Map Section

In this chapter:

Map Section Screen Layout

The Map section is a graphical display of the features in the open data file. It can also display a background image, GPS information, and navigation information.

The color of an item on the map depends on which of the **Map Layers (see page 15)** the item belongs to.

Use the **Map Tools (see page 14)** to change the map scale and position, and to perform special functions such as digitizing positions and measuring between points.

For more information about the functions of the Map section, see **Using the Map Section, page 25**.

To open the Map section, tap the Section list button and then select Map.

Labels on the figure:
- Lightbar
- Navigation target
- Current GPS position
- Between feature GPS
- Navigation path
- Point feature
- Area feature
- GPS trail
- Line feature
- Navigation start
- Command bar
- Scale
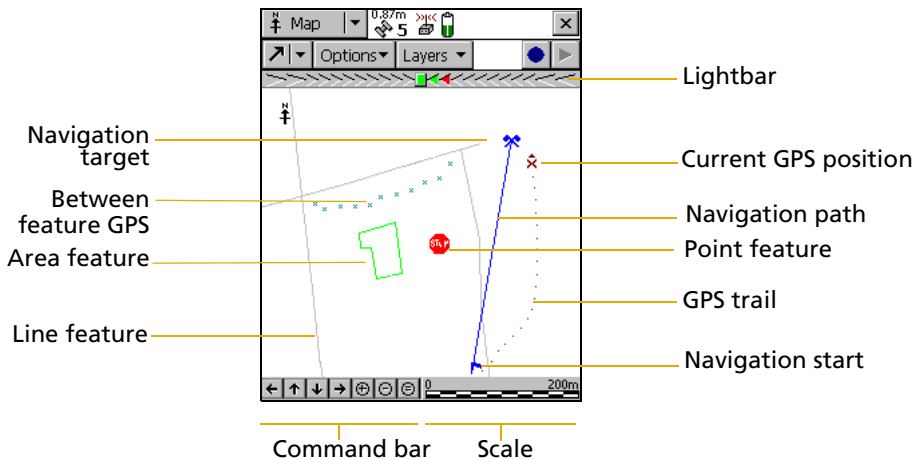
Note – In the TerraSync Standard edition software you cannot display background images or imported data files.

Table 2.1   Map section: Icons

Item	Name	Description
>>>>>◀◀◀◀◀	Lightbar	The lightbar uses colored icons to simulate the colored LEDs of a physical lightbar. The lightbar graphically guides you along the cross-track line, which is the shortest path between the navigation start and target. See **Lightbar (see page 129)**.
	North arrow	An arrow indicating the direction of north relative to the map display. The map is always oriented so that north is at the top of the screen.
	GPS trail	A trail of dots that shows the path you have taken recently. The GPS trail shows the last 60 GPS positions calculated by the receiver.
	Current position	The current GPS position, marked by the GPS cursor ✕, and your heading, shown by the heading arrow ►. If you are traveling too slowly or are stationary, only the GPS cursor is displayed.
	Reference position	The reference position for the base data file that is being collected. This icon only appears if a base data file is open.
	Map point	A point that you have selected from the map which is not part of a feature. When you tap a map point, a tooltip showing its **Position information (see page 10)** appears.
	Navigation start	An icon indicating the feature or point that is currently selected as the start for navigation. When a start and a target are selected, they are joined by a line to show the most direct path from start to target. You can use the Map section or the Navigation section to navigate from the start to the navigation target.
	Navigation target	An icon indicating the feature or point that is currently selected as the target for navigation. When a target is selected, you can use the Map section or the Navigation section to navigate to its location.

Table 2.1   Map section: Icons (continued)
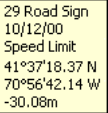
Item	Name	Description
	Bearing to go arrow	An outlined arrow on the edge of the map, showing the approximate direction to the navigation target when it is not in the visible part of the map.
	Features	Features you have logged in the current data file. Each feature type appears using the point feature symbol or line thickness defined in the data dictionary. A feature's color is determined either in the data dictionary or by the color of the layer it appears in.
		When a feature is selected on the map, it is highlighted and its position information appears. A selected point feature is outlined, and a selected line or area feature is displayed with a bold line.
	Between feature GPS	A trail of small crosses that show all GPS positions logged but not associated with a feature.
29 Road Sign 10/12/00 Speed Limit 41°37'18.37 N 70°56'42.14 W -30.08m	Position information	A tooltip showing the coordinates of the current map cursor location. If the selected location is a feature, the feature name and number also appear, as well the two attribute values from the feature that have been specified in the data dictionary as labels.
	Digitized position	The last point that you digitized for the open feature.
	Measured point	The last point that you measured.

Table 2.1   Map section: Icons (continued)

Item	Name	Description
1.368 km 238°20'41"T 60,536.72 km²	Measurement information	A tooltip showing the total length of the current measurement, the bearing from the start of the measurement to the last measured point, and the area enclosed by the measurement, if the measurement has been ended.
←↑↓→⊕⊖⊜	Command bar	A toolbar containing zooming and panning controls: ← Pan half the map width to the left ↑ Pan half the map height upwards ↓ Pan half the map height downwards → Pan half the map width to the right ⊕ Zoom in ⊖ Zoom out ⊜ Zoom to extents to show all positions in all visible layers
0 _____ 310.5m	Scale	The scale at which the map is drawn. As you zoom in or out, the scale changes accordingly.

Table 2.2   Map section: Buttons

Button		Function
↗|▾	Map Tools	Opens the map tool list. See **Map Tools, page 14**.
Options▾	Options	Opens the option list for the map. See **Map section: Options, page 12**.
Layers ▾	Layers	Opens the layer option list for the map. See **Map Layers, page 15**.
●	Create Feature	Lets you start a new feature without returning to the Data section. See **Creating and ending features from the Map section, page 28**.
■	End Feature	Lets you close the open feature without returning to the Data section. See **Creating and ending features from the Map section, page 28**.
↺	Undo	Deletes the last digitized position recorded for the current feature. See **Digitizing, page 29**.

Table 2.2 Map section: Buttons (continued)

Button		Function
▶	Log/Resume	Starts GPS position logging for the current feature, or resumes logging if logging is paused. See **Controlling logging from the Map section, page 35**.
⏸	Pause	Pauses GPS position logging for the current feature. See **Controlling logging from the Map section, page 35**.
⏹	End Measurement	Ends the current measurement. See **Measuring, page 32**.

Table 2.3 Map section: Options

Option	Description
Zoom Extents	Changes the scale so that all selected layers are visible in the Map section. The Zoom extents option varies. What it shows depends on what layers are selected and whether the features are filtered.
	If nothing is displayed on the Map screen, the Zoom extents option does not affect the map scale.
Auto Pan to GPS Position	Makes sure that the current GPS position is always visible. When this option is selected, and the GPS position is off screen or close to the edge of the screen, the TerraSync software automatically pans to bring the GPS position to the center of the screen.
	When the Auto Pan to GPS Position option is active, a bullet appears beside it.
	Note – *You can select either Auto Pan to GPS Position or Auto Pan to Selection, but not both. To clear Auto Pan to GPS Position, select it again, or select Auto Pan to Selection.*
Auto Pan to Selection	Makes sure that the currently selected feature is always visible. When this option is selected, and the currently selected feature is off screen or close to the edge of the screen, the TerraSync software automatically pans to bring the selected feature to the center of the screen.
	When the Auto Pan to Selection option is active, a bullet appears beside it.
	Note – *You can select either Auto Pan to Selection or Auto Pan to GPS Position, but not both. To clear Auto Pan to Selection, select it again, or select Auto Pan to GPS Position.*

Table 2.3   Map section: Options (continued)

Option	Description
Filter	Opens the Data section's **Filter By form (see page 83)**, where you can set or change filtering criteria.
Update Selected Feature	Opens the Data section's **Attribute entry form (see page 56)** for the currently selected feature, where you can update the feature's attributes or position. When you save the changes to the feature and close the attribute entry form, you are returned to the Map section. **Note –** *You can also open a feature for update by double-tapping it on the map.*
Delete Selected Feature	Deletes the currently selected feature. This is the same as the **Delete option (see page 78)** in the Data section's **Update Features screen (see page 75)**. **Note –** *Deleted features are never displayed in the map. Once you have deleted a feature, it is hidden on the map. You can only undelete a feature in the **Update Features screen (see page 75)**.*
Set Nav Start	Defines the position of the navigation start. See **Setting and clearing the navigation start and target, page 33**.
Set Nav Target	Defines the position of the navigation target. See **Setting and clearing the navigation start and target, page 33**.
Clear Nav Targets	Clears the current navigation start and target. You do not have to select either the start or target before clearing them.
Cross-Track Light Bar	Hides or displays the navigation lightbar at the top of the Map screen. By default, the lightbar is hidden. See **Lightbar, page 129**.
Enter Coordinates	Opens the **Enter Coordinates form (see page 23)**, where you can record a position for the open feature by entering its coordinates manually. See **Creating manual positions, page 31**. **Note –** *To enter coordinates manually, you must be in Digitize mode with a feature open.*
Refresh	Clears the map display and then redraws it.

Map Tools

The Map section has six map tools. Only one map tool is active at a time. To change to a different map tool, tap the Map Tools list button and select a command from the list.

When you tap a point on the Map screen, the effect depends on the currently selected map tool. For example, if you tap a point on the map when the Zoom In tool is active, the map zooms in to the next largest scale, centered on that point.
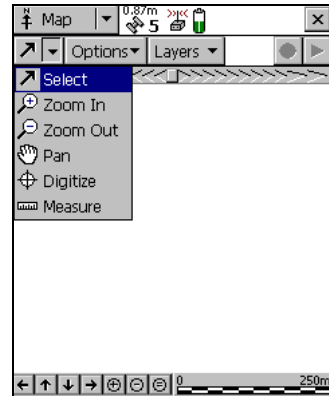
Tip – You can use the **Command bar (see page 11)** to pan or zoom at any time without changing the map tool. When you use the command bar to zoom or pan, the operation is centered on the middle of the map, as if you had selected the appropriate map tool, then tapped the center of the map.

Table 2.4   Map section: Tools

Tool	Name	Description
↗	Select	When the Select tool is selected, tap a point on the map to highlight a position or a feature. Double-tap any feature to open it for update. See **Selecting features and map points, page 25**.
🔍⊕	Zoom In	When the Zoom In tool is selected, tap a point on the map or drag a rectangle to reduce the map scale and magnify the map display. The map zooms in on that point. See **Zooming, page 27**.
🔍⊖	Zoom Out	When the Zoom Out tool is selected, tap a point on the map to enlarge the map scale and show a greater area on the map. The map zooms out from that point. See **Zooming, page 27**.

Table 2.4   Map section: Tools (continued)

Tool	Name	Description
✋	Pan	When the Pan tool is selected, tap a point on the map to pan the display so that the point is in the center of the screen. See **Panning, page 26**.
⊕	Digitize	When the Digitize tool is selected, tap a point on the map to create a position for a feature. See **Digitizing, page 29**.
▭	Measure	When the Measure tool is selected, tap a series of points on the map to measure the distance between the points and the area that they enclose. See **Measuring, page 32**.

Map Layers

To view the list of layers that you can display on the map and to access commands for formatting layers, tap **Layers**.

Table 2.5   Map section: Layer options

Option	Description
Filtered Features	Hides or displays filtered features on the map and in the Data section. When this option has a check mark (✓) beside it, filtered features are visible. Select this option to clear the check mark and hide filtered features from view. *Note –* *You can set or clear filters in the Map section or in the* **Data Section (see page 37)***.*
Unfiltered Features	Hides or displays unfiltered features on the map and in the Data section. When this option has a check mark (✓) beside it, features that have not been filtered are visible. Select this option to clear the check mark and hide unfiltered features from view. *Note –* *When you hide or show filtered features or unfiltered features in the Data section, they are also shown or hidden in the Map section. When you hide or show filtered or unfiltered features in the Map section, they are also hidden or shown in the Data section.*
Between Feature GPS	Hides or displays **Between feature GPS (see page 10)** positions on the map.

Table 2.5 Map section: Layer options (continued)

Option	Description
Background	Hides or displays the background file if one is selected. When this option has a check mark (✓) beside it, features in the background file are visible. Select this option to clear the check mark and hide background features from view. This option is not available in the TerraSync Standard edition software. You can only open background files in the TerraSync Professional edition software.
GPS Trail	Hides or displays the **GPS trail (see page 9)**.
Background File	Opens the **Background File form (see page 16)**. Use this form to select a data or background file to be used as the map background, or clear the currently selected background. This option is not available in the TerraSync Standard edition software. You can only open background files in the TerraSync Professional edition software.
Layer Formatting	Opens the **Layer Formatting form (see page 21)**. Use this form to change the colors and line thicknesses used for the layers in the map.

Background File form

When you tap **Layers** and select Background file, the *Background File* form appears. Use this form to select a file to be displayed in the background of the map, or to clear the current background selection.

Note – This form is not available in the TerraSync Standard edition software.

Two types of file can be displayed in the background:

- Data files

- Background files containing vector information or raster information
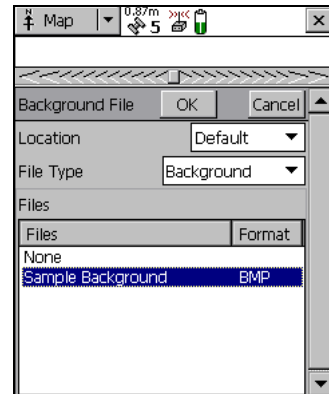
Any data file in the TerraSync software can be selected as the background file, provided it is not already open in the Data section. When you open a data file in the background, its features are visible but cannot be selected, edited, or deleted.

Tip – If you want to use a data file in the background, but will not be opening it as a data file, you can transfer the file to the TerraSync software as a *background file.* This uses less storage space, because the attribute information is removed. You cannot open a background file for data collection or update, and features in a background file cannot be selected, updated, or deleted.

The TerraSync software data file format is the only vector format supported in version 2.50 of the TerraSync software. If you want to use Shapefiles as background files, use the **Read from Shape form (see page 99)** in the Data section to convert Shapefiles into TerraSync software data files.

You can also transfer raster files such as aerial photographs to the TerraSync software as background files. The supported formats are bitmap (.bmp), JPEG (.jpg), MrSID (.sid), and TIFF (.tif). An image file must be transferred with the following files:

- A World (.wld) file that tells the TerraSync software how the pixels in the file relate to real-world coordinates. You can create the World file in your GIS.

- A coordinate system file that includes the coordinate system that the image file uses. You can create the coordinate system file in the GPS Pathfinder Office or in the Trimble Data Transfer utility at the time of transfer.

Web map server

In addition to background files that you have transferred to the field computer, you can connect to a Web map server (also known as an Internet map server, or IMS) and download raster background images.

To download background files from a Web map server:

1. Use Panning or Zooming (see the *TerraSync Software Getting Started Guide*) to make sure that the area for which you want a background image is displayed on the map.

    If the map server covers the area you are in, it will provide a background image that matches the current map extents.

2. Connect to the Internet using your normal connection method.

Note – You cannot connect to the Internet from within the TerraSync software.

3. Once you have established an Internet connection, open the *Background File* form.

4. Select Internet in the *Location* field, then use the fields that appear to specify a Web map server, a service, and the layers from that service that you want to download.

5. Tap **OK** to close the *Background File* form and download the selected background map.

    This may take some time. When a download is in progress, an animated icon ⊘   appears in the top left corner of the map. Once the background file is downloaded, the hourglass icon appears until the downloaded image is rendered and becomes visible.

If you pan or zoom beyond the extents of the downloaded image, new images are downloaded automatically and displayed in the background of the map. To stop automatic downloading, either clear the map server's address from the *URL* field, or set the *Location* field to Device and select None from the list of files.

Tip – Background settings are saved when you exit the TerraSync software, so when you restart the software, any Web map server session that you have configured automatically starts again.

Table 2.6   Background file forms: Fields

Field	Description	Default
Location	The location of the files to be listed in the *Files* field. This field contains an entry for each storage location on the device. There is also an option called Default, which represents the TerraSync documents folder, and an option called Internet, which allows you to download background images from a Web map server.	Default
File Type	The type of file to list in the *Files* field. The options are: • Background Data files that have been transferred to the field computer as background files, or raster (bitmap) image files • Data Data files in the SSF format, including .ssf, .imp, and .cor files This field does not appear if Internet is selected in the *Location* field.	Background
Files	A list of the files that can be displayed in the background. The *Format* column shows the format of each file in the list. The options are: • BMP A bitmap (.bmp) file • JPEG A .jpg file • MrSID A .sid file • TIFF A .tif file • Trimble A Trimble data file • Vector A background file containing vector data • None No background file is selected Select a filename from this list. If you select None, the current background file is closed and no background information is displayed. This field only appears if Default or Card is selected in the *Location* field.	None

Table 2.6   Background file forms: Fields (continued)

Field	Description	Default
Server type	The type of Web map server to connect to. The options are:	Open GIS
	• ArcIMS A map server that uses the ArcIMS protocol	
	• Open GIS A map server that conforms to the Open GIS standard	
URL	The Internet address of the map server. Select a URL from the drop-down list, or enter the URL of the server you want to connect to.	None
	Once you successfully connect to a server, the server is added to the drop-down list.	
	This field only appears if Internet is selected in the *Location* field.	
Service	The map service that you want to use from the selected ArcIMS Web map server.	None
	If you want to connect to an Open GIS server, leave this field blank. Open GIS servers do not provide services.	
	This field only appears if Internet is selected in the *Location* field.	
Coordinate system	The coordinate system that maps will be downloaded in. The selected option must match the coordinate system configured in the **Coordinate System form (see page 214)** in the Setup section.	None
	Some servers do not let you select a coordinate system for the images you download. If this field is not available, you must set the coordinate system in the TerraSync software to match the coordinate system of the image. To do this, visit the website for the map server to determine the coordinate system required, and then select the same system in the Setup section.	
	This field only appears if Internet is selected in the *Location* field.	
Layers	The layers that you want to download. Under this heading, a check box appears for each layer in the selected service.	None
	This field only appears if Internet is selected in the *Location* field.	

Layer Formatting form

When you tap **Layers** and select Layer Formatting, the *Layer Formatting* form appears. Use this form to change the colors assigned to items in the five **Map Layers (see page 15)**.

Features in the open data file are displayed according to the following rules:

- Feature symbols, symbol sizes, and line thicknesses are derived from the data dictionary.

- All items in a layer appear in the color assigned to that layer.

- The color assigned to a layer depends on the selected option in the *Color Source* field:

  - Select the *Layer Color* option to use the color that is selected in the corresponding *Color* field.

  - Select the *Data Dictionary* option to use the color assigned in the data dictionary.
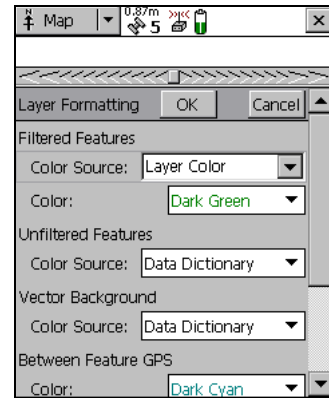
Table 2.7   Layer Formatting form: Fields

Field	Description	Default
Filtered Features	Sets the display options for the **Filtered Features layer (see page 15)**.	(none)
Color Source	Specifies whether to display filtered features using the layer color or the color specified in the data dictionary.	Layer color
Color	The color for filtered features in the data file. This field only appears if the **Color Source field (see page 21)** is set to Layer Color.	Dark Green
Unfiltered Features	Sets the display options for the **Unfiltered Features layer (see page 15)**.	(none)
Color Source	Specifies whether to display unfiltered features using the layer color or the color specified in the data dictionary.	Data dictionary

Table 2.7   Layer Formatting form: Fields (continued)

Field	Description	Default
Color	The color for unfiltered features in the data file. This field only appears if the **Color Source field (see page 21)** is set to Layer Color.	Black
Vector Background	Sets the display options for the **Background layer (see page 16)**. *Note –* *This field is not available in the TerraSync Standard edition software.*	(none)
Color Source	Specifies whether to display features in a file that is open in the background using the layer color or the color specified in the data dictionary.	Data dictionary
Color	The color for background features if the background file contains feature information. This field only appears if the **Color Source field (see page 22)** is set to Layer Color. *Note –* *This field is not available in the TerraSync Standard edition software.*	Dark Magenta
Between Feature GPS	Sets the display options for the **Between Feature GPS layer (see page 15)**.	(none)
Color	The color for **Between feature GPS (see page 10)** positions.	Dark Cyan
GPS trail	Sets the display options for the **GPS Trail layer (see page 16)**. *Note –* *In addition to the GPS trail, the following items appear in the color assigned to the GPS Trail layer:* • ***Current position, page 9*** • ***Map point, page 9*** • ***Bearing to go arrow, page 10*** • *Line segments between digitized positions for the current feature* • *Line segments between measured points* *However, when the GPS Trail layer is hidden, these map items are not hidden.*	(none)

Table 2.7   Layer Formatting form: Fields (continued)

Field	Description	Default
Color	The color for the **GPS trail (see page 9)**.	Dark Red
Navigation	Sets display options for the Navigation layer.	(none)
Color	The color for the **Navigation start (see page 9)** and **Navigation target (see page 9)**.	Blue

Enter Coordinates form

When you tap **Options** and select Enter Coordinates, the *Enter Coordinates* form appears. Use this form to record a manual position for the open feature by entering its coordinates.

This option is only available if there is an open feature and the Map section is in **Digitize mode (see page 15)**. A point feature can contain only one position, but a line or area feature can contain any number and combination of manual, digitized, and GPS positions. See **Creating manual positions, page 31**.

Table 2.8   Enter Coordinates form: Fields

Field	Description	Default
Latitude	The latitude of the manual position.	?
	The value that you enter is displayed in the units specified in the **Coordinate System form (see page 214)**. This field only appears if the current coordinate system is Lat/Long.	
	Note – *To indicate a Southern hemisphere latitude or Western hemisphere longitude, you must include the hemisphere letter (S or W) or a minus sign (–). The hemisphere letter or plus sign is optional for Northern or Eastern hemisphere positions.*	
	Note – *The symbols for degrees (°), minutes ('), and seconds (") can be omitted or replaced with a space, but you must include the decimal point (.).*	
Longitude	The longitude of the manual position. The formats you can use are as for the *Latitude* field. This field only appears if the current coordinate system is Lat/Long.	?
North	The northing of the manual position, in the coordinate units specified in the **Coordinate System form (see page 214)**. This field only appears if the current coordinate system uses North/East.	?
East	The easting of the manual position, in the coordinate units specified in the **Coordinate System form (see page 214)**. This field only appears if the current coordinate system uses North/East.	?
USNG	The northing and easting of the manual position, in USNG format. This field only appears if you have enabled USNG display in the **Coordinate System form (see page 214)**.	?
Altitude	The altitude of the manual position. The altitude is expressed as a Height Above Ellipsoid or Mean Sea Level, depending on the option configured in the **Coordinate System form (see page 214)**, and is in the altitude units specified in this form. This field only appears if you have enabled USNG display in the **Coordinate System form (see page 214)**.	?

Using the Map Section

You can move around the map, hide or display different parts of the map, and select features or points of interest.

Note – *Imported files cannot be opened in the TerraSync Standard edition software.*

Selecting features and map points

When a feature is selected in the **Data Section (see page 37)**, it becomes the selected feature in the map.

Selected
map point

Position information
tooltip for selected
map point

Selected feature
(in Data section)
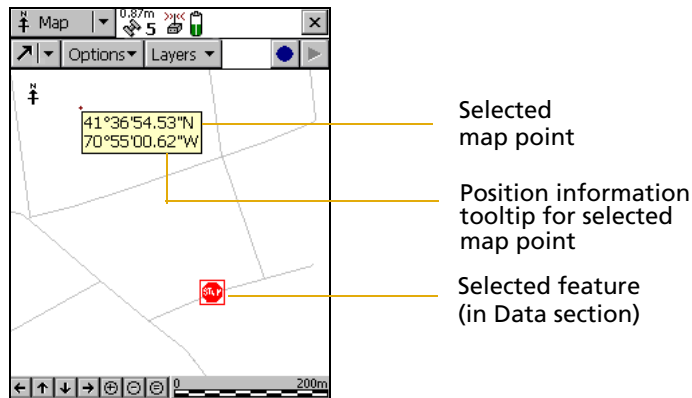
When you select a feature from the map and there is no open feature in the Data section, the feature selected on the map is highlighted in the *Choose Feature* list in the Data section's **Update Features screen (see page 75)**.

To select a feature on the map, make sure that the Select tool is active and then tap the feature. The feature is highlighted and a position information tooltip, including the coordinates, feature number, and name, is displayed.

The position information tooltip remains visible until you tap the tooltip, another feature, a different map point, or anywhere else on the screen. The feature remains selected (highlighted) until you tap another feature.

When you select a **Map point (see page 9)** that is not a feature, the last feature that you selected on the map remains highlighted.

Panning

When you pan, you change the area that is visible in the Map screen by sliding the map left, right, up, or down. Panning does not change the scale at which you are viewing the map.

- To pan to any location, select the **Pan tool (see page 15)** and then tap on the location. The selected location is placed in the center of the display.

- To pan half a screen width or height in any direction without changing the currently selected map tool, tap the appropriate panning button on the **Command bar (see page 11)** at the bottom of the Map screen.

Auto Pan options

The two Auto Pan options let you control the map automatically. You can set either option, or clear both to retain full manual control over the map display.

- When you select the **Auto Pan to GPS Position (see page 12)** option, the TerraSync software ensures that the map shows the current GPS position. Whenever the GPS position moves to or beyond the edge of the display, the map automatically pans until the GPS position is in the center of the screen.

- The **Auto Pan to Selection (see page 12)** option ensures that the currently selected position is always visible by automatically panning whenever the selected feature is at the edge of the display, or beyond it. When you tap close to the edge of the map, the map automatically pans (half a screen width or height) in the direction of the movement. The selected point remains at the same geographic position. In these circumstances, the current GPS position may not be visible.

Zooming

When you zoom, you change the map scale to display a larger or smaller area. You can zoom in to view a few features that are close together, or zoom out for an overview of the features you have collected so far.

Zooming in

To zoom in, make the **Zoom In tool (see page 14)** active and then tap the location on the map you want to zoom in on. Alternatively, tap the Zoom In button on the   **Command bar (see page 11)** to zoom in on the center of the map.

You can also zoom in by dragging across the map when the Zoom In tool is active. As you drag, a rectangle appears. The diagonal of the rectangle is the line between the point where you started dragging and the last point you dragged to. When you stop dragging, the map zooms in on the rectangle.

Note – If the rectangle you draw is very small, the map does not zoom.

Zooming out

To zoom out, make the **Zoom Out tool (see page 14)** active and then tap the location you want to zoom out from. Alternatively, tap the Zoom Out button on the command bar to zoom out from the center of the map.

Note – You cannot zoom out by dragging a rectangle. This method is for zooming in only.
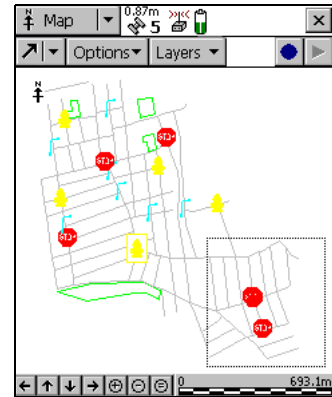
Zoom Extents

To view all the features in all visible layers, tap the Zoom Extents button on the command bar, or select Zoom Extents from the **Map section: Options list (see page 12)**. The map scale increases until all points in all the visible layers appear. **Map Layers (see page 15)** you can display include features in the data file and background file, the current GPS position, and past GPS positions.

Creating and ending features from the Map section

You can use the Create Feature button ● and the End Feature button ■ to open a new feature, or to close a feature that is already open in the Data section. When you tap the Create Feature button, a drop-down list appears, showing each feature type that is defined in the open file's data dictionary. Select a feature type from this list to open its attribute entry form.

Whenever a feature is open, and irrespective of whether it was opened from the Map section or from the Data section, you can close it by tapping the End Feature button. If you have collected insufficient positions, have not entered all the feature's attribute values, or have set the **Confirm End Feature field (see page 184)** in the *Logging Settings* form to Yes, you will be asked to confirm that you want to close this feature. When you close a feature using the End Feature button, you are returned to the section that you opened the feature from. If you used the Create Feature button, you are returned to the Map section. Otherwise, you are returned to the Data section.

Tip – To create digitized positions from the map, you need an open feature. Use the Create Feature button to open a new feature without switching to the Data section. See **Digitizing, page 29**.

Digitizing

Digitizing is the process of creating positions for a feature by selecting points on the map, instead of using GPS positions. A line or area feature can contain both GPS and digitized positions, but you must pause GPS logging before you can digitize positions.

To record digitized positions:

1. Make sure that the new or existing feature that you want to add positions to is open in the Data section. If no feature is open, tap the Create Feature button ● in the Map section to quickly open a new feature. See **Creating and ending features from the Map section, page 28**.

2. Make sure that GPS logging is paused.

Tip – Use the **Log Later option (see page 53)** to prevent GPS logging from starting automatically when you start a new feature.

3. Make the **Digitize tool (see page 15)** active. The Digitize icon appears in the Status bar.

4. Tap the location on the map where you want to create a position. If the location you tap is close to an existing position, the new position will "snap" to the same location. This is a useful feature when you want to create line or area features with shared boundaries.

Tip – Whether or not a digitized position snaps to an existing one depends on how close the two positions are in the map display. It does not depend on the distance between their actual coordinates. To record a digitized position without snapping to a nearby position, zoom in to increase the distance between the two positions on the screen.

To record a digitized area or line feature, tap the location where you want each vertex.

The number beside the Digitize icon increments to show the number of digitized positions in the current feature. A line appears on the map, joining all the vertices recorded so far.

A digitized point feature can contain only one position, so if you tap again while a point feature is open, an error message appears.

Any offset you have configured for the feature is applied to each digitized position. The map location that you tap is the position that the offset is measured from.

If you tap the wrong location, use the Undo button 🔄 to remove the incorrect position. You can undo any number of positions recorded for the current feature, in reverse order, up to the last GPS position recorded.

For example, if you have recorded four digitized positions, you can undo the fourth, then the third, and then the second position, by tapping the Undo button three times. Once you have undone all the positions in a feature, the Undo button becomes unavailable.

Note – You cannot undo a GPS position. Once you have undone all digitized positions in the feature up to the last GPS position, the Undo button becomes unavailable, even if there are other digitized positions in the feature that you recorded before the GPS position.

To record GPS positions, simply tap the **Resume** button to resume logging GPS. When you are logging GPS positions, you cannot record digitized positions. However, you do not leave Digitize mode until you select one of the other **Map Tools (see page 14)**, so you can quickly switch between GPS and digitized positions using the **Pause** and **Resume** buttons.
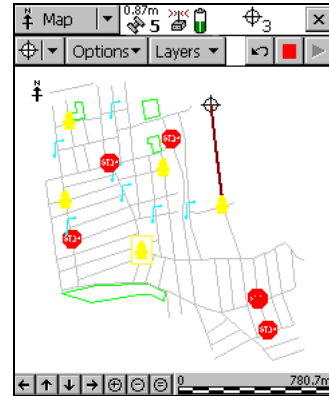
Creating manual positions

A manual position is a position that you create by entering its coordinates manually. A line or area feature can contain a mixture of GPS, manual, and digitized positions, but a point feature can contain either GPS positions or a single manual or digitized position.

Manual positions can be recorded under the same conditions as digitized positions:

- There must be a feature open.

- GPS logging must be paused.

- The **Digitize tool (see page 15)** must be active.

Also see **Digitizing, page 29**.

To record a manual position:

1. Tap **Options** in the Map section.

2. Select Enter Coordinates. The **Enter Coordinates form (see page 23)** appears. The fields that appear (*Latitude*, *Longitude*, and *Altitude*, or *North*, *East*, and *Altitude*) depend on the current coordinate system.

3. Enter the coordinates of the position.

4. Tap **OK** to close the form and store the position.

Measuring

You can use the **Measure tool (see page 15)** to measure the distance between points, or the area enclosed by a set of points. To measure a distance or area:

1. Make the Measure tool active. A tooltip appears in the top left corner of the map.

2. Tap on the map location where you want to start measuring.

3. Tap on each point that you want to measure to. The last position that you tapped is marked with a cross ✛, and the measured points are connected by a line. As you add points to the measurement, the distance and bearing are updated in the tooltip. The distance shown is the total line length, while the bearing is the bearing of the last line segment that you measured
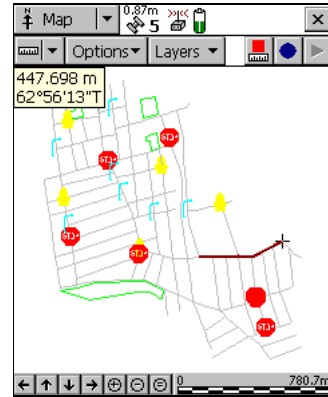
　　　Tip – If the location you tap is close to the GPS cursor or a point on an existing feature, the point will "snap" to that position. This is a useful feature when you want to measure the length or area of a feature**.**

To end the measurement, do one of the following:

• Double-tap the last point.

• Tap the End Measurement button ![button].

The area enclosed by the measured points is displayed in the tooltip. You do not have to join the first and last points; the TerraSync software assumes that these points are joined when it calculates the area.

Setting and clearing the navigation start and target

To navigate to a location using the Navigation section, you must set a navigation target. If you want to use the **Lightbar (see page 129)** to navigate, you must also set a navigation start position. You can set both the navigation start and target in the Map graphical screen or in the Data section.

Setting the navigation start

The navigation start can be any of the following items:

- the selected map point

- the selected point feature

- the start, middle, end, or selected vertex of the selected line feature

- the start/end, centroid, or selected vertex of the selected area feature

- the current GPS position

To set the navigation start in the Map section:

1. If you want to navigate from a point on the map, or from a feature, select the map point or feature.

2. Tap **Options** and then select Set Nav Start.

3. Select the start option that you require. Do one of the following:

   – To set the start to the current GPS position, select GPS.

   – To set the start to the selected map point, select Map Point.

   – To set the start to a location on the selected feature, select one of the feature options. The feature options are identified by the feature number and feature type (for example, **173 Road - Start** is the feature option for the start point of the Road feature that has ID number 173).

   The start icon ⌐ appears over the selected map point, feature, or position

Tip – A start icon also appears beside the selected feature in the **Update Features screen (see page 75)**.

*Note – If you have specified a navigation start and target, but the start is farther from your position than the configured Range (see **Close-up range, page 128**), you must navigate to the start before you can navigate to the target. Until you are within the close-up range of the navigation start, the Navigation section guides you to the navigation start.*

Setting the navigation target

The navigation target can be any of the following items:

- the selected map point

- the selected point feature

- the start, middle, end, or selected vertex of the selected line feature

- the start/end, centroid, or selected vertex of the selected area feature

- a position that you specify as an offset from the start position

To set the navigation target in the Map section:

1. If you want to navigate to a point on the map, or to a feature, select the map point or feature.

2. Tap **Options** and then select Set Nav Target.

3. Select the target option that you require. Do one of the following:

   – To set the target to the selected map point, select Map Point.

   – To set the target to a location on the selected feature, select one of the feature options. The feature options are identified by the feature number and feature type (for example, **3 Park - Centroid** is the feature option for the center of the Park feature that has ID number 3).

– To enter a target position manually, select Construct. The **Construct Target Offset form (see page 88)** appears. Enter the bearing and distance from the start to the target and then tap **OK**.

Note – *The Construct option is only available if you have set the navigation start.*

The target icon ✖ appears over the selected map point, feature, or position. If a navigation start is also defined, the start and target are joined by a line that shows the most direct navigation path.

Tip – A target icon also appears beside the selected feature in the **Update Features screen (see page 75)**.

Clearing the navigation start and target

To clear the navigation start and target, tap **Options** and select Clear Nav Targets. The start and target icons disappear from the Map section and from the Data section's Update Features screen. In the Navigation section, the lightbar is grayed out and the message Set your nav target in the Map or Data section appears. You cannot navigate until you set a new target.

Controlling logging from the Map section

When the attribute entry form for a feature is open in the Data section, you can use the Log button ▶ and Pause button ❚❚ in the Map section to start, pause, or resume logging, just as you would tap Log, Pause, or Resume in the Data section.

The two buttons perform the same function, so they are synchronized. For example, if you tap Pause in the Data section, its label changes from Pause to Resume, and logging is suspended. At the same time, the Log button in the Map section is replaced by the Pause button. You can use either the Log button in the Map section or Resume in the Data section to start logging again.

See **Pausing and resuming logging, page 59**.

Data Section

In this chapter:

Introduction

To open the Data section, tap the Section list button and select Data.

Use this section to open data files, collect new data, update existing data, and manage files in the field.
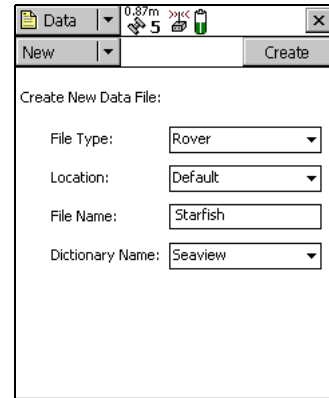
The Data section has five subsections:

Subsection	Availability
New File	Available when no data file or base file is open.
Existing File	Available when no data file or base file is open.
Update Features	Available when a data file is open.
Collect Features	Available when a data file or base file is open.
File Manager	Always available.

The **Read from Shape form (see page 99)** is also available from the File Manager subsection.

New File

To open the New File subsection, tap the Subsection list button and select New File. The *New File* screen appears.

Use the *New File* subsection to create a new data file for logging features and GPS positions.

When you have selected a file type, filename, and (for rover files only) a data dictionary, tap **Create** to create a new file.

If the new file is a rover file, the **Collect Features screen (see page 52)** opens. If the new file is a base file, the first step of the **Base Station Setup wizard (see page 42)** appears.

> ☼ **Tip –** Once you have logged features to the new file, you can switch to the **Update Features form (see page 75)** to edit features you have collected so far.

Table 3.9   New File screen: Fields

Field	Description
File Type	The type of data that will be stored in the new file. The options are:
	• Rover The new file will contain feature, attribute, and position information.
	• Base The new file will contain base GPS data recorded at a stationary location, or will allow you to set up the connected GPS receiver as an unattended base station, broadcasting correction messages.
	If the connected receiver is a Trimble survey receiver, you cannot log base data to file; you can only generate corrections for broadcast. If any other receiver that supports carrier phase logging is connected, you can log data to a base file, and depending on the receiver you may be able to broadcast corrections as well.

Table 3.9 **New File screen: Fields (continued)**

Field	Description
Location	The TerraSync software enables you to write data files directly to internal or removable secondary storage locations. This field contains an entry for each storage location on the device. There is also an option called Default, which represents the TerraSync documents folder.
File Name	The name of the new file. When you open this section, the TerraSync software automatically generates a filename for the new data file, using the date and time from the field computer's clock. It uses the formula **RMMDDHHX** for rover files, and **BaseMMDDHHX** for base files, where: • **R** or **Base** is the Filename Prefix. • **MM** is the current month, • **DD** is the current day of the month, • **HH** is the current hour of the day, • **X** increments within this hour, starting at **A** for the first file in that hour, then **B** for the second file, and so on. *Note – You can change the prefix character for rover files in the* **Logging Settings form (see page 182)** *in the Setup section.* The auto-generated filename is only a suggestion. You can edit it, or replace it with an entirely different name. Filenames must follow the naming rules for Windows.
Dictionary Name	The data dictionary that will be associated with the new file. This field lists all the data dictionaries currently loaded in the TerraSync software. The default data dictionary is the last dictionary you used. The Generic data dictionary is always available. It lets you record point, line, and area features, each with a simple descriptive attribute. *Note – When you create a data file, a copy of the data dictionary you select is permanently associated with that file. This embedded data dictionary determines what types of features can be recorded to the file, and what attributes the features have.* This field only appears when Rover is selected in the *File Type* field (see **page 39**).

Confirm Antenna Height form

This form lets you check the configured antenna height and measurement position, so that you can accurately record altitude data. The *Height* field defaults to the current value from the **Height field (see page 186)** in the *Antenna Settings* form, and the *Measure To* field shows the current value from the **Measure Height To field (see page 187)**. If you change either value, it is also changed in the *Logging Settings* form.

If the **Confirm field (see page 186)** in the *Antenna Settings* form is set to Per File, this form appears whenever you tap **Create** in the **New File screen (see page 38)**, or **Open** in the **Existing File screen (see page 38)**.

If the **Confirm field (see page 186)** in the *Antenna Settings* form is set to Per Feature, this form appears whenever you create a new feature or update an existing feature's position information.

Table 3.10   Confirm Antenna Height form: Fields

Field	Description	Default
Height	The height of the GPS antenna that is connected to the GPS receiver. This is used as a vertical offset on each position.	The current value from the **Height field (see page 43)** in the *Antenna Settings* form.
Measure To	The point on the antenna that the height is measured to. If the selected antenna type does not allow alternative measurement locations (for example, if you are using the internal antenna in a GeoExplorer series handheld), this field does not appear.	The current value from the **Measure Height To field (see page 187)** in the *Antenna Settings* form.

Base Station Setup wizard

The Base Station Setup wizard guides you through the process of setting up a GPS receiver to broadcast real-time corrections or log base data to file.

To start the Base Station Setup wizard, select Base in the *File Type* field on the **New File screen (see page 39)**, and then tap **Create**.

For detailed information about using the TerraSync software to set up a receiver as a base station, see **Setting up a Base Station, page 270**.
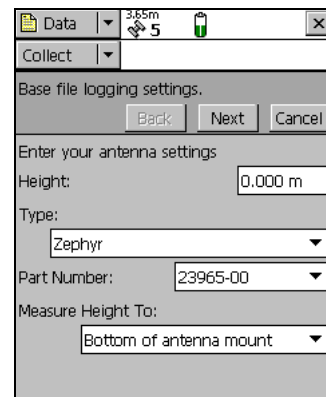
The wizard contains the following steps:

- **Antenna Settings step, page 42**
- **Logging and GPS Settings step, page 43**
- **Real-Time Output step, page 45**
- **Reference Position step, page 50**

Antenna Settings step

This is the first step of the *Base Station Setup* wizard. Use this step to specify the antenna type that you are using, and its height.

When you have finished, tap **Next** to move to the Logging and GPS Settings step.

Table 3.11   Antenna Settings step: Buttons

Button	Description
Next	Moves on to the **Logging and GPS Settings step (see page 43)**.
Cancel	Cancels the Base Station Setup wizard and returns to the **New File screen (see page 39)**.

Table 3.12   Antenna Settings step: Fields

Field	Description	Default
Height	The height of the GPS antenna that is connected to the GPS receiver. This is used as a vertical offset on each position.	0.00 m
Type	The type of antenna that is connected to the GPS receiver. See **Antenna Settings form, page 185**.	Unknown External
Part Number	The part number of the antenna that is connected to the GPS receiver. See **Antenna Settings form, page 185**.	n/a
Measure Height To	The point on the antenna that you have measured to. The TerraSync software automatically adjusts the antenna height by the distance between the measurement location and the Antenna Phase Center (APC). See **Antenna Settings form, page 185**.	(none)

Logging and GPS Settings step

This is the second step of the **Base Station Setup wizard (see page 42)**. Use this step to specify the logging interval and GPS settings for the base station.

When you have finished, tap **Next** to move to the **Real-Time Output step (see page 45)**.
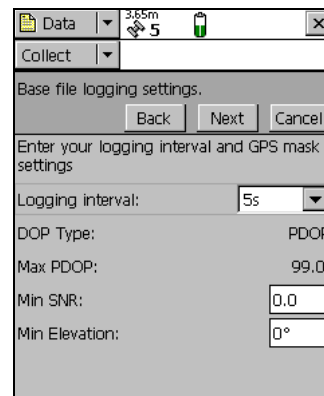
Table 3.13 Logging and GPS Settings Step: Buttons

Button	Description
Back	Returns to the **Antenna Settings step (see page 42)**.
Next	Moves on to the **Real-Time Output step (see page 45)**.
Cancel	Cancels the Base Station Setup wizard and returns to the **New File screen (see page 39)**.

Table 3.14 Logging and GPS Settings Step: Fields

Field	Description	Default
Logging interval	The logging interval, in seconds, for the base station data. Select an option from the drop-down list.	5s
DOP Type	The type of DOP value to use. This field is read-only.	PDOP
Max PDOP	The maximum PDOP value. This field is read-only.	99.0
Min SNR	The minimum SNR value. The SNR is a measure of the quality of the signal from a satellite. When a satellite's SNR falls below the minimum value, the TerraSync software stops using that satellite to calculate the base station's GPS position. If the GPS receiver is a survey receiver, this field shows N/A.	0.0
Min Elevation	The minimum elevation. Signals from satellites that have a low elevation from the horizon can be of poor quality. The TerraSync software does not use any satellite that is below the minimum value to calculate the base station's GPS position.	0°

Real-Time Output step

This is the third step of the **Base Station Setup wizard (see page 42)**. Use this step to specify whether the base station will output real-time differential correction messages, to configure the receiver port, and to define message settings.

When you have finished, tap **Next** to move to the **Reference Position step (see page 50)**.
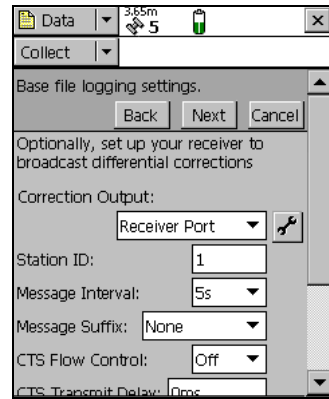
Table 3.15   Real-Time Output step: Buttons

Button	Description
Back	Returns to the **Logging and GPS Settings step (see page 43)**.
Next	Moves on to the **Reference Position step (see page 50)**.
Cancel	Cancels the Base Station Setup wizard and returns to the **New File screen (see page 39)**.

Table 3.16 Real-Time Output step: Fields

Field	Description	Default
Correction Output	This field specifies whether differential corrections will be output for broadcast. The options are:	Off
	• Off — Do not output differential corrections. If this option is selected, this is the only field on the form.	
	• Receiver Port — Output differential corrections on the receiver port. To configure the receiver port, tap the Setup button beside this field. The **Receiver Port Settings form (see page 48)** appears.	
	• R8 Internal Radio — Output corrections on the receiver's internal transmit radio. This options is only available if the receiver is an R8. To configure the radio, tap the Setup button beside this field. The **R8 Internal Radio Settings form (see page 49)** appears.	
	*Note – When you configure a GPS Pathfinder® receiver to output RTCM messages, the communication settings you set in this form override the NMEA output and RTCM input settings defined in the **NMEA Output Settings form (see page 194), Receiver Port Settings form (see page 205),** and the **Receiver Port Settings form (see page 205)**.*	
Station ID	The ID number that the base station will use to identify itself to rovers. Enter a station ID number between 0 and 1023.	1
Real-time Protocol	The message format to be used. Select an option from the drop-down list.	RTK/DGPS RTCM 2.1
	The protocol that you choose depends on the message formats supported or required by rovers:	
	Choose an RTCM option to output all the message types required for RTK and DGPS rovers. Use the latest RTCM version that is compatible with all rovers.	
	Choose a CMR option if all rovers are Trimble RTK rovers. CMR is more efficient than RTCM, but may not be supported by non-Trimble receivers.	
	This field only appears for a survey GPS receiver. For other receivers, the RTCM 2.1 message format is used.	

Table 3.16   Real-Time Output step: Fields (continued)

Field	Description	Default
Message Interval	The interval, in seconds, at which correction messages are output. Select an option from the drop-down list or type the time interval. If the connected receiver is a survey receiver, this field is read-only. These receivers output messages at a 1-second interval.	1s
⚠	**CAUTION —** The following five fields configure advanced communication settings. Do not change the settings in these fields unless you are having trouble configuring communications between the TerraSync software and the data radio. For information on recommended settings, refer to the documentation for the data radio.	
Message Suffix	The formatting characters to append to the end of each message. The options are: • None — Do not append any suffix to messages. • <CR> — Append a carriage return to the end of each message. • <LF> — Append a line feed to the end of each message. • <CR><LF> — Append a carriage return and line feed to the end of each message.	None
CTS Flow Control	This field specifies whether clear-to-send (CTS) flow control is enabled on RTCM output. This field does not appear if the connected receiver is a survey GPS receiver.	Off
CTS Transmit Delay	The delay between transmitting the CTS message and the RTCM correction. Enter a value between 0 ms and 5,000 ms. This field does not appear if the connected receiver is a survey GPS receiver.	0ms
RTS Mode	The ready-to-send (RTS) mode. Select an option from the drop-down list. This field does not appear if the connected receiver is a survey GPS receiver.	High
RTS Edge Delay	The delay between transmitting the RTS message and the RTCM correction. Enter a value between 0 ms and 5,000 ms. This field does not appear if the connected receiver is a survey GPS receiver.	0ms

Table 3.16 Real-Time Output step: Fields (continued)
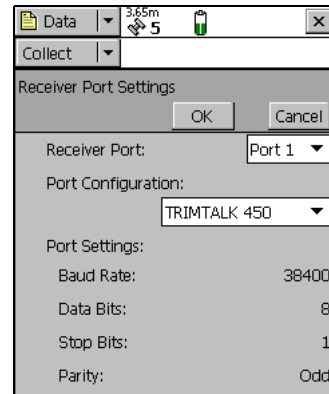
Field	Description	Default
⚠️	**WARNING –** Enabling power output can damage some CE devices. Trimble recommends that you always select the Auto option unless you require power to another external device **and** have protected the CE device from power supplied by the GPS receiver.	
Receiver Power Output	This field specifies whether the connected receiver outputs power. If the connected GPS receiver can be configured to supply power, you can use this field to enable power output for an external device such as a DGPS radio. The options are: • Auto — Corresponds to the On option for a GPS Pathfinder Power receiver; corresponds to Off for all others. • On — Enable power output. • Off — Disable power output. See **Receiver power output, page 191**. This field does not appear if the GPS receiver is a survey receiver.	Auto

Receiver Port Settings form

The *Receiver Port Settings* form appears when you tap the Setup button in the Real-time Output step.

Use this form to configure communication settings between the GPS receiver port and the data radio that is used to broadcast the correction messages.

This form contains the same fields as the **Receiver Port Settings form (see page 205)** in the Real-time subsection of the Setup section.

R8 Internal Radio Settings form

The *R8 Internal Radio Settings* form appears when you select R8 Internal Radio in the *Correction Output* field of the Real-time output step and then tap the Setup button next to the *Correction Output* field.

Use this form to configure the R8 receiver to broadcast corrections using its internal transmit radio.

You can select a channel and base type in this form.

Table 3.17   R8 Internal Radio Settings form: Buttons

Button	Description
OK	Confirms the R8 internal radio settings and closes the form.
Cancel	Closes the *R8 Internal Radio Settings* form without saving any changes.

Table 3.18   R8 Internal Radio Settings form: Fields

Button	Description
Channel	The channel that the R8 receiver's internal radio will transmit corrections on.

Reference Position step

This is the last step of the **Base Station Setup wizard (see page 42)**. Use this step to specify the location of the base receiver (its reference position).

Table 3.19   Reference Position step: Buttons

Button	Description
Here	Sets the reference position to the current GPS position.
	Note – *Because the current GPS position is autonomous, using the* **Here** *button will result in an inaccurate reference position. Trimble recommends that you set the base station up over a known, surveyed point, and enter the exact reference position. If you do use the* **Here** *button, Trimble recommends that you apply a coordinate transformation in the Trimble postprocessing software to calibrate the base data.*
	Tip – You can use this button to speed up data entry. Press **Here** to quickly fill in an approximate position, and then replace only the digits that are incorrect.
Back	Returns to the **Real-Time Output step (see page 45)**.
OK	Ends the Base Station Setup wizard and begins logging base data. The **Collect Base Data screen (see page 54)** appears.
Cancel	Cancels the Base Station Setup wizard and returns to the **New File screen (see page 39)**.

Table 3.20   Reference Position step: Fields

Field	Description
Latitude	The latitude of the reference position. Select an option from the drop-down list.
	The value that you enter is displayed in the units specified in the **Coordinate System form (see page 214)**.
	This field only appears if the current coordinate system is Lat/Long.
	Note – *To indicate a Southern hemisphere latitude or Western hemisphere longitude, you must include the hemisphere letter (S or W) or a minus sign (–). The hemisphere letter or plus sign is optional for Northern or Eastern hemisphere positions.*
	☼ **Tip –** The symbols for degrees (°), minutes ('), and seconds (") can be omitted or replaced with a space, but you must include the decimal point (.).
Longitude	The longitude of the reference position. The formats you can use are as for the Latitude field.
	This field only appears if the current coordinate system is Lat/Long.
North	The northing of the reference position, in the coordinate units specified in the **Coordinate System form (see page 214)**.
	This field only appears if the current coordinate system uses North/East.
East	The easting of the reference position, in the coordinate units specified in the **Coordinate System form (see page 214)**.
	This field only appears if the current coordinate system uses North/East.
Altitude	The altitude of the reference position. The altitude is expressed as a Height Above Ellipsoid or Mean Sea Level, depending on the option configured in the **Coordinate System form (see page 214)**, and is in the altitude units specified in this form.

Collect Features

To open the *Collect Features* subsection, tap the Subsection list button and select Collect Features. The *Collect Features* screen appears.

Note – This subsection is only available when a file is open. Use the **New File screen (see page 39)** *to open a new data file, or the* **Existing File screen (see page 73)** *to open an existing data file.*

Use this form to select a feature type to add. To add a feature, select it from the *Choose Feature* list and tap **Create**. An attribute entry form appears.
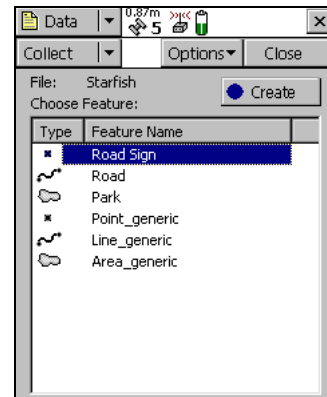
Table 3.21   Collect Features form: Buttons

Button	Description
Create	Adds a new feature of the selected type. When you tap **Create,** the **Attribute entry form (see page 56)** for the feature selected in the Choose Feature list appears.

🔆 **Tip –** The Map screen also has a **Create Feature (see page 11)** button.

Table 3.22   Collect Features form: Fields

Field	Description
File	The filename of the open file. This field is read-only.
Choose Feature list	The feature types in the data dictionary. Select the type of feature you want to create. The list contains the following columns:

	• Type	The type of feature, indicated by the line or area icon, or the point symbol configured in the data dictionary.
	• Name	The name of the feature.

Table 3.23   Collect Features form: Options

Option	Description
Logging interval	Opens the **Logging interval form (see page 70)**. Use this form to configure the logging interval for all features of the selected type in the open data file.
Repeat	Sets the default attribute values for each new feature to the same values you entered for the last feature of that type. This overrides any default values set in the data dictionary.
	The Repeat option lets you record a series of similar features quickly and efficiently. You can change any of the attributes of the current feature or simply accept the repeated values.
	When Repeat is selected, a check mark (✓) appears beside it in the option list. When Repeat is not selected, attributes for new features use the default values set in the data dictionary, if any. See **Repeating Features, page 240**.
Log Now	Configures the software to log positions for a new feature as soon as you begin the feature. You can pause and resume logging at any time.
	When Log Now is selected, a bullet (•) appears beside it in the option list.
Log Later	Pauses logging of positions for a new feature until you tap **Log** in the attribute entry form. The pause icon flashes in the Status bar when logging is paused.
	When Log Later is selected, a bullet (•) appears beside it in the option list.

Table 3.23 Collect Features form: Options (continued)

Option	Description
Trigger <sensor name>	Sends a data request to the sensor. If the sensor is configured to fill in an attribute value, the specified attribute's value is updated with the sensor message.
	*Note – This option only appears if the sensor is configured to provide data when requested. To do this, in the **Sensor Properties form (see page 219)** set the **Receive Mode field (see page 221)** to Requested, and set the Request Intervals field for the feature type to Trigger.*
	Note – This option does not appear in the TerraSync Standard edition software.
Continue	Resumes logging a line or area feature that you logged previously. You can stop logging a line or area feature, record other features on or near it, and then use Continue to return to logging the line or area feature without beginning a new feature.
	Select the Continue option to open the Continue feature form. Use this form to select a feature to continue. When you select a feature, the attribute entry form for the last line or area feature you logged opens, and logging resumes from the last position. In the line or area feature, the last position logged and the new positions are joined up automatically.
	See **Continuing Line and Area Features, page 227**.

Collect Base Data

To open the *Collect Base Data* screen, tap the Subsection list button and select Collect.

*Note – This screen is only available when a base file is open. Use the **New File screen (see page 39)** to open a new base file.*

Use the *Collect Base Data* form to monitor the status of the open base file, or to change the base station logging settings
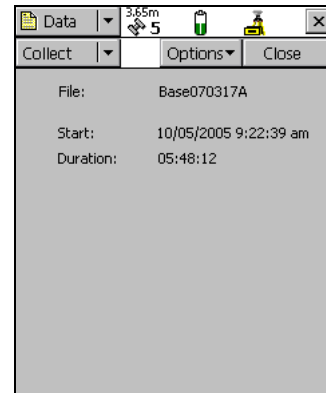
Table 3.24   Collect Base Data screen: Button

Button	Description
Options	Opens the option list for this form. See **Collect Base Data screen: Options, page 55**.
Close	Closes the current base file and returns to the **New File screen (see page 39)**.

Table 3.25   Collect Base Data screen: Fields

File	The filename of the open file.
Start	The time and date when the base file was opened.
Duration	The duration, in hours, minutes, and seconds, of the current base data logging session.
	Note – If the receiver is a survey receiver, the Start and Duration fields show N/A. These receivers can be used only to generate corrections, not to log a base file.

Table 3.26   Collect Base Data screen: Options

Option	Description
Base Settings	Opens the **Base file logging settings form (see page 56)**. Use this form to configure the logging interval and GPS settings for the open base file.

Base file logging settings form

To open the *Base file logging settings* form, in the **Collect Base Data screen (see page 54)** tap **Options**, and then select the Base Settings option.

Use this form to change the logging interval and GPS settings for the base data file that you are logging.

The fields on this form are the same fields that appear in the Logging and GPS Settings step of the **Base Station Setup wizard (see page 42)**.

You can also open this form by tapping the Setup button in the **Skyplot screen (see page 139)** or **Satellite Information screen (see page 147)**. However, if this form is already open, you cannot use the **Logging Settings** or **GPS Settings** buttons in the **Setup Section (see page 175)**.

Attribute entry form

Use the attribute entry form to enter attribute values for a new feature. To add a new feature, select the feature type from the *Choose Feature* list in the **Collect Features screen (see page 52)** and tap **Create**.

To enter a value for an attribute, select the attribute field. The method of data entry you use will depend on the availability of physical or virtual keyboards, and on the type of field selected. When you have finished entering data in a field, select another field. Alternatively, use the **Enter**

key on the physical or virtual keyboard to move to the next field. For more information on data entry techniques, see the *TerraSync Software Getting Started Guide*.

When you have finished entering attribute data and collecting positions, tap **OK**. The feature is stored and you are returned to the *Collect Features* screen.

Tip – You can also use the **End Feature** button in the Map screen to close the current feature.

To discard the new feature, tap **Cancel**. You are prompted to confirm that you want to abandon changes. If you tap **Yes**, the feature, including all its attributes and positions, is discarded.

The attribute entry form also appears when you update an existing feature. See **Attribute entry form for existing features, page 79**.

Table 3.27   Attribute entry form: Buttons

Button		Description
■ OK	OK	Closes and saves the current feature and returns to the **Collect Features screen (see page 52)**.
Cancel	Cancel	Returns to the **Collect Features screen (see page 52)** without saving the current feature.
Log ▶	Log	Starts logging GPS positions.
Pause ∥	Pause	Suspends logging of GPS positions. See **Pausing and resuming logging, page 59**.
Resume ▶	Resume	Starts logging GPS positions again after you have pausing logging. See **Pausing and resuming logging, page 59**.
Options▾	Options	Opens the option list for this form. For a detailed list of the available options, see **Attribute entry form: Options, page 58**.

Table 3.28   Attribute entry form: Fields

Field	Description
Mark as updated	Select this check box to indicate that you have visited a feature and checked its position and attributes, without making any changes to the values stored.
	This field only appears if you are updating an existing feature that has been imported from the Trimble postprocessing software. It is not available if you are creating or updating a new feature.
Attribute fields	The attribute entry form includes a field for each attribute defined in the data dictionary for this feature type.

Table 3.29   Attribute entry form: Options

Option	Description
Offset	If a line or area feature is open, this option opens the **Offset form (see page 60)**. Use this form to enter or edit the offset for the selected feature.
	If a point feature is open, this option opens the **Point offset type form (see page 61)**. Use this form to choose what type of offset to record for the selected point feature.
New Vertex	Opens the **Vertex form (see page 68)**. Use this form to record an averaged vertex for the selected line or area feature.
Logging Interval	Opens the **Logging interval form (see page 70)**. Use this form to change the logging interval for the selected feature type.
Segment Line	Segments the current line feature. This ends the current line feature and immediately starts a new feature of the same type. The first position of the new feature and the last position of the old feature are at the same location, which is a position recorded when you select the Segment Line option. See **Segmenting Line Features, page 241**.
Trigger <sensor name>	Sends a data request to the sensor. If the sensor is configured to fill in an attribute value, the specified attribute's value is updated with the sensor message. Otherwise, an uninterpreted sensor data record is added to the data file.
	*Note – This field only appears if the sensor is configured to provide data when requested. To do this, in the **Sensor Properties form (see page 219)** set the **Receive Mode field (see page 221)** to Requested, and set the Request Intervals field for the feature type to Trigger.*
	Note – This field does not appear in the TerraSync software Standard Edition.
Log	Starts logging GPS positions.

Table 3.29   Attribute entry form: Options (continued)

Option	Description
Pause	Suspends logging of GPS positions.
Resume	Starts logging GPS positions again after you have pausing logging.

Pausing and resuming logging

When the TerraSync software is logging GPS positions, the logging icon appears in the status bar. To pause logging, tap **Pause**. While paused, the TerraSync software stops logging GPS positions and the pause icon flashes over the logging icon in the status bar.

When GPS logging is paused, the TerraSync software does not record GPS positions. However, if carrier logging is enabled, background logging of carrier data does continue.

Use the pause function if you want to stop logging briefly. For example, you could pause logging if you are collecting a line feature and you want to stop and enter attribute values, or you have to travel around an obstacle before returning to the line.

To resume logging GPS, tap **Resume**. The pause icon stops flashing and the logging icon appears again. Each time you resume logging while collecting a line or area feature, the TerraSync software immediately logs a GPS position (regardless of the logging interval that you have set for line/area features).

Tip – You can also start, pause, and resume logging from the **Map Section (see page 7)**.

Offset form

When you select the Offset option in the attribute entry form for a line or area feature, the *Offset* form appears.

Recording an offset lets you log accurate position information for a feature without traveling over it. For example, to record a road centerline, it is safest to walk beside the road at a constant distance from the centerline.

Tip – You can use a laser rangefinder to record offsets. See **Using a Laser Rangefinder to Record Offsets, page 239**.

Note – You can only enter one offset for each feature you collect.

Table 3.30   Offset form: Fields

Field	Description	Default
Direction	The direction the feature lies in, relative to your path of travel. The options are left or right. For example, if you travel clockwise around a building, the feature you are logging is to the right of the path you are traveling, so select Right.	(none)
Horizontal distance	The two-dimensional distance to the feature. The horizontal distance ignores any difference in height between your position and the feature. This field only appears if the **Offset Format (see page 217)** is set to Horizontal/Vertical.	0.00 m
Vertical distance	The vertical distance between your position and the feature. This field only appears if the **Offset Format (see page 217)** is set to Horizontal/Vertical.	0.00 m

Table 3.30   Offset form: Fields (continued)

Field	Description	Default
Slope distance	The distance from your position to the feature, including any difference in height. This field only appears if the **Offset Format (see page 217)** is set to Slope distance.	0.00 m
Inclination	The angle of inclination between your position and the feature. This field only appears if the **Offset Format (see page 217)** is set to Slope distance.	0.00°

Point offset type form

When you select the Offset option in the **Attribute entry form (see page 56)**, and the selected feature is a point feature, the *Point offset type* form appears.

Use this form to specify the type of offset to record.

Select an option and tap **Next** to open the corresponding form. The options are:

- **Distance-Bearing Offset form, page 62**

- **Distance-Distance Offset form, page 63**

- **Triple Distance Offset form, page 65**

- **Bearing-Bearing Offset form, page 66**

- **Triple Bearing Offset form, page 67**
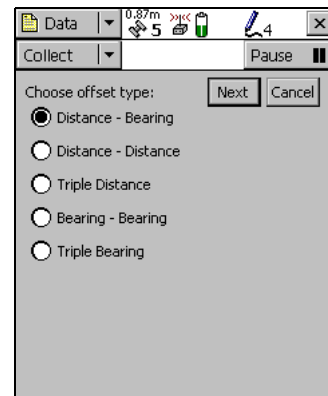
Distance-Bearing Offset form

When you select the Distance-Bearing
option in the **Point offset type form
(see page 61)**, the *Distance-Bearing
Offset* form appears.

When you set a distance-bearing offset,
you specify a distance and a bearing
from north. The feature lies at the point
where the bearing line intersects the
circle with the specified distance as its
radius.

To specify a distance-bearing offset, fill in
the fields on this form and tap **OK.**

Table 3.31   Distance-Bearing Offset form: Fields

Field	Description	Default
Bearing	The bearing, in the selected angle units, from the reference position to the point feature you are logging. For example, if you are facing North and the feature is directly to your right (East), enter 90°. The angle you enter is relative to the configured north reference, which is indicated by a T (true north) or M (magnetic north) after the field name. To configure the north reference, use the **Units form (see page 216)**.	0.00°
Horizontal distance	The two-dimensional distance to the feature, ignoring any difference in height between your position and the feature. This field only appears if the **Offset Format (see page 217)** is set to Horizontal/Vertical.	0.00 m
Vertical distance	The vertical distance between your position and the feature. This field only appears if the **Offset Format (see page 217)** is set to Horizontal/Vertical.	0.00 m

Table 3.31   Distance-Bearing Offset form: Fields (continued)

Field	Description	Default
Slope distance	The distance from your position to the feature, including any difference in height. This field only appears if the **Offset Format (see page 217)** is set to Slope/Inclination.	0.00 m
Inclination	The angle of inclination between your position and the feature. This field only appears if the **Offset Format (see page 217)** is set to Slope/Inclination.	0.00°

Distance-Distance Offset form

When you select the Distance-Bearing option in the **Point offset type form (see page 61)**, the *Distance-Distance offset* form appears.

When you set a distance-distance offset, you record two reference positions, and the distance from each of these positions to the feature. See **Distance-distance offset, page 235**.

To increase accuracy, you can 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.

To record the offset, you need to perform a number of steps in a particular sequence. To ensure that the correct steps are followed, the form displays instructions and hides some fields until you have performed the preceding steps. See **Offsets, page 230**.

Table 3.32   Distance-Distance offset form: Buttons

Button	Description
Next	Moves to the next step in the sequence. When you have completed all steps, this button is replaced with the **OK** button.
Clear	Deletes all the offset and position data that you have recorded for this feature.

Table 3.33   Distance-Distance offset form: Fields

Field	Description	Default
Reference position	The status of the reference position. This field is read-only, and is repeated for each reference position. The options are: • Not started — You have not yet collected any positions, because logging was paused when you opened the form. • Logging — The TerraSync software is logging positions for this reference position. • Paused — Logging of positions is paused. • Collected — The position has been collected.	(none)
Distance	The distance from the reference position to the feature. Depending on the current **Offset Format (see page 217)**, the fields below this heading are either **Horizontal distance (see page 60)** and **Vertical distance (see page 60)**, or **Slope distance (see page 61)** and **Inclination (see page 61)**. The fields are repeated for each reference position.	(none)
Direction	The feature's direction relative to the path between the reference positions. The options are left and right.	(none)

Triple Distance Offset form

When you select the Triple Distance option in the **Point offset type form (see page 61)**, the *Triple Distance Offset* form appears.

When you set a triple distance offset, you record three reference positions (A, B, and C), and the distance from each of these positions to the feature. A triple distance offset is similar to a distance-distance offset, but a third measurement provides some mathematical redundancy so that the direction can be calculated automatically. See **Triple distance offset, page 236**.

To increase accuracy, you can 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.

To record the offset, you need to perform a number of steps in a particular sequence. To ensure that the correct steps are followed, the form displays instructions and hides some fields until you have performed the preceding steps. See **Offsets, page 230**.

The *Triple Distance Offset* form contains the same controls as the **Distance-Distance Offset form (see page 63)**, except that the repeated fields appear three times (for the three reference positions A, B, and C), and the *Direction* field is usually read-only because the software calculates it automatically.

Bearing-Bearing Offset form

When you select the Bearing-Bearing option in the **Point offset type form (see page 61)**, the *Bearing-Bearing Offset* form appears.

When you set a bearing-bearing offset, you record two reference positions (A and B), and the bearing from north from each of these positions to the feature. See **Bearing-bearing offset, page 237**.

To increase accuracy, you can 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.

To record the offset you need to perform a number of steps in a particular sequence. To ensure that the correct steps are followed, the form displays instructions and hides some fields until you have performed the preceding steps. See **Offsets, page 230**.

Table 3.34   Bearing-Bearing Offset form: Buttons

Button	Description
Next	Moves to the next step in the sequence. When you have completed all steps, this button is replaced with the **OK** button.
Clear	Deletes all the offset and position data that you have recorded for this feature.

Table 3.35   Bearing-Bearing Offset form: Fields

Field	Description	Default
Reference position	The status of the reference position. This field is read-only, and is repeated for each reference position. The options are as for the **Reference position field (see page 64)** on the **Distance-Distance Offset form (see page 63)**.	(none)
Bearing	The bearing, in the selected angle units, from the reference position to the feature. This field is repeated for each reference position. For example, if you are facing north and the feature is directly to your right (east), enter 90°. The angle you enter is relative to the configured north reference, which is indicated by a T (true north) or M (magnetic north) after the field name. To configure the north reference, use the **Units form (see page 216)**.	0.00°

Triple Bearing Offset form

When you select the Triple Bearing option from the **Point offset type form (see page 61)**, the *Triple Bearing Offset* form appears.

When you set a triple bearing offset, you record three reference positions (A, B, and C), and the bearing from north from each of these positions to the feature. A triple bearing offset is similar to a bearing-bearing offset, but a third measurement provides some mathematical redundancy that can improve accuracy. See **Triple bearing offset, page 238**.

To increase accuracy, you can 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.

To record the offset you need to perform a number of steps in a particular sequence. To ensure that the correct steps are followed, the form displays instructions and hides some fields until you have performed the preceding steps. See **Offsets, page 230**.

The *Triple Bearing Offset* form contains the same buttons and fields as the **Bearing-Bearing Offset form (see page 66)**, except that the repeated fields appear three times (for the three reference positions A, B, and C).

Vertex form

When you select the New Vertex option in the **Attribute entry form (see page 56)**, the *Vertex* form appears.

The *Vertex* form looks exactly like the attribute entry form, except that the messages Vertex # open (where # represents the vertex number within the current feature) and Remain stationary appear in the form title.

When you log an averaged vertex for a line or area feature in *autonomous* or *DGPS* mode, the TerraSync software records several positions at each vertex, then averages these positions to calculate the vertex position. The averaged position is more accurate than a single position. When you log a vertex in *RTK* mode, the TerraSync software records only the RTK-corrected position with the best precision. All other positions are discarded.

💡 **Tip –** If you want a line or area feature to contain only vertices, use the **Log Later (see page 53)** function to pause logging before opening the feature. When you open the *Vertex* form, logging resumes automatically. When you close the vertex, logging returns to the paused state. This ensures that you do not record any positions that are not associated with a vertex.

See **Recording Averaged Vertices, page 243**.

To record a vertex:

1. Open the attribute entry form.

2. Tap **Options**.

3. Select New Vertex. The logging icon in the status bar changes to show that you are logging a vertex:

    – In autonomous or DGPS mode, the logging icon changes to an animated circle zooming in $\circledcirc_4$, and the number beside it shows the number of positions logged for this vertex.

    – In RTK mode, the logging icon changes to an animated circle zooming in over a triangle $\triangle_1$. The number beside the icon is 1 if a position has been logged, or 0 if no positions with the required precision have been received yet.

4. Remain stationary at your current location, and enter or edit attribute values if necessary.

5. When you have recorded enough positions for this vertex, tap **OK**. The *Vertex* form closes, and you are returned to the attribute entry form.

Tip – In RTK mode, you can finish logging the vertex at any time, provided the number beside the logging icon is 1.

Logging interval form

You can open the *Logging interval* form from any of the following screens:

- **Collect Features, page 52**

- **Update Features, page 75**

- **Attribute entry form, page 56** (when logging a new feature)

- **Attribute entry form for existing features, page 79** (when updating an existing feature)

Tip – The logging interval is only for the highlighted or open feature type. To configure logging intervals for all feature types in the open data file, use the **Logging Settings form (see page 182)** in the Setup section.

To open the *Logging interval* form, tap **Options** in one of these screens, then select Logging interval.

In this form, you can change the interval for all features of the selected type. A default logging interval for each type of feature is set in the data dictionary.

*Note – Any changes you make in this form are applied to **all** features of the selected type that you collect or update in the open data file.*

Table 3.36   Logging interval form: Fields

Field	Description	Default
Logging style	The unit of measurement for the logging interval. The options are:	Time
	• Time — Log a new position when a certain time since logging the last position for this feature has elapsed.	
	• Distance — Log a new position when you have moved a certain distance from the last position logged for this feature.	
	This field is only available for line and area features. If the selected feature is a point, this field displays Time and the logging style cannot be edited.	
Logging interval	The time or distance between recording GPS positions. You must enter the interval in the units specified in the Logging style field.	5 s
	Note – When the logging interval is small, the TerraSync software records more positions for the feature. More storage space is required.	
	If you do not want to log positions, select Off. No GPS data is recorded for this feature.	
Accuracy	This field specifies whether to log the usual code phase data from the GPS receiver, or to log more detailed but more accurate carrier phase data.	Code

Continue feature form

When you select the Continue option in the **Collect Features screen (see page 52)**, the *Continue feature* form appears.

This form displays a list of line and area features that can be continued.

To continue a feature, select it from the list and tap **Continue**. The **Attribute entry form (see page 56)** for the selected feature appears, and logging of GPS positions to this feature resumes.

See **Continuing Line and Area Features, page 227**.
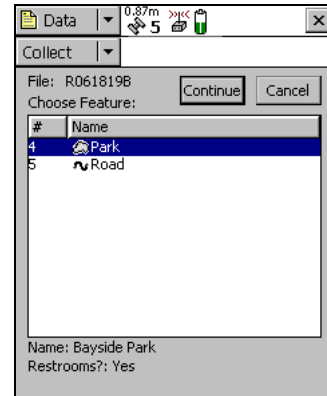
Table 3.37   Continue feature form: Buttons

Button	Description
Cancel	Returns to the **Collect Features screen (see page 52)** without continuing a feature.
Continue	Opens the attribute entry form for the selected feature. Use this form to continue logging positions to the selected feature.

Table 3.38   Continue feature form: Fields

| Field	Description
File	The filename of the open file. This field is read-only.
Choose Feature list	The list of features that you can review or update. The list contains the following columns:
	• # The feature identification number. Each feature is given a unique number in the file.
	• Name The name of the feature and its type, shown by the line or area icon to the left of the feature name.
Labels	The name and value of two attributes from the selected feature. The data dictionary defines which attributes from each feature type are selected as labels. Use the labels to verify that you have selected the correct feature from the list.

Existing File

Note – *You cannot open imported files using the TerraSync Standard edition software. Imported files do not appear in the Existing File screen.*

To open the *Existing File* subsection, tap the Subsection list button and choose Existing File.

Use the *Existing File* subsection to open an existing data file.

When you have selected an existing data file from the list of files, tap **Open** to open this file and begin reviewing existing features in the **Update Features screen (see page 75)**.

Note – *This section is not available if a file is already open. To access this section, close the open data file.*
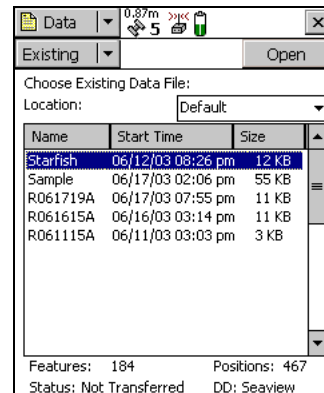
Tip – You can also switch to the **Collect Features screen (see page 52)** to add new features to the file. However, because of the way in which GPS times are stored, you cannot log new features to a file that is more than a week old. To maintain accurate storage, it is necessary to limit the time-span of a data file to seven days.

Table 3.39   Existing File screen: Fields

| Field	Description
Location	The TerraSync software enables you to write data files directly to internal or removable secondary storage locations. This field contains an entry for each storage location on the device. There is also an option called Default, which represents the TerraSync documents folder.
List of files	A list of all the data files that are available for update. The list contains the following columns:
	• Name — The name of the data file.
	• Time — The date and time when the file was created or was last updated.
	• Size — The size of the file.
	You can drag each column heading to resize the column, or tap a column heading to sort by that column. If the list is already sorted by the column you tap, the sort order reverses.
	To open a file, highlight it in this list and then tap **Open**. The **Update Features screen (see page 75)** appears.
Features	The number of features in the selected file.
Positions	The number of position records in the selected file.

Table 3.39   Existing File screen: Fields (continued)

Field	Description
Status	The update status of the selected file. The options are:
	• Transferred The file has been created or updated in the TerraSync software, and then copied to the office computer, and it has not been updated in the TerraSync software since.
	• Not Transferred The file has not been copied to the office computer since it was created or last updated.
	• Imported The file has been transferred from the office computer, imported from Shapefiles, or received by e-mail, but it has not yet been updated in the TerraSync software.
	Note – If you are using the TerraSync Standard edition software, files with the status Imported do not appear in this list, because they cannot be opened.
DD	The data dictionary that the selected file was associated with when you created it.
	Note – Once you have created a file, you cannot change which data dictionary it uses.

Update Features

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

To open the *Update Features* subsection, tap the Subsection list button and select Update Features.

Use the Update Features subsection to review and maintain features and attributes you have already collected. You can update attributes, offsets, and GPS positions, or delete features. The *Update Features* screen lists all the features in the open data file.
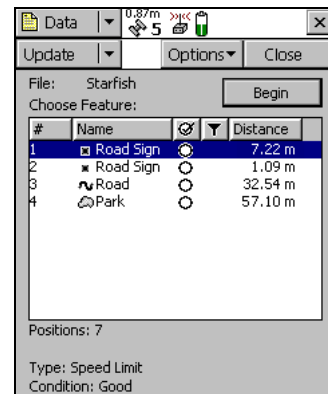
To update a feature, highlight it in the *Choose Feature* list and tap **Begin**. An attribute entry form appears.

Note – This subsection is only available when a file is open. Use the Existing File screen (see page 73) to open an existing data file, or the New File screen (see page 39) to open a new data file.

Table 3.40   Update Features screen: Buttons

Button	Description
Begin	Opens the selected feature on the list for update. When you tap **Begin**, the attribute entry form for the selected feature appears.

Table 3.41   Update Features screen: Fields

Field	Description	
File	The filename of the open file. This field is read-only.	
Choose Feature list	The list of features that you can review or update. The list contains the following columns:	
	#	The feature identification number. Each feature is given a unique number in the file.
	Name	The name of the feature and its type, shown by the point, line, or area icon to the left of the feature name
	Update	The **Update status (see page 80)** of the feature:
		• (blank) The feature is new.
		• ⭘ The feature has been imported from the postprocessing software.
		• ☑ The feature has been updated.
	Filter	The filter status of the feature:
		• (blank) The feature does not meet the criteria of the filter, or no filter has been set.
		• ▼ The feature meets the filter criteria.
	Distance	The distance from the feature to the GPS position.
Positions	The number of GPS and digitized positions recorded for the selected feature in the list.	

Table 3.41   Update Features screen: Fields (continued)

Field	Description
Carrier coverage	The carrier phase status of the selected feature. This field only appears if the selected feature has carrier phase data collection enabled. Possible values are: • <carrier time> Enough carrier data has been collected for this feature. This field shows the length of the block, in mm:ss format. • Continuing The carrier block that this feature belongs to is still being collected, and may provide enough carrier data to process this feature. • Insufficient Not enough carrier data has been collected for this feature.
Length (2D)	The two-dimensional length of the selected feature. This field only appears if the selected feature is a line or area feature. The two-dimensional length is calculated by adding together the horizontal distances between positions logged for the feature, ignoring height information.
(3D)	The three-dimensional length of the selected feature. This field only appears if the selected feature is a line feature. The three-dimensional length takes the height of each position in the feature into account when it calculates distances between positions.
Area	The (two-dimensional) area of the feature. This field only appears if the selected feature is an area feature.
Labels	The name and value of two attributes from the selected feature. The data dictionary defines which attributes from each feature type are selected as labels. Use the labels to check that you have selected the correct feature from the list.

Table 3.42   Update Features screen: Options

Option	Description
Show Filtered Features	Displays filtered features in the Choose Feature list and on the map. Filtered features are indicated by the filter icon ▼ in the Filter column. When filtered features are displayed, this option has a check mark (✓) beside it.
Show Unfiltered Features	Displays unfiltered features in the Choose Feature list and on the map. Unfiltered features are indicated by a blank in the Filter column. When unfiltered features are displayed, this option has a check mark (✓) beside it.
Filter	Opens the **Filter By form (see page 83)**. Use this form to set or clear filtering conditions.

Table 3.42 Update Features screen: Options (continued)

Option	Description
Delete	Deletes the selected feature from the Choose Feature list. A deleted feature is indicated by a horizontal line through it. Deleted features can be undeleted in the TerraSync software or in the postprocessing software.
Undelete	Undeletes the selected feature. The line through the feature is removed. This option is only available if the selected feature is deleted.
Set Nav Start	Sets the currently selected feature or GPS position as the navigation start point. When you set the start, the point ⬚, line ∿, or area ⬭ icon beside the selected feature is replaced by the start icon ▸. If there was already a navigation start selected, that feature's icon changes from the start icon back to its usual point, line, or area icon.
Set Nav Target	Sets the currently selected feature as the navigation target. When you set the target, the point ⬚, line ∿, or area ⬭ icon beside the selected feature is replaced by the target icon ✿. If there was already a navigation target selected, that feature's icon changes from the target icon back to its usual point, line, or area icon.
	Note – *You can also set the navigation start and target in the Map section.*
Clear Nav Targets	Clears the navigation start and the navigation target. You can use this option even when the selected feature in the list is not the navigation start or target. When you select this option, the start ▸ and target ✿ icons beside the existing navigation start and target are replaced by the usual point, line, or area icons for those features.
Logging interval	Opens the **Logging interval form (see page 70)**. Use this form to configure the logging interval for all features of the selected type in the open data file.
Continue	Resumes logging a line or area feature that you logged previously. See **Continuing Line and Area Features, page 227**.

Attribute entry form for existing features

Use this form to update a feature's attributes or position data. To update a feature, highlight the feature in the *Choose Feature* list in the **Existing File screen (see page 73)** and tap **Begin**. Alternatively, double-tap the feature in the Map screen.

See also **Attribute entry form: Buttons, page 57**, **Attribute entry form: Fields, page 58**, and **Attribute entry form: Options, page 58**.

Tip – To update a feature without changing its attribute values or position information, select the *Mark as updated* check box. See **Marking a feature as updated, page 81**.

When you have finished editing the attribute data, or have marked the feature as updated, tap **OK**. The updated information is stored and the **Update Features screen (see page 75)** reappears. A check mark ✸ appears next to the feature name in the *Choose Feature* list. This indicates that the feature has been updated.

To abandon changes to a feature, tap **Cancel**. You are prompted to confirm this cancellation.

Use **Log**, **Pause**, and **Resume** to start, pause, or resume logging of GPS positions. By default, when you update an existing feature, new GPS positions are not logged, so logging is paused when you first open the feature for update. See **Pausing and resuming logging, page 59**.

Update status

Each feature in a data file has an update status. Use the update status to sort or filter features in the field, so you can tell which features are new, which you have visited for data maintenance, and which you have not visited yet. In the postprocessing software, you can use the update status to select features to export to the GIS.

The Update column of the **Choose Feature list (see page 52)** in the **Update Features screen (see page 75)** shows the status of each feature:

Table 3.43   Data section: Update status

Icon	Update status	Description
(blank)	New	The feature has been created since the file was transferred from the postprocessing software, or the feature is in a new file that has never been transferred to the postprocessing software.
⬡	Imported	The feature has been transferred from the postprocessing software but has not been updated yet.
⬡	Updated	The feature has been transferred from the postprocessing software and has been updated since the transfer.

When you change an Imported feature in any way, its update status changes to Updated. Any of the following actions automatically changes a feature's status to Updated:

- **Attribute entry form for existing features, page 79**

- **Marking a feature as updated (see page 81)** in the **Attribute entry form (see page 56)**

- **Updating positions (see page 81)** with the **Log** button

- Digitizing positions (see **Digitizing, page 29)**

- Adding or changing offsets in an offset form (see **Offsets, page 230)**

Note – When you edit a New feature, its status does not change to Updated. The update status indicates the feature's status with respect to the postprocessing software and the GIS.

Marking a feature as updated

When you change an existing feature's attribute values, offset data, or GPS position, its **Update status (see page 80)** changes to Updated. When you are visiting features for data maintenance, you can use the update status to identify the features you have not visited yet.

Sometimes you may want to indicate that you have visited a feature and checked its position and attributes, without making any changes to the values stored. You can do this by selecting the Mark as updated check box in the attribute entry form. The feature's status changes to Updated and the updated icon (⊘) appears beside it in the **Choose Feature list (see page 52)**.

If the feature has a date attribute that is set in the data dictionary to Auto Generate on Update, the date attribute's value automatically changes to the current date. No other changes to the feature information occur.

Tip – After you have marked a feature as updated, you can still change its attributes or position information. However, once you change attribute values or position information, you cannot unmark the feature.

Updating positions

To update the position information for a feature:

1. Select the feature from the **Choose Feature list (see page 52)** and tap **Begin**. The attribute entry form appears.

2. Tap **Log**.

3. If the **Allow Position Update field (see page 183)** on the
    Logging Settings form is configured to require confirmation, or
    the feature is a line or area, a message box appears, asking you to
    select a logging option:

Table 3.44   Update Features screen: Logging options

Option	Description
Update feature (Replace)	Records new positions for this feature, replacing all positions.
Continue feature (Append)	Continues the feature, appending the new positions to the existing positions. See **Continuing Line and Area Features, page 227**. This option is not available for point features.

If you tap **OK** in this message box, the TerraSync software starts
logging GPS data. This data either replaces or is appended to
existing positions, depending on the option you selected. If you
tap **Cancel**, the message box closes and no GPS data is logged.

4. When you have finished collecting positions for a feature, tap
    OK. The updated information is stored and the **Update Features
    screen (see page 75)** reappears. The updated icon ( ) appears
    next to the feature in the *Choose Feature* list to indicate that it is
    updated.

*Note – If you log new or additional position information for a feature while
that feature is selected as the navigation target, you must reselect the
feature as the navigation target before you can navigate to its new position.*

Tip – You can also use **Digitizing (see page 29)** to update a feature's
positions.

Filter By form

When you select the *Filter* option in the **Update Features screen (see page 75)**, the *Filter By* form appears.

In this form you can set filters that divide features into two groups: **filtered** and **unfiltered**. Once you have applied a filter, you can hide or show either group in the Data section or in the **Map Section (see page 7)**. You can also sort features by their filter status.

Note – Any filter that you apply in the Data section applies throughout the TerraSync software while the current data file remains open.

See also **Filtering features, page 85**.

Table 3.45   Filter By form: Fields

Field	Description
Update Status	Select this check box to filter by update status. If this check box is selected, the following fields appear below it: • **New (see page 80)** • **Imported (see page 80)** • **Updated (see page 80)** For each field, you can choose one of the following options: • Unfiltered • Filtered If this check box is cleared, the *New*, *Imported*, and *Updated* fields do not appear, and the filter does not consider update status.

Table 3.45   Filter By form: Fields (continued)

Field	Description
Deleted Status	Select this check box to filter by deletion status. If this check box is selected, the following fields appear below it: • Deleted • Undeleted For each field, you can choose one of the following options: • Unfiltered • Filtered If this check box is cleared, the Deleted and Undeleted fields do not appear, and the filter does not consider deletion status.
Features	Select this check box to filter by feature types or their attributes. If this check box is selected, a field for each type of feature in the data dictionary appears below it. Use these fields to specify feature filtering conditions. Each feature type field provides the following options: • Unfiltered — Do not filter by this feature type. • All Filtered — Filter all features of this type. • Filter By — Select features of this type to filter by, using attribute values. When you select this option, the **Attribute (see page 84)**, **Test (see page 85)**, and **Value (see page 85)** fields appear below it. Use these three fields to select the attribute values for this feature to filter by.
Attribute	The attribute from the feature type to filter by. Each attribute of the feature type is listed here. This field only appears if the Filter By option is selected in the feature type field.

Table 3.45   Filter By form: Fields (continued)

Field	Description
Test	The comparison to perform on the attribute selected above. The options listed depend on the attribute type:
	• Menu Equal To, Not Equal To
	• Text or filename Containing, Not Containing
	• Date, time, or numeric Equal To, Not Equal To, Less Than, Greater Than
	This field only appears if the Filter By option is selected in the feature type field.
Value	The attribute value to filter by. If there is a list of options, select an attribute value from the list. Otherwise, enter the value to filter by.
	This field only appears if the Filter By option is selected in the feature type field.

Filtering features

The TerraSync software lets you filter each feature by one attribute value. However, a filter can include conditions for each feature type, as well as the deletion status or update status of each feature. You can set complex filtering conditions with a single filter, or you can select just one condition to filter.

When you apply a filter, all features are divided into two groups: filtered and unfiltered. The software does not automatically hide or show either group; it is up to you to decide which group you want to view and which, if any, you want to hide.

To define a filter, tap **Options** in the **Update Features screen (see page 75)** or in the **Map Section (see page 7)** and select Filter. The **Filter By form (see page 83)** appears.

The *Filter By* form lets you define conditions on each feature's update status, deletion status, and feature type. You can set any or all of these filters. By default, no filtering is applied.

The filter functions like a sieve. All features that satisfy the conditions you specify are moved to the filtered group. The others remain in the unfiltered group. If you want to separate a small group of features from the rest, set them to be filtered.

You can set any or all of these filters at the same time. When you set more than one filtering condition, **all** conditions must be met for a feature to be filtered. For example if you have chosen to filter deleted features that have been updated, a feature must be **both** updated **and** deleted to be included in the filtered group. If it does not meet all the conditions you set, it remains in the unfiltered group.

To set a filter on each feature's update status, select the *Update Status* check box. The *New*, *Imported*, and *Updated* fields appear below the check box. Select the appropriate value in each field. For example, to filter new and updated features, select Filtered in the *New* field and selected Filtered in the *Updated* field.
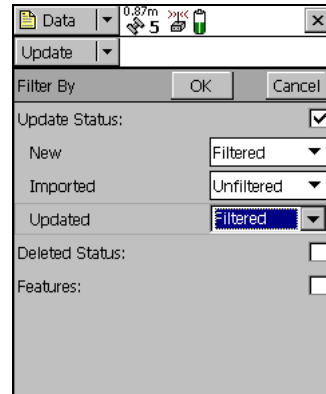
Similarly, to set a filter on each feature's deletion status, select the *Deleted Status* check box. The *Deleted* and *Undeleted* fields appear below the check box. Select the appropriate value in each field to specify filtering conditions.

To set a filter on feature properties, select the *Features* check box. A field for each feature type in the data dictionary appears in the *Filter By* form. By default, each of these fields is set to the Unfiltered option, so no features are selected.

If you select All Filtered from a feature type field, all features of that type are included in the filter. If you select Unfiltered, no features of this type are included. If you select Filter By, you can filter this feature type according to its attribute values.
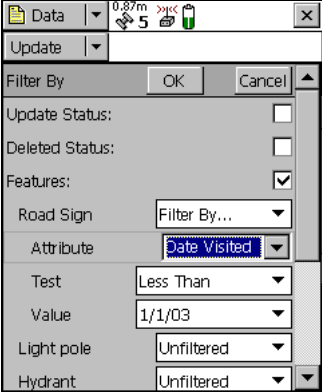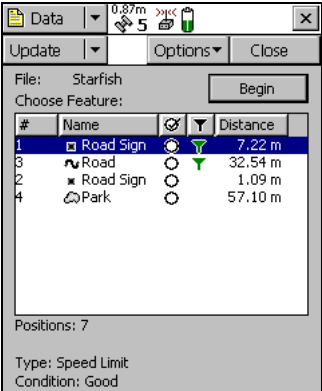
When you select Filter By in a feature type field, the *Attribute*, *Test*, and *Value* fields appear below it. To filter by attribute, select the attribute name in the *Attribute* field, select a comparison operation in the *Test* field, and enter or select a value in the *Value* field.

When you apply the filter, a feature of this type is filtered if the value in the selected attribute matches the value and comparison in the filter. For example, if you specify that the Date Visited attribute must be less than 1 January 2003, any feature visited on or before 31 December 2002 is filtered. Features visited on or after 1 January 2003 remain in the unfiltered group.

You can apply different levels of filtering to different feature types. For example you could select All Filtered for the Road and Park feature types, but specify an attribute condition for the Road Sign feature type. When you apply the filter, all of the Road and Park features, and some of the Road Sign features, are filtered. The remaining Road Sign features are unfiltered.

To apply a filter, simply tap **OK** in the *Filter By* form. The form closes and the filter icon ▼ appears in the Status bar. Each feature in the **Update Features screen (see page 75)** that is filtered has a filter icon ▼ beside it. Unfiltered features have no icon.

Note – *Any filter you use applies as long as the current data file remains open, and is cleared when you close the file.*

Once a filter is active, you can tap the *Filter* column heading to sort the list by filter status. Filtered features are grouped first, followed by unfiltered features. Tap the column heading again to reverse the sort order, listing unfiltered features first.

Use the **Show Filtered Features (see page 77)** and **Show Unfiltered Features (see page 77)** options in the *Update Features* screen to hide or show the two groups of features. When you hide or show a group of features in the Data section, the corresponding map layer is hidden or shown. Similarly, when you hide or show features in the Map section, they are hidden or shown in the Data section. See **Map Layers, page 15**.

Note – Deleted features are never displayed on the map.

Construct Target Offset form

When you select *Set Nav Target / Construct* from the option list in the **Update Features screen (see page 75)**, the *Construct Target Offset* form appears.

In this form, you can set a navigation target by specifying an offset from the current navigation start point.

Table 3.46   Construct Target Offset form: Fields

Field	Description
Bearing	The bearing, in the selected angle units, from the navigation start to the target position.
	The angle you enter is relative to the configured north reference, which is indicated by a T (true north) or M (magnetic north) after the field name. To configure the north reference, use the **Units form (see page 216)**.
Horizontal distance	The two-dimensional distance from the navigation start to the target position. The horizontal distance ignores any difference in height between the start and target.
	This field only appears if the **Offset Format (see page 217)** is set to Horizontal/Vertical.
Vertical distance	The vertical distance from the navigation start to the target position.
	This field only appears if the **Offset Format (see page 217)** is set to Horizontal/Vertical.
Slope distance	The distance from the navigation start to the target position, including any difference in height.
	This field only appears if the **Offset Format (see page 217)** is set to Slope/Inclination.
Inclination	The angle of inclination between the navigation start and the target position.
	This field only appears if the **Offset Format (see page 217)** is set to Slope/Inclination.

File Manager

To open the File Manager subsection, tap the Subsection list button and select File Manager. You can use this subsection to:

- copy or move files between the main memory and storage cards, or between disk drives

- delete or rename files

- e-mail files

- convert files to or from Shapefile format

- create, extract, or edit data dictionaries
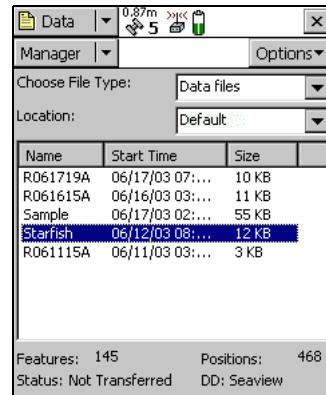
Highlight the file you want, and then tap **Options** to access a list of available options (see **File Manager screen: Options, page 92**) for this screen.

Note – The options that are available depend on the selected file type, the TerraSync software edition (Professional or Standard) that is installed, and the storage locations that are available on the field computer.

Table 3.47   File Manager screen: Fields

Field	Description		Default
Choose File Type	Select the type of file to display. The options are:		Data files
	• Data files	SSF files (.cor, .imp, .phs, or .ssf files) containing feature and attribute information.	
	• Base files	SSF files containing reference base station data.	
	• Dictionaries	Data dictionary (.ddf) files containing feature definitions.	
	• Background files	Background image files in vector (.cor, .imp, .phs, .ssf) or raster (.bmp, .jpg, .sid, .tif) format.	
	• Geoid files	Files containing geoid definitions.	
	• Configuration files	.tcf files containing the TerraSync software configuration information.	
Location	Select the storage location to display files from. This field contains an entry for each storage location on the device. There is also an option called Default, which represents the TerraSync documents folder.		Default
List of files	The list of files that you can move, copy, rename, delete, or export to Shapefiles. The list contains the following columns:		(no default)
	• Name	The name of the file.	
	• Start Time	The date and time when the file was created or last updated.	
	• Format	The file format of the background file. This column appears instead of the Start Time column when Background files is selected in the Choose File field.	
	• Size	The size of the file, in kilobytes.	
	You can drag a column heading to resize the column, or tap a column heading to sort by that column. If the list is already sorted by the column you select, the sort order is reversed.		

Table 3.47 File Manager screen: Fields (continued)

Field	Description		Default
Features	The number of features in the selected file.		(no default)
	This field does not appear unless the Data files option or the Base files option is selected in the Choose File Type list. If the Base files option is selected, this field shows the value Base.		
Positions	The number of position records in the file.		(no default)
	This field does not appear unless the Data files option is selected in the Choose File Type list.		
Status	The update status of the selected file. The status is one of the following:		(no default)
	• Transferred	The file has been created or updated in the TerraSync software, has been copied to the office computer, and has not been updated in the TerraSync software since.	
	• Not Transferred	The file has not been copied to the office computer since it was created or last updated.	
	• Imported	The file has been transferred from the office computer, imported from Shapefiles, or received by e-mail, but has not yet been updated in the TerraSync software.	
	• Not Usable	The file's status is Imported, but you are using the TerraSync Standard edition software so you cannot update it.	
	This field does not appear unless the Data files option is selected in the Choose File Type list.		
DD	The name of the data dictionary associated with the selected file.		(no default)
	This field does not appear unless the Data files option is selected in the Choose File Type list.		

Table 3.48 File Manager screen: Options

Option	Description
Delete	Deletes the highlighted file.
Copy to	Makes a copy of the highlighted file and stores that copy in the storage location that you select. Each storage location on the field computer appears as an option on the submenu.

Table 3.48   File Manager screen: Options (continued)

Option	Description
Rename	Enables you to change the name of the highlighted file, using the keyboard of the field device or the integrated keyboard.
Move to	Moves the highlighted file to the storage location that you select. Each storage location on the field computer appears as an option on the submenu.
Send via E-mail	Opens the **Send via E-mail form (see page 94)**.
Receive via E-mail	Opens the **Receive via E-mail form (see page 96)**.
Edit dictionary	Opens the **Edit dictionary form (see page 105)**. Use this form to update the selected data dictionary, or to update the data dictionary that is embedded in the selected data file.
	If you edit a data dictionary, the changes affect all data files that you create using this data dictionary. Changes do not affect data files already created using this data dictionary.
	If you edit a data file's ***embedded*** dictionary, the changes affect only this data file, not the data dictionary that was used when the file was created.
New dictionary	Opens the **New dictionary form (see page 105)**. Use this form to specify a name for the new data dictionary.
Read dictionary from data	Opens the **Read dictionary from data form (see page 98)**.
Read data from Shape	Opens the **Read from Shape form (see page 99)**. The name of this option and the name of the form depend on the file type that is selected in the Choose File field.
Write data to Shape	Opens the **Write to Shape form (see page 101)**.
Extract data from file	Opens the **Extract Data form (see page 103).** This allows you to create a file that contains new and updated data.

Send via E-mail form

Note – This option is only available on field computers that have e-mail support.

When you select the Send via E-mail option from the Options list in the **File Manager (see page 90)**, the *Send via E-mail* form appears.

In this form you can specify the recipient and the subject line for an e-mail. When you tap **OK**, an e-mail, with the selected file attached to it, is automatically generated and sent to your e-mail program's outbox. The next time you connect to your selected e-mail service, the e-mail is sent to the address you specified.

On a CE device, you can use different e-mail services to send data files from the TerraSync software. The default service used is synchronization with a desktop computer. However, you can set up services for connection via a network, cellphone, or modem.

Note – To successfully send and receive files from within the TerraSync software, the e-mail service that you use must specify the login details for connecting to your ISP, and must be configured to download the entire message and any attachments, not just the message header.

For more information on adding and configuring services, refer to the help for your e-mail program.

Note – The only file types that the TerraSync software can send by e-mail are data files and data dictionary files.

Table 3.49   Send via E-mail form: Fields

Field	Description
To	The e-mail address you want to send the selected file to.
	If you have sent files from the TerraSync software before, this field defaults to the last e-mail address you used.
Subject Prefix	A subject line for the e-mail.
	If you have sent files from the TerraSync software before, this field defaults to the last subject line you used.
Service	The e-mail service to use when sending the message. This field lists all the services that you have defined in your e-mail program.
	By default, the Microsoft ActiveSync® technology is selected. The ActiveSync technology service synchronizes the field computer's outbox with the desktop computer's outbox. The next time the desktop computer connects to the Internet, the e-mail program sends the e-mails in its outbox.
	This field only appears if the field computer is a CE device.
Delete after send	Select this check box to delete the file from the TerraSync document folder when you attach it to an e-mail message. If you select this check box, the data file is moved to the e-mail program's outbox. If you clear this check box, a copy of the data file is placed in the outbox, and the original file remains in the document folder.
	If space on the field computer is limited, select this check box. Only one copy of the file will be stored on the field computer. The stored file cannot be opened in the TerraSync software. When you next connect to the selected e-mail service and send the e-mail, the data file is deleted.

Receive via E-mail form

Note – *This option is only available on field computers that have e-mail support.*

When you select Receive via E-mail from the Options list in the **File Manager (see page 90)**, the *Receive via E-mail* form appears.

Use this form to check your e-mail program's inbox for e-mails that have Trimble data files attached to them, and transfer the attached files to the TerraSync software.

Note – *You can only use this form to receive files sent by e-mail from the Trimble Data Transfer utility (by transferring the files to a GIS E-mail device)*

To receive e-mailed files, enter a subject line in the *Subject must contain* field, select the *Allow file overwrites* check box if you want to overwrite existing files with new ones of the same name, and tap **OK**.

The TerraSync software searches the inbox of your e-mail program, selects any e-mails whose subject line includes the text you specified, and transfers any files attached to these e-mails to the TerraSync software data folder. The *Receive via E-mail* form closes.

Tip – In the Trimble Data Transfer utility you can specify a subject line prefix for each e-mail you send. To transfer all data files successfully into the TerraSync software, make sure that the prefix you specify in Data Transfer matches the text you specify in this form.

If you have set up your e-mail program to leave file attachments on the mail server until requested, the software displays a message asking you to confirm that you want to download each attached file from the server

Note – *The TerraSync software can only receive the following file types by*
e-mail:
- *data files*
- *background files*
- *configuration files*
- *waypoint files (when sent as data files)*
- *data dictionary files*

Table 3.50   Receive via E-mail form: Fields

Field	Description
Subject must contain	A subject line to search your e-mail inbox for. Only e-mails containing this text in their subject line will be recognized by the TerraSync software as having Trimble data files attached.
	If you have received files in the TerraSync software before, this field defaults to the last subject line you used.
Allow file overwrites	This field specifies whether to allow received files to overwrite existing files of the same name.
Service	The e-mail service that you want to use to receive the message. This field lists all the services that you have defined in your e-mail program.
	By default, the ActiveSync technology is selected. The ActiveSync service synchronizes the field computer's inbox with the desktop computer's inbox, so that any new e-mails in the desktop computer's inbox are copied to the field computer's inbox.
	This field only appears if the field computer is a CE device.

Read dictionary from data form

When you select the *Read dictionary from data* option from the options list in the **File Manager screen (see page 90)**, the *Read dictionary from data* form appears.

Use this form to extract the data dictionary from a TerraSync software data file. Before you open the form, first make sure that the data file selected in the File Manager screen is the one that you want to extract the dictionary from.

In the *Read dictionary from data* form, specify an output filename in the *Create dictionary file* field. To create the file, tap **OK**. When the file has been created, the form closes and you are returned to the **File Manager screen (see page 90)**. The new file appears in the **List of files (see page 91)** when Dictionaries is selected in the **Choose File Type list (see page 91)**.

Table 3.51   Read dictionary from data form: Fields

Field	Description
Create dictionary file	The name of the new data dictionary file. the TerraSync software uses the name of the data file as the default filename for the new data dictionary. You can edit this default name, or enter an entirely different name. Filenames must follow the naming rules for Windows.
Data File	The selected data file. Use this field to check that the correct data file is selected. This field is read-only. To change the selected data file, tap **Cancel** and select a different file in the **File Manager screen (see page 90)**.

Read from Shape form

When you select the *Read data from Shape* option from the options list in the **File Manager screen (see page 90)**, the *Read from Shape* form appears.

Use this form to convert ESRI Shapefiles on the field computer into data, data dictionary, or vector background files suitable for use in the TerraSync software. You can select which input files to use, and the name of the output file, but you cannot change any other conversion settings.

Before you open the *Read from Shape* form, make sure that the file type selected in the *Choose File* field on the File Manager screen is the file type that you want to create. For example, if you want to create a data dictionary from Shapefiles, select Dictionaries in the *Choose File* field. Then tap **Options** and select Read data from Shape.

Also make sure that the coordinate system that you want the output file to use is selected in the *Setup* section. See **Coordinate System, page 214**.

In the *Read from Shape* form, specify an output filename in the *Create <file type> file* field, and check that the coordinate system shown is correct. Then select the folder on the field computer that contains the Shapefiles you want to convert. To select the folder, enter its full path and name in the *From Shape file(s) in* field. Alternatively, tap the drop-down arrow and, in the pop-up window that appears, navigate to the required folder.

Once you have selected an input folder, a separator field called Include appears, followed by a check box for each Shapefile in the folder. To include a Shapefile in the conversion, select its check box. To exclude a file, clear its check box.

To begin the conversion, tap **OK**. The fields on the form are replaced by a progress bar and summary information about the conversion.
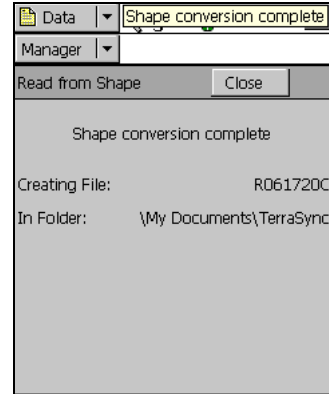
When the files have been converted, the message Shape conversion complete replaces the progress bar. The same message also appears in a tooltip in the status bar.

Tap **Close** to return to the **File Manager screen (see page 90)**. The new file appears in the **List of files (see page 91)**.

Table 3.52   Read from Shape form: Fields

| Field	Description
Create <file type> file	The name of the new file. The TerraSync software automatically generates a default filename for the new data, data dictionary, or background file, using the same naming convention as in the **File Name field (see page 40)** in the **New File subsection (see page 39)**. You can edit this default name, or enter an entirely different name. Filenames must follow the naming rules for Windows, but you should not specify an extension.
From Shape file(s) in	The folder where the source Shapefiles are stored.

Table 3.52   Read from Shape form: Fields (continued)

Field	Description
In coordinate system	The current coordinate system. Use this field to check that the coordinate system to be used by the new file is correct.

Note – *When you create a data or background file, the current coordinate system must match the coordinate system in the input Shapefiles. Use the Setup section's **Coordinate System form (see page 214)** to change the coordinate system if necessary. When you create a data dictionary file, the coordinate system does not matter.* |
| Include | A list of the Shapefiles in the selected folder. To include features in a Shapefile in the converted file, select the check box beside the Shapefile's name. |

Write to Shape form

When you select the Write data to Shape option from the options list in the **File Manager screen (see page 90)**, the *Write to Shape* form appears.

Use this form to convert a data file from the TerraSync software into ESRI Shapefiles. You can select the location of the output files, but you cannot change any other conversion settings. The conversion creates a separate Shapefile for each feature type in the input data file.
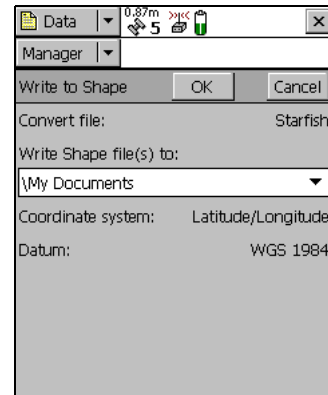
The input data file in the *Convert file* field is the file that was highlighted in the list of files in the **File Manager screen (see page 90)**. To change the selected file, return to the *File Manager* screen and select a different file.

To convert a data file to Shapefiles, select the folder on the field computer where you want to create the Shapefiles. To select the folder, enter its full path and name in the *Write Shape file(s) to* field. Alternatively, tap the drop-down arrow and, in the pop-up window that appears, navigate to the required folder.

To begin the conversion, tap **OK**. The fields on the form are replaced by a progress bar and summary information about the conversion.

When the file has been converted, the message Shape conversion complete replaces the progress bar. Tap **Close** to return to the **File Manager screen (see page 90)**.

Table 3.53   Write to Shape form: Fields

Field	Description
Convert file	The name of the file to be converted. Use this field to check that you have selected the correct input data file. If this field does not show the correct filename, return to the File Manager screen, highlight the correct file in the list, and select the Write data to Shape option again.
Write Shape file(s) to	The folder where the Shapefile(s) will be stored.
Coordinate system	This field shows the current coordinate system, which is the coordinate system that will be used for the new data file. Use the *Setup* section's **Coordinate System form (see page 214)** to change the coordinate system if necessary.
Zone	The currently selected coordinate system zone. This field does not appear if the selected coordinate system has no zones.
Datum	The datum that the selected coordinate system and zone are associated with. If the system can be associated with only one datum, this field does not appear.

Extract Data form

Note – *This function is not available in the TerraSync Standard edition software.*

When you select the Extract data from file option from the options list in the **File Manager screen (see page 90)**, the *Extract Data* form appears.

In this form, you can extract new and updated features from an updated data file and transfer them to a new data file. The new file can be transferred to the office computer for processing. The original file is modified so that you can append new GPS data.

Note – *An existing feature is treated as "new" if its GPS position has been updated.*

You can select the location of the output files, but you cannot change any other conversion settings for new and updated features. Both are extracted to the same file.

Note – *You must close the input file before proceeding.*

The input data file in the *Original file* field is the file that was highlighted in the list of files in the **File Manager screen (see page 90)**. To change the selected file, return to the *File Manager* screen and select a different file.

To begin the process, tap **OK**. The fields on the form are replaced by a progress bar and summary information about the conversion.

When the file has been created, the message Extraction complete
replaces the progress bar. Tap **Close** to return to the **File Manager
screen (see page 90)**.

Table 3.54   Extract Data form: Fields

Field	Description
Original file	The name of the original file.
Extract data to file	The name of the file that will contain the new features. A default filename is provided, but you can change or replace this name.
Include updated features	To extract features that are flagged as updated, select the check box.

Data Dictionary Editor

New dictionary form

When you select New dictionary from the options list in the **File Manager screen (see page 90)**, the *New dictionary* form appears.

Use this form to specify a name for the new data dictionary. When you have entered a name, tap **OK** to open the **Edit dictionary form (see page 105)**. Use that form to add features and attributes to the data dictionary.
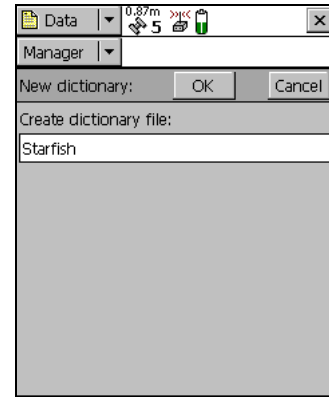
Table 3.55   New dictionary form: Fields

Field	Description
Create dictionary file	A name for the new data dictionary. A default filename is provided, but you can change or replace this name.

Edit dictionary form

When you select Edit dictionary from the options list in the **File Manager screen (see page 90)**, or tap **OK** in the **New dictionary form (see page 105)**, the *Edit dictionary* form appears.

Note – If the data dictionary you are editing is embedded in a data file, the title of this form is Edit embedded dictionary.

Use this form to add features or attributes to the selected data dictionary, or to edit the existing features and attributes.
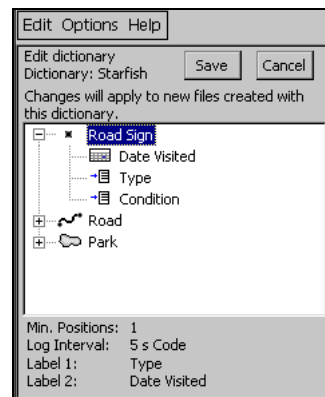
Note – Changes that you make to a data dictionary file affect all data files that you create subsequently using this data dictionary. However, existing data files are not affected. Changes to the data dictionary that is embedded in a data file affect only that data file.

The data dictionary is displayed in a Windows Explorer-style tree. Tap **+** beside a feature name to expand the feature, showing all its attributes. Tap **–** beside a feature to collapse the feature, hiding its attributes.

When a feature or attribute is selected, some of its properties are displayed at the bottom of the screen. The properties shown depend on the type of feature or attribute selected.

Use the *Edit dictionary* field list to add, edit, move, duplicate, or delete features and attributes. You can also double-tap a feature or attribute to open an editing form, where you can view or edit its properties. Use the Options list to edit general properties of the data dictionary.

Table 3.56   Edit dictionary form: Fields

Field	Description
Filename	The filename of the open file. This field is read-only
List of features and attributes	The features and attributes in the data dictionary.
Properties	The properties of the selected feature or attribute. The information shown depends on the type of feature or attribute selected.
	If a feature is selected, the following fields appear:
	• Min Positions (for point features), Offset (for line and area features)
	• Logging Interval
	• Label 1
	• Label 2
	If an attribute is selected, the following fields appear:
	• Attribute type, Default, Format
	• Max length, Min, Max
	• Generate, Auto-increment
	• Creation, Update
	Note – Only the fields that are relevant to the attribute type appear. For example, the Format field appears only for date and time attributes.

Table 3.57   Edit dictionary form: Edit options

Option	Description
Edit Feature	Displays the **Edit Feature form (see page 108)**. Use this form to view or edit the properties of the selected feature.
Edit Attribute	Displays the **Edit Attribute form (see page 115)**. Use this form to view or edit the properties of the selected attribute.
Delete Feature	Deletes the selected feature. A message appears, asking you to confirm the deletion. Tap **Yes** to continue.
Delete Attribute	Deletes the selected attribute. A message appears, asking you to confirm deletion. Tap **Yes** to continue.
New Feature	Opens the **Edit Feature form (see page 108)**. Use this form to add a new feature to the data dictionary.
New Attribute	Opens the **New Attribute Type form (see page 114)**. Use this form to specify the type of attribute to add to the selected feature.
Undo	Undoes the last action.
Cut	Copies the selected feature or attribute and deletes it from the data dictionary. Before you paste the copy, select the feature or attribute that you want to paste it after.
Copy	Copies the selected feature or attribute. Before you paste the copy, select the feature or attribute that you want to paste it after.
Paste	Pastes the cut or copied feature or attribute after the selected feature or attribute.
Move Up	Moves the selected feature or attribute one position higher in the list.
Move Down	Moves the selected feature or attribute one position lower in the list.
Expand All Features	Expands all features in the data dictionary, so that all attributes are visible.
Contract All Features	Collapses all features in the data dictionary, so that no attributes are visible.

Table 3.58 Edit dictionary form: Options

Field	Description
Settings for All Features	Opens the **Settings for All Features form (see page 119)**.
Auto-generation of Labels	Automatically sets the two labels for each feature type to the first two attributes of that feature type.
Unique Feature Names	This field specifies whether duplicate feature names are allowed in the data dictionary. If this option is selected, the Data Dictionary editor checks that all feature names are unique when you save the data dictionary.
Numeric Defaults Required	This field specifies whether each numeric attribute in the data dictionary is required to have a default value.

Edit Feature form

When you open a feature for editing, or open a new feature, the Edit Feature form appears. Use this form to specify the feature type (point, line, or area), its default logging setting, and its display settings.

The title of the form is *New Feature* or *Edit Feature,* depending on whether you are adding a new feature or editing an existing one.

The *Edit Feature* form has four tabs. The tabs that appear depend on the feature type.

Tab	Availability
Properties	Available for all feature types.
Default Settings	Available for all feature types.
Symbol	Available for point features only.
Line Style	Available for line and area features only.

Properties tab

Use the *Properties* tab of the *Edit Feature* form to specify the feature's name and type.

Table 3.59   Properties tab: Fields

Field	Description
Feature	The name of the feature. You can enter up to 20 characters, including spaces and underscores, but you cannot use punctuation.
Comment	An optional description of the feature, or any other comments. You can enter up to 40 characters, including punctuation.
Feature Classification	The feature type. The options are:
	• Point A single geographical location, such as a tree or road sign.
	• Line A connected series of positions, such as a fenceline, road, or river.
	• Area A polygon or closed line, such as a lake or park.

Default Settings tab

Use the *Default Settings* tab of the *Edit Feature* form to specify default logging settings. The fields and buttons that appear depend on the feature type (point, line, or area).
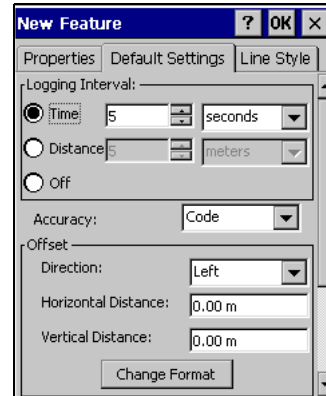

Table 3.60   Default Settings tab, Edit Feature form: Buttons

Button	Description
Default	Resets the general feature properties to their default settings, as defined in the **Settings for All Features form (see page 119)**.
Change Format	Switches between displaying offsets in Horizontal/Vertical format and displaying them in Distance/Inclination format.

Table 3.61   Default Settings tab, Edit Feature form: Fields

Field	Description		Default
Logging interval	The default logging style. The options are:		Time
	• Time	Log a new position when a certain time has elapsed since logging the last position for this feature.	
	• Distance	Log a new position when you have moved a certain distance from the last position logged for this feature.	
	• Off	Do not log GPS positions for this feature.	
Time	The time between positions and the unit of measure (seconds or minutes), when Time is selected as the logging interval.		5 seconds

Table 3.61   Default Settings tab, Edit Feature form: Fields (continued)

Field	Description	Default
Distance	The distance between positions and the unit of measure (meters or feet), when Distance is selected as the logging interval. This field only appears if the feature is a line or area.	5 meters
Minimum Positions	The minimum number of positions to log. This field only appears if the feature is a point feature.	1
Accuracy	This field specifies whether to log the usual code phase data from the GPS receiver, or to log more detailed but more accurate carrier phase data.	Code
Direction	The default direction to the feature, relative to your path of travel. The options are left and right.	Left
Horizontal Distance	The default two-dimensional distance to the feature. The horizontal distance ignores any difference in height between your position and the feature. This field only appears if the offset format is Horizontal/Vertical. Use the **Change Format (see page 110)** button to switch between the display formats.	0.00 m
Vertical Distance	The default vertical distance between your position and the feature. This field only appears if the offset format is Horizontal/Vertical.	0.00 m
Slope Distance	The default three-dimensional distance between your position and the feature. This field only appears if the offset format is Distance/Inclination.	0.00 m
Inclination	The default angle of inclination between your position and the feature. This field only appears if the offset format is Distance/Inclination.	0.00°
Label 1	The attribute that will be used as the first label for the feature. Labels appear in the **Update Features screen (see page 75)** and in the position information in the **Map Section (see page 7)**.	First attribute
Label 2	The attribute that will be used as the second label for the feature.	Second attribute

Symbol tab

Use the *Symbol* tab of the *Edit Feature* form to specify the appearance of the symbol that is used to represent this feature in the Map section and *Update Features* list. This tab only appears if the selected feature is a point feature.

Tip – In the **Map Section (see page 7)**, you can choose to display the color you select in this tab, or the color of the map layer that the feature belongs to.
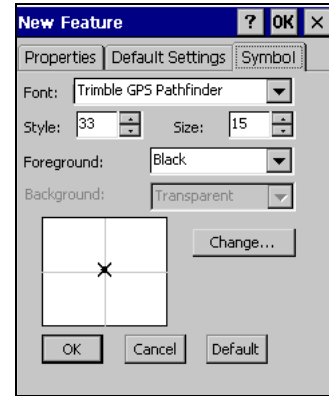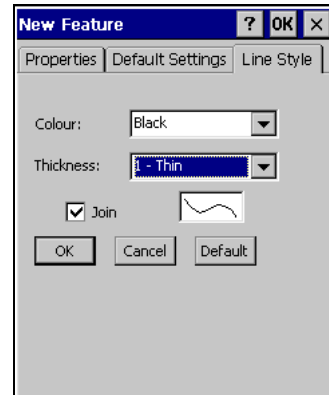
Table 3.62   Symbol tab, Edit Feature form: Buttons

Button	Description
Default	Resets the symbol properties to the defaults. The default point symbol is a cross over a small round point ✖ (symbol style 33 from the Trimble GPS Pathfinder font, black, 15 points).
Change	Selects a different font or symbol style.

Table 3.63   Symbol tab, Edit Feature form: Fields

Field	Description	Default
Font	The font to use for the point feature symbol. You can use any font that is installed on the field computer.	Trimble GPS Pathfinder
Style	The symbol from the font that you want to use. Symbols are identified by their ASCII character codes, and a preview of the selected symbol is displayed.	33
Size	The size that the symbol is displayed at.	15
Foreground	The color of the point symbol.	Black
Background	The background color of the point symbol. When the TerraSync software is installed on a CE device, this field is read-only.	Transparent

Line Style tab

Use the *Line Style* tab of the *Edit Feature* form to specify the appearance of the line used to represent this feature in the Map section and *Update Features* list. This tab only appears if the selected feature is a line or area feature.

Tip – In the **Map Section (see page 7)**, you can choose to display the color you select in this tab, or the color of the map layer that the feature belongs to.

Table 3.64   Line Style tab, Edit Feature form: Buttons

Button	Description
Default	Resets the line style properties to their default settings (thin black joined line).

Table 3.65   Line Style tab, Edit Feature form: Fields

Field	Description
Color	The color of the feature.
Thickness	The thickness of the line, or, if the line is not joined, the diameter of the circles that represent the positions in the line. The options range from a thin line (1 pixel wide) to a thick line (6 pixels wide). *Note – Thicker lines take longer for the software to draw. Use thin lines when you want to maximize the Map screen's drawing speed.*
Join	This field specifies whether to display only the positions in the line or area (as circles in the selected color and thickness), or to join all the positions into a line. *Note – In the TerraSync software, positions are always joined. However, when the line or area feature is viewed in the postprocessing software, this setting is used to determine its appearance.*

New Attribute Type form

Use this form to select the type of attribute that you want to add to the selected feature. Select the attribute type from the list of options. Then tap **Add** to open the **Edit Attribute form (see page 115)**, where you can give the attribute a name and set its properties.

Table 3.66   New Attribute Type form: Attribute types

Attribute type	Description
Menu	The value to be stored in the attribute can be selected from a predefined list. For example, the possible values for an attribute called Surface Type for the Road feature may be Asphalt, Concrete, Gravel, and Dirt. The range of possible values is stored in the data dictionary. In the field, you choose the correct value from the list.
Numeric	A set of decimal or whole numbers. For example, these values could represent the girth or height of a tree or the concentration of a pollutant at a particular location.
Text	The value to be stored in the attribute is a string of characters, such as the name of a street.
Date	The value to be stored in the attribute is a date, such as the date of installation of a power pole or the date you collected a feature.
Time	The value to be stored in the attribute is a time value, such as the time you read a meter or the time you collected a feature.
File Name	The value to be stored in the attribute is the name of a file on the field computer. For example, you can use a filename attribute to associate a digital picture of the feature with the feature being collected.
Separator	A separator attribute cannot be edited and does not store a value. It is used to group related attributes or to provide a break in a long list of attributes.

Edit Attribute form

When you select Edit Attribute from the **Edit dictionary form: Options list (see page 108)**, or tap **Add** in the **New Attribute Type form (see page 114)**, the *Edit Attribute* form appears.

Use this form to add a new attribute to the selected feature, or to edit an existing attribute.

The form's title depends on the attribute type, and whether that you are adding or editing the attribute. For example, if you are editing a date attribute, the title is *Edit Date Attribute*. If you are adding a menu attribute, the title is *New Menu Attribute*. The buttons and fields that appear depend on the attribute type.

Table 3.67   Edit Attribute form: Buttons (for menu attributes only)

Button	Description
New	Opens the **Edit Attribute Value form (see page 118)**. Use this form to add new attribute values.
Edit	Opens the **Edit Attribute Value form (see page 118)**. Use this form to edit the selected attribute value.
Delete	Deletes the selected attribute value.
Up arrow	Moves the selected attribute value to the previous position in the list.
Down arrow	Moves the selected attribute value to the next position in the list.

Table 3.68 Edit Attribute form: Fields

Field	Description	Default
Attribute Name	The name of the attribute. You can enter up to 20 characters, including spaces and underscores, but you cannot use punctuation.	(none)
Comment	An optional description of the attribute, or any other comments. You can enter up to 40 characters, including punctuation.	(none)
On Creation	Editing rules for the attribute when a new feature is opened. The options are: • Normal — Entering a value for this attribute is optional. • Required — A value must be entered for this attribute. • Not Permitted — The value of this attribute cannot be changed.	Normal
On Update	Editing rules for the attribute when the feature is opened for update. The options are the same as for the **On Creation field (see page 116)**.	Normal
Menu Attribute Values	The list of values for a menu attribute. Use the **New (see page 115)** and **Edit (see page 115)** buttons to add or edit values in this list. This field only appears if the attribute type is Menu.	(none)
Decimal Places	The number of decimal places for a numeric attribute. This field only appears if the attribute type is Numeric.	0
Minimum	A minimum value for a numeric attribute. This field only appears if the attribute type is Numeric.	0
Maximum	A maximum value for a numeric attribute. This field only appears if the attribute type is Numeric.	0

Table 3.68   Edit Attribute form: Fields (continued)

Field	Description	Default
Auto-Incrementing	This field specifies whether the default value for the attribute is supplied by automatically incrementing (or decrementing) the value of the last attribute of this type that was entered. The options are: • No Increment No auto-incremented default value is supplied. • Increment An auto-incremented default value is supplied. This field only appears if the attribute type is Numeric or Text.	No Increment
Step Value	The amount by which the attribute value increments or decrements. This field only appears if the attribute type is Numeric or Text.	+1
Length	The maximum length for a text attribute. The length can be any integer from 1 to 100. This field only appears if the attribute type is Text.	30
Default	A default value for the attribute.	(none)
Auto Generate on Creation	This field specifies whether the attribute is automatically filled in with the current date or time when the feature is created. This field only appears if the attribute type is Date or Time.	Selected
Auto Generate on Update	This field specifies whether the attribute is automatically filled in with the current date or time when the feature is opened for update. This field only appears if the attribute type is Date or Time.	Not selected
Format	The display format of the attribute. If the attribute type is Date, the options are: • Day - Month - Year • Month - Day - Year • Year - Month - Day If the attribute type is Time, the options are: • 24 Hour • 12 Hour This field only appears if the attribute type is Date or Time.	Year-Month-Day (for Date attributes) **or** 24 Hour (for Time attributes)

Edit Attribute Value form

When you tap New or Edit in the **Edit Attribute form (see page 115)**, the *Edit Attribute Value* form appears.

Use this form to add new attribute values, or edit existing values, for the selected menu attribute. The title of the form is *New Attribute Value* or *Edit Attribute Value*, depending on whether you are adding a new attribute value or editing an existing one.

Table 3.69 Edit Attribute Value form: Buttons

Button	Description
Add/OK	Adds the new value to the list, or confirms the changes that you have made to the existing value.
	If you opened this form by tapping **Add** in the **Edit Attribute form (see page 115)**, this button is labeled **Add**. When you tap it, the form remains open so that you can add a number of values to the list without reopening this form each time.
	If you opened this form by tapping **Edit** in the **Edit Attribute form (see page 115)**, this button is labeled **OK**. When you tap it, the form closes.
Cancel/Close	Closes this form.
	If you have made changes in this form but have not yet tapped **Add** or **OK**, this button is labeled **Cancel**. If you use it to close the form, a message appears asking you to confirm that you want to close the form without saving any changes. Tap **Yes** to continue.
	If you have saved changes by tapping **Add**, this button is labeled **Close**.

Table 3.70 Edit Attribute Value form: Fields

Field	Description
Attribute Value	The value of the attribute. The value can be up to 20 characters long.
Default	This field specifies whether this value is the default value in the list.

Table 3.70   Edit Attribute Value form: Fields (continued)

Field	Description
Code Value 1	A code value for this attribute value. Use code values if you want to see a list of descriptive attribute values in the field, but you need to export a code to the GIS or CAD system.
	Code values are optional, and can be up to 6 characters long.
Code Value 2	A second code value for this attribute value.

Settings for All Features form

Use this form to specify default logging settings for all features in the data dictionary. When you create a new feature, or tap **Default** in the *Edit Feature* form's **Default Settings tab (see page 110)**, the feature's logging settings are set to the values that you define in this form.

When the selected feature is a point, the fields on the *Point* tab are the same as the fields on the **Default Settings tab (see page 110)** of the *Edit Feature* form.

When the selected feature is a line or area, the fields on the *Line and Area* tabs are the same as those on the **Default Settings tab (see page 110)**.
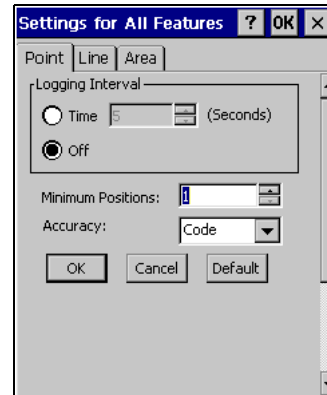
⚠ **CAUTION –** Changes that you make in this form overwrite any customized feature defaults in the data dictionary.

Navigation Section

In this chapter:

- ■ **Direction Dial**
- ■ **Close-up Screen**
- ■ **Lightbar**
- ■ **Information Fields**
- ■ **Message Line**
- ■ **Navigation Options Form**

Use the Navigation section to:

- make sure that you follow a direct course to a target location

- revisit features that you have previously mapped

Even if you do not want to navigate to a particular point, you can use the Navigation section to view information such as your current heading or the distance from your current position to the target.
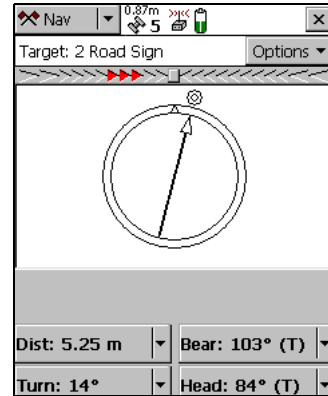
There are two navigation modes, depending on how close you are to the navigation target. Use the **Direction Dial (see page 123)** to navigate to the target from a distance. Use the **Close-up Screen (see page 126)** to navigate to the exact location of the target. In either mode, you can use the **Lightbar (see page 129)** at the top of the screen to guide you to the target.

Note – With real-time differential GPS, you can navigate to an accuracy of one meter or less, depending on factors such as the GPS receiver and the frequency at which corrections are received. Without any form of real-time differential corrections, you are subject to errors introduced by GPS and atmospheric conditions. These errors degrade the accuracy of navigation. Autonomous navigation (without real-time corrections) can be useful to get you close to the feature, but it may be less useful for locating a specific feature if similar features are near to each other, or if the feature is underground.

Direction Dial

When you first open the Navigation section, the default screen displayed is the Direction Dial graphical screen.
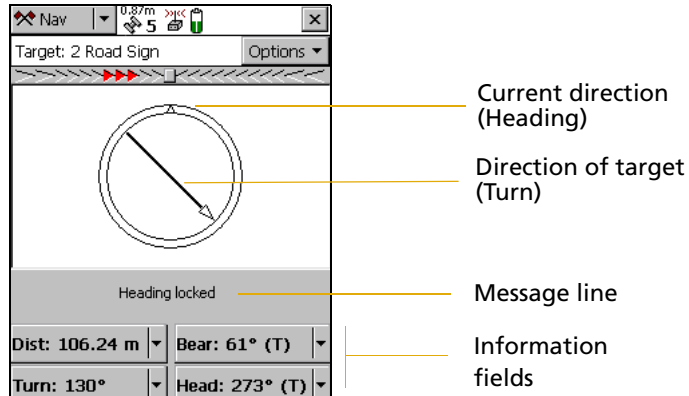
The Direction Dial graphical screen provides a simple dial which shows you all the information you need to get to the target. It is very useful for navigation in open country or where you can follow a direct route to the target.

Tip – You cannot set the navigation target in the Navigation section. Select a target from the **Data Section (see page 37)** or the **Map Section (see page 7)**.

Table 4.71   Direction Dial: Fields and icons

Item	Description
Target	This field indicates the current navigation target: • If a feature is selected, the feature ID and feature type appear. • If you have selected a map point, the text **Map Point** appears. • If you have constructed a target by specifying an offset from the navigation start, the text **Constructed** appears. • If no target is selected, the text **No Target** appears.
Nav Start	If you have specified a navigation start and target, but the start is further away from your position than the configured **Range (see page 135)**, you must navigate to the start before you can navigate to the target. While you are navigating to the start, the *Nav Start* field appears instead of the *Target* field. Once you have navigated within close-up range of the start, the *Nav Start* field is replaced by the *Target* field and you can start navigating to the target. Like the *Target* field, the *Nav Start* field identifies the navigation start: • If a feature is selected, the feature ID and feature type appear. • If you have selected a map point, the text **Map Point** appears.
Lightbar	The **Lightbar (see page 129)** guides you along the shortest path between the navigation start and the target.
Heading	The top of the dial indicates your direction of travel (heading).
Turn arrow	The turn arrow shows the direction you should travel in order to take the shortest path between the current GPS position and the target.
Message line	The **Message Line (see page 134)** displays messages relating to navigation.
Information fields	The **Information Fields (see page 131)** at the bottom of the screen provide navigational information.

Using the Direction Dial

To activate navigation, use the **Data Section (see page 37)** or the **Map Section (see page 7)** to select a navigation *target*. When you select a target, the Direction Dial displays information that helps you to navigate to the target. The Direction Dial graphically displays your heading and the bearing to the target. The **Information Fields (see**

page 131) at the bottom of the screen display relevant text information. The message line also shows relevant information for navigation.

The heading along which you are moving (your current direction of travel) is always shown at the top of the dial. The Turn arrow shows where the target is, relative to your heading. To navigate to the target, simply line up the arrow (the direction of the target) with the triangle at the top of the dial (your current direction of travel).

The arrow on the dial rotates according to your direction of travel. Consequently, the dial only provides an accurate reading when you are moving, and a direction of travel can be determined by the receiver. If you are moving too slowly, or are standing still, the Heading arrow freezes. See **Message Line, page 134**.

Tip – Because the Direction Dial screen is based on your heading, it works best if you do not move backwards.

Until GPS is acquired and a target is specified, the heading cannot be calculated so the turn arrow does not appear.

If you also select a navigation *start*, you can use the **Lightbar (see page 129)** to navigate along the shortest path from the start to the target. This path is called the **cross-track line**. If you are not within the configured **Range (see page 135)** of the navigation start, you must first navigate to the start before you can navigate to the target.

Tip – You cannot set the navigation start or target in the Navigation section. Select a start and target from the **Data Section (see page 37)** or the **Map Section (see page 7)**.

Note – *If you log a new GPS position for the feature that is currently selected as the navigation target, you must reselect the feature as the navigation target before you can navigate to the feature's new location.*

Close-up Screen

When you come within the specified **Close-up range (see page 128)** of the target, the navigation proximity alarm sounds, and the *Close-up* graphical screen replaces the *Direction Dial* screen:

- Current GPS position
- Target
- Message line
- Information fields

Table 4.72   Close-up Screen: Fields and icons

Item	Description
Target	This field identifies the current navigation target: • If a feature is selected, the feature ID and feature type appear. • If you have selected a map point, the text **Map Point** appears. • If you have constructed a target by specifying an offset from the navigation start, the text **Constructed** appears. • If no target is selected, the text **No Target** appears.
Lightbar	The **Lightbar (see page 129)** guides you along the shortest path between the navigation start and the target.
Bull's-eye	The bull's-eye represents the navigation target.

Table 4.72   Close-up Screen: Fields and icons

Item	Description
Cross	The cross represents the current GPS position.
Message line	The **Message Line (see page 134)** displays messages relating to navigation.
Information fields	The **Information Fields (see page 131)** at the bottom of the screen provide navigational information.

Using the Close-up screen

For precision navigation right up to the target, move so that the GPS position cross is in the center of the bull's-eye. Depending on the **Close-up Style (see page 128)** you select, either the bull's-eye or the cross remains fixed in the center of the screen, while the other icon moves around it.

The top of the *Close-up* screen is relative to the direction that you were traveling in (your heading) when you entered the *Close-up* screen. The heading is not updated on the *Close-up* screen, so the screen does not move if you change the direction you are facing while using it.

All **Information Fields (see page 131)** that depend on the heading are automatically locked as well. See **Heading locked, page 134.**

Tip – Because the *Close-up* screen does not update your heading, it works best if you maintain your original direction of travel. If necessary, move sideways or backwards rather than turning.

Tip – To quickly open the feature that is set as the target for update, double-tap the bull's-eye in the *Close-up* screen.

Close-up range

The close-up range value controls the distance from the target at which the *Direction Dial* graphical screen switches to the *Close-up* graphical screen. You can configure the close-up range value either to control the distance at which the *Close-up* screen appears, or to disable it.

The close-up range also determines the scale that is represented on the *Close-up* screen. The distance from the edge of the screen to the center represents the close-up range distance.

Tip – If you are zoomed in to a scale that is too close for the GPS accuracy you currently have, the GPS cross appears to leap around the screen. To minimize this effect, select a larger close-up range.

You can configure the close-up range values from the **Navigation Options Form (see page 135)**.

Close-up Style

The close-up style can be set to either target-centered or GPS-centered. It controls which position is the fixed reference point in the center of the *Close-up* screen: your position or the position of the target.

- For the target-centered style, the bull's-eye, representing the target, is fixed in the center of the screen and the GPS cross moves around it as your position changes.

- For the GPS-centered style, the GPS cross, representing your position, is fixed in the center of the screen and the bull's-eye moves around it.

Configure the close-up style from the **Navigation Options Form (see page 135)**.

Lightbar

The navigation lightbar appears at the top of the *Direction Dial* and *Close-up* screens, as well as in the **Map Section (see page 7)**. It uses colored icons to simulate the colored LEDs of a physical lightbar.

Tip – The lightbar can also be displayed at the top of the Map screen. To do this, select the *Cross-Track Light Bar* option from the **Map section: Options list (see page 12)**.

The lightbar guides you towards the navigation target by graphically representing the **cross-track error**. This is the amount and direction by which your **heading** differs from the **cross-track line**. The cross-track line is the shortest path between the navigation start and target.

Note – The lightbar is only available if you have set both a navigation start and a navigation target. You can set the start and target in the **Data Section (see page 37)** *or the* **Map Section (see page 7)**.

When the three center icons in the lightbar are green and all the other icons are gray, you are traveling along the cross-track line. When other icons are "lit" in green or red, you are off track. To get back on track, turn in the direction of the lit arrow icons. Continue to adjust your heading until the three center icons are green.

The lightbar's appearance and behavior depend on the lightbar mode that you have selected: Center or Chase.

In *Center* mode, the center of the lightbar represents the cross-track line, and the lit icons represent your heading. To stay on track you must "pull" the lit icons towards the center of the lightbar. The arrow icons point towards the cross-track line. If you are off track, turn in the direction that the lit arrow icons are pointing. For example, if arrow icons on the left side of the lightbar are lit, your heading is to the left of the cross-track line, so you must turn to the right to correct your heading.

In *Chase* mode, the center of the lightbar represents your heading, and the lit icons represent the direction of the cross-track line. To stay on track you

must "chase" the lit icons. The arrow icons point towards the cross-track line. If you are off track, turn in the direction that the lit arrow icons are pointing. For example, if arrow icons on the left side of the lightbar are lit, the cross-track line is to the left of your heading, so you must turn to the left to correct your heading.

The lightbar display consists of a square icon in the center, with nine inner arrows and two larger outer arrows on each side. Each inner arrow represents a small cross-track error. The size of the error that each arrow represents is determined by the setting that you specify for the **Inner Lightbar Spacing (see page 136)**. Each outer arrow represents a large cross-track error. The size of the error that each arrow represents is determined by the **Outer Lightbar Spacing (see page 136)**. The total cross-track error is the sum of the errors of each arrow from the center to the middle arrow that is lit.
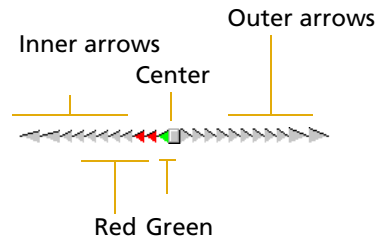
When you are on track, the square center icon is green. When you are off track, three adjacent arrow icons are "lit". The size of the cross-track error is indicated by the color and location of the lit icons.

If the *square center* icon, and the two arrow icons on each side of it, are green, then you are on track. You do not need to adjust your heading.

If *inner* arrow icons are lit, then you are off track. If a green arrow icon is lit, then you are only slightly off track. If all of the lit icons are red, a larger heading adjustment is required. The farther the lit icons are from the center, the larger the adjustment. For example, if the inner lightbar spacing is 0.5 m, and the middle lit arrow is six from the center, then you are 3 m (6 × 0.5 m) off track.

If *outer* arrow icons are lit, you are significantly off track. A large heading adjustment is required. For example, if the outer lightbar spacing is 5 m, the inner spacing is 0.5 m, and the middle lit arrow is the first outer arrow, then the cross-track error is 9.5 m. This distance is the sum of the inner arrow error (4.5 m = 9×0.5 m) and the outer arrow error (5 m = 1×5 m).

Information Fields

Additional information about the selected navigation target appears in the configurable information fields. These fields appear on four buttons on the **Direction Dial screen (see page 123)** and on the **Close-up Screen (see page 126)**.

Note – If the field computer uses the landscape orientation, the buttons appear to the right of the Navigation screen.

By default, the four buttons show the Distance, Bearing, Turn, and Heading information fields. You can choose four information fields out a total of twelve to display on the buttons.

To change the information field that is displayed on a button, tap the drop-down arrow on the right side of the button, and select the information field from the list that appears. The button displays the label and data for the selected field. If the selected field is already selected on another button, the two fields swap position.
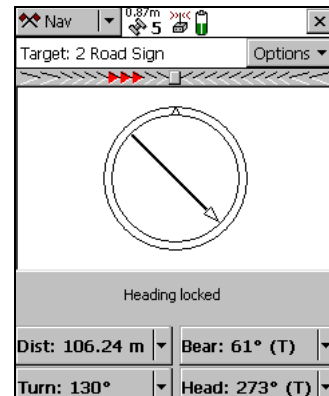
Tip – You can use the **Units form (see page 216)** in the Setup section to change the distance units, velocity units, north reference, and altitude reference.

Note – *Most information fields are only relevant if a target is selected. Only the Velocity, Heading, and Altitude fields (see **Navigation section: Messages, page 134**) show data when no target is selected. If no target is selected, all other fields show the value N/A, and the **Message Line (see page 134)** prompts you to select a target. If you are stationary or are not moving fast enough for the software to calculate a heading, these fields show the value ?, and the message line prompts you to start moving.*

Table 4.73   Navigation section: Information fields

Field	Label	Description
Distance	Label: Dist.	The distance to the navigation target. This is the shortest **great-circle distance** to the target, computed on the local **datum**.
Bearing	Label: Bear.	The compass bearing (angle) that you should follow in order to take the shortest path between the current GPS position and the target. The bearing is useful if you are navigating in open country and can travel in a direct line to the target. The bearing is displayed with a **T** if it is relative to **true north** or an **M** if it is relative to **magnetic north**.
Turn	Label: Turn	The direction that you need to turn in, to head towards the target. It indicates the magnitude by which your course should vary. This is the difference between the bearing to the target and the current heading.
Heading	Label: Head	Your current direction of travel. The heading is the angle between the last two GPS positions computed. If you are stationary, or moving very slowly, the heading is locked until you start moving again. The units of this field also include a **T** or **M** to indicate whether the heading is relative to **true north** or **magnetic north**. The heading is displayed whether or not you have chosen a target.
Cross-track	Label: X-Tk	The direction and distance to the cross-track line. The direction of the cross-track line (left or right) is indicated by **(L)** or **(R)**. The numeric value indicates the distance that you must travel in that direction to get back on track. The cross-track error is only displayed if you have selected a start and a target.

Table 4.73   Navigation section: Information fields (continued)

Field	Label	Description
Time to Go	Label: TTG	The expected time to reach the target. The time to go takes your current heading and velocity into account. It shows a larger value if you are not heading directly toward the target.
ETA	Label: ETA	The Estimated Time of Arrival (ETA) at the target, based on your current heading and velocity. It shows a larger value if you are not heading directly toward the target. If the arrival time is more than 24 hours in the future, this field displays **>24 hr**.
Velocity	Label: Vel.	Your two-dimensional velocity. The velocity is displayed whether or not you have chosen a target.
Altitude	Label: Alt.	The current altitude. This field also shows the configured altitude reference (**HAE** or **MSL**). The altitude is displayed whether or not you have chosen a target.
Go Up/Go Down	Label: Up/Down	The difference in altitude between your current altitude and the altitude of the target. This field is useful for 3D navigation. It tells you how far up or down you need to go to be at the same altitude as the target. ***Note –*** *This value is calculated using the altitude of the GPS antenna. If you have specified an antenna height, it is not subtracted from the antenna's altitude before calculating the Go Up/Go Down value.*
Go North	Label: Go N	The northerly distance component of the bearing to the target. This field shows the north/south distance from the current GPS position to the target. The Go North and Go East information fields are useful for navigation around city blocks, or when you cannot travel in a direct line to the target.
Go East	Label: Go E	The easterly distance component of the bearing to the target. This field shows the east/west distance from the current GPS position to the target. The Go North and Go East information fields are useful for navigation around city blocks, or when you cannot travel in a direct line to the target.

Message Line

The message line appears above the **Information Fields (see page 131)**. It displays important messages relevant to navigation. The following messages may appear:

Table 4.74 **Navigation section: Messages**

Message	Meaning
Heading locked	You are stationary or moving too slowly for an accurate heading to be computed. This message flashes alternately with the message Start moving. The direction dial arrow and any Information fields affected freeze. To unlock the heading, start moving faster than the *cutoff velocity* of 0.35 meters/second (1.26 kilometers/hour, or 0.78 miles/hour). *Note –* *The heading is always locked when the Close-up screen is visible.*
Heading not available	No heading can be calculated because you have not started moving (fast enough) since the GPS receiver was connected. This message alternates with the message Start moving until you begin to move.
No GPS	The TerraSync software is not connected to a GPS receiver.
Old navigation	GPS position information is temporarily unavailable (for example, because one or more satellites is obscured, or satellite geometry is poor). The TerraSync software still displays the most recent navigation information, but the direction dial arrow flashes.
Set your navigation target in the Map or Data section	You have not selected a navigation target. Select a target in the **Map Section (see page 7)** or the **Data Section (see page 37)**.
Start moving	Your speed is not sufficient for an accurate heading to be calculated: you are either stationary or are not moving fast enough. This message alternates with Heading not available, if you have not moved since connecting to GPS, or Heading locked, if you have slowed down too much since the last heading was calculated.

Navigation Options Form

To display the *Navigation options* form, tap **Options** in the Direction Dial screen or the Close-up screen, and select Navigation Options.

Use this form to specify settings for the Navigation section.

Table 4.75   Navigation Options Form: Fields

Field	Description	Default
Range	The distance from the target to activate the *Close-up* screen. Enter a value to activate the *Close-up* screen at that distance, or select None to stop the *Close-up* screen from ever appearing.	5.00 m
Style	The style for the *Close-up* screen. The options are: • Target-centered The target remains still in the center of the screen and your GPS position is displayed relative to it. • GPS-centered Your GPS position remains still in the center of the screen and the target is displayed relative to it.	Target-centered
Mode	The lightbar mode. The options are: • Chase The center of the lightbar represents your current heading, and the lit arrow icons represent the direction of the cross-track line. • Center The center of the lightbar represents the direction of the cross-track line, and the lit arrow icons represent your current heading.	Center

Table 4.75 Navigation Options Form: Fields (continued)

Field	Description	Default
Inner Lightbar Spacing	The amount of cross-track error that each small inner arrow icon represents.	0.5 m
Outer Lightbar Spacing	The amount of cross-track error that each large outer arrow icon represents. This value must be greater than or equal to the value that you set for the inner lightbar spacing.	15 m
Look Ahead Time	The lightbar display gives guidance for your predicted position, not your current position. Providing feedback for your predicted position helps you to correct your heading before you move too far off track.	0.5 s
	The look ahead time specifies how far into the future the lightbar should predict your position. The look ahead time must be short enough to ensure accurate and timely feedback, but must also be long enough to prevent the lightbar from recalculating the prediction too often. If the look ahead time is too short, the lightbar recalculates your position and changes the display feedback too quickly for you to respond with appropriate course corrections.	

Status Section

In this chapter:

Introduction

To open the Status section, tap the Section list button and select Status.

Use this section to view information about external connections, including the GPS receiver and any real-time differential correction source.

The Status section has nine subsections:

- **Skyplot, page 139**
- **Satellite Information, page 147**
- **Plan, page 149**
- **Receiver, page 154**
- **Real-time, page 156**
- **Sensor, page 171**
- **Comms, page 172**
- **UTC Time, page 173**
- **About, page 174**
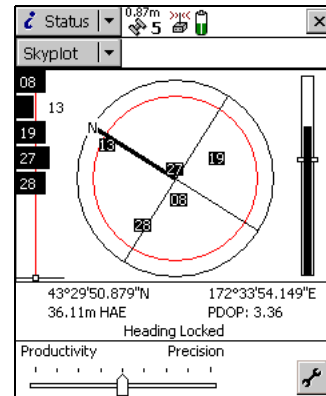
Skyplot
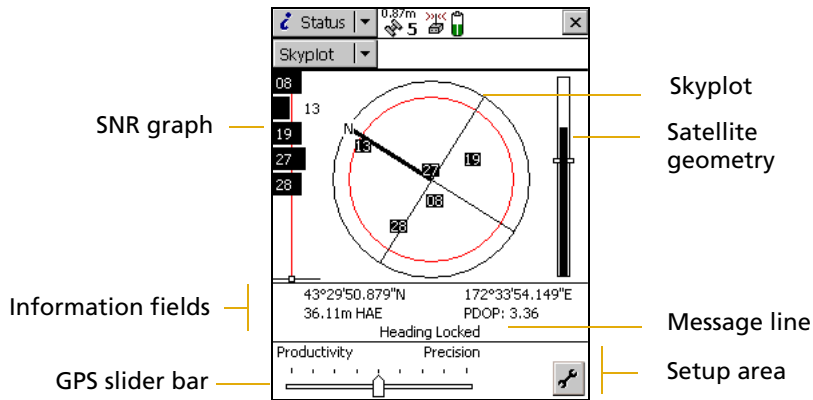
The Skyplot graphical screen is the default screen displayed when you open the Status section. It provides a graphical display of the satellites available to the receiver.

To display the Skyplot when another screen in the Status section is visible, tap the Subsection list button and select Skyplot.

The Skyplot screen includes:

- **Skyplot, page 140**
- **SNR graph, page 141**
- **Satellite geometry indicator, page 142**

The following also appear at the bottom of the screen:

- **Information fields, page 143**
- **Message line, page 144**
- **Setup area, page 146**

Skyplot
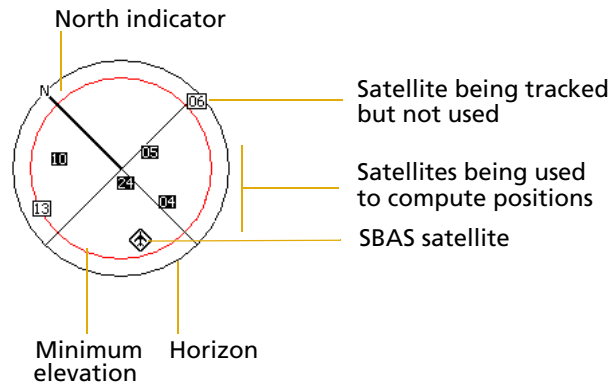
The black outer circle represents the horizon (at 0°). The inner circle, which is red on a color screen, represents the configured minimum elevation (see **Min Elevation, page 190**). When the minimum elevation value is changed, the inner circle of the skyplot changes diameter accordingly.

If the minimum elevation is increased, the inner circle gets smaller and only those satellites higher in the sky are used to compute GPS positions. If the minimum elevation is decreased, the inner circle gets larger, and satellites closer to the horizon are included when GPS positions are computed.

Numbered boxes represent the satellites currently available to the TerraSync software. The satellites near the center of the circle are higher in the sky (overhead), while those toward the edge are closer to the horizon. The location of a satellite can be determined by noting its direction (N, S, E, W) and its approximate elevation in the skyplot.

Satellites shown as filled black boxes are currently being used by the TerraSync software to compute GPS positions. Satellites shown as white boxes are being tracked, but are not being used to compute positions. Satellites shown without boxes are available, but are not being tracked. If an SBAS satellite is being tracked, its location is indicated by this icon: ⊕.

When you tap the skyplot, a tooltip appears, showing details about the area you have tapped. See **Tooltips, page 142**.

The skyplot rotates (like a compass) to indicate the direction that you are traveling in. Your direction is calculated from the last GPS positions received. If no positions have been received recently, the direction shown may not be correct.

Note – *The skyplot only rotates if you are moving.*

When you turn the receiver on, it begins to track visible satellites and to calculate the current position. Once the first position is displayed, subsequent positions are updated once per second.

Tip – If no positions are computed, look for obstructions that might be blocking satellite signals. Move away from any possible obstructions. If the receiver is still not computing positions, see **Troubleshooting, page 287**.

SNR graph

The SNR bar graph on the left of the **Skyplot screen (see page 139)** is a graphical representation of the L1 frequency signal quality of each satellite that the GPS receiver is currently tracking. A black bar represents a satellite with a signal strength above the configured minimum level. An empty bar represents a satellite that is not being used to compute GPS positions because its signal strength is below the configured minimum level.

The vertical red line shows the configured minimum SNR value.

Note – *If the satellite is connected to a survey GPS receiver, the red line does not appear, because these receivers do not use minimum SNR values.*

When you tap the SNR graph, a tooltip appears, showing details about the area you have tapped. See **Tooltips, page 142**.

Satellite geometry indicator

The satellite geometry indicator on the right of the **Skyplot screen (see page 139)** is a graphical representation of the overall quality of the GPS positions computed. The white horizontal bar shows the configured minimum quality value, and the level of black inside the indicator shows the current quality value.

When you tap the satellite geometry indicator, a tooltip appears, showing details about the area that you tapped. See **Tooltips, page 142.**

The quality of the computed positions is a function of the geometry of the visible satellites (how they are positioned in the sky relative to each other and you). When the satellites are well spaced, and cover a large portion of the sky, the GPS receiver can compute accurate positions and the level inside the indicator is high. If satellites are grouped together in the sky, the precision of the computed positions is reduced, and the level inside the indicator is low.

Tooltips

When you tap any of the elements in the Skyplot screen, a tooltip appears. The tooltip provides detailed information about the element that you tapped.

Table 5.1   Skyplot screen: Tooltips

Skyplot screen element	Tooltip
Bar on SNR graph	Satellite PRN and SNR value(s)
White box on indicator below SNR graph	Configured minimum SNR value
Geometry indicator	Current PDOP or HDOP value
Horizontal bar on geometry indicator	Configured maximum PDOP or HDOP value
Satellite on skyplot	Satellite PRN, SNR value(s), elevation and bearing
Inner circle on skyplot	Configured minimum elevation value

Information fields

Information fields show the current GPS position and settings.

Note – If the field computer's screen uses a landscape orientation, the information fields appear on the right of the Skyplot screen.

Table 5.2   Skyplot screen: Information fields

Display	Description
GPS position	The current GPS position is displayed in terms of the currently configured coordinate system and datum. To change this configuration, use the **Coordinate System form (see page 214)** in the Setup section. *Note – Positions viewed on the screen are not saved. To save them, open a data file and start a feature.*
PDOP	The Position Dilution of Precision (PDOP) is a numeric value representing the satellite geometry. If you set a Max PDOP value (see **Max PDOP, page 189**), and the PDOP rises above the value you set, the TerraSync software stops computing positions. To set the maximum PDOP value, use the GPS slider in the **Setup area (see page 146)**, or tap the *Setup* button 🔧 to open the **GPS Settings form (see page 187)**. This field only appears if you have configured a maximum PDOP.
HDOP	The Horizontal Dilution of Precision (HDOP) represents the horizontal component of the PDOP. If you set a Max HDOP value (see **Max HDOP, page 189**), and the HDOP rises above the value you set, the TerraSync software stops computing positions. To set the maximum HDOP value, tap the Setup button 🔧 to open the **GPS Settings form (see page 187)**. This field only appears if you have configured a maximum HDOP.

GPS position

The current GPS position is displayed in terms of the currently configured coordinate system and datum. To change this configuration, use the **Coordinate System form (see page 214)** in the *Setup* section.

Note – Positions viewed on the screen are not saved. To save them, open a data file and start a feature.

PDOP

The Position Dilution of Precision (PDOP) is a numeric value representing the satellite geometry. If you set a Max PDOP value (see **Max PDOP, page 189**), and the PDOP rises above the value you set, the TerraSync software stops computing positions. To set the maximum PDOP value, use the GPS slider in the **Setup area (see page 146)**, or tap the Setup button 🔧 to open the **GPS Settings form (see page 187)**.

This field only appears if you have configured a maximum PDOP.

HDOP

The Horizontal Dilution of Precision (HDOP) represents the horizontal component of the PDOP. If you set a Max HDOP value (see **Max HDOP, page 189**), and the HDOP rises above the value you set, the TerraSync software stops computing positions. To set the maximum HDOP value, tap the Setup button 🔧 to open the **GPS Settings form (see page 187)**.

This field only appears if you have configured a maximum HDOP.

Message line

The message line below the **Skyplot screen (see page 139)** and the **Satellite Information screen (see page 147)** displays any error or warning messages. Messages only appear when there is a problem or a condition you should be aware of. For example, if satellite geometry is good, no message appears; when it is poor, a message appears.

Table 5.3   Skyplot and Satellite Information screens: Messages

Message	Meaning
GPS disconnected	The GPS receiver is not connected.
Attempting to connect to GPS receiver	The TerraSync software is trying to establish a connection with the GPS receiver. This message appears when you start the TerraSync software, and whenever you try to reconnect to GPS.
Antenna is not connected to GPS receiver	The GPS receiver cannot detect the antenna, or the antenna cable is not connected to the GPS receiver.
Heading locked	The GPS receiver is stationary or is moving too slowly to calculate an accurate heading. When the heading is locked, the skyplot does not rotate.
Old position	The receiver has stopped computing positions, so the GPS position displayed in the **Information fields (see page 143)** is not the current position. This message alternates with either the Poor satellite geometry message or the Too few satellites message.
Poor satellite geometry	The PDOP or HDOP is higher than the level you specified in the **GPS Settings form (see page 187)**.
	Note – When the geometry of the satellites is poor, the satellite icon in the Status bar flashes. This icon is always visible, regardless of which section you are in.
Too few satellites	The GPS receiver is not tracking enough satellites to compute a GPS position.
	Note – When there are too few satellites to compute GPS positions, the number below the satellite icon in the Status bar flashes. This icon is always visible, regardless of which section you are in.

Setup area

The Setup area appears at the bottom of the **Skyplot screen (see page 139)** and the **Satellite Information screen (see page 147)**. It shows the current GPS settings. The Setup area has two modes: Slider and Custom.

In *Slider* mode, the Setup area displays a slider bar. The position of the slider bar indicates the current GPS settings. The GPS slider makes it easy for you to choose between productivity and precision, without needing to know the best values for each setting.

> ☼ **Tip –** The default position in the middle of the slider bar is the most productive setting at which the precision specifications of the GPS receiver are met. See **SNR values (see page 193)**.

To change GPS settings in Slider mode, move the slider bar to the left or right. The slider duplicates the GPS slider in the *Setup* section's **GPS Settings form (see page 187)**, so any changes you make to the slider position in the Setup area are also made in the *GPS Settings* form.

Note – Slider mode is not available if a base data file is open.

In *Custom* mode, the Setup area shows the configured limits for PDOP or HDOP, elevation, and SNR. To change to Custom mode, tap the Setup button 🔧 to open the **GPS Settings form (see page 187)**. Then clear the *Slider* check box.

Satellite Information

To display the Satellite information screen, tap the Subsection list button and select Satellite Info.

Use the Satellite information screen to view information about satellites in text form.

As in the Skyplot screen, the following appear at the bottom of the screen:

- **Information fields, page 148**)

- **Message line, page 144**)

- **Setup area, page 146**)
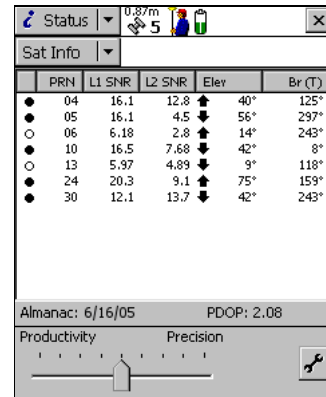
Table 5.4   Satellite Information screen: Columns

Column	Description
Use indicator	This column displays a filled circle (●) for a satellite that is being used to calculate positions, and an empty circle (○) for any satellite that is visible but is not being used to calculate positions. For example, a visible satellite may not be used because it is below the configured minimum elevation. Satellites with no circle are available, but are not being tracked by the TerraSync software.
PRN	The pseudorandom number of each satellite. A satellite is identified by its unique PRN.
L1 SNR	The current signal-to-noise ratio of the L1 signal from each satellite, in dBHz. A satellite that is below the configured **Min SNR (see page 189)** is not used to compute positions.

Table 5.4   Satellite Information screen: Columns (continued)

Column	Description
L2 SNR	The current signal-to-noise ratio of the L2 signal from each satellite, in dBHz. This column only appears if the connected GPS receiver is a dual-frequency receiver with a dual-frequency antenna, for example the GPS Pathfinder ProXH or a survey receiver. ***Note** – If a satellite is marked as "unhealthy" by the GPS Control Segment, the characters U/H appear in the SNR columns for that satellite.*
Elev	The current elevation above the horizon of each satellite. A satellite that is below the configured **Min Elevation (see page 190)** is not used to compute positions.
Br(T) or Br(M)	The current bearing to each satellite. This bearing is shown relative to either true north (T) or magnetic north (M), as determined by the currently configured **North Reference (see page 217)**.

Information fields

Information fields show the current GPS position and settings

***Note** – If the field computer's screen uses the landscape orientation, the information fields appear to the right of the Satellite information screen.*

Table 5.5   Satellite Information screen: Information fields

Display	Description
Almanac	The date of the last almanac received from satellite broadcasts.
PDOP	The current PDOP value (see **PDOP, page 143**). This field only appears if you have configured a maximum PDOP.
HDOP	The current HDOP value (see **HDOP, page 143**). This field only appears if you have configured a maximum HDOP.

Plan

To display the Plan screen, tap the
Subsection list button and select Plan.

The Plan screen lets you plan your data
collection session while you are in the
field. You can view an animated skyplot
and DOP graph for your current position
over the next 12 hours, and use these to
plan data collection around the times of
the day when satellite geometry is best.
See **Planning a data collection session,
page 152**.
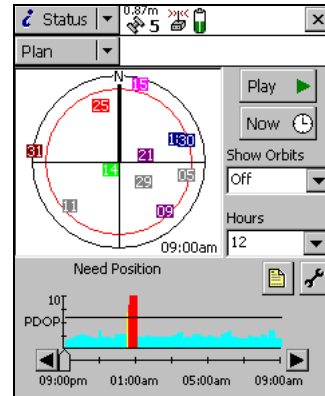
The Plan screen includes:

- **Planning skyplot, page 150**

- **Message line, page 152**

- **DOP graph, page 151**

Table 5.6   Plan screen: Buttons

Button		Description
Play ▶	Play	Tap **Play** to begin playback of a session, or to resume playback after pausing. When the session is playing, the button changes to the **Pause** button. Tap the **Pause** button to temporarily pause playback. At the end of playback, the button changes to the **Home** button. Tap the **Home** button to return to the beginning of the session, ready for playback again.
Now ⊙	Now	Tap **Now** to set the session to the current time. The time shown on the skyplot and position of the slider bar on the **DOP graph (see page 151)** change to match the current time.
📄	Report	Tap the Report button to create a text file in the TerraSync documents folder that contains details of the current planning session.
🔧	Setup	Tap the Setup button to open the **GPS Settings form (see page 187)** from the Setup section.

Table 5.7 **Plan screen: Fields**

Field	Description
Show Orbits	Use this field to select the type of orbit information to display on the skyplot. The options are:
	• Off Do not show any orbit information.
	• Trails Show an orbit trail for each satellite. During session playback, a satellite's trail plots where the satellite has been in this session. The trail is a solid line in the same color that is used to represent the satellite.
	• Trajectories Show an orbit trajectory for each satellite. At the beginning of playback, each satellite's entire trajectory is visible, showing where it will travel during the session. The trajectory is a dashed line in the same color that is used to represent the satellite. During session playback, each satellite erases its trajectory as it moves over the plotted positions.
Hours	Select an option from this field to specify how many hours the planning session will cover. The session begins at the last full hour before the current time. For example, if the time is 10:56, the session starts at 10:00. A session can cover up to twelve hours.

Planning skyplot

The planning skyplot is similar to the skyplot shown in the **Skyplot subsection (see page 139)**. The outer black circle indicates the horizon, the inner red circle represents the minimum elevation that you have set. Each satellite that is in view is represented by a box containing the satellite's pseudorandom number (PRN). Each satellite is colored for easy identification.
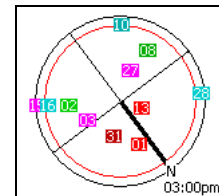
Note – *Unlike the main skyplot, the planning skyplot shows all visible satellites, even if they are below the configured minimum elevation or their current SNR value is too high. To check which satellites are currently being tracked, use the main* **Skyplot (see page 139)***.*

The time displayed in the lower right corner of the planning skyplot indicates the exact time that the skyplot is showing. It matches the position of the slider bar on the **DOP graph (see page 151)**.

When you open the Plan section, the planning skyplot's orientation matches the current heading shown in the main **Skyplot (see page 139)** The planning skyplot does not rotate as your heading changes, but if your heading becomes locked (for example, if you are not moving fast enough for an accurate heading to be calculated) then the planning skyplot's orientation is updated to this locked heading.

DOP graph

The DOP graph shows the projected PDOP or HDOP values over the specified time period.
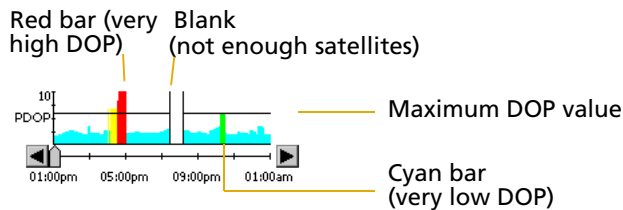
The horizontal line indicates the currently configured maximum PDOP or HDOP.

The slider bar shows the time period that is selected in the **Hours list (see page 150)**. Drag the slider bar across the slider, or tap the left or right arrow button, to view the skyplot for a specific time. As the slider control's position changes, the skyplot and time display change to match the selected time.

Appearance	PDOP	HDOP
Cyan bar	< 4	< 2.5
Green bar	4 to 6	2.5 to 4
Yellow bar	6 to 8	4 to 5.5

Appearance	PDOP	HDOP
Red bar	> 8	> 5.5
Blank with black left and right borders	Not enough satellites are available to compute a position.	

Message line

The message line below the planning skyplot in the **Plan screen (see page 149)** displays any error or warning messages. Messages only appear when there is a problem or a condition you should be aware of.

Table 5.8 Plan screen: Messages

Message	Meaning
Recording almanac	The TerraSync software is downloading an almanac from the connected GPS receiver.
Need almanac	The TerraSync software does not have a current almanac of satellite locations.
Need position	The GPS receiver has stopped computing positions.
Heading locked	The GPS receiver is stationary or moving too slowly to calculate an accurate heading. The rotation of the planning skyplot does not reflect the current heading.

Planning a data collection session

Tip – If the message Need almanac or Recording almanac appears in the message line, the TerraSync software does not have a current almanac of satellite positions. This may occur the first time you connect to GPS after you install the TerraSync software, or if the GPS receiver has not been used for a while. A current almanac is important when planning a data collection session. Wait until the message disappears before using the Plan section.

Before you use the Plan section, tap the Setup button 🔧 to open the **GPS Settings form (see page 187)** from the *Setup* section, and configure GPS settings to your data collection requirements. Any

changes you make are reflected in the planning skyplot and DOP graph in the **Plan subsection (see page 149)**. For example, if you decrease the minimum elevation, the red circle on the planning skyplot gets larger.

If required, select an option from the Show Orbits list to display orbit trails (past locations within the session) or trajectories (future locations within the session) for each satellite.

Tap the Play button Play ▶ to play back the session automatically. The **Play** button changes to a **Pause** button, the satellites move in the skyplot, and the position of the slider on the DOP graph changes to match the time shown on the skyplot. Tap the **Pause** button at any time to pause playback.

Tap the **Now** button Now ⏲ to show the current time, drag the slider on the **DOP graph (see page 151)** to fast forward to a time of interest, or use the Back ◀ and Forward ▶ buttons to move in increments of ten minutes. The skyplot changes to show the constellation for the time indicated by the slider position.

To zoom in on a particular time period, use the **Pause** button, slider, or the Back and Forward buttons to stop playback at the time of interest. Select a value from the Hours list. The DOP graph zooms in to show DOP values for the specified number of hours ahead of the selected time.

Note – The planning skyplot shows all possible satellites, using the almanac received from satellite broadcasts. It does not take into account any obstructions, such as buildings or tree canopy, that may block satellites from your line of sight.

Receiver

To display the Receiver screen, tap the Subsection list button and select Receiver. Use this screen to view information about the connected GPS receiver.

Table 5.9   Receiver screen: Fields

Field	Description
GPS	The current status of the GPS receiver connection. The options are:
	• Connected The TerraSync software is connected to the GPS receiver.
	• Attempting to connect to GPS The TerraSync software is trying to connect to the receiver. If this message appears, no other fields appear.
	• GPS is disconnected The receiver has been disconnected from the TerraSync software. If this message appears, no other fields appear.
	• No GPS detected. Check cables, batteries etc The TerraSync software has failed to detect the receiver, because it is not connected to the port specified in the **GPS Settings form (see page 187)**, or has no power. If this message appears, no other fields appear.
Antenna	The current status of the antenna connection. The options are:
	• Connected The TerraSync software is connected to a GPS receiver, and the receiver is connected to a GPS antenna.
	• Not connected No antenna is connected. The antenna icon also appears in the Status bar.

Table 5.9   Receiver screen: Fields (continued)

Field	Description
Position status	An indicator of the GPS status. The options are:
	• Calculating positions — The receiver is computing GPS position fixes. The current satellite constellation is therefore acceptable.
	• Poor satellite geometry — The current PDOP or HDOP value is greater than the maximum value, so The GPS receiver is not computing GPS positions.
	• Too few satellites — The GPS receiver has acquired satellites, has not acquired enough satellites to compute a position.
	• Unavailable — No position is available. For example, there may be no antenna connected to the receiver.
Carrier time	The time elapsed, in minutes and seconds, since the TerraSync software began logging the current block of carrier data. If the TerraSync software is not logging carrier phase data, this field shows N/A.
Almanac	The date of the almanac appears in this field.
Battery	The current level of charge in the GPS receiver's battery. This value appears as a percentage.
Receiver type	The name of the receiver model currently connected to the field computer. The TerraSync software shows the internal name supplied by the receiver, which may not exactly match the name you use for the receiver.
Navigation version	The version number of the navigation firmware that is installed in the connected GPS receiver.
Signal processor version	The version number of the signal processing firmware that is installed in the connected GPS receiver.
OmniSTAR ID	The activation code for the OmniSTAR satellite differential service. You need this code when contacting your OmniSTAR provider for activation. This field only appears if the connected receiver supports real-time corrections from a satellite differential service.

Real-time

To view real-time information, tap the Subsection list button and then select Real-time.

By default, the real-time screen that appears is the **Real-time Summary screen (see page 157)**. Depending on the real-time configuration, the following detailed status screens may also be available:

- **External Source Status screen, page 161**
- **External Beacon Status screen, page 162**
- **Integrated Beacon Status screen, page 164**
- **Integrated Satellite Status screen, page 166**
- **Integrated SBAS Status screen, page 168**
- **Integrated RTK Radio Status screen, page 169**

Use these screens to view information about the real-time correction sources you have set up.

Use the Status Mode list button to move between the real-time status screens. When you tap the Status Mode list button, a list of status screens appears. Select an option to open the corresponding screen.

Real-time Summary screen

The *Real-time Summary* screen contains a heading for each real-time source you have set up. The heading shows the name of the source. The order of the real-time sources matches the order of your choices in the **Real-time Settings form (see page 196)** in the *Setup* section.

The real-time source currently in use for real-time corrections has an icon beside its name. The icon used matches the icon that appears in the status bar, to provide a quick indicator of the real-time source in use.

If no icon is shown, the TerraSync software is waiting for real-time corrections to resume, or it is logging uncorrected positions. The real-time icon in the status bar also flashes to indicate that real-time corrections are not available.

Brief summary information on each configured real-time source is included in this screen:

- **Real-time Summary screen: External Source summary fields, page 158**

- **Real-time Summary screen: External Beacon summary fields, page 158**

- **Real-time Summary screen: Integrated Beacon summary fields, page 159**

- **Real-time Summary screen: Integrated Satellite summary fields, page 159**

- **Real-time Summary screen: SBAS summary fields, page 159**

- **Real-time Summary screen: RTK Radio summary fields, page 160**

- **Real-time Summary screen: RTK summary fields, page 160**

For full status information on any source you have configured, tap the Status Mode list button and select the source name.

The screen also includes a **Setup area (see page 160)** for quick access to real-time settings.

Table 5.10 Real-time Summary screen: External Source summary fields

Field	Description
External Source	The status of the External Source real-time source. The options are:
	• In use This source is being used for real-time corrections.
	• Waiting This source is configured but a lower-ranked choice is currently in use. The source's status is being monitored and the TerraSync software will switch to this source if it becomes available and is the highest-ranked available source.
	• (none) This source is configured but is not being monitored or used.
	If External Source is the real-time source that is in use, the real-time External icon appears to the left of the field name for a single base source or the real-time VRS icon appears to the left of the field name for a virtual reference station (VRS™) source.

Table 5.11 Real-time Summary screen: External Beacon summary fields

Field	Description
External Beacon	The status of the external beacon receiver that is configured as an external source. The options are the same as the options for the **External Source field (see page 158)**.
	If an external beacon receiver, such as the Beacon-on-a-Belt (BoB™) receiver, is the real-time source that is currently in use, the real-time External Beacon icon appears to the left of the field name.
Frequency	The current beacon frequency being tracked or locked on to by the external beacon receiver.
State	The real-time operating status of the external beacon receiver.
SNR	The signal-to-noise ratio of the beacon signal that is being monitored.

Table 5.12   Real-time Summary screen: Integrated Beacon summary fields

Field	Description
Integrated Beacon	The status of the Integrated Beacon real-time source. The options are the same as the options for the **External Source field (see page 158)**, with the addition of this option:
	Not supported The connected GPS receiver does not support real-time corrections from this source.
	If Integrated Beacon is the real-time source that is in use, the real-time beacon icon 📡 appears to the left of the field name.
Frequency	The current beacon frequency being tracked or locked on to.
State	The real-time operating status of the integrated beacon receiver.
SNR	The signal-to-noise ratio of the integrated beacon signal that is being monitored.

Table 5.13   Real-time Summary screen: Integrated Satellite summary fields

Field	Description
Integrated Satellite	The status of the Integrated Satellite real-time source. The options are the same as the options for the **Integrated Beacon field (see page 159)**.
	If Integrated Satellite is the real-time source that is in use, the real-time satellite icon 📡 appears to the left of the field name.
Service Provider	The name of the satellite differential service provider that the satellite in use belongs to.
Frequency	The current satellite frequency being tracked or locked on to.
State	The real-time operating status of the integrated satellite receiver.
SNR	The signal-to-noise ratio of the satellite signal that is being monitored.

Table 5.14   Real-time Summary screen: SBAS summary fields

Field	Description
Integrated SBAS	The status of the Integrated SBAS real-time source. The options are the same as the options for the **Integrated Beacon field (see page 159)**.
	If Integrated SBAS is the real-time source that is in use, the real-time SBAS icon 📡 appears to the left of the field name.
SNR	The signal-to-noise ratio of the SBAS satellite signal that is being monitored.

Table 5.15   Real-time Summary screen: RTK Radio summary fields

Field	Description
RTK Radio	The status of the Integrated RTK Radio real-time source. The options are the same as the options for the **Integrated Beacon field (see page 159)**. If RTK Radio is the real-time source that is in use, the RTK icon 🧍 appears to the left of the field name.
Frequency	The frequency that the RTK radio is listening to.

Table 5.16   Real-time Summary screen: RTK summary fields

Field	Description
Frequency	The frequency that the RTK radio is listening to.
State	The RTK state. Select an option from the drop-down list.
Position is	The type of RTK position being logged. Select an option from the drop-down list.

Setup area

There is a Setup area at the bottom of each screen in the Status section's Real-time subsection that provides a shortcut to the **Real-time Settings form (see page 196)**.

To configure real-time settings, tap the Setup button 🔧. The *Real-time Settings* form appears. Make any changes you require, and then tap **OK** to return to the real-time status screen.

External Source Status screen

To display the *External Source Status* screen, open the **Real-time subsection (see page 156)**, tap the Status Mode list button, and select External Source.

This screen shows detailed information about the external real-time correction source you have set up.

*Note – If you have configured an external beacon receiver as the external source, the **External Beacon Status screen (see page 162)** is available instead of the External Source screen.*

Table 5.17   External Source Status screen: Fields

Field	Description
External Source	The status of this real-time source. The options are:
	• In use The external real-time source is currently being used to correct positions in real time.
	• Waiting A lower-ranked choice is currently being used to correct positions in real time. The external source's status is being monitored and the TerraSync software will switch to the external source if it becomes available and it is the highest-ranked available source.
	• Not in use The external real-time source is set up but is not currently being used for real-time corrections.
Correction Type	The type of VRS correction being received. The options are:
	• Network The VRS is providing a network solution, using corrections from more than one base station to calculate the position of the virtual reference station.
	• Single Station The VRS is operating in raw mode, and is using only one base station to provide RTCM corrections.
	This field only appears if the external source is a virtual reference station (VRS).

Table 5.17 External Source Status screen: Fields (continued)

Field	Description
Connection Up-time	The duration, in hours, minutes, and seconds, of the current VRS connection. This field only appears if the external source is a VRS.
Data Received	The amount of data, in megabytes, kilobytes, or bytes as appropriate, that has been sent and received since the connection was established. This field only appears if the external source is a VRS.
Last correction	The time, in seconds, since the last correction message from this source was received.

External Beacon Status screen

To display the *External Beacon Status* screen, open the **Real-time subsection (see page 156)**, tap the Status Mode list button, and select External beacon.

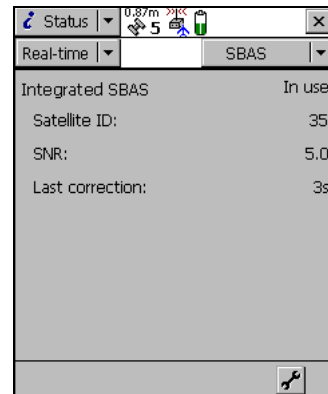This screen shows detailed information about the external beacon receiver you have set up as an external real-time correction source.
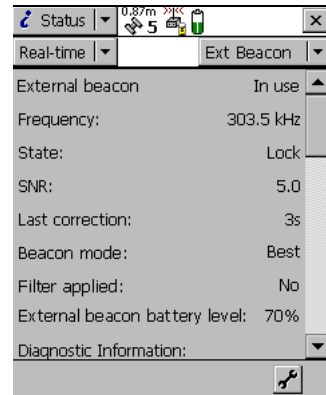
*Note – If you have configured an external source that is not an external beacon receiver, the **External Source Status screen (see page 161)** is available instead of the External Beacon Status screen.*

Table 5.18   External Beacon Status screen: Fields

Field	Description
External Beacon	The status of the external beacon receiver. The options are:
	• In use — The external beacon receiver is currently being used to correct positions in real time.
	• Waiting — A lower-ranked choice is currently being used to correct positions in real time. The external beacon receiver status is being monitored and the TerraSync software will switch to the external beacon if it becomes available and it is the highest-ranked available source.
	• Not in use — The external beacon is set up but is not currently being used for real-time corrections.
	• Not supported — The connected GPS receiver does not support real-time corrections from an external beacon receiver.
Frequency	The current beacon station frequency being tracked or locked on to by the external beacon receiver.
	Note – Use the configuration software to set the external beacon receiver frequency.
State	The state of the external beacon receiver. Select an option from the drop-down list.
SNR	The signal-to-noise ratio, in decibels, of the beacon signal that the external beacon receiver is monitoring.
Last correction	The time, in seconds, since the last correction message from this source was received by the GPS receiver.
Beacon mode	The mode the external beacon receiver is operating in. The options are:
	• Best — The external beacon receiver tracks the best frequency available and automatically switches frequency if a better signal is available.
	• Fixed — The external beacon receiver tracks only the frequency you specify in the configuration software.
Filter applied	This field specifies whether a filter has been applied to the list of frequencies the external beacon receiver can track.

Table 5.18   External Beacon Status screen: Fields (continued)

Field	Description
External beacon battery level	The remaining battery power of the external beacon receiver, as a percentage.
Diagnostic Information	A heading used to group together fields that contain information for troubleshooting the external beacon receiver signal.
Error Rate	The RTCM Word Error Rate, which shows the proportion of RTCM words that have parity errors. An error rate of less than 0.1 is acceptable.
Input Level	The intensity level of the electromagnetic field. This value should be between 10 and 100 dBuV/M.
Data Rate	The data modulation rate from the external beacon receiver.
Health	The health of the external beacon receiver signal. Select an option from the drop-down list.

Integrated Beacon Status screen

To display the *Integrated Beacon Status* screen, open the **Real-time subsection (see page 156)**, tap the Status Mode list button, and select Integrated Beacon.

This screen shows detailed information about the integrated beacon source you have set up.
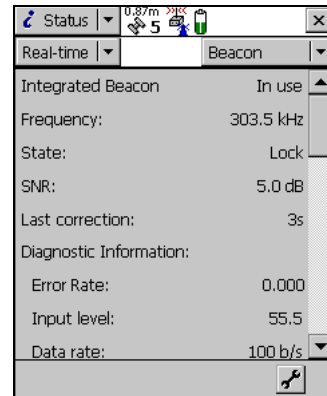
Table 5.19   Integrated Beacon Status screen: Fields

Field	Description
Integrated Beacon	The status of this real-time source. The options are:
	• In use A beacon is currently being used to correct positions in real time.
	• Waiting A lower-ranked choice is currently being used to correct positions in real time. The beacon status is being monitored, and the TerraSync software will switch to the beacon source if it becomes available and it is the highest-ranked available source.
	• Not in use A beacon real-time source is set up but is not currently being used for real-time corrections.
	• Not supported The connected GPS receiver does not support real-time corrections from an integrated beacon receiver.
Frequency	The current beacon frequency being tracked or locked on to.
State	The current state of the integrated beacon receiver. Select an option from the drop-down list.
SNR	The signal-to-noise ratio, in decibels, of the beacon station being tracked. An SNR above 6.0 dB indicates that the signal is usable.
Last correction	The time, in seconds, since the last correction message from this source was received by the GPS receiver.
Diagnostic Information	A heading used to group together fields that contain information for troubleshooting the beacon service.
Error Rate	The RTCM Word Error Rate, which shows the proportion of RTCM words that have parity errors. The error rate should be 0.1 or less.
Input Level	The intensity level of the electromagnetic field. This value should be between 10 and 100 dBuV/M.
Data Rate	The data modulation rate from the beacon.
Health	The health of the beacon signal. Select an option from the drop-down list.

Integrated Satellite Status screen

To display the *Integrated Satellite Status* screen, open the **Real-time subsection (see page 156)**, tap the Status Mode list button, and select Integrated Satellite.

This screen shows detailed information about the satellite differential service you have set up.

Table 5.20 Integrated Satellite Status screen: Fields

Field	Description
Integrated Satellite	The status of this real-time source. The options are:
	• In use — The integrated satellite real-time source is being used to correct positions in real time.
	• Waiting — A lower-ranked choice is currently being used to correct positions in real time. The satellite status is being monitored and the TerraSync software will switch to the satellite source if it becomes available.
	• Not in use — An integrated satellite real-time source is set up but is not currently being used for real-time corrections.
	• Not supported — The connected GPS receiver does not support corrections from an integrated satellite receiver.
Service Provider	The name of the provider of the satellite differential service being used.
Frequency	The current satellite frequency being tracked or locked on to.
State	The current real-time state of the integrated satellite receiver. Select an option from the drop-down list.
SNR	The signal-to-noise ratio, in decibels, of the selected satellite signal. An SNR above 3.0 dB indicates that the signal is usable.
Last correction	The time, in seconds, since the last correction message from this source was received by the GPS receiver.

Table 5.20   Integrated Satellite Status screen: Fields (continued)

Field	Description
Real-time Service Information	A heading used to group together fields that contain information about the integrated satellite subscription.
User access	This field specifies whether the selected correction service has been enabled for the GPS receiver. The options are:
	• Enabled The service is enabled.
	• Disabled The activation has expired.
	• Unknown The service has not yet been activated on this receiver, or the receiver has not yet determined the activation status.
Decoder state	The current status of the satellite activation. The options are:
	• Initializing The real-time decoder is initializing.
	• Receiving corrections The decoder is providing corrections.
	• No recent data Real-time data has not been received from the decoder in the last 10 seconds.
	• Decoder unavailable The decoder is not available or is not operating correctly.
	• Decoder reset A reset has been detected in the decoder.
	• Invalid link The decoder is using a satellite link that is not valid for the subscription.
	• Invalid region The decoder is being used in a region that is not covered by the current subscription.
	• Update required The decoder requires an update from the master station before corrections can be provided.
	• No offshore The decoder is being used in a marine area but the current subscription does not provide for offshore operation.
Expiration	The date on which the satellite differential service subscription expires, or the time remaining until the subscription expires.
Diagnostic Information	A heading used to group together fields that contain information for troubleshooting the satellite service.

Table 5.20   Integrated Satellite Status screen: Fields (continued)

Field	Description
Quality figure	The percentage of error-free data received from the integrated satellite in the last data block. This value should be 90% or higher.
Age of sync	The number of seconds since the receiver decoded a data block from the satellite. If this value is greater than 3 seconds, the signal from the satellite may no longer be valid.
Decoder version	The version number of the satellite decoder in the GPS receiver.

Integrated SBAS Status screen

To display the *Integrated SBAS Status* screen, open the **Real-time subsection (see page 156)**, tap the Status Mode list button, and select Integrated SBAS.

This screen shows detailed information about the SBAS correction source.

Table 5.21   Integrated SBAS Status screen: Fields

Field	Description
Integrated SBAS	The status of this real-time source. The options are:
	• In use — The integrated SBAS real-time source is being used to correct positions in real time.
	• Waiting — A lower-ranked choice is currently being used to correct positions in real time. The SBAS status is being monitored and the TerraSync software will switch to the SBAS source if it becomes available.
	• Not in use — The integrated SBAS real-time source is set up but is not currently being used for real-time corrections.
	• Not supported — The connected GPS receiver does not support corrections from an integrated SBAS receiver.
SNR	The signal-to-noise ratio, in decibels, of the selected SBAS satellite signal. An SNR above 3.0 dBHz indicates that the signal is usable.
Last correction	The time, in seconds, since the last correction message from this source was received by the GPS receiver.

Integrated RTK Radio Status screen

To display the *Integrated RTK Radio Status* screen, open the **Real-time subsection (see page 156)**, tap the Status Mode list button, and select RTK Radio.

This screen shows detailed information about the corrections being received by the GPS receiver's internal RTK radio.

Table 5.22 Integrated RTK Radio Status screen: Fields

Field	Description
RTK Radio	The status of this real-time source. The options are:
	• In use Data from the integrated RTK radio is being used to correct positions in real time.
	• Waiting The RTK radio is initializing.
	• Not supported The connected GPS receiver does not support corrections via an integrated RTK radio.
Frequency	The frequency that the RTK radio is listening to.
State	The RTK state. The options are:
	• No base station coordinates The integrated RTK radio has not yet received coordinate information from the base station.
	• Waiting for base info The integrated RTK radio is waiting for information from the base station radio.
	• Initializing The GPS receiver is performing RTK initialization.
	• Initialized RTK is initialized and in use.
	• Link down The integrated RTK radio is not receiving corrections from the base station radio.
Position is	The type of RTK position being logged. The options are:
	• Roving A line or area feature is being logged. All positions that meet the required precision for roving mode are logged.
	• Static A point feature or vertex is being logged. Only the position with the best precision estimate is recorded. All other positions are discarded.
Station ID	The ID number that the base station uses to identify itself to rovers.
Station Name	The name of the base station.
SVs Tracked	The PRNs of the GPS satellites that the base station is tracking.

Sensor

Note – The Sensor subsection does not appear in the TerraSync Standard edition software as the standard edition does not support external sensors.

To view sensor information, tap the Subsection list button and select Sensor.

There is a sensor status screen for each sensor that you can configure. Use these screens to view information about the external sensors that you have set up.

Use the Sensor Mode button to move between the sensor status screens. When you tap the Sensor Mode button, a list of sensors appears. Select an option to open the status screen for that sensor.

If the sensor is not enabled or connected, the message Sensor not active appears instead of information fields.
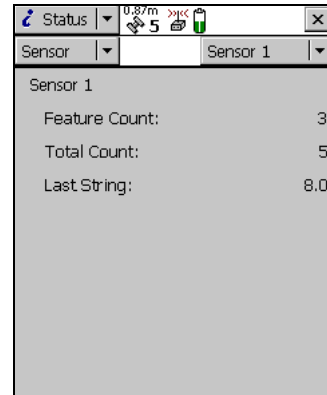
Table 5.23   Sensor screen: Fields

Field	Description
<Sensor name>	The name of the sensor, as defined in the Sensor Properties form (see **Sensor Properties form (see page 219)**.
Feature Count	The number of messages received from the sensor since the start of the current feature. This field is only displayed if a feature is open.
Total Count	The total number of messages received from the sensor.
Last String	The last message string received from the sensor.

Comms

To view communication port information, tap the Subsection list button and select Comms.

The Comms screen contains a field for each serial (COM) port that is available on the field computer. The value in each field is the name of the device that is connected to that port.
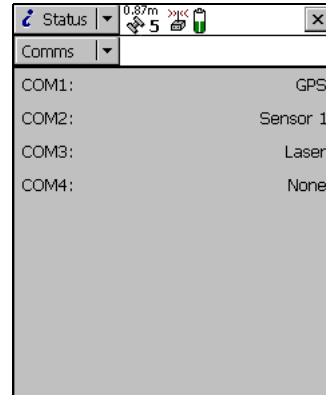
Table 5.24   Comms screen: Fields

Value	Description
GPS	A GPS receiver is connected.
Laser	A laser rangefinder is connected.
<Sensor name>	An external sensor is connected.
Unknown Application	Another application is using the port.
None	No device is connected to the port.

UTC Time

To display the UTC Time screen, tap the Subsection list button and select UTC Time. The UTC Time screen shows the current Universal Time Coordinated (UTC) time, calculated from the GPS time reported by the connected GPS receiver.

This screen is provided for use with the MediaMapper™ software. MediaMapper georeferences digital photographs to features collected in the TerraSync software or in other Trimble data collection software. To ensure that each photograph is georeferenced to the correct feature, you need to calibrate the digital camera's internal clock to UTC time. To do this, take a digital photograph of the UTC Time screen. MediaMapper compares the UTC time shown in the picture to the picture's time stamp, then calculates the offset between the camera's clock and UTC time.

To ensure an accurate calibration, it is important that the calibration photo displays the current UTC time. Whenever a GPS receiver is connected, the TerraSync software synchronizes its UTC time display every five seconds with the time reported by the GPS receiver. The UTC time is always up to date when the TerraSync software is connected to GPS.

If the receiver is disconnected, the TerraSync software uses the field computer's internal clock to update the UTC time display. However, the internal clock is not as accurate as the GPS time from the receiver, so the time displayed becomes less and less accurate. After 24 hours without synchronization (that is, without reconnecting to GPS), the UTC time displayed is no longer accurate enough to be used for calibration, so the UTC time display is replaced with the message Time not available. Connect to GPS.
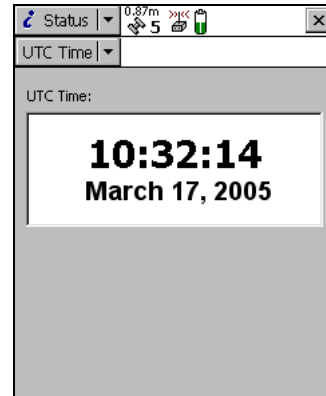
Note – Before you take a calibration photograph, Trimble recommends that you connect to GPS and wait until the satellite icon with a number beside it ⬥5 appears in the status bar.

About

To display the About screen, tap the Subsection list button and select About.

Use this screen to view information about the installed copy of the TerraSync software.

The About screen also contains the **System Report** button. Tap this button to create a text file in the TerraSync documents folder describing the field computer's configuration. If you encounter a problem with the field computer or the TerraSync software, this file (Report.txt) may be requested by a technical support representative to assist with troubleshooting.
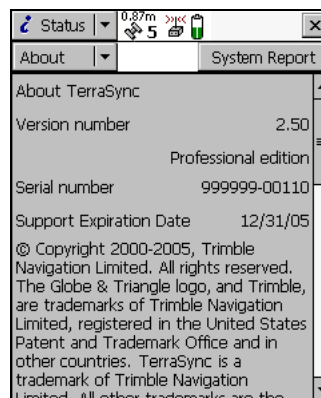
Table 5.25   About screen: Fields

Field	Description
Version number	The version and edition of the TerraSync software that is installed.
Serial number	The serial number of this copy of the TerraSync software. This is the serial number you entered during installation.
Copyright	Copyright information.
Support Expiration Date	The date until which you are entitled to telephone support, e-mail support, and upgrades to later versions of the TerraSync software.
Acknowledgments	Acknowledgments for the parts of the TerraSync software that were developed by other companies.

Setup Section

In this chapter:

Introduction

To open the Setup section, tap the Section list button and select Setup. The Setup screen appears.

Use the *Setup* section to configure the TerraSync software.

Use the *Setup* screen to perform common setup tasks, and to access the *Setup* section's six subsections:

Table 6.26   Setup screen: Buttons

Button	Description
Ext Source	Connects to or disconnects from an external VRS correction source. This button is a shortcut to the **Connect to External Source (see page 178)** and **Disconnect from External Source (see page 178)** options.
	This button only appears if you have configured a VRS External Source as the preferred real-time source, and the TerraSync software is connected to GPS.
GPS	Connects to or disconnects from the GPS receiver. This button is a shortcut to the **Connect to GPS (see page 177)** and **Disconnect from GPS (see page 177)** options.
Reload	Re-applies the settings from the selected configuration file. Any changes that you have made to the configuration will be lost.
Change	Opens the **Choose Configuration form (see page 181)**. Use this form to change to a different configuration file. If the current configuration file specifies that you cannot change configurations, this button is not available.

Table 6.26   Setup screen: Buttons

Button	Description
Lock	Locks the current configuration, or opens the **Enter Password form (see page 182)**. Use this form to unlock the current configuration. See Configuration files, **page 178**.
Logging Settings	Opens the **Logging Settings form (see page 182)**. If a base data file is open, this button is unavailable.
GPS Settings	Opens the **GPS Settings form (see page 187)**. If a base data file is open, this button is unavailable.
Real-time Settings	Opens the **Real-time Settings form (see page 196)**.
Coordinate System	Opens the **Coordinate System form (see page 214)**.
Units	Opens the **Units form (see page 216)**.
External Sensors	Opens the **External Sensors form (see page 218)**.

Table 6.27   Setup screen: Fields

Field or icon	Description
Current Configuration	A read-only field that shows the name of the selected configuration file. If you have changed any settings since loading the configuration file, the text **Based Upon** is displayed in front of the filename. See **Configuration files, page 178**.
Lock icon	This icon indicates whether the loaded configuration file is locked (🔒) or unlocked (🔓).

Table 6.28   Setup screen: Options

Option	Description
Connect to GPS	Establishes a connection with the GPS receiver. If the GPS receiver is already connected, this option is not available.
Disconnect from GPS	Disconnects the TerraSync software from the GPS receiver. When you select this option, a message box appears, asking you to confirm that you want to disconnect from GPS. Tap **Yes** to disconnect. If the GPS receiver is already disconnected, this option is not available.

Table 6.28 Setup screen: Options

Option	Description
Reset GPS receiver	Resets the GPS receiver to its default settings.
	Note – *If the GPS receiver does not operate as expected after it has been connected to another field computer or another data collection application, reset the receiver. This clears any settings that may prevent it from working properly with the TerraSync software.*
Activate Integrated Satellite	Allows you to enter an activation code to enable your subscription to a satellite differential service.
	This option is only available if a satellite differential service has been set up as a real-time choice, and you are connected to a receiver that supports this service.
Connect to External Source	Establishes a connection with the configured VRS server. If the TerraSync software is already connected, this option is not available.
Disconnect from External Source	Disconnects the TerraSync software from the VRS server. If the TerraSync software is already disconnected, this option is not available.

Configuration files

A configuration file contains instructions that define, and optionally lock, the configuration of the TerraSync software. The configuration determines how data is collected, entered, and communicated with external devices. You can use configuration files to ensure that data collected by different field crews or on different days is collected in a consistent way.

To create a configuration file, use the Configuration Manager utility in the GPS Pathfinder Office software. You can specify a value for each setting, and you can specify whether each setting is password-locked. If a setting is password-locked, you cannot change it in the TerraSync software until you enter the correct password to unlock the configuration file.

In addition to configuring software settings, a configuration file can also be used to lock some tasks and options. You cannot use a locked option or perform a locked task until you unlock the configuration file.

A locked menu item or option appears grayed out, and has a locked icon (🔒) beside it. The same icon appears beside locked fields in the *Setup* section, which are read-only.

For more information on working with configuration files, see:

- **Reloading a configuration, page 180**
- **Resetting to factory defaults, page 180**

Changing configuration

Although you can send any number of configuration files to the TerraSync software, only one configuration can be loaded at a time. Provided the loaded configuration file has not locked changing configurations, you can load a different configuration file at any time. You do not have to close any open files or restart the software for the changes to take effect.

To load a different configuration file, tap **Change** in the main *Setup* screen, select a file in the **Choose Configuration form (see page 181)**, and tap **Load**.

If the **Change** button is not available, the current configuration file is locked and does not permit you to change configurations. You must unlock the current configuration file before you can load a different file, or edit password-locked settings. Tap **Unlock** and in the **Enter Password form (see page 182)** enter the configuration file's password. Once you have unlocked a configuration, you can edit all settings and access all menu items. You can leave the configuration unlocked, or tap **Lock** to lock it again.

If you have made changes to settings in the software, the name of the configuration file in the **Current Configuration field (see page 177)** is prefixed by **Based Upon**.

Reloading a configuration

Once you have changed settings from those defined in the selected configuration file, the configuration name in the main *Setup* screen's **Current Configuration field (see page 177)** is prefixed by Based Upon, and the **Reload** button becomes available.

You can reload a configuration at any time. Reloading returns all settings to the values defined in the selected configuration file. To reload a configuration, tap **Reload**. A message appears, asking you to confirm that you want to discard all changes to settings. Tap **Yes** to continue with reloading.

The Factory Defaults configuration is always available, even if you have not transferred any configuration files to the TerraSync software. Use the **Reload** button to reset the software to the factory default values.

Resetting to factory defaults

The Factory Defaults configuration file is always available. Provided the current configuration allows you to change configurations, you can reload the Factory Defaults configuration. This resets the software to the factory default settings.

The Factory Defaults configuration file is loaded in the same way as any other configuration file. See **Changing configuration (see page 179)** and **Reloading a configuration (see page 180)**.

The factory default settings include:

- layer colors and any background file that is selected in the Map section

- filtering conditions and logging intervals in the Data section

- the default data dictionary for a new file (reset to Generic)

- options in the Navigation section

- all settings in the *Setup* section

- window size and pane layout, if the field computer displays Panes

Resetting does not delete data dictionaries, data files, or coordinate systems.

Choose Configuration form

To open the *Choose Configuration* form, tap **Change** in the *Setup* screen.

To load a configuration from the list, highlight it and tap **Load**. The *Choose Configuration* form closes and the settings in the selected configuration file are applied.

☀ **Tip –** The Factory Defaults configuration file is always available. Load it to reset the software to the factory default settings.
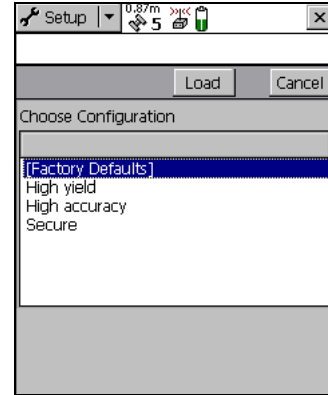
Table 6.29   Choose Configuration form: Buttons

Button	Description
Load	Loads the settings in the selected configuration file.
Cancel	Returns to the *Setup* screen without changing the current configuration.

Table 6.30   Choose Configuration form: Fields

Field	Description
List of files	A list of all of the configuration files loaded in the TerraSync software. To load a configuration file, select it from this list and then tap **Load**.

Enter Password form

To open the *Enter Password* form, tap **Unlock** in the Setup screen.

Use this form to unlock the current configuration file. Once you have entered the correct password, you can change settings and use options that are locked in this configuration.

Note – Passwords are case-sensitive.

If you have forgotten the password, see **You cannot unlock a configuration file, page 297**.

Table 6.31   Enter Password form: Fields

Field	Description
Enter Password	The password for the current locked configuration file.

Logging Settings

To open the *Logging Settings* form, tap **Logging Settings** in the *Setup* screen. Use this form to configure settings that control what data is stored, and how.

Table 6.32   Logging Settings form: Fields

Field	Description	Default
Log Velocity Data	This field specifies whether to log velocity records as well as GPS position records. If you log velocity records, you can use velocity filtering in the postprocessing software to reduce any "spikes" in data that were caused by poor autonomous GPS conditions. **Note –** *If you log SuperCorrect records, you do not have to log velocity records as well.*	No
Log H-Star Data	This fields specifies whether to log H-Star™ data as well as GPS position records. If you log H-Star data you can perform H-Star processing in Trimble postprocessing software for improved accuracy. • Auto Select this option if you have a GPS receiver that is H-Star capable and you want to log H-Star data. **Note –** *If your GPS receiver is not H-Star capable no H-Star data will be logged.* • No Select this option if you have a GPS receiver that is H-Star capable but you do not want to log H-Star data.	Auto
Log SuperCorrect Data	This field specifies whether to log SuperCorrect records as well as GPS position records. If you log SuperCorrect records, you can use the SuperCorrect option in the postprocessing software to process the data using different GPS settings from those used in the TerraSync software, and you can use velocity filtering in the postprocessing software to reduce spikes in the data.	Yes
Antenna Height	The height of the GPS antenna. This field is read-only. To specify antenna details, tap the Setup button beside this field. The **Antenna Settings form (see page 185)** opens.	0.00 m
Allow Position Update	The conditions under which updating of feature position information is allowed. The options are: • Yes Position information for existing features can always be updated. • No Positions cannot be updated. • Confirm Confirmation is required before you are allowed to update the position.	Confirm

Table 6.32 Logging Settings form: Fields (continued)

Field	Description	Default
Confirm End Feature	Select the Yes option to display a confirmation message when you close an updated feature. The message asks you to confirm that you want to end the current feature and save any changes to the feature's attributes or position information. Select the No option to disable the confirmation message.	No
Filename Prefix	The prefix to be included at the beginning of the default name of each new data file. The prefix may be any alphanumeric string between 1 and 30 characters long. *Note – The prefix that you define in this field is for rover files only. The default filename prefix for base files is Base. You cannot change this default prefix. However, when you create a new base file, you can edit the default filename.*	R
Style	The method of measurement for between feature positions. The options are: • Time — A position is logged after a specified time has elapsed since the last position logged. • Distance — A position is logged once you have traveled a specified distance from the last position logged.	Time
Interval	The logging interval for the between feature positions: If you selected Distance from the Style list, enter the number of meters between logging positions, or select an existing value from the list. If you selected Time from the Style list, enter the number of seconds between logging positions, or select an existing value from the list. Select Off to turn off between feature logging.	Off

Table 6.32   Logging Settings form: Fields (continued)

Field	Description	Default
Style	The method of measurement for the specified feature type. The options are as for **Style (see page 184)** above.	Time
	This field only appears if a data file is open. It is repeated for each feature type in the file.	
	Note – *If the feature is a point feature, this field is set to Time and cannot be changed.*	
Interval	The logging interval for the specified feature type. The options are as for **Interval (see page 184)** above.	Off
	This field only appears if a data file is open. It is repeated for each feature type in the file.	
Accuracy	This field specifies whether to log the usual code phase data from the GPS receiver, or to log more detailed but more accurate carrier phase data.	Code
	This field only appears if a data file is open. It is repeated for each feature type in the file.	

Antenna Settings form

To open the *Antenna Settings* form, tap the Setup button beside the *Antenna Height* field on the **Logging Settings form (see page 182)**. Use this form to specify the antenna type you want to use, and the height of the antenna.

Table 6.33   Antenna Settings form: Fields

Field	Description	Default
Height	The height of the GPS antenna that is connected to the GPS receiver. This is used as a vertical offset on each position.	0.00 m
Confirm	How often the software asks you to confirm the configured antenna height during data collection. The options are: • Never — Do not confirm the antenna height before logging positions. • Per File — Display the **Confirm Antenna Height form (see page 41)** whenever you open a new or existing data file. • Per Feature — Display the **Confirm Antenna Height form (see page 41)** when you start a new feature, or when you update an existing feature's position information.	Per File
Type	The type of antenna that is connected to the GPS receiver. If the TerraSync software is connected to a receiver that can only connect to an internal antenna, this field automatically shows the correct antenna type. To specify the antenna that you are using, either select an option from this field, or select the correct part number in the *Part Number* field. Whenever you change a value in one of these two fields, the other field updates accordingly.	Unknown External

Table 6.33   Antenna Settings form: Fields (continued)

Field	Description	Default
Part Number	The part number of the antenna that is connected to is connected to a receiver that can only connect to an internal antenna, this field automatically shows the correct part number.	n/a
	To specify the antenna that you are using, either select an option from this field, or select the correct antenna type in the *Type* field. When you change a value in one of these two fields, the other field updates accordingly.	
Measure Height To	The point on the antenna that you have measured to. For accurate altitude measurements, the antenna height must be measured to the electronic center of the antenna (its Antenna Phase Center, or APC). For some antenna types, the APC is not accessible. To accurately measure the antenna height, measure to another location, then select that location from this field. The TerraSync software automatically adjusts the antenna height by the distance between the measurement location and the APC.	(none)
	The options in this field vary depending on the selected antenna type. If the selected antenna type does not allow alternative measurement locations (for example, if you are using the internal antenna in a GeoExplorer series handheld), this field does not appear.	

GPS Settings

To open the *GPS Settings* form, tap **GPS Settings** in the *Setup* screen. Alternatively, tap the Setup button at the bottom of the Skyplot screen (see page 139), or at the bottom of the Satellite Information screen (see page 147), in the **Status Section (see page 137)**.

Use this form to control the precision you require for GPS positions, and to specify which port on the field computer the GPS receiver is connected to. There are
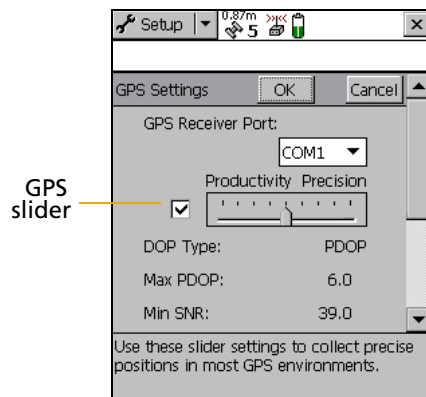
two configuration modes: Slider and Custom. To change modes, select or clear the check box beside the GPS slider.

Table 6.34   GPS Settings form: Fields

Field	Description	Default
GPS Receiver Port	The port on the field computer that the receiver is connected to.	COM1
Slider check box	This field specifies whether the GPS settings are configured using Slider mode or Custom mode. To configure GPS settings in Slider mode, select the Slider check box. The slider control appears on the GPS Slider, and the other fields in the form become read-only. The values in these fields change as the slider position changes. To configure GPS settings in Custom mode, clear the Slider check box. The slider control disappears from the GPS slider, and the remaining fields change to editable numeric fields. Enter values in these fields to specify the GPS settings you require.	Selected
GPS slider	The GPS slider makes it easy for you to change the level of accuracy without needing to know the best values for each precision setting. The GPS slider is a scale from Low to High. Drag the slider control to the *left* to *decrease* the GPS precision. Drag it to the *right* to *increase* the GPS precision and exclude positions that do not meet the precision requirements. *Note – The GPS slider is the same as the slider in the* **Setup area (see page 146)** *in the Skyplot and Satellite information screens. If you change the slider position in the GPS Settings form, it changes in the Setup areas.*	
DOP Type	The type of maximum DOP value to use. The options are: • PDOP Set a maximum PDOP. When you select this option, the **Max PDOP field (see page 189)** appears. • HDOP Set a maximum HDOP. When you select this option, the **Max HDOP field (see page 189)** appears. A low DOP value indicates that the visible satellites are widely separated in the sky, which gives better position information. When the DOP value rises above the maximum value, the TerraSync software stops logging GPS positions. This field does not appear in Slider mode.	PDOP

Table 6.34 GPS Settings form: Fields (continued)

Field	Description	Default
Max PDOP	The maximum PDOP value. In Slider mode, this field is read-only, and its value is the maximum PDOP value for the current slider position.	6.0
	A low PDOP value indicates that the visible satellites are widely separated in the sky, which gives better position information. When the PDOP value rises above the maximum value, the GPS receiver stops logging GPS positions.	
	Specify a lower maximum PDOP to collect fewer, more precise positions. Specify a higher maximum PDOP to collect more, less precise positions.	
Max HDOP	The maximum HDOP value. Specifying a maximum HDOP can give greater productivity than filtering the solutions with a maximum PDOP. Setting a maximum PDOP rejects some positions that have an acceptable HDOP value, because their VDOP value is unacceptable. When you use a maximum HDOP, these positions are accepted.	4.0
	Use a maximum HDOP value when vertical precision is not particularly important, and productivity would be decreased by excluding positions with a high vertical component in the PDOP value (for example, if you are collecting data under canopy).	
	This field does not appear in Slider mode. In Slider mode, you can only change the maximum PDOP. To set a maximum HDOP, use Custom mode.	
	Note – *To achieve the same precision horizontally as you would achieve with a given maximum PDOP, set this value to two-thirds of the maximum PDOP.*	
Min SNR	The minimum L1 SNR value. In Slider mode, this field is read-only, and its value is the minimum SNR value for the current slider position.	39.0
	The SNR is a measure of the quality of the signal from a satellite. When a satellite's SNR falls below the minimum value, the TerraSync software stops using that satellite to calculate your GPS position.	

Table 6.34   GPS Settings form: Fields (continued)

Field	Description	Default
Min Elevation	The minimum elevation. In Slider mode, this field is read-only, and its value is the minimum elevation value for the current slider position. Signals from satellites that have a low elevation from the horizon can be of poor quality. The TerraSync software does not use any satellite that is below the minimum value to calculate your GPS position. *Note – The minimum elevation that you specify in this field applies to code phase data only. To ensure that you collect high quality carrier phase data, the minimum elevation during carrier phase data collection is always 15°.*	15°
Velocity Filter	This field specifies whether to apply velocity filtering to GPS positions. Velocity filtering reduces "spikes" in GPS data that are caused by poor GPS conditions. The options are: • Auto Apply velocity filtering if either of the following is true: The Log SuperCorrect Data option (see page 183) is enabled (all positions are filtered). At least one valid real-time correction source is selected in the Choice fields, and the last Choice field is set to Wait for Real-time (only real-time positions are filtered). • Off Do not apply velocity filtering to any positions. *Note – Trimble recommends that you do **not** use velocity filtering in good GPS conditions.*	Off
Receiver Power Output	This field specifies whether the connected receiver outputs power. If the connected GPS receiver can be configured to supply power, you can use this field to enable power output for an external device such as a DGPS radio. The options are: • Auto Corresponds to the On option for a GPS Pathfinder Power or survey receiver; corresponds to Off for all others. • On Enable power output. • Off Disable power output.	Auto

Table 6.34   GPS Settings form: Fields (continued)

Field	Description	Default
	Note – *Enabling power output can damage some field computers. Trimble recommends that you always select the Auto option unless you require power to another external device* ***and*** *have protected the field computer from power that is supplied by the GPS receiver.*	
NMEA Output	Specifies whether the GPS receiver will output NMEA messages. Tap the Setup button beside this field to open the **NMEA Output Settings form (see page 194)**, where you can configure NMEA communication settings and the messages that will be generated.	Off
RTK Precisions	Summarizes the required precisions for RTK-corrected positions. When you log data using RTK corrections, each position generated has precision estimates associated with it. You can use these estimates to filter out positions that do not meet your accuracy requirements.	5 cm, 5 cm, 10 cm, 15 cm
	The four values represent the horizontal and vertical precisions for static positions, and the horizontal and vertical precisions for roving positions.	
	To change the configured precision values, tap the Setup button beside this field. The **RTK Precision Settings form (see page 195)** appears.	

Receiver power output

Trimble survey receivers, and some GPS Pathfinder receivers, can output power on their serial ports. This can be useful if you want to supply power to an external device, such as an external radio for real-time differential corrections. However, some field computers cannot accept power supplied on a serial port by a GPS receiver. Supplying power can cause problems with, or even permanent damage to, the field computer.

If you enable power output, power is supplied to all of the GPS receiver's ports. When you select the Auto or On option in the **Receiver Power Output form (see page 190)**, the TerraSync software displays a warning message to remind you that power will be supplied to the field computer and to the external device.

If you want to supply power from the GPS receiver to an external device, you must:

- check that the GPS receiver is capable of power output on its serial ports (see the table below).

- enable power output in the **Receiver Port Settings form (see page 205)**.

- connect the field computer to the GPS receiver using a *non-powered* connection. Either use the curly straight-through cable (P/N 45052), or connect a null modem adaptor (P/N 3197) to a powered cable.

- connect the external device to the GPS receiver using a *powered* connection such as the curly straight-through cable (P/N 30236).

The following table shows the GPS receivers that are supported by the TerraSync software and indicates their power output behavior:

GPS receiver	Outputs power	Auto option corresponds to	Comments
GPS Pathfinder Power 5700 5800 / R8	Always	On	Power output cannot be disabled, even if you select the Off option. *Always* protect the field computer using the data/power cable with P/N 45052, or a null modem adaptor.
GPS Pathfinder Pro XRS GPS Pathfinder Pro XR	Configurable	Off	If power output is required, select On and protect the field computer using the data/power cable with P/N 45052, or a null modem adaptor.
GPS Pathfinder Pocket GeoExplorer series handheld (GeoXT, GeoXM) GPS Pathfinder Pro series (ProXT and ProXH)	Never	Off	These GPS receivers do not output power. When one of these receivers is connected, you cannot select the On option.

SNR values

Version 2.50 of the TerraSync software stores and displays SNR values as Carrier-to-Noise ratio (C/No) values, measured in decibel-Hertz (dBHz). Previously, signal-to-noise ratio (SNR) values were stored and displayed as Amplitude Measurement Unit (AMU) values. Typical SNR values for supported Trimble Mapping and GIS receivers now range from 33 to 43 dBHz.

Note – The minimum SNR setting only applies to L1 data. If the SNR of a satellite's L1 signal meets the minimum SNR setting, then the L2 signal from the same satellite is always used, if it is available.

Minimum SNR values for GPS slider positions

The positions on the GPS slider correspond to the following minimum SNR values:

Table 6.35   SNR values

Position on GPS slider	Min SNR in C/No (dBHz)	Equivalent to Min SNR in AMU
1 (Maximum productivity)	33	2.0
2	35	2.5
3	37	3.0
4	38	3.5
5 (Default)	39	4.0
6	40	4.5
7	41	5.0
8	42	5.5
9 (Maximum precision)	43	6.0

NMEA Output Settings form

To open the *NMEA Output Settings* form, in the *GPS Settings* form tap the Setup button ![icon] beside the *NMEA Output* field.

Use this form to specify which NMEA messages the GPS receiver will generate, and the communication settings for the GPS receiver port(s) that the messages are output on.

Note – The GeoExplorer series handheld does not output NMEA messages until you connect the virtual COM2 port (NMEA out) to the output port (COM1 for output via the output port, or a virtual COM port for Bluetooth output). To do this, use the GPS Connector utility.
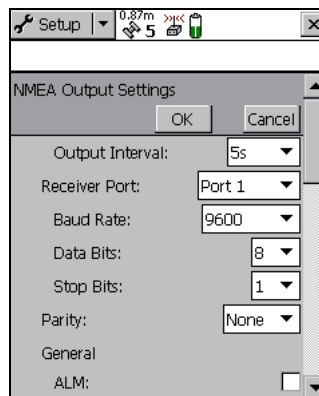
Table 6.36   NMEA Output Settings form: Fields

Field	Description	Default
Output Interval	The interval at which NMEA messages are output. Select an option from the drop-down list or enter the time interval (in seconds).	5s
Receiver Port (Primary)	The port on the GPS receiver that NMEA messages are output on. This field only appears if the connected GPS receiver is a survey receiver.	Port 1
Receiver Port (Secondary)	The TerraSync software allows NMEA to be output from up to two ports concurrently on the GPS Pathfinder Pro XR, Pro XRS, ProXT™, ProXH™, and Power receivers. For receivers with only one port capable of outputting NMEA, the secondary port is set to None and is unavailable.	None
Baud Rate	The baud rate that the GPS receiver and external device communicate at. Select from the drop-down list.	9600
Data Bits	The number of data bits used when the GPS receiver and external device communicate. The options are 7 or 8.	8
Stop Bits	The number of stop bits used when the GPS receiver and external device communicate. The options are 1 or 2.	1

Table 6.36   NMEA Output Settings form: Fields (continued)

Field	Description	Default
Parity	The parity setting used when the GPS receiver and external device communicate. Select an option from the drop-down list.	None
General	Below this heading is a check box for each general NMEA message type. To output a message type, select the corresponding check box. Select an option from the drop-down list.	(none)
Survey	Below this heading is a check box for each NMEA message type that is used by survey receivers. To output a message type, select the corresponding check box. Select an option from the drop-down list.

These fields only appear if a survey receiver is connected. | (none) |

RTK Precision Settings form

To open the *RTK Precision Settings* form, in the *Real-time Settings* screen tap the Setup button ![Setup icon] beside the *RTK Precisions* field.

Use this form to specify the minimum precision estimates for GPS positions corrected using RTK measurements. Positions that do not meet the specified precisions are not logged.
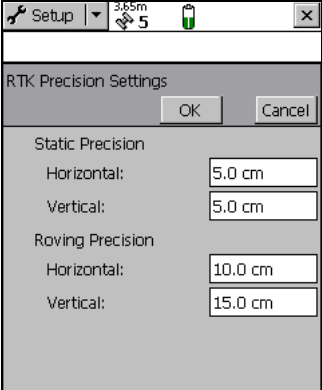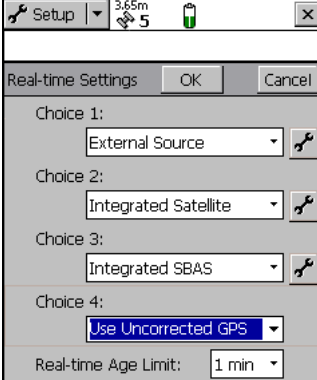
Table 6.37   RTK Precision Settings form: Fields

Field	Description	Default
Static Precision	Use the fields in this group to specify the required precision for positions in static mode. Static mode is used when collecting point features, or vertices for line or area features. In static mode, only the position with the best precision estimate is logged. All other positions are discarded.	(none)
Horizontal	The minimum horizontal precision for positions collected in static mode.	5.0 cm
Vertical	The minimum vertical precision for positions collected in static mode.	5.0 cm
Roving Precision	Use the fields in this group to specify the required precision for positions in roving mode. Roving mode is used when collecting line and area features. In roving mode, all positions that meet the required precision are logged.	(none)
Horizontal	The minimum horizontal precision for positions collected in roving mode.	10.0 cm
Vertical	The minimum vertical precision for positions collected in roving mode.	15.0 cm

Real-time Settings

To open the *Real-time Settings* form, in the *Setup* screen tap **Real-time Settings**. Alternatively, tap the Setup button 🔧 at the bottom of any real-time status screen in the **Status Section (see page 137)**.

Use this form to configure the real-time differential GPS sources that you use, if any, and to configure how the system communicates with each source.

If you set a *Choice* field to External Source, Integrated Beacon, Integrated Satellite, Integrated SBAS, or Integrated RTK Radio, a Setup button ⬚ appears beside that field. Tap the Setup button to open the settings form for the selected source. Use the settings form to set configuration options that are specific to that choice:

- **External Source Settings form, page 201**

- **Integrated Beacon Settings form, page 210**

- **Integrated Satellite Settings form, page 211**

- **Integrated SBAS Settings form, page 212**

- **RTK Radio Settings form, page 213**

Note – No Setup button appears for the Use Uncorrected GPS and Wait for Real-time selections. There are no settings to configure for these selections.

It is important that you set up all of the choices correctly, so that when the TerraSync software switches between choices it can continue to receive corrections.

Note – The Choice 2, Choice 3, and Choice 4 fields only appear if there are further options to choose from. For example, if you choose Use Uncorrected GPS in the Choice 1 field, there are no further valid choices, and the Choice 2, Choice 3, and Choice 4 fields do not appear.

The TerraSync software always uses the highest priority real-time source available, according to your list of preferences. If the source it is currently using becomes unavailable, the TerraSync software switches to the next choice. Whenever the TerraSync software acquires a higher priority real-time source, it switches back to this source. For example, the TerraSync software will not use your third choice if your first choice is available.

The Choice fields let you select up to four options for real-time corrections. However, there are restrictions on the correction combinations you can select. For example, External Source can only ever be selected in the Choice 1 field. Also, the last (least preferred) choice you make must be either Use Uncorrected GPS or Wait for

Real-time. Once you select either of these options in a Choice field, there are no further logical choices you can make, so the subsequent Choice fields disappear.

Note – *To record uncorrected GPS positions only, without using any real-time corrections, select Use Uncorrected GPS in the Choice 1 field. You can correct these positions using Trimble postprocessing software.*

Table 6.38 Real-time Settings form: Fields

Field	Description		Default
Choice 1	Your preferred source of real-time corrections. The options are:		Integrated Beacon
	• External Source	Use an external correction source such as a virtual reference station (VRS), data radio, or external beacon receiver.	
	• Integrated Beacon	Use corrections from an integrated beacon receiver (Pro XR and Pro XRS receivers only).	
	• Integrated Satellite	Use corrections from an integrated satellite receiver (Pro XRS and Power receivers only).	
	• Integrated SBAS	Use corrections from the integrated **SBAS.** The following receivers support SBAS corrections: • GeoExplorer series handhelds (GPS firmware version 1.03 or later is required for EGNOS) • GPS Pathfinder Pro XR, Pro XRS, and Power receivers with firmware version 1.50 or later (firmware version 1.70 or later is required for EGNOS) and the WAAS option enabled in the receiver firmware • GPS Pathfinder Pro series receivers	
	• Integrated RTK Radio	Use RTK corrections from an integrated data radio in the GPS receiver (survey receivers only). To use RTK data with a survey receiver that does not have the optional internal radio, use the External Source option instead.	
	• Use Uncorrected GPS	Log autonomous GPS positions without applying real-time corrections.	

Table 6.38   Real-time Settings form: Fields (continued)

Field	Description	Default
Choice 2	The source of real-time corrections that you want to use when your first choice is not available. The options are as for the Choice 1 field except that External Source is not available, and the following additional option is available: • Wait for Real-time — Suspend logging until a real-time correction source becomes available.	Use Uncorrected GPS
Choice 3	What the TerraSync software should do when your first and second choices are not available. The options are: • Use Uncorrected GPS • Wait for Real-time • Integrated SBAS	(not displayed)
Choice 4	What the TerraSync software should do when none of your other preferred real-time correction sources are available. The options are: • Use Uncorrected GPS • Wait for Real-time	(not displayed)
Real-time Age Limit	The maximum age at which a correction message will be used. A message's age is the time that has elapsed since it was received. Select an option from the drop-down list. **Note –** *If you are using a GPS Pathfinder Pro XR, Pro XRS, or Power receiver with an earlier firmware version than version 1.50 installed, the maximum age limit is 1 minute.*	50 seconds

The following table summarizes the valid combinations of real-time correction sources:

Table 6.39   Real-time Settings form: Valid real-time correction choices

Choice 1	Choice 2	Choice 3	Choice 4
External Source	Integrated Beacon	Integrated SBAS	Use Uncorrected GPS
			Wait for Real-time
		Use Uncorrected GPS	–
		Wait for Real-time	–
	Integrated Satellite	Integrated SBAS	Use Uncorrected GPS
			Wait for Real-time
		Use Uncorrected GPS	–
		Wait for Real-time	–
	Integrated SBAS	Use Uncorrected GPS	–
		Wait for Real-time	–
	Use Uncorrected GPS	–	–
	Wait for Real-time	–	–
Integrated Beacon	Integrated SBAS	Use Uncorrected GPS	–
		Wait for Real-time	–
	Use Uncorrected GPS	–	–
	Wait for Real-time	–	–
Integrated Satellite	Integrated SBAS	Use Uncorrected GPS	–
		Wait for Real-time	–
	Use Uncorrected GPS	–	–
	Wait for Real-time	–	–
Integrated SBAS	Use Uncorrected GPS	–	–
	Wait for Real-time	–	–
Integrated RTK Radio	Wait for Real-time	–	–
Use Uncorrected GPS	–	–	–

You do not have to remember which combinations are valid: the TerraSync software manages this for you by hiding invalid options or Choice fields depending on your previous choices. For example, with a GPS Pathfinder Pro XRS receiver, you cannot use Integrated Satellite if you have already selected Integrated Beacon for a higher choice. When you select Integrated Beacon in the Choice 2 field, Integrated Satellite is removed from the options for the Choice 3 field.

The software also ensures that you do not select choices that are not valid for the connected GPS receiver. For example, if the connected receiver is a GeoExplorer series handheld, only the External Source, Integrated SBAS, and Use Uncorrected GPS options are available in the Choice 1 field. If you then select Integrated SBAS in the Choice 1 field, the only options available in the Choice 2 field are Use Uncorrected GPS and Wait for Real-time.
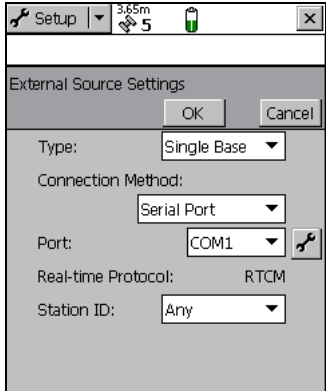
If you have configured an invalid real-time combination before connecting the GPS receiver, a warning message appears when you connect to GPS, telling you to check your real-time settings. When you open the Real-time Settings form, the only changes you can make to your real-time settings are those that are compatible with the connected receiver.

External Source Settings form

To open the *External Source Settings* form, in the *Real-time Settings* form select External Source in the *Choice 1* field. Then tap the Setup button 🔧 beside the *Choice 1* field.

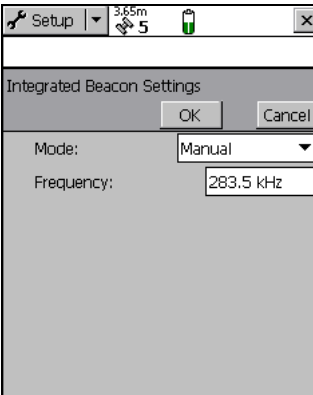Use this form to configure settings specific to an external real-time source, such as a virtual reference station (VRS).
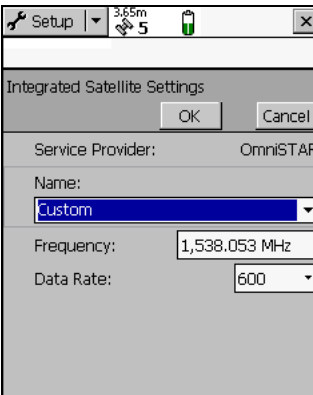
For more information on connecting to a VRS, see **Using Corrections from a VRS system (see page 245)**.

> ☼ **Tip –** You cannot use the settings in this form to change settings on a external beacon receiver. To change external beacon receiver settings, use the software that is supplied with the receiver.

Table 6.40   External Source Settings form: Fields

Field	Description		Default
Type	The type of source. The options are:		Single Base
	• Single Base	Corrections are sent by a single base station.	
	• VRS	Corrections are sent by a virtual reference station (VRS) server, which uses corrections from several base stations to compute corrections for a virtual base station at your location.	
Connection Method	How the TerraSync software connects to the external correction source. The options are:		Serial Port
	• Internet	The TerraSync software communicates with a VRS server over a TCP/IP connection, for example using a GSM or GPRS cellphone. The connection must be configured and made outside the TerraSync software.	
	• Direct Dial	The TerraSync software communicates with a VRS server using a dial-up modem connection.	
	• Serial Port	RTCM corrections are received by a data radio, such as an external beacon receiver or TRIMTALK™ radio, connected to a serial port on the field computer.	
	• Receiver Port	Corrections are received by a data radio that is connected to the GPS receiver. This option is only available if the **Type field (see page 202)** is set to Single Base. To configure communication settings for the port, tap the Setup button 🔧 beside this field. The **Receiver Port Settings form (see page 205)** appears.	

Table 6.40   External Source Settings form: Fields (continued)

Field	Description	Default
Address	The IP address (for example, 255.255.255.255) or URL (for example, vrs.seaview.gov) of the VRS server or broadcast server that is supplying the VRS corrections. A broadcast server manages authentication and password control for a network of VRS servers, and relays VRS corrections from the selected VRS server to the TerraSync software. This field only appears if the **Connection Method field (see page 202)** is set to Internet.	(blank)
Port	When the *Connection Method* field is set to Serial Port, this field specifies the serial (COM) port on the field computer that the external correction source is connected to. When the *Connection Method* field is set to Internet, this field specifies the port on the VRS server to connect to. Tap the Setup button 🔧 beside the Port field to open the **Receiver Port Settings form (see page 205)**, where you can configure the serial port settings. This field only appears if the **Connection Method field (see page 202)** is set to Serial Port or Internet.	COM1 (Serial Port) or 80 (Internet)
Modem Type	The type of modem you are using to connect to the VRS server. This field only appears if the **Connection Method field (see page 202)** is set to Direct Dial.	(blank)
Phone Number	The VRS server's telephone number. This field only appears if the **Connection Method field (see page 202)** is set to Direct Dial.	(blank)
Source	If you are connecting to a VRS server through a broadcast server, this read-only field shows the selected VRS server. If you are connecting directly to a VRS server, or have not yet selected a VRS server, this field shows the text Not Applicable. To select a VRS server, tap the Setup button 🔧 beside the Source field. The TerraSync software attempts to establish a connection to the broadcast server. If the connection is successful, the **Select Server form (see page 208)** appears. Select the VRS server that you want to use and tap OK to return to the External Source Settings form. This field only appears if the **Connection Method field (see page 202)** is set to Internet.	Not Applicable
User name	The username that you use to log on to the broadcast server. This field only appears if the VRS server you want to use requires authentication.	(blank)

Table 6.40 External Source Settings form: Fields (continued)
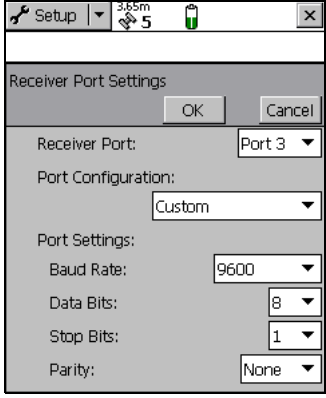
Field	Description	Default
Password	The password that you use to log on to the broadcast server. This field only appears if the VRS server you want to use requires authentication.	(blank)
Connection Control	This field specifies whether communication with the server is controlled automatically by the TerraSync software, or is controlled manually. The options are:	Auto
	• Auto The TerraSync software automatically establishes a connection when it is needed, and re-connects if an existing connection is lost.	
	• Manual You must manually connect to the VRS server whenever you want to use real-time VRS corrections. To connect or disconnect, tap the Ext Source button in the main screen of the **Setup Section (see page 175)**.	
	This field only appears if the **Connection Method field (see page 202)** is set to Internet or Direct Dial.	
Real-time Protocol	The type of real-time correction messages that the external source is transmitting. Currently only RTCM messages are supported, so this field displays RTCM, and is read-only.	RTCM
Station ID	The reference station that you want to use real-time corrections from. Select Any to use any available station, or enter a station ID number between 0 and 1023. This field is only displayed if the **Type field (see page 202)** is set to Single Base.	Any

Receiver Port Settings form

To open the *Receiver Port Settings* form, in the **External Source Settings form (see page 201)** tap the Setup button beside the *Connection Method* field.

Use this form to configure communication settings when an external correction source is connected to a port on the receiver.

This form is also used to configure communication settings when you choose to output corrections while collecting base station data. In this case, access the form from the **Base Station Setup wizard (see page 42)** in the Data section.

Table 6.41 Receiver Port Settings form: Fields

Field	Description	Default
Receiver Port	The port on the GPS receiver that the external device is connected to. On a 5700 receiver, external devices can only be connected to Port 3. When a 5700 receiver is connected, the only option available for this field is Port 3.	Port 3 (5700) **or** Port 1 (other receivers)
Port Configuration	The communication settings for the port. There is an option for each communications protocol (NMEA, RTCM, and TSIP), and an option for each type of radio supported. These options define preset values that match the radio's ***default*** settings. The values defined for each option appear in this form in read-only fields. If the external device allows you to configure port settings, the preset values may not match the device's current settings. If this is the case, or if the device you want to use is not listed, select the Custom option. The remaining fields become available and you can select customized port settings.	Custom
Baud Rate	The baud rate the GPS receiver and external source communicate at. Select from the drop-down list. This field is read-only unless you select Custom in the *Type* field.	9600
Data Bits	The number of data bits used when the external correction source and GPS receiver communicate. The options are 7 or 8. This field is read-only unless you select Custom in the *Type* field.	8
Stop Bits	The number of stop bits used when the external correction source and GPS receiver communicate. The options are 1 or 2. This field is read-only unless you select Custom in the *Type* field.	1
Parity	The parity setting used when the GPS receiver and external source communicate. Select an option from the drop-down list. This field is read-only unless you select Custom in the *Type* field.	None

Serial Port Settings form

To open the *Serial Port Settings* form, in the **External Source Settings form (see page 201)** tap the Setup button 🔧 beside the *Port* field.

Use this form to configure communication settings when an external correction source is connected to an external COM port.

Note – *When an application opens the serial port, it controls that port. You cannot access the port or change its settings from another application until the port is closed again. Settings that you define in this form are only applied if the port is not in use by another application.*
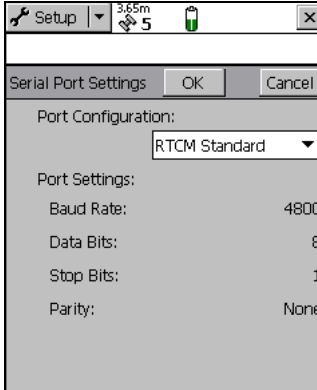
Table 6.42   Receiver Port Settings form: Fields

Field	Description	Default
Port Configuration	The communication settings for the port. There is an option for each communications protocol (NMEA, RTCM, and TSIP), and an option for each type of radio supported. These options define preset values which match the radio's *default* settings. The values defined for each option appear in this form in read-only fields.	Custom
	If the external device allows you to configure port settings, the preset values may not match the device's current settings. If this is the case, or if the device you want to use is not listed, select the Custom option. The remaining fields become available and you can select customized port settings.	
Baud Rate	The baud rate the GPS receiver and external source communicate at. Select from the drop-down list. This field is read-only unless you select Custom in the Type field.	9600

Table 6.42 Receiver Port Settings form: Fields (continued)

Field	Description	Default
Data Bits	The number of data bits used when the external correction source and GPS receiver communicate. The options are 7 or 8.	8
	This field is read-only unless you select Custom in the Type field.	
Stop Bits	The number of stop bits used when the external correction source and GPS receiver communicate. The options are 1 or 2.	1
	This field is read-only unless you select Custom in the Type field.	
Parity	The parity setting used when the GPS receiver and external source communicate. Select an option from the drop-down list.	None
	This field is read-only unless you select Custom in the Type field.	

Select Server form

To open the *Select Server* form, do one of the following in the **External Source Settings form (see page 201)**:

- tap the Setup button [icon] beside the *Source* field

- change the value in the *Address* field or the *Port* field, and then move to another field

If the specified Internet address is a VRS broadcast server, the *Select Server* form appears, listing the VRS servers that are available through the selected broadcast server. Use this form to select the VRS server that you want to receive corrections from.
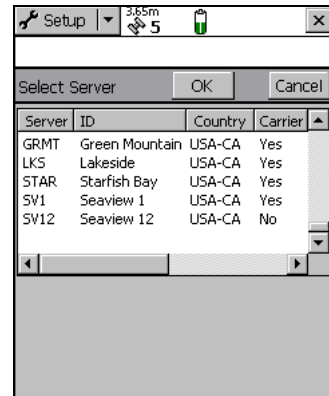
☀ **Tip –** If you cannot find a server on the list, return to the *External Source Settings* form and make sure that the option that you require (VRS or Single Base) is selected in the *Type* field.

The form contains a table of information about the available VRS servers. You can drag each column heading to resize the column, or tap a column heading to sort by that column. If the list is already sorted by the column you tap, the sort order is reversed.

To select a VRS server, highlight it in the list and then tap **OK**. You are returned to the *External Source Settings* form, where the selected server name is displayed in the *Source* field.

Table 6.43   Select Server form: Fields

Field	Description
Server	The identification code of the VRS server.
Name	A description of the VRS server.
Country	The three-letter code for the country where the VRS server is located.
Carrier	This field specifies whether the VRS data stream includes carrier phase data.
Format	The format of the data stream, such as RTCM, raw data, or CMR. ***Note –*** *Currently, the TerraSync software does not support VRS data in CMR format.*
Details	Details of the message format, such as the RTCM message types generated.
Network	The network or VRS service provider.
Generator	The hardware or software used to generate the data stream.
Solution	This field specifies whether the data stream is generated from a single base station (Single Base) or a network of base stations (Network Solution).
Fee	This field specifies whether there is a charge for use of the correction data.
Rate	The bit rate of the data stream, in bits per second.
Misc	Miscellaneous notes about the VRS server.

Integrated Beacon Settings form

To open the *Integrated Beacon Settings* form, in the *Real-time Settings* form select Integrated Beacon from a *Choice* field. Then tap the Setup button 🔧 beside the *Choice* field.

Use this form to configure settings that are specific to an integrated beacon real-time source.

Table 6.44   Integrated Beacon Settings form: Fields

Field	Description	Default
Mode	The radiobeacon signal tracking mode to operate the integrated beacon in. The options are: • Auto Power The receiver tracks and locks on to the most powerful radiobeacon signal. • Auto Range The receiver tracks and locks on to the nearest radiobeacon signal. • Manual The receiver tracks only the frequency you specify in the Frequency field.	Auto Range
Frequency	The frequency used when you select Manual in the Mode field.	283.5 kHz

Integrated Satellite Settings form

To open the *Integrated Satellite Settings* form, in the *Real-time Settings* form select Integrated Satellite from a *Choice* field. Then tap the Setup button 🔧 beside the *Choice* field.

Use this form to configure settings that are specific to an integrated satellite real-time source.

Table 6.45   Integrated Satellite Settings form: Fields

Field	Description	Default
Service Provider	The satellite differential service provider. Select an option from the drop-down list.	(blank)
Name	The satellite used for satellite differential corrections. The options in this list depend on the satellite differential service provider that is selected.	Custom
Frequency	The frequency used when you select Custom in the Name field.	1538.053 MHz
Data Rate	The data rate used when you select Custom in the Name field. Select from the drop-down list.	

Integrated SBAS Settings form

To open the *Integrated SBAS Settings* form, in the *Real-time Settings* form, select Integrated SBAS from a *Choice* field. Then tap the Setup button 🔧 beside the *Choice* field.

Use this form to configure the SBAS satellite settings.
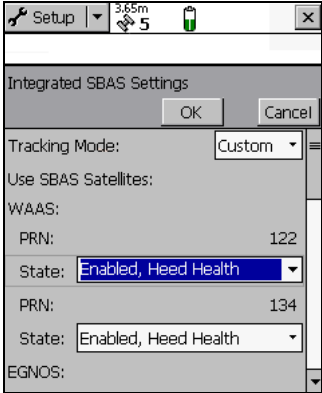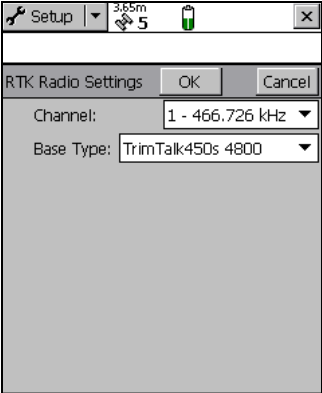
Table 6.46   Integrated SBAS Settings form: Fields

Field	Description
Tracking Mode	Specify the tracking mode. The options are:
	• Auto — The receiver tracks or locks on to the most powerful satellite signal. The receiver uses its latitude to determine which SBAS system to track. A GPS Pathfinder Pro series receiver tracks the SBAS satellites that it has been configured to track, or tracks SBAS satellites by latitude if it has not been configured.
	• Custom — The receiver only tracks specified satellites.
State	In custom mode, select specific SBAS satellites and then select the following options:
	• Disabled — The satellite is disabled.
	• Enabled, Heed Health — The real-time source is only used if the information is flagged as healthy.
	• Enabled, Override Health — The real-time information is used irrespective of the health flag in the signal, that is, an unhealthy signal will still be tracked and used.

RTK Radio Settings form

To open the *RTK Radio Settings* form, in the *Real-time Settings* form select Integrated RTK Radio from a *Choice* field. Then tap the Setup button 🔧 beside the *Choice* field.

Use this form to configure communication settings between the integrated RTK data radio of a supported survey receiver (a survey receiver), and a data radio that is transmitting RTK corrections from a base station.

> 💡 **Tip –** To receive RTK corrections on a survey receiver that does not have an internal RTK radio, connect the receiver to an external radio instead. Use the **External Source Settings form (see page 201)** to configure communication between the external data radio and the receiver.

Table 6.47 RTK Radio Settings form: Fields

Field	Description	Default
Channel	The channel that the integrated RTK radio is receiving RTK messages on. If a receiver with an integrated RTK radio is connected, this field lists the radio's channels and their frequencies. If no receiver is connected, the frequencies are listed as Unknown.	1 - Unknown
Base Type	The type of RTK radio and the wireless rate that the base station is using. Select an option from the drop-down list.	TRIMTALK 450S 4800

Coordinate System

To open the *Coordinate System* form, in the Setup screen tap **Coordinate System**.

Use this form to specify the coordinate system that you want the TerraSync software to use to display foreground and background files.

Note – Data files are always stored using WGS-84, but are displayed using the current coordinate system. If you change coordinate system, the current data file's coordinates are recalculated, which may take some time.

Note – A background image is referenced to a particular coordinate system and can only be opened in that coordinate system. If you change coordinate system, any open background image is unloaded.

Table 6.48   Coordinate System form: Fields

Field	Description	Default
Select By	How the coordinate system is selected. By default this field is read-only. If you have transferred sites to the TerraSync software, the options are:	Coordinate system and zone
	• Coordinate system and zone — A coordinate system and a zone within that system.	
	• Site — A named site. Each site is associated with a coordinate system and zone that you cannot change.	
Site	If you selected Site in the Select By field, this field shows the site name.	(none)
	This field does not appear if you have not transferred sites to the TerraSync software.	

Table 6.48   Coordinate System form: Fields (continued)

Field	Description	Default
System	The coordinate system to be used in the TerraSync software. If you selected Site in the Select By field, this field is read-only.	Latitude/ Longitude
Zone	The zone in the coordinate system. This field does not appear if the selected coordinate system does not have zones. If you selected Site in the Select By field, this field appears but is read-only.	(none)
Datum	The datum that the selected coordinate system and zone are associated with. • If the system can be associated with only one datum, this field is read-only. • If you can choose a datum, this field is blank by default, and you must choose a datum from the list before you can save your changes and close the form.	WGS 1984
Altitude Reference	This field specifies whether to display height values relative to the geoid (mean sea level, or MSL) or relative to the ellipsoid (height above ellipsoid, or HAE).	Height Above Ellipsoid (HAE)
Coordinate Units	Select the unit of measurement to be used for coordinate values. Select an option from the drop-down list. *Note – This setting is for Northing and Easting distances only. Units for direct measures of distance are controlled by the **Distance Units field (see page 217)** on the Units form.*	(none)

Table 6.48 Coordinate System form: Fields (continued)

Field	Description	Default
Altitude Units	The unit of measurement to be used for altitude values. Options in the drop-down list are as for the Coordinate Units field.	Meters
Display USNG	The level of precision for northing and easting values when displaying U.S. National Grid (USNG) coordinates. The options are:	Off

•	Off	Disable the display of USNG values, and display coordinates to 2 decimal places
•	10,000 m	Display USNG coordinates to 2 digits
•	1,000 m	Display USNG coordinates to 4 digits
•	100 m	Display USNG coordinates to 6 digits
•	10 m	Display USNG coordinates to 8 digits
•	1 m	Display USNG coordinates to 10 digits

Units

To open the *Units* form, in the *Setup* screen tap **Units**.

Use this form to specify the units used for measurements and display.
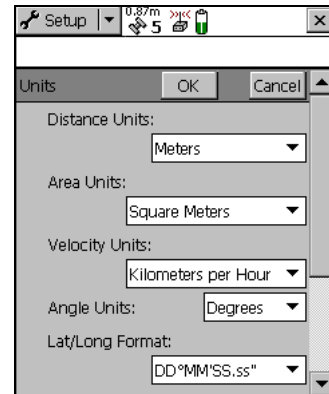
Table 6.49   Units form: Fields

Field	Description	Default
Distance Units	The unit that distances are measured and displayed in. Select an option from the drop-down list. *Note –* *This setting is for direct measures of distance only. Units for Northing and Easting distances are controlled by the* **Coordinate Units field (see page 215)** *on the Coordinate System form.*	Meters
Area Units	The unit that areas are measured and displayed in. Select an option from the drop-down list.	Square Meters
Velocity Units	The unit that velocities are measured and displayed in. Select an option from the drop-down list.	Kilometers per Hour
Angle Units	The unit that angles are measured and displayed in. Select an option from the drop-down list.	Degrees
Lat/Long Format	The format that latitude and longitude values are displayed in. You can enter values in a different format, but they are converted to the selected format. Select an option from the drop-down list.	DD°MM'SS.ss"
Offset Format	How offset distances are measured. The options are: • Horizontal/Vertical The offset is defined as the two-dimensional distance and vertical distance to the feature. • Slope/Inclination The offset is defined as the three-dimensional distance to the feature and the inclination of the slope.	Horizontal/ Vertical
North Reference	This field specifies whether north references are relative to true north or magnetic north.	True
Magnetic Declination	The magnetic declination, in degrees. Select Auto or enter a number in the field. The number must be between –90° and 90°. This field is only available if you have selected Magnetic in the North reference field.	Auto

External Sensors

Note – The External Sensors form does not appear in the TerraSync Standard edition software.

To open the *External Sensors* form, in the *Setup* screen tap **External Sensors**. Use this form to enable and configure external sensors, such as laser rangefinders and geiger counters.
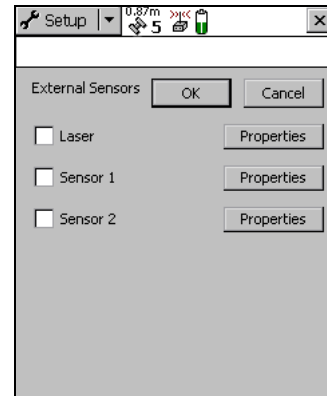
Table 6.50   External Sensors form: Buttons

Button	Description
Properties	Open the *Sensor Properties* form for the selected sensor or laser rangefinder, where you can configure communication, data, and logging properties. This button is repeated for each sensor.

Table 6.51   External Sensors form: Fields

Field	Description	Default
Check box	Use this check box to enable or disable input from the selected sensor or laser rangefinder. When this check box is cleared, any data received from the configured sensor is ignored by the TerraSync software.	(cleared)
<Sensor name>	The configured sensor. You cannot change the name of the Laser sensor. This is a predefined sensor for recording feature offsets. You can change the names of the other two sensors in the *Sensor Properties* form. *Note – To use a laser rangefinder to record attribute values instead of offsets (for example, to record the heights of trees), configure it using Sensor 1 or Sensor 2.*	Laser *or* Sensor #

Sensor Properties form

To open the *Sensor Properties* form, in the **External Sensors form (see page 218)** tap a **Properties** button.
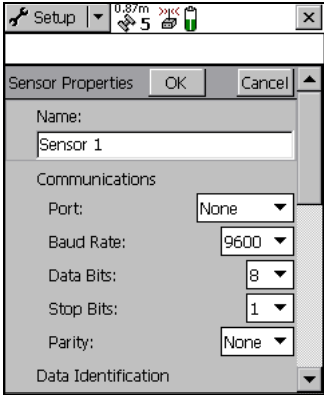
Table 6.52   Sensor Properties: Fields

Field	Description	Default
Name	The name of the sensor.	(none)
Port	The serial (COM) port that the sensor is connected to.	None
Baud Rate	The baud rate the field computer and external sensor communicate at. Select an option from the drop-down list. If the selected sensor is the Laser sensor, the only options are 4800 and 9600.	9600 (external sensor) *or* 4800 (laser)
The following fields do not appear if the Laser sensor is selected:		
Data Bits	The number of data bits used when the field computer and external sensor communicate. The options are 7 or 8.	8
Stop Bits	The number of stop bits used when the field computer and external sensor communicate. The options are 1 or 2.	1
Parity	The parity setting used when the field computer and external sensor communicate. Select an option from the drop-down list.	None

Table 6.52 Sensor Properties: Fields (continued)

Field	Description	Default
Prefix String	The static sequence of characters that begins each message. The prefix is used to specify when to start recording the incoming data stream. The prefix may be up to 30 characters in length. If you do not want to specify a prefix, leave this field blank. For example, all NMEA-compliant sensors output messages that begin with a $ character, followed by one or more characters identifying the specific sensor. **Note –** *The TerraSync software strips off the prefix characters before it stores the message. For example, if you specify a prefix of **ABC**, and the message is **ABC12345**, only **12345** is stored.*	(none)
Suffix String	The static sequence of characters that ends each message. The suffix is used to specify when to stop recording the incoming data stream. The suffix may be up to 30 characters in length. If you do not want to specify a suffix, leave this field blank. For example, all NMEA-compliant sensors output messages that are terminated with a carriage return and line feed characters. **Note –** *The TerraSync software strips off the suffix characters, and any characters after the suffix, before it stores the message. For example, if you specify a suffix of **XYZ**, and the message is **12345XYZ17**, only **12345** is stored.*	(none)
Max Bytes	Limits the length of each message to a specific number of bytes. This value includes the prefix and suffix strings, if they are defined. You cannot enter a value in this field that is less than the combined length of the prefix and suffix strings. If you do not want to specify a maximum number of bytes, leave this field blank. ***Do not enter 0.*** The maximum value for the Max Bytes field is 242. This is the maximum length for UNINTERPRETED_SENSOR_DATA SSF records.	(none)

Table 6.52   Sensor Properties: Fields (continued)

Field	Description	Default
Time Out	The maximum time that may elapse between receiving characters of the same message. If a character is received after the timeout period has elapsed, it is considered to be the start of a new message. The timeout value may be between 0 and 0.5 seconds.	0.10s
Receive Mode	How the TerraSync software receives data from the sensor. The options are: • Unsolicited The sensor emits data continuously. Positions are logged at the configured interval for the current feature type, and whenever a sensor record is received. • Requested Data is only logged from the sensor when it is requested by the TerraSync software. You can configure request intervals for each feature type, or use the **Trigger <sensor name> (see page 54)** in the Data section to request data when you need it.	Unsolicited
Request String	The string that the TerraSync software sends to the sensor to request data. This field only appears if the **Receive Mode field (see page 221)** is set to Requested. *Note –* *You can include non-printable characters (for example, line feeds) and system commands in the request string. See* **Request Codes, page 223***.*	(none)

Table 6.52 Sensor Properties: Fields (continued)

Field	Description	Default
Point Feature	The interval at which data is requested or read from the sensor for point features. The options are:	All
	• Off — Data from this sensor is not recorded for point features.	
	• 5s — Data from this sensor is requested or read every five seconds.	
	• All — All data sent by the sensor is read. This option is only available if the **Receive Mode field (see page 221)** is set to Unsolicited.	
	• Trigger — Data is requested when the **Trigger <sensor name> (see page 54)** is selected in the Data section. This option is only available if the **Receive Mode field (see page 221)** is set to Requested.	
	You can also enter an interval, in seconds, in this field.	
Line/Area Feature	The interval at which data is requested or read from the sensor for line and area features. The options are as for **Point Feature (see page 222)** above.	All
Not in Feature	The interval at which data is requested or read from the sensor for between feature positions. The options are as for **Point Feature (see page 222)** above.	All

Table 6.52   Sensor Properties: Fields (continued)

Field	Description	Default
Data Destination	How the sensor data should be saved in the data file. The options are:	Uninterpreted
	• Uninterpreted The data is stored in the data file in independent UNINTERPRETED_SENSOR_DATA records.	
	• As attribute The data is stored in an attribute of the current feature. Use the **Attribute Name field (see page 223)** to specify which attribute to use.	
Attribute Name	The name of the attribute that the sensor data is to be saved in. If the feature does not contain an attribute with this name, the data is ignored.	(not displayed)
	Note – You can store sensor data in a text or numeric attribute. However, if you use a numeric attribute, any data that cannot be interpreted as a number or that is not in the attribute's value range will be ignored. To ensure that no data is lost, use a text attribute that is as long as the longest possible message from the sensor.	

Request Codes

To include a non-printable character (for example, a line feed) or a system command in a sensor request string, enter a backslash (\) followed by a hexadecimal code. The following codes are supported:

Code	Value	Code	Value
\00	nul	\10	dle
\01	soh	\11	dc1
\02	stx	\12	dc2
\03	etx	\13	dc3
\04	eot	\14	dc4
\05	enq	\15	nak
\06	ack	\16	syn
\07	bel	\17	etb
\08	bs	\18	can

Code	Value
\09	tab
\0a	lf
\0b	vt
\0c	ff
\0d	cr
\0e	so
\0f	si

Code	Value
\19	em
\1a	sub
\1b	ec
\1c	fs
\1d	gs
\1e	rs
\1f	us

Advanced Data Collection

In this chapter:

- ■ **Advanced Datalogging Options**
- ■ **Using Corrections from a VRS system**
- ■ **High-Accuracy Data Collection**
- ■ **Setting up a Base Station**

Advanced Datalogging Options

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 (see **page 52**) 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 only begins logging positions for a new feature 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 (**Collect Features, page 52**). Then select *Log Later* from the option list.

Recording Between Feature Positions

The GPS data that you collect with 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 (see page 182)** in the *Setup* section 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.

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.

Note – Other Trimble GIS data collection products refer to this functionality as nesting.

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 they 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 an existing feature's positions 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.

To use Continue:

1. In the attribute entry form, tap **OK** to close the line or area feature you are collecting. The **Collect Features screen (see page 52)** appears.

2. In the Choose Feature list, highlight the feature that you want to collect and tap **Create**. The attribute entry form appears and logging starts.

3. When you have recorded attributes for the feature and logged sufficient GPS positions, tap **OK** to close the feature. The **Collect Features screen (see page 52)** appears again.

4. Tap **Options**. From the option list, select **Continue**. The **Continue feature form (see page 72)** appears, listing all the line and area features that are available for continuation, in the order they were collected.

5. Select a feature from the list and tap **Continue**. The software returns to the attribute entry form for the selected line or area feature, and continues to log GPS positions for that feature.

6. When you complete the traverse of the line or area perimeter, tap **OK** to store the feature.
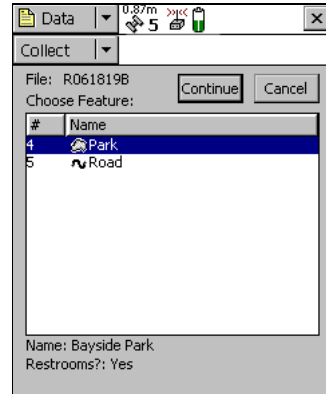
☀ **Tip –** You can also continue a selected feature from the *Update Features* subsection, or from the Map section. Do one of the following:

– Highlight the feature in the *Update Features* screen, tap **Options**, and then select Continue.

– From the *Update Features* section or the Map, open the feature for update. Then begin logging GPS or digitized positions. A message box appears, asking you to specify the logging option you want. Select the *Continue feature* option and then tap **OK**.

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.
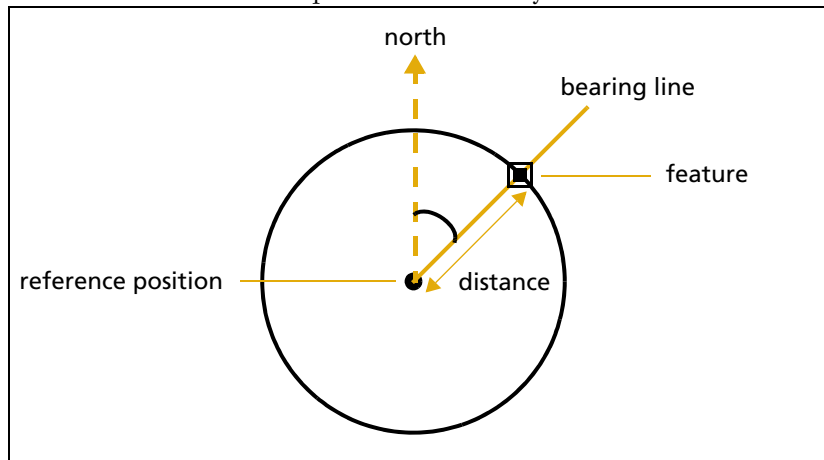
Note – *The example above is a simple distance-bearing offset. For point features, you can also record* ***complex offsets***, *which use measurements from two or more reference positions to calculate the feature position. See also* **Complex offsets, page 233**.

To view or enter the offset for the feature being collected or updated, tap **Options** in the attribute entry form, 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.
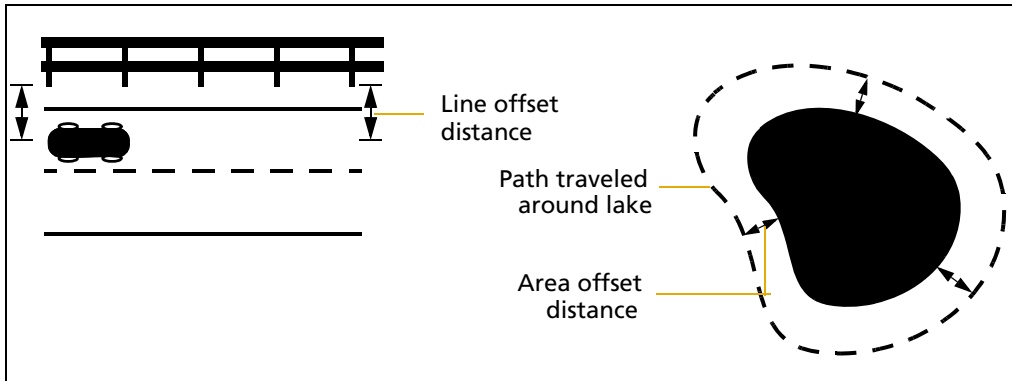
Note – *Any feature (point, line, or area) can have only* ***one*** *offset associated with it. To collect a line or area feature using offsets, the same offset value must apply to the whole feature. This may require a test run around or along an object to make sure that you can remain a consistent distance 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 (see page 241).**

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.
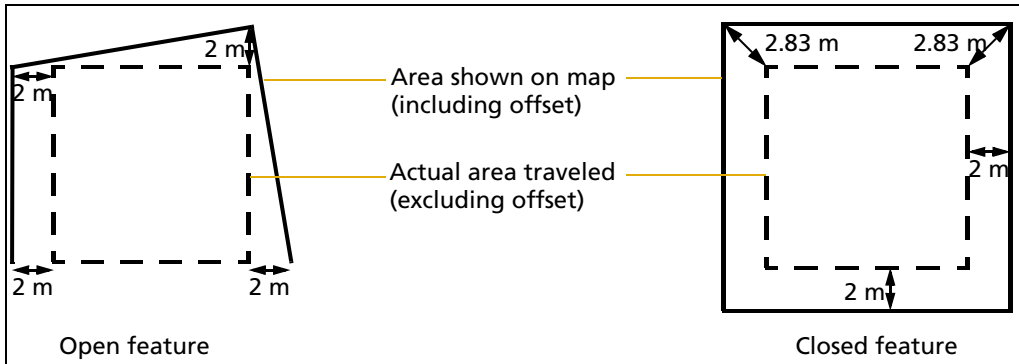
To record an offset for a feature:

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 239**.

5. When the offset form is complete, tap **OK**. The attribute entry form reappears.
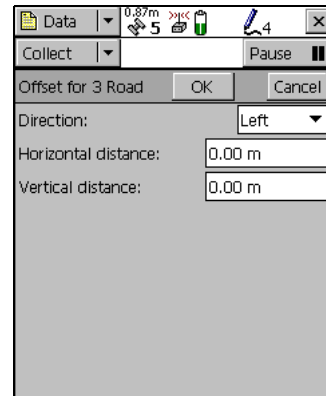
6. When you have recorded attributes for the feature and logged sufficient GPS positions, tap **OK** to store the feature. The **Collect Features screen (see page 52)** appears.

Note – You can also record **Complex offsets (see page 233)** *for point features.*

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, you can record a complex offset using either two or three reference positions, and you can specify either the distance to the feature, or the bearing (direction). You can record the following types of complex offset:

*   **Distance-distance offset, page 235**

*   **Triple distance offset, page 236**

*   **Bearing-bearing offset, page 237**

*   **Triple bearing offset, page 238**

To increase accuracy, you can 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 (see page 308)** applies to complex offsets, so you should choose reference positions that are widely spaced.

For detailed instructions, see **Recording a complex offset (see page 234)**.

Recording a complex offset

To record a complex point offset:

1. Start the point feature.

2. In the attribute entry form, tap **Options** and select Offset.

3. In the **Point offset type form (see page 61)**, select the type of offset you want to record, then tap **OK**. The appropriate offset form appears.

4. 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 also **Using a Laser Rangefinder to Record Offsets, page 239**.

   f. Tap **Next** to confirm the measurement for this reference position.

5. 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 feature's position.

6. 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.*

7. Record attributes for the feature, and then tap **OK** to store the
    feature. The **Collect Features screen (see page 52)** appears.

Distance-distance offset

A distance-distance offset uses the distance between the feature and
two reference positions (A and B) to specify the feature's position. 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.
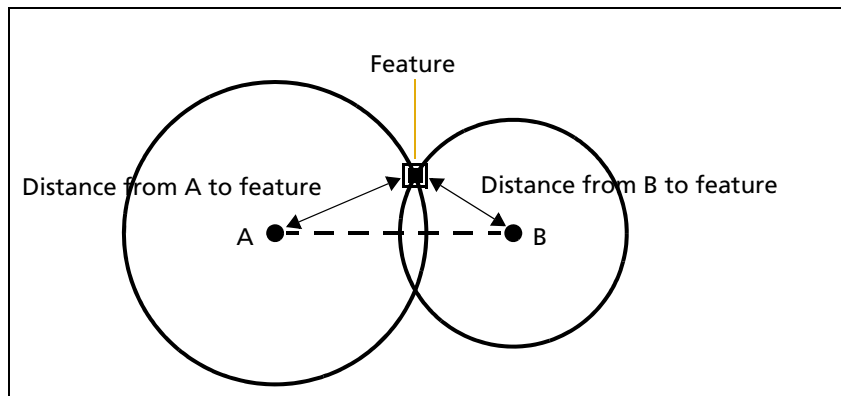
Triple distance offset

A triple distance offset uses the distance between the feature and three reference positions (A, B, and C) to specify the feature's position. 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.
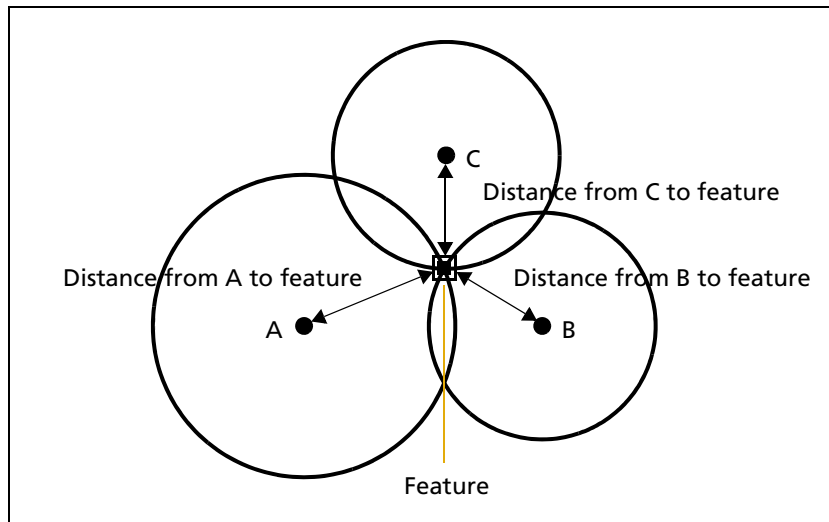
Bearing-bearing offset

A bearing-bearing offset uses the bearing from north from each of two reference points (A and B) to the feature to specify the feature's position. The feature lies at the point where the two bearing lines intersect.
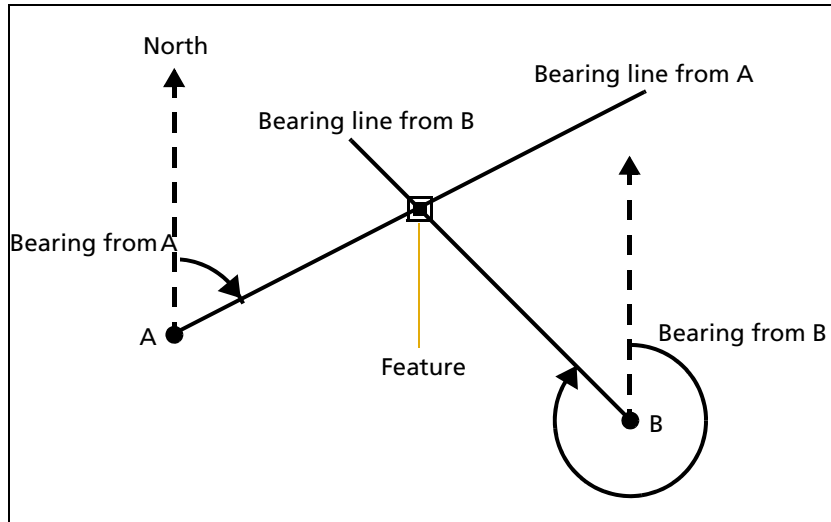
Triple bearing offset

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 feature's position. 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.
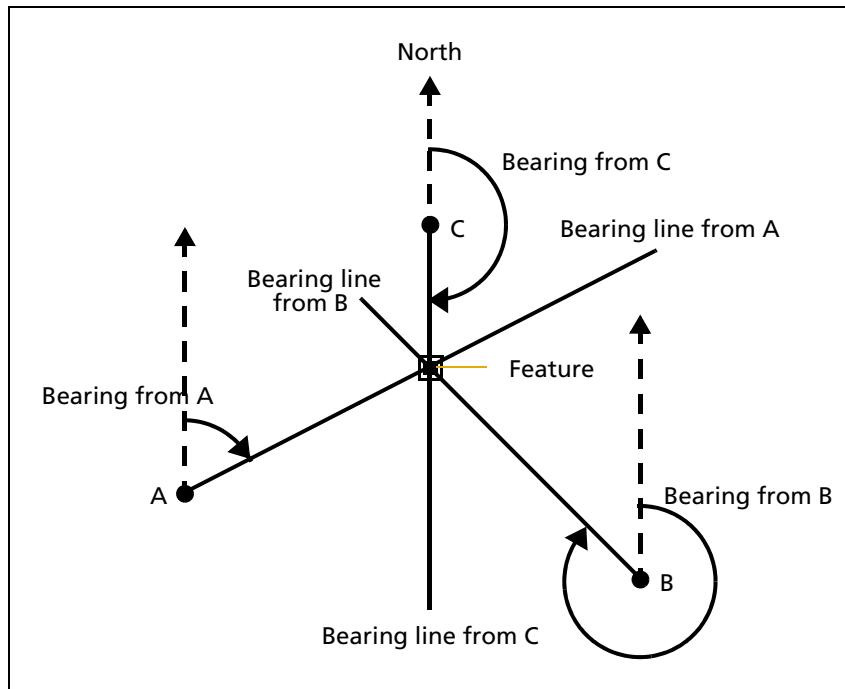
Using a Laser Rangefinder to Record Offsets

You can use a laser rangefinder to record accurate offsets for any 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 feature's attribute entry form, 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 (see page 183)** from the measurement. The antenna height is specified in the *Setup* section. An incorrect antenna height can reduce the vertical accuracy of the feature's position. 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 feature's altitude.

For more information on configuring a laser rangefinder to work with the TerraSync software, see **External Sensors, page 218**.

You can also use a laser rangefinder as an external sensor. See also **Using an External Sensor, page 240**.

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.

For more information on configuring an external sensor to work with the TerraSync software, see **External Sensors, page 218**.

Note – A laser rangefinder can be used either as an external sensor, as described here, or to supply data for feature offsets. See also **Using a Laser Rangefinder to Record Offsets, page 239**.

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. In the **Collect Features screen (see page 52)**, tap **Options** and 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 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:

- In the **Collect Features screen (see page 52)**, tap **Options** and 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:

1. While logging a line feature, in the **Attribute entry form (see page 56)**, tap **Options** and select Segment Line. The TerraSync software ends the current line feature and immediately starts another line feature of the same type.

2. If necessary, edit the new feature's attributes.

⚠ **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 318**) of the feature. For more accurate recording of line and area features, you can record several positions at each vertex, then average these 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:
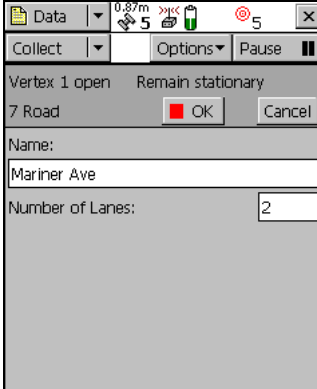
1. In the **Attribute entry form (see page 56)** for the line or area feature, tap **Options** and select New Vertex.

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

    Logging of positions for the averaged vertex begins immediately. The logging icon in the status bar changes to an animated circle zooming in ◎4.
    The number beside it shows the number of positions logged for this vertex.

2. If necessary, enter or edit attribute values for the feature.

3. When you have logged as many positions as you require for this vertex, close the *Vertex* form. You are returned to the attribute entry form.

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 feature's offset, using the line/area **Offset form (see page 60)**.

- 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 **Advanced Datalogging Options, page 226**.

Using Corrections from a VRS system

A VRS (virtual reference station) system consists of GPS hardware, software, and communication links. It uses data from a network of base stations to provide rovers with corrections that are more accurate than corrections from a single base station.
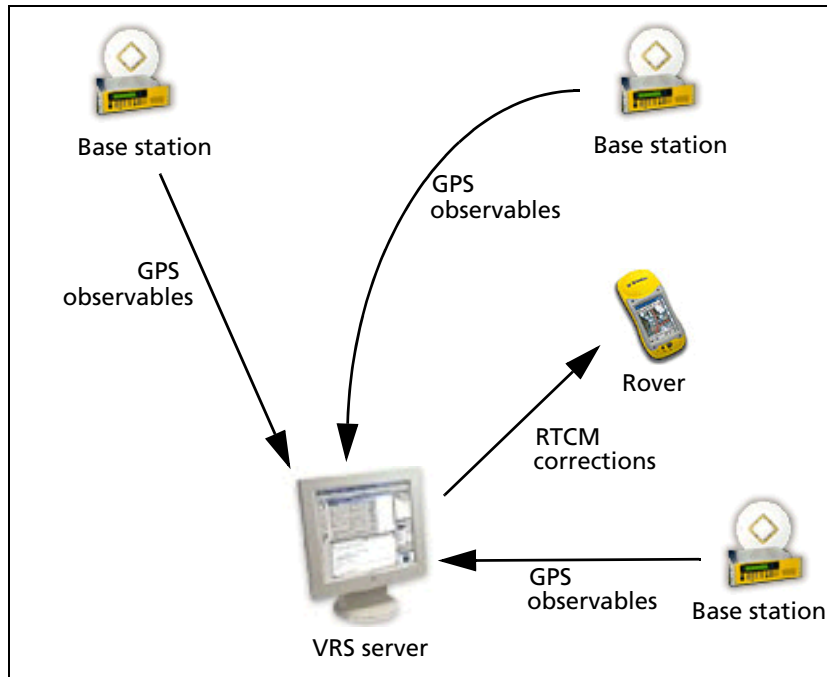
To start using VRS corrections, the rover sends its position to the VRS server. A VRS server is a computer running VRS software such as the Trimble GPSNet™ software. The VRS server uses the base station data to model systematic ephemeris, tropospheric, and ionospheric errors at the rover position. It then sends interpolated RTCM correction messages back to the rover.

Depending on the VRS software, the VRS server may also use the data from the base station network to simulate a base station (or VRS) at the rover's location.

If no network corrections are available, the VRS 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 rover.

Supported receivers

You can use VRS corrections from the TerraSync software with:

- GeoExplorer series handhelds with GPS firmware version 1.03 or later:
  - GeoXT™ handheld
  - GeoXM™ handheld
- GPS Pathfinder receivers with firmware version 1.52 or later:
  - GPS Pathfinder Power receiver
  - GPS Pathfinder Pro XR receiver
  - GPS Pathfinder Pro XRS receiver
- GPS Pathfinder Pro series receivers:
  - GPS Pathfinder ProXT receiver
  - GPS Pathfinder ProXH receiver
- Trimble survey receivers:
  - 5700 receiver with GPS firmware version 1.30 or later
  - 5800 or R8 receiver with GPS firmware version 2.23 or later

VRS message formats

There are two VRS message formats in common use: the Trimble VRS format, and the SAPOS FKP format used in some German networks. Although SAPOS FKP is not technically a VRS, it achieves similar results by transmitting network corrections.

The TerraSync software can receive messages in either Trimble VRS or SAPOS FKP format, and automatically recognizes the message format. However, the TerraSync software can only interpret VRS corrections if the VRS server generates RTCM Type 1 messages. The VRS server may also output a number of additional message types.

There are currently two commercial VRS server software products: GPSNet from Trimble, and GNNET from Geo++. Both systems can output RTCM messages in either the Trimble VRS format or the SAPOS FKP format.

Connecting to the VRS server

A VRS system requires two-way communication between the VRS server and the rover. The rover 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 server generates a unique VRS for each rover, it must send separate corrections to each rover.

This two-way connection can be achieved in three ways:

- **Internet Connection Method, page 248**

  An Internet connection to a VRS server can be achieved in a number of ways, including:

  – using a GPRS-capable cellphone to establish a data link over a GPRS network

  – using a cellphone to make a voice call to an Internet Service Provider (ISP)

- **Direct Dial Connection Method, page 252**

  This is a voice call, using a cellphone that is connected to a modem, or a cellphone that has an internal modem, to dial up the VRS server directly.

- **Serial Port Connection Method, page 255**

  To connect to a VRS server that outputs corrections in the old German SAPOS format, you must use a decoder box connected to a serial port on the field computer.

Internet Connection Method

The Internet connection method uses an existing Internet connection on the field computer. 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 server, and the IP port on the server to connect to.

You can connect to the Internet in a number of ways, including:

- using a GPRS- or CDMA-capable cellphone to log in to your account on the cellular service provider's network. This is called an "always-on" connection, because you are connected continuously to the Internet. An always-on connection is usually charged by the volume of data you transfer, not call time. This connection type transmits only digital data, and does not use a voice call.

- using a modem connected to a data-capable GSM cellphone to dial up your Internet Service Provider (ISP) and establish a TCP/IP connection. Because it is a voice call, a GSM connection is charged by connection time, so it is often more expensive than an always-on connection.

- connecting over a wireless LAN (an 802.11b connection).

These connections can be achieved using many different hardware configurations. For example, if you use a modem and cellphone, the modem may be an internal modem in the field computer, an internal

modem in the cellphone, an external modem, or a cellular (wireless) modem, which combines the functions of a cellphone and a modem. The hardware components may be connected by cable, or by a wireless link such as Bluetooth® wireless technology or infrared.

Before you begin

For an Internet connection, you need the following information from the VRS provider:

- The IP address or URL of the VRS or broadcast server
- The port number on the VRS or broadcast server to connect to
- A username and password for logging in to the VRS server, if the VRS server charges a connection fee

Configuration

To configure the TerraSync software to establish an Internet connection to a VRS source:

1. Use the Control Panel or the Remote Connections control to set up and test the Internet connection.

2. Start the TerraSync software and open the *Setup* section.

3. Tap **Real-time Settings**. The *Real-time Settings* form appears.

4. In 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 (see page 201)** appears.

   b. In the *Type* field, select VRS.

   c. In the *Connection Method* field, select Internet.

   d. In the *Address* field, enter the IP address or URL of the VRS server or **broadcast server** that is supplying the VRS corrections. A broadcast server manages authentication

and password control for a network of VRS servers, and relays VRS corrections from the selected VRS server to the TerraSync software.

e. In the *Port* field, enter the port number that you will use to connect to the VRS server.

f. If you are connecting to a VRS server through a broadcast server, tap the Setup button [icon] beside the *Source* field. The TerraSync software attempts to establish a connection to the broadcast server. If the connection is successful, the **Select Server form (see page 208)** appears. Select the VRS server that you want to use, and then tap **OK** to return to the *External Source Settings* form.

g. If you have selected a VRS server that requires authentication, the *Name* and *Password* fields appear. Enter the username and password that you obtained from the VRS provider.

h. In the *Connection Control* field, select Auto if you want the TerraSync software to automatically establish and end connections to the VRS server as necessary. Select Manual if you want to connect or disconnect only when you tap **Options** in the *Setup* screen.

i. Tap **OK** to confirm the settings and return to the *Real-time Settings* form.

6. Tap **OK**.

Using an Internet connection

To use an Internet VRS connection:

1. Use the Control Panel or the Remote Connections control to connect to the Internet.

☀ **Tip –** Use Microsoft Pocket Internet Explorer to check that the Internet connection is working.

2. Connect to the VRS server:

    a. Run the TerraSync software and open the *Setup* section.

    b. If the TerraSync software is not connected to the GPS receiver, tap the GPS button to connect to the GPS receiver.

    c. If you selected the Auto option in the *Connection Control* field, the TerraSync software automatically initiates the connection to the VRS server. If you selected the Manual option, you must initiate the connection to the server. To do this, tap **Options** and select Connect to External Source.

3. Proceed with data collection. Use the *Real-time Summary* screen in the *Status* section if you want to check the VRS status.

4. When you have finished using the VRS correction source:

    a. To disconnect from the VRS server, in the TerraSync software's *Setup* section tap **Options** and then select Disconnect from External Source.

    b. If you have finished using the Internet, use the Control Panel or the Remote Connections control to disconnect from the Internet.

Direct Dial Connection Method

The direct dial connection method uses a cellphone and modem, or a cellular modem, to dial up the VRS server directly. 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 VRS 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 VRS provider:

- The dial-up telephone number of the VRS server

- Your VRS username and password, if the VRS provider requires you to enter these details when you connect to the server

Configuration

To configure the TerraSync software to establish a direct dial connection to a VRS source:

1. Install any software or drivers for the modem.

2. Start the TerraSync software and open the *Setup* section.

3. Tap **Real-time Settings**. The *Real-time Settings* form appears.

4. In 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 (see page 201)** appears.

   b. In the *Type* field, select VRS.

   c. In the *Connection Method* field, select Direct Dial.

   d. In the *Modem Type* field, select the modem that you want to use. Then tap the Setup button to open the *Connection Properties* form.

   e. Specify appropriate port connection settings. For detailed connection information, refer to the documentation for the cellphone or cellular modem.

   f. If the call is authenticated with a username and password, select the *Use terminal window after dialing* check box.

   g. Tap **OK** to return to the *External Source Settings* form.

   h. In the *Phone Number* field, enter the telephone number of the VRS server, including any prefix or area code required.

   i. In the *Connection Control* field, select Auto to automatically connect to and disconnect from the VRS server as necessary. Select Manual to only connect or disconnect when you tap **Options** in the *Setup* screen.

   j. Tap **OK** to confirm the settings and return to the *Real-time Settings* form.

6. Tap **OK**.

Using a direct dial connection

To use a direct dial connection:

1. Connect to the VRS server:

    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 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 VRS status.

3. When you have finished using the VRS correction source:

    a. To manually disconnect from the VRS server, in the TerraSync software's *Setup* section tap **Options**. Select Disconnect from External Source.

    b. To ensure that the call is ended, use the End Call command on the cellphone.

Serial Port Connection Method

Use a serial port connection to connect the field computer directly to a decoder box for a VRS that outputs SAPOS FKP corrections in the old format.

Before you begin

For a serial port connection, you need to know the serial communication parameters (baud rate, data bits, stop bits, parity) for the external device. Because the TerraSync software is directly connected to the device, no authentication information is required.

Configuration

To configure the TerraSync software to establish a serial port connection to a VRS source:

1. Start the TerraSync software and open the *Setup* section.

2. Tap **Real-time Settings**. The *Real-time Settings* form appears.

3. In 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 (see page 201)** appears.

   b. In the *Type* field, select VRS.

   c. In the *Connection Method* field, select Serial Port.

   d. In the *Port* field, select the COM port on the field computer that the external source is connected to.

   e. Tap the Setup button beside the *Port* field to open the **Receiver Port Settings form (see page 205)**.

   f. Specify appropriate port connection settings. For detailed connection information, refer to the documentation for the external correction source.

g.   Tap **OK** to return to the *External Source Settings* form.

h.   Tap **OK** to confirm the settings and return to the *Real-time Settings* form.

5.   Tap **OK**.

Using a serial port connection

To use a serial port connection, connect to GPS, and then make sure that the decoder box is turned on and is receiving corrections. For more information, refer to the documentation for the decoder box.

High-Accuracy Data Collection

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 (see PRN, **page 315**) to reach the receiver. For greater accuracy, you can use carrier phase measurements, which work with the carrier signal that the PRN code is carried on. Carrier phase measurements are much more accurate, because the carrier signal has a much higher frequency than the PRN code, and this makes errors smaller.

In the TerraSync software, there are three ways to use carrier phase measurements:

- You can log *H-Star data* from a GPS Pathfinder ProXH receiver. H-Star data collection uses carrier phase data, but requires much shorter occupation times in the field than normal carrier phase data collection.

- You can log *postprocessable carrier phase data* from a GPS Pathfinder Pro XR, Pro XRS, ProXT, or ProXH receiver, or from a GeoXT handheld. This data can be postprocessed in the GPS Pathfinder Office software to achieve accuracy of 30 cm or less. See **Collecting Carrier Phase Data for Postprocessing (see page 261)**.

- You can use a survey receiver to receive *real-time kinematic (RTK) measurements* from an RTK base station. RTK positions have an accuracy of up to 1 cm. When TerraSync is operating in RTK mode, you cannot log uncorrected positions, and any RTK positions logged cannot be postprocessed.

Logging H-Star Data

By connecting the TerraSync software to a receiver with H-Star™ technology, such as the Trimble GPS Pathfinder ProXH receiver, you can collect high accuracy GPS data. With H-Star processing in Trimble postprocessing software, you can achieve accuracies of 30 cm (1 ft) or better. Positions logged while standing still using an external dual-frequency (L1/L2) antenna can achieve accuracies of 20 cm (8 inches) or better after H-Star postprocessing.

Note – Accuracy estimates for GPS positions logged while moving may be larger than 20 cm (dual-frequency) or 30 cm (single frequency).

Status information

When collecting H-Star data, the TerraSync software provides additional status information:

- A Predicted Postprocessed Accuracy (PPA) value for the feature is displayed in the status bar.

- If carrier lock is lost, a tooltip appears warning of the loss of lock, and showing the last PPA value. A warning sound is also given to indicate loss of lock.

Note – The PPA value is only an indicator of accuracy that can be achieved with H-Star postprocessing. The accuracy indicated by the PPA is not guaranteed.

Configuring the TerraSync software to collect H-Star data

If you have an H-Star capable receiver, configure the TerraSync software to collect H-Star data. To do this:

1. Tap the Section list button and select Setup to open the *Setup* section **Setup Section (see page 175)**.

2. Tap **Logging Settings**. The **Logging Settings form (see page 182)** appears.

3. Verify that the *Log H-Star Data* field is set to Auto.

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.*

4. Tap **OK** to close this form and confirm the changes you have made.

H-Star data logging is now enabled.

Collecting features

To log H-Star data, you require a clear view of the sky at all times, so avoid obstacles such as trees, bridges, and tall buildings. As you log a feature, the Predicted Post-processed Accuracy (PPA) value appears in the status bar. The PPA predicts the accuracy that will be achieved for the position after H-Star postprocessing. The value of the PPA correlates directly with the length of time that you have continuously collected H-Star data. To collect H-Star data you must:

- be connected to a receiver that has H-Star technology

- maintain lock on the required number of satellites

- maintain a maximum PDOP of 6 or less

When logging point features or averaged vertices, you must maintain lock on at least four satellites. When logging line and area features, you must maintain lock on at least five satellites.

When the PPA value reaches the accuracy you require for a point feature or vertex, you can stop logging. For example, to collect a point feature with an estimated accuracy of 20 cm, you will need to maintain lock on at least 4 satellites with a PDOP of 6 or less until the PPA indicator shows 20 cm. After H-Star postprocessing, the accuracy of the feature should be close to the value shown by the PPA (20 cm). The PPA indicates a 63% confidence level for the positions you collect.

Note – *If you lose lock while collecting a feature, the PPA value increases, and you will need to reacquire satellites and remain at the feature until the PPA value decreases to the required accuracy.*

Advanced data collection

The TerraSync software does not stop logging automatically when the required accuracy is achieved, and it does not prevent you from closing a feature before the required accuracy is achieved, or before the lock period is complete.

You do not have to remain at the same feature until the PPA 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 lock, you can move to the next feature before the required PPA is reached. Provided that the PPA shows the accuracy you require for the features, all of the features collected while lock was maintained will have the same accuracy value after H-Star postprocessing.

⚠ **CAUTION –** This data collection method is recommended only if 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 accuracy you require.

Collecting Carrier Phase Data for Postprocessing

When you need to collect a feature with a postprocessed precision of better than 30 cm, you can configure the TerraSync software to log carrier phase data. When the TerraSync software logs carrier phase data, positions collected in the field can be postprocessed in the office to generate more precise positions. Because measurements are collected from each individual satellite, the positions generated during postprocessing are ***more precise*** than positions logged in the field.

You require a clear view of the sky at all times when collecting carrier phase data, so avoid obstacles such as trees, bridges, and tall buildings. Choose a time of day when you can expect to track a maximum number of satellites with the best possible geometry.

Note – Carrier phase data collection is not available when you are using a GPS Pathfinder Pocket receiver or a GeoXM handheld. If you are using a Trimble survey receiver, you can achieve high accuracy in real time using **Real-time Kinematic (RTK) Data Collection (see page 265)***.*

This section includes the following topics:

- **Collecting sufficient data (see page 261)**
- **Configuring carrier accuracy features (see page 263)**
- **Logging carrier phase data (see page 264)**

Collecting sufficient data

To provide sufficient carrier phase data to achieve the required precision, the TerraSync software needs to log data from at least ***four*** satellites for the minimum time specified. "Loss of lock" occurs when the number of available satellites drops below four.

When you are logging carrier phase data, a counter starts as soon as four or more satellites are available. When the minimum time has elapsed, all of the carrier phase data recorded during that period can be used during postprocessing. When the counter reaches the minimum time, a success beep sounds. This indicates that the current "block" contains sufficient useful data.

See also **What is a "block" of data?, page 262**.

Note – *The minimum time for a "block" of carrier phase data is 10 minutes. You cannot change this value.*

If you lose lock before the end of the minimum time, the data collected since the start of the block may not provide the required precision during postprocessing. The counter is automatically reset to zero when loss of lock occurs. It only restarts when lock is regained.

Note – *Carrier phase data is not logged from satellites that are below the current Minimum Elevation (*__page 194__*). Before logging carrier phase data, check that the minimum elevation is set to an appropriate value.*

What is a "block" of data?
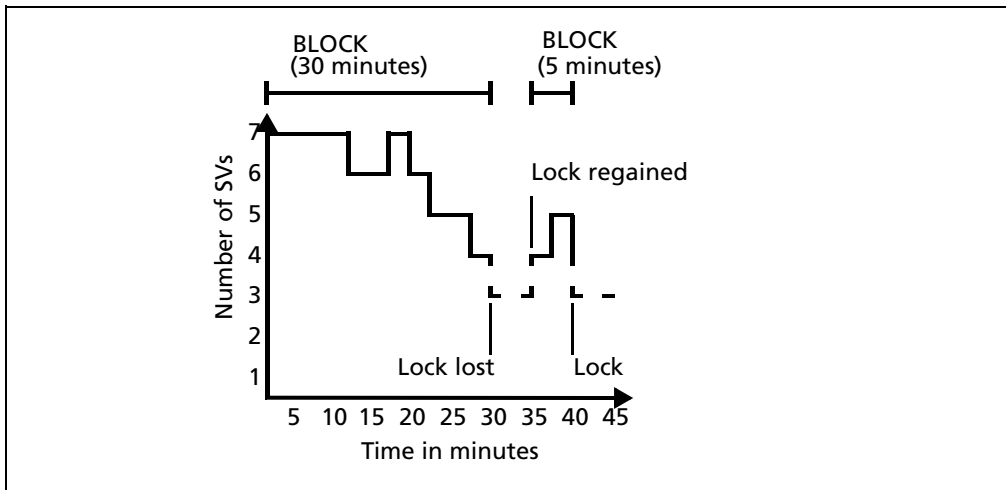
When you start a file, the TerraSync software starts to record carrier phase measurements. Useful data is not stored as one continuous stream, however, but as a series of "blocks".

The beginning and end of each block is determined by the number of available satellites. As soon as four or more satellites are available, a new block begins. This block continues until lock is lost. When lock is regained, a new block begins. The TerraSync software continues to create blocks of data throughout the file.

Configuring carrier accuracy features

You can configure individual feature types in a data dictionary to use carrier phase data. You can do this when you create the data dictionary in the Data Dictionary Editor utility in the Trimble postprocessing software, or in the Data section's **File Manager screen (see page 90)**. For more information, refer to the Data Dictionary Editor Help.

Alternatively, you can set any feature type to carrier accuracy in the TerraSync software. To do this:

1. In the **Data Section (see page 37)**, open the data file that you want to record carrier data to.

2. Tap the Section list button and select Setup to open the *Setup* section **Setup Section (see page 175)**.

3. Tap **Logging Settings**. The **Logging Settings form (see page 182)** appears. At the end of the form, there is a section for each feature type in the open data file.

4. Locate the section for the feature type you want to set to carrier accuracy.

5. Make sure that the *Style* field is set to Time.

6. In the *Accuracy* field, select Carrier.

7. Tap **OK** to close this form and confirm the changes you have made.

Carrier phase data logging is now enabled for all features of this type in this file.

Logging carrier phase 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 any 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. When you start a new feature that is set to carrier accuracy, the software logs carrier data in the foreground so that this feature can be processed with carrier phase accuracy. The carrier logging icon appears in the Status bar, and the satellite icon shows the carrier time.

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.

As you log carrier phase data, the satellite icon shows the time elapsed, in minutes and seconds, since the current block of data started. This is referred to as carrier time. This time also appears in the *Carrier time* field on the **Receiver screen (see page 154)**. When the TerraSync software has logged carrier phase data continuously for the minimum time (10 minutes), the success beep sounds.

Carrier logging icon showing carrier time

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.

⚠ **CAUTION –** Do not move to the next feature before the minimum time is up unless you are sure that you will not lose lock.

Real-time Kinematic (RTK) Data Collection

Note – RTK data collection is not available when you are using a GPS Pathfinder receiver or a GeoExplorer series handheld.

If you are using a survey receiver, you can use real-time kinematic (RTK) data collection to achieve centimeter-level accuracy in real time. Like postprocessed carrier phase data collection, RTK uses carrier phase measurements for greater accuracy. However, when the TerraSync software is operating in RTK mode, GPS positions are corrected 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. RTK-corrected positions cannot be postprocessed, even if you have configured the TerraSync software to collect SuperCorrect records or carrier phase data.

The rover can use RTK corrections from two types of source:

- another GPS receiver that is set up as an RTK base station

- a virtual reference station (VRS) that is generating RTK messages.

💡 **Tip –** You can use the TerraSync software to set up a second survey receiver as an RTK base receiver. See also **Setting up a Base Station, page 270**.

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, you can use a variety of methods to establish a direct dial or Internet connection between the field computer and the VRS. See also **Using Corrections from a VRS system, page 245**.

This section includes the following topics:

- **Configuring the TerraSync software for RTK data collection (see page 266)**

- **Logging data in RTK mode (see page 268)**

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 (see page 196)** appears.

3. In 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, 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 (see page 213)** 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 (see page 201)** 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, select appropriate settings depending on the VRS source and the communication method used. See also **Using Corrections from a VRS system, page 245**. When you have finished configuring the external source, tap **OK**.

5.   In 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.   Set the RTK precision tolerances:

a.   Tap **GPS Settings**. The **GPS Settings form (see page 187)** appears.

b.   Tap the Setup button beside the *RTK Precisions* field. The **RTK Precision Settings form (see page 195)** appears.

c.   Specify the minimum horizontal and vertical precision estimates for static and roving data collection.

d.   Tap **OK**.

e.   Tap **OK** again to confirm the GPS settings and return to the main Setup screen.
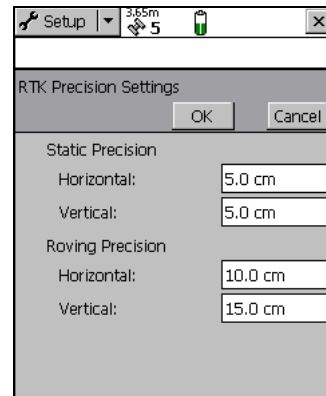
Connecting to the RTK receiver

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 ![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 static mode (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.

Logging data in RTK mode

An RTK receiver can estimate the horizontal and vertical precision for each position it calculates. The horizontal precision of the most recently logged position appears over the satellite icon in the status bar ![icon].

The TerraSync software uses these estimates to reject any positions that do not fall within the precision tolerances you have specified. For example, you can specify that all positions must have a horizontal and vertical precision of 10 cm or less. If the GPS receiver calculates a position that does not meet both these precision requirements, the TerraSync software does not log that position.

During RTK data collection, positions are logged either in static mode or in roving mode. In roving mode, all positions that meet the roving precision tolerances are logged. Area features, line features, and between feature positions are logged in roving mode.

In static mode, only the position with the best precision estimate is logged. Static mode is used for logging point features and vertices. Instead of logging all positions, and then averaging them to get a more accurate position for the point or vertex, the TerraSync software uses only the single best position, and discards all the others.

In static mode, there is no minimum number of positions that you have to record. Instead, you only need to collect one position that is within the precision tolerances you require. To do this, simply remain stationary until the logging icon in the status bar 🔺1 shows the number 1. This indicates that the TerraSync software has logged a position with suitable precision estimates. As soon as the number beside the logging icon changes to 1, you can stop logging and move on to the next feature or vertex.

Setting up a Base Station

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 for the following operations:

- **Logging base data to a file (see page 271)**, which can be used to postprocess rover data in Trimble postprocessing software.

- **Generating real-time corrections (see page 271)** for broadcast to DGPS or RTK rovers.

The base receiver must be a receiver that is supported by the TerraSync software. It must be capable of carrier phase data collection. The table below shows the GPS receivers that can be used, and the base station operations that each receiver supports:

GPS receiver	Log to base file	Output DGPS corrections	Output RTK corrections
GeoXT	✓	X	X
GPS Pathfinder Power			X
GPS Pathfinder Pro XR			X
GPS Pathfinder Pro XRS			X
GPS Pathfinder ProXT		X	X
GPS Pathfinder ProXH		X	X
5700	X		
5800	X		
R8	X		

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 273)**.

Logging base data to a file

The following receivers can log base data to a file, for use in Trimble postprocessing software:

- GPS Pathfinder Power receiver

- GPS Pathfinder Pro XR receiver

- GPS Pathfinder Pro XRS receiver

- GPS Pathfinder ProXT receiver

- GPS Pathfinder ProXH receiver

- GeoXT handheld

To log base data to a file, open the **New File subsection (see page 39)** and start a new base data file. Then follow the **Base Station Setup wizard (see page 42)**.

Generating real-time corrections

The following receivers can output real-time corrections:

- GPS Pathfinder Power receiver

- GPS Pathfinder Pro XR receiver

- 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 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. See **Receiver power output, page 191**.

To output real-time corrections:

1. Open the **New File subsection (see page 39)** and start a new base data file.

2. Follow the **Base Station Setup wizard (see page 42)**. In the **Real-Time Output step (see page 45)**, 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. In the Data section, open the **New File subsection (see page 39)** and start a new base data file.

3. Follow the **Base Station Setup wizard (see page 42)**. In the Real-Time Output step (see **Real-Time Output step (see page 45)**, 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 you 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.

Coordinate Systems

In this chapter:

When using the TerraSync software to collect GPS data, you can configure the coordinate system, zone, and datum. This lets you enter and display coordinates using the coordinate system that best suits you and the location you are working in.

Coordinate Systems and Datums

Coordinate systems are three-dimensional reference frames used to describe the location of objects in space. The TerraSync software provides you with your position anywhere on the earth's surface in relation to the coordinate system you have configured.

Before you can compare geographic data obtained from different sources, all the data must be referenced to the same datum and coordinate system. This is because different datums and coordinate systems provide different coordinate values for a single geographic location.

GPS positions are normally expressed as latitudes and longitudes relative to a mathematical model called a datum. The datum used by GPS is called the World Geodetic System 1984 datum (or WGS-84). A datum is defined by the relationship between an ellipsoid and an origin point. An ellipsoid is a three-dimensional surface shaped like a squashed sphere, which approximately models the shape of the earth (either as a whole, or over a particular part of the earth). The WGS-84 datum is defined in terms of the GRS-80 ellipsoid.

For most land-based GPS applications, and particularly for GIS data collection applications, latitudes and longitudes are much less convenient. Typically, a GIS will represent the coordinates of geographic features in a locality of interest using a rectangular grid (running North and East) and will presume that the earth is locally flat. A local ellipsoid can be defined to provide a good approximation to the shape of the earth in that area. A datum transformation and a map projection are then used to transform coordinates from this local ellipsoid to the flat-earth model in the GIS.

Heights can be displayed by the TerraSync software relative either to a local ellipsoid, or to an empirically defined surface known as the geoid. The geoid is a surface over which the earth's gravity is constant. (The geoid represents mean sea level.)
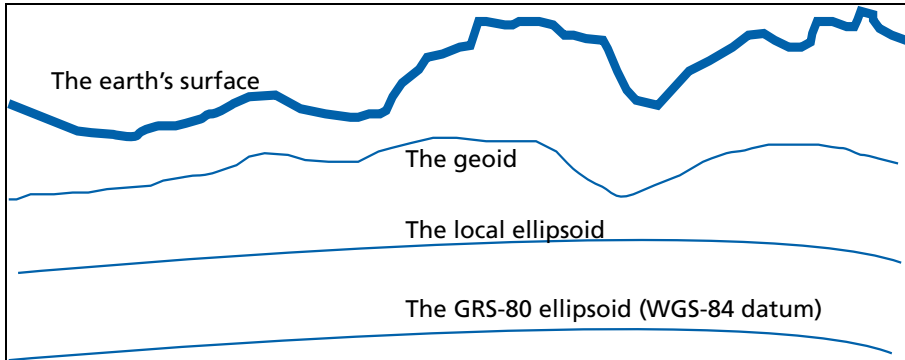
In summary, there are three models for describing geographic locations:

- The flat North, East model of the GIS, possibly with heights as well

- The curved local ellipsoid, used by the GIS as a model of the earth's surface locally

- The curved GRS-80 ellipsoid, used by GPS as a model of the earth's surface as a whole

These models can describe heights as being relative to either an ellipsoid or the geoid (mean sea level).

To collect the positions of features using GPS (and hence the WGS-84 datum) and then send them to a GIS as North, East coordinates, the GPS latitudes and longitudes need to be processed in a number of ways.

First, they need to 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***. 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 TerraSync software and the GPS Pathfinder Office software both contain a geoid separation model which enables them to transform altitudes relative to GRS-80 into heights relative to mean sea level.

Note – Data files are stored using the current coordinate system. If you change coordinate system, the current data file's coordinates are recalculated, which may take some time.

Note – Each background image is associated permanently with a coordinate system. To display correctly when opened, a background image's coordinate system must match the current 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 image's coordinate system in the 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.

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 GPS Pathfinder Office. 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 also **Transferring a coordinate system export file, page 282**.

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. Alternatively, 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.

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.

There are two procedures for transferring coordinate system data to the TerraSync software:

- **Transferring a coordinate system export file, page 282**
- **Transferring a single coordinate system, page 283**

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 on these steps, see Transferring data to the field computer (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 you require, 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 on these steps, 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. In 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.
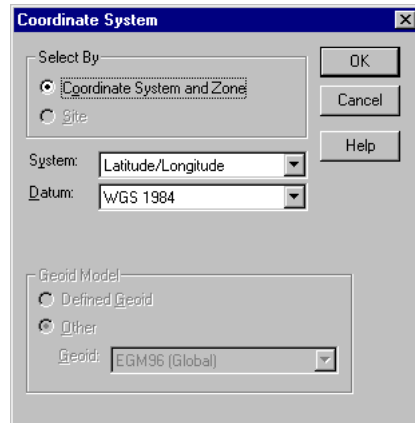
6. Click **OK**. The *Coordinate System* dialog disappears. The coordinate system or site you selected is added to the *Send* list in the *Data Transfer* dialog.

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 that you require, 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

You can use the **Coordinate System form (see page 214)** 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. Open the **Setup Section (see page 175)**. Tap the **Section** button and select Setup from the drop-down list.

2. Tap **Coordinate System**.

    The *Coordinate System* form appears.
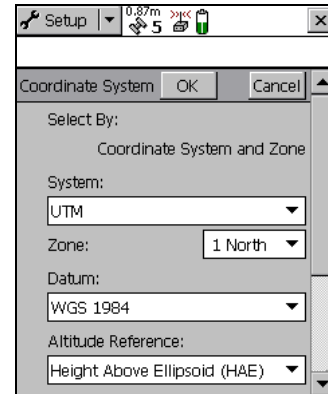
3. Use this form to specify the coordinate system, site, zone, datum, and altitude reference. You can also specify the units used to display the coordinates and altitude.

4. Tap **OK** when you have finished.

    The *Coordinate System* form closes and any changes you have made are applied immediately throughout the TerraSync software. If any points in the Map section are not within the coordinate system you select, the TerraSync software warns you and asks 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.

See also **Coordinate System, page 214**.

Troubleshooting

In this chapter:

- ■ **Communications**
- ■ **Field Computer**
- ■ **GPS**
- ■ **Real-time**
- ■ **Using the TerraSync Software**
- ■ **Position Accuracy**

This section list potential problems and describes how to solve them.

Communications

This section lists possible causes of, and solutions to, the following communication problems:

- **The ActiveSync technology does not connect to the field device, page 288**

- **Data transfer is slow, page 289**

- **The TerraSync software does not list the COM port that you want to use, page 289**

- **The desktop computer does not connect to the field device, page 289**

- **You cannot send or receive data files by e-mail from within the TerraSync software, page 290**

The ActiveSync technology does not connect to the field device

Possible cause	Solution
The CE 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 CE device out of the cradle and then replace it.
	Unplug the CE device's data cable 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 177**), 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 Laser port field on the Logging Settings form (see **page 183**).
An ActiveSync technology **partnership** with another CE device is interfering with connection to the device.	In ActiveSync technology, delete any partnerships with other CE devices.
	Use a guest relationship, not a partnership.

Data transfer is slow

Possible cause	Solution
The CE 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

Possible cause	Solution
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 GeoExplorer 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 field device

Possible cause	Solution
The CE device is not set up to establish a PC connection.	Open the Communications Properties dialog on the CE device. For information on how to do this, refer to the documentation for the CE device. Select the PC Connection tab and check that the Allow connection with desktop computer when device is attached 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 e-mail from within the TerraSync software

Possible cause	Solution
The TerraSync software cannot connect to your ISP because it does not have your account login details.	In the settings for the e-mail service that you are using, specify the login details for connecting to your ISP.
The data files attached to e-mails are not being downloaded from the mail server.	Configure the e-mail service that you are using to download the entire message and any attachments, not just the message header.
The field computer does not support e-mail.	Use the Trimble Data Transfer utility to transfer files to or from the TerraSync software.

Field Computer

This section lists possible causes of, and solutions to, the following field computer problems:

The field computer does not turn on, or turns off immediately after being turned on

Possible cause	Solution
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

Possible cause	Solution
Not enough memory on the CE device is allocated to programs, because too much is allocated for storage.	Adjust memory allocation, see the *TerraSync Software Getting Started Guide*.
There is not enough free memory on the field computer.	Delete unwanted files.

The screen is not visible outside or in bright light

Possible cause	Solution
The screen contrast is too low.	Adjust the screen contrast. See the T*erraSync Software Getting Started Guide*.

A file attached to a filename field does not open or play on a desktop computer

Possible cause	Solution
The file has been recorded in a special file format that is used only under Windows CE or on a specific brand of CE 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

Possible cause	Solution
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 e-mail.*

GPS

This section lists possible causes of, and solutions to, the following problems with GPS or a GPS receiver:

- **The message No GPS detected appears, page 292**

- **The receiver has not acquired a satellite within three minutes of starting the TerraSync software, page 292**

- **The receiver is not able to compute a GPS position within one minute of starting the TerraSync software, page 293**

The message No GPS detected appears

Possible cause	Solution
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

Possible cause	Solution
The receiver is still looking for satellites.	Check the **Satellite Information screen (see page 147)** 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.
	GPS does not work indoors.

Possible cause	Solution
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, in **Setup Section (see page 175)**, tap **Options** and select Reset GPS receiver.

The receiver is not able to compute a GPS position within one minute of starting the TerraSync software

Possible cause	Solution
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 **GPS Settings form (see page 187)**, check that the minimum elevation value is not too high.
	In the **GPS Settings form (see page 187)**, 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 **GPS Settings form (see page 187)**, check that the configured maximum DOP value (PDOP or HDOP) is not too low.

Real-time

This section lists possible causes of, and solutions to, the following problems with real-time corrections or correction sources:

- **Not all positions are corrected in real time, page 294**

- **The TerraSync software is not using your first choice real-time correction source, page 294**

- **The integrated beacon component (Pro XR or XRS receiver only) does not appear to work, page 295**

- **The integrated satellite component (Pro XRS or Power receiver only) does not appear to work, page 295**

- **The real-time differential correction link does not appear to work, page 296**

Not all positions are corrected in real time

Possible cause	Solution
You have chosen to use uncorrected GPS if no real-time corrections are available.	In the last Choice field on the **Real-time Settings form (see page 196)**, select Wait for real-time.

The TerraSync software is not using your first choice real-time correction source

Possible cause	Solution
Your first choice correction source is not available, so your second or third choice is being used.	In the **Real-time screen (see page 156)**, check the status of your preferred correction source. Change the configuration in the **Real-time Settings form (see page 196)** if necessary, or wait until this source is available again.
The correction source you expected is not set up as your preferred source.	In the **Real-time Settings form (see page 196)**, select your preferred real-time correction source in the Choice 1 field.

The integrated beacon component (Pro XR or XRS receiver only) does not appear to work

Possible cause	Solution
You have set the real-time source incorrectly.	In the **Real-time Settings form (see page 196)**, set one of the Choice fields to Integrated Beacon. If integrated beacon is your preferred correction source, set the Choice 1 field to Integrated Beacon.
You have set the mode or frequency incorrectly.	In the **Real-time Settings form (see page 196)**, select appropriate options in the Mode and Frequency fields.

The integrated satellite component (Pro XRS or Power receiver only) does not appear to work

Possible cause	Solution
You have set the real-time source incorrectly.	In the **Real-time Settings form (see page 196)**, set one of the Choice fields to Integrated Satellite. If integrated beacon is your preferred correction source, set the Choice 1 field to Integrated Satellite.
You have not enabled the integrated satellite component of the receiver.	For information on how to enable the integrated satellite component, refer to the GPS Pathfinder Systems Receiver Manual.
You have entered the incorrect provider, satellite, and/or frequency.	In the **Real-time Settings form (see page 196)**, select appropriate options in the Service Provider, Name, and Frequency fields.
Your satellite differential subscription has expired or has not yet been activated.	In the **Integrated Satellite Status screen (see page 166)**, check the expiry date of the satellite differential subscription. For information on how to renew or acquire a subscription, refer to the GPS Pathfinder Systems Receiver Manual.

The real-time differential correction link does not appear to work

Possible cause	Solution
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 **Real-time Settings form (see page 196)**, check that you have set the Station ID field correctly.
You have configured the real-time settings incorrectly.	In the **Real-time Settings form (see page 196)**, check that the settings under the External Source heading match the telemetry link and the transmitted RTCM data stream.

Using the TerraSync Software

This section lists possible causes of, and solutions to, the following operational problems:

- **You cannot update a feature, add new features, or open a data file, page 297**

- **You cannot change settings or use some menu items, page 297**

- **You cannot unlock a configuration file, page 297**

- **Automatically generated time attributes are incorrect, page 298**

- **File dates are incorrect, page 298**

- **Some or all features are missing from the Update Features screen or the Map section, page 298**

- **The coordinates displayed by the TerraSync software seem to be incorrect, page 299**

- **You cannot select some coordinate system datums, zones, or ellipsoids, page 300**

- **The target icon is not at the location of the feature you selected as the navigation target, page 300**

You cannot update a feature, add new features, or open a data file

Possible cause	Solution
You are using the TerraSync Standard edition softaware, 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 e-mail 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 **Allow Position Update field (see page 183)** on the *Logging Settings* form to Yes or Confirm.

You cannot change settings or use some menu items

Possible cause	Solution
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

Possible cause	Solution
You have forgotten the configuration file's password.	Use the manager's password, **TrimbleTerraSync**.

Automatically generated time attributes are incorrect

Possible cause	Solution
The field computer's internal clock 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

Possible cause	Solution
The field computer's internal clock 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.

Some or all features are missing from the Update Features screen or the Map section

Possible cause	Solution
There is no data file open.	Use the **New File form (see page 39)** to create a new file, or the **Existing File screen (see page 73)** to open an existing file.
There are no features in the file to display.	Open the **Collect Features screen (see page 52)** and collect some features.
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 (see page 7)**, tap **Layers** and select Filtered Features, or Unfiltered Features, to display the appropriate layer.
	In the **Update Features screen (see page 75)**, tap **Options** and select Show Filtered Features, or Show Unfiltered Features, to display the appropriate group.
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 **Background File form (see page 16)** to check that the map is set to display this file. Then tap **Layers** and make sure that the Background option has a check mark beside it.

Possible cause	Solution
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.
You are viewing the wrong area in the Map screen.	Use the **Pan (see page 15)** map tool or the Pan button on the **Command bar (see page 11)** to pan the display to the appropriate area.
	Use the **Zoom Extents mode (see page 12)** or the Zoom Extents button on the **Command bar (see page 11)** to zoom to a scale where all features are visible.
The features have been filtered out.	Check the Status bar to see if a filter is active. If the filter icon ▽ is visible, open the **Filter By form (see page 83)** where you can disable or change the criteria for filters.
The features have been deleted.	Deleted features are never shown in the Map section. In the **Update Features screen (see page 75)**, highlight a deleted feature (a feature with a line through it), tap **Options**, and select Undelete.

The coordinates displayed by the TerraSync software seem to be incorrect

Possible cause	Solution
You have selected the wrong coordinate system or zone.	In the **Coordinate System form (see page 214)**, select the correct coordinate system and zone.
You have selected the wrong coordinate units.	In the **Coordinate System form (see page 214)**, select the coordinate system, then select the correct coordinate units.
You are using the Latitude/Longitude coordinate system and have selected the wrong datum.	In the System field on the **Coordinate System form (see page 214)**, 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 System field on the **Coordinate System form (see page 214)**, select UTM, then specify the correct zone and datum. The traditional UTM datum for the U.S.A. is NAD-27.

Possible cause	Solution
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

Possible cause	Solution
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 the TerraSync software, 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 the TerraSync software.
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

Possible cause	Solution
You re-recorded the GPS position of the feature, or digitized its position. The navigation target remains at the feature's old position.	Reselect the feature as the navigation target.

The message The system time of this device does not match GPS time appears

Possible cause	Solution
The field computer's 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 zone correctly. For more information, refer to the documentation for the field computer.

Position Accuracy

This section lists possible causes of, and solutions to, the following problems with positional accuracy:

- **The accuracy of recorded GPS positions is not as good as you expect, page 302**

- **You are unable to differentially correct GPS positions (either in real time or in postprocessing), page 304**

The accuracy of recorded GPS positions is not as good as you expect

Possible cause	Solution
You did not record sufficient positions to achieve the required accuracy.	In the Data Dictionary Editor, increase the value in the Minimum Positions 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 **GPS Settings form (see page 187)**, 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 you let the receiver use satellites with a low **SNR** or elevation, this may have a detrimental effect on the accuracy of positions calculated by the receiver.	In the **GPS Settings form (see page 187)**, raise the minimum SNR and/or elevation value to make sure that the receiver uses satellites with a strong signal.

Possible cause	Solution
You are operating in an area of high multipath.	Move to an area with better GPS coverage and use offsets.
	Apply velocity filtering:
	• Set the **Velocity Filter field (see page 190)** on the GPS Settings form to Auto to apply velocity filtering to positions as they are recorded. If the **Log SuperCorrect Data option (see page 183)** is enabled, all positions are filtered. If at least one valid real-time correction source is selected in the **Real-time Settings form (see page 196)**, 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 **Log Velocity Data field (see page 183)** or the **Log SuperCorrect Data option (see page 183)** on the *Logging Settings* 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 **Real-time Settings form (see page 196)**, select Wait for Real-time, to use differentially corrected positions only.

The accuracy of recorded GPS positions is not as good as you expect

Possible cause	Solution
You did not record sufficient positions to achieve the required accuracy.	In the Data Dictionary Editor, increase the value in the Minimum Positions field to make sure that the TerraSync software records enough positions.
	Collect more positions at each point feature.

Possible cause	Solution
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 **GPS Settings form (see page 187)**, 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 you let the receiver use satellites with a low **SNR** or elevation, this may have a detrimental effect on the accuracy of positions calculated by the receiver.	In the **GPS Settings form (see page 187)**, raise the minimum SNR and/or elevation value to make sure that the receiver uses satellites with a strong signal.
You are operating in an area of high multipath.	Move to an area with better GPS coverage and use offsets.
	Apply velocity filtering:
	• Set the **Velocity Filter field (see page 190)** on the GPS Settings form to Auto to apply velocity filtering to positions as they are recorded. If the **Log SuperCorrect Data field (see page 183)** is enabled, all positions are filtered. If at least one valid real-time correction source is selected in the **Real-time Settings form (see page 196)**, 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 **Log Velocity Data field (see page 183)** or the **Log SuperCorrect Data field (see page 183)** on the Logging Settings 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 **Real-time Settings form (see page 196)**, select Wait for Real-time, to use differentially corrected positions only.

You are unable to differentially correct GPS positions (either in real time or in postprocessing)

Possible cause	Solution
The TerraSync software used satellites that were not visible to the base station.	If the **Log SuperCorrect Data option (see page 183)** was enabled when the data was collected, use the SuperCorrect feature in the Differential Correction utility to postprocess the data using only those satellites that were common to the rover and base station.
	Make sure that the minimum elevation value in the TerraSync software is set sufficiently high 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.
	If the **Log SuperCorrect Data option (see page 183)** was enabled when the data was collected, use the SuperCorrect feature in the Differential Correction wizard to postprocess the data using only those satellites that were common to the rover and base station. This option is enabled by default.

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 CE device. 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.

attributes　　Attributes are the characteristics of a **feature** in a Geographic Information System (GIS). For example, a road may have a name, surface type, or a number of lanes. Each of these factors are attributes of the road feature and could have a range of possible values.

The value chosen to describe a particular feature is called the attribute value. In our example of a road feature, Main Street could be the value of the name attribute and 4 could be the value of the number of lanes attribute.

base 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	An Internet server that manages authentication and password control for a network of **VRS** servers, and relays VRS corrections from the VRS server that you select.
C/A code	See **code phase**.
carrier phase	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.
CE device	A small handheld computer that is capable of running the Microsoft Windows CE operating system or Windows Mobile software. A CE device usually has a small screen, and limited memory and storage space.
centroid	The calculated center of an area feature.
CMR	(Compact Measurement Record)
	A real-time message format developed by Trimble for broadcasting corrections to other Trimble receivers. CMR is a more efficient alternative to **RTCM**, but is not supported by all non-Trimble receivers.
Coarse Acquisition code	See **code phase**.
code phase	(also known as Coarse Acquisition code, or C/A code)
	The difference between the **pseudorandom 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.
cross-track error	The amount and direction by which your current **heading** differs from the **cross-track line**.
cross-track line	The shortest direct path from the navigation start to the navigation target.

data dictionary 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**.

datum
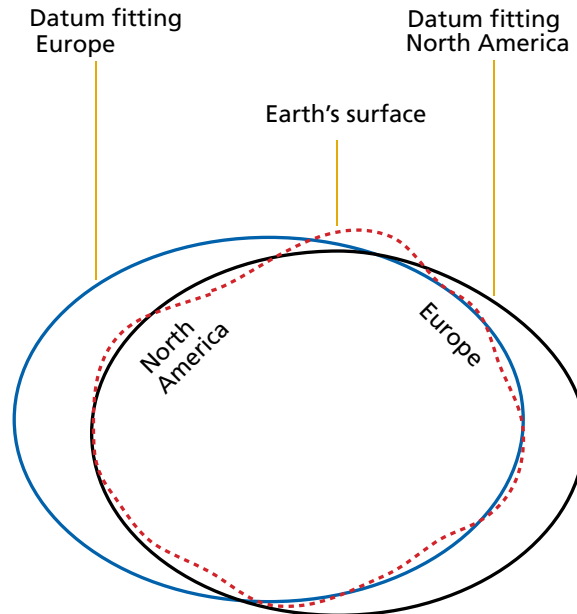
A datum is a mathematical model of the earth's surface. World geodetic datums are typically defined by the size and shape of an **ellipsoid** and the relationship between the center of the ellipsoid and the center of the earth.

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.

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**).

All GPS coordinates are based on the **WGS-84** datum surface.

See **Coordinate Systems, page 275**.

declination	See **magnetic declination**.
DGPS	See **real-time differential GPS**.
differential correction	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.
	Differential correction can be done in real time, or after the data has been collected by **postprocessing**.
differential GPS	See **real-time differential GPS**.
digitizing	The process of creating positions manually by selecting a point on a map.
Dilution of Precision	(DOP)
	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.
	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:
	$PDOP^2 = HDOP^2 + VDOP^2$
DOP	See **Dilution of Precision**.
EGNOS	(European Geostationary Navigation Overlay Service)
	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.

ellipsoid
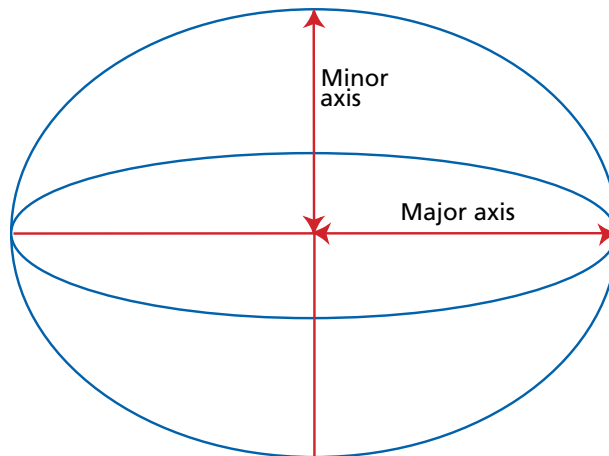
An ellipsoid is the three-dimensional shape that is used as the basis for mathematically modeling the earth's surface. The ellipsoid is defined by the lengths of the minor and major axes. The earth's minor axis is the polar axis and the major axis is the equatorial axis. See **Coordinate Systems, page 275**.

feature
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.

Features are defined in a **data dictionary**.

field computer
In the TerraSync software documentation, a field computer is any computer that has the TerraSync software installed. The computer must be a PC running a supported Windows desktop operating system (for example, a laptop or notebook computer running Windows 2000), or be a supported CE device.

geoid

A geoid is a 3D 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. See also **Coordinate Systems, page 275**.
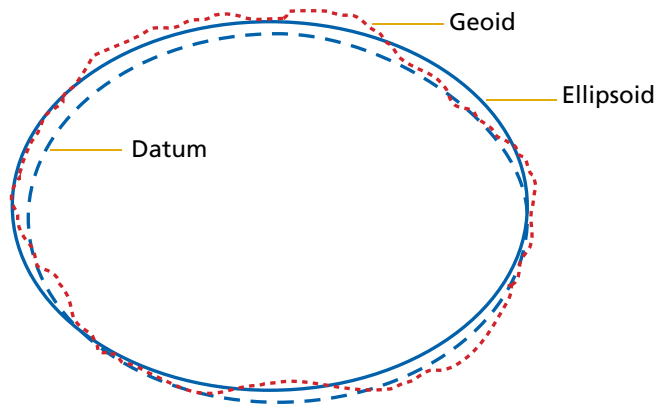
great-circle distance

The great-circle distance is the shortest distance between two points on the surface of a sphere.

guest
A guest connection lets a **CE 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 CE device and the GPS Pathfinder Office software on the desktop computer.

When you connect as a guest, you can:

• move or copy files between the two computers

• back up files on the CE device

• install or uninstall programs on the CE device

However, you cannot **synchronize** data between the two computers when you connect as a guest. To synchronize data you must set up a partnership.

A guest connection is temporary. When the guest CE device is disconnected from the desktop computer, any settings for the guest connection are lost. The next time you connect the CE device to the desktop computer, you must set the guest connection again.

For more information, refer to the ActiveSync Help.

H/PC 2000
See **Handheld PC 2000**.

HAE
See **Height Above Ellipsoid**.

Handheld PC 2000
(H/PC 2000)

A lightweight personal computer that is small enough to be carried. H/PC 2000 devices that support TerraSync 2.50 use the Windows CE 4.x (Windows CE .NET) operating system. This operating system is based on the Windows operating system, but customized for computers with a limited screen size and memory.

HDOP
See **Horizontal Dilution of Precision**.

heading
The heading is the direction you are facing or traveling, usually measured clockwise from north.

Height Above Ellipsoid
(HAE)

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.

horizon
The line at which the earth and sky seem to meet.

Horizontal Dilution of Precision	(HDOP)
	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.
	HDOP is a DOP value that indicates the accuracy of horizontal measurements. Other DOP values include VDOP (vertical DOP) and **PDOP** (Position DOP).
	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.
	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).
H-Star	H-Star data collection uses carrier phase data, but requires much shorter occupation times in the field than normal carrier phase data collection. To collect H-Star data, the TerraSync software must be connected to an H-Star capable receiver.
IMS	See **Web map server**.
International Terrestrial Reference Frame	(ITRF)
	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).
Internet Map Server	(IMS)
	See **Web map server**.
ionospheric noise	The effects 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.
ITRF	See **International Terrestrial Reference Frame.**

laser rangefinder	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.
latitude	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.
	Traditionally, north is considered positive, and south is considered negative.
longitude	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.
	Traditionally, east is considered positive, and west is considered negative.
magnetic declination	Magnetic declination is the difference between **magnetic north** and **true north**. Declination is expressed as an angle and differs between locations.
magnetic north	A bearing that is relative to magnetic north uses the north magnetic pole as its north reference.
Mean Sea Level	(MSL)
	Mean Sea Level is a method of altitude reference. Altitudes expressed in relation to MSL actually give a height above the **geoid**.
	It is important to use the same geoid when comparing altitudes in MSL.
MSAS	(MTSAT Satellite-Based Augmentation System)
	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.
MSL	See **Mean Sea Level**.
MTSAT Satellite-Based Augmentation System	See **MSAS**.

multipath   Multipath 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.

NAD-27   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.

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.

parity   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.

Typically you should have the same parity setting on the CE device as on the external device you are communicating with.

partnership   A partnership lets a **CE 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 CE device and the GPS Pathfinder Office software on the desktop computer.

A partnership stores information about:

- 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

Unlike a guest connection, a partnership is stored on the desktop computer and remains when the CE device is disconnected from the desktop computer.

For more information, refer to the ActiveSync Help.

PC   In TerraSync software documentation, a field computer that is running a supported Windows desktop operating system.

PDOP	See **Position Dilution of Precision**.
Pocket PC	A lightweight personal computer that is small enough to fit in your hand or pocket. Pocket PCs that TerraSync software version 2.50 supports use the Windows Mobile software, which is based on the Windows operating system but is customized for computers with a limited screen size and memory.
Position Dilution of Precision	(PDOP)
	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.
	PDOP is a DOP value that indicates the accuracy of three-dimensional measurements. Other DOP values include VDOP (vertical DOP) and **HDOP** (Horizontal DOP).
	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.
	Using a maximum PDOP value is ideal for situations where both vertical and horizontal precision are important.
postprocessing	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.
	Because the base station is on a known location, any errors can be determined and removed from the rover data.
PRN	See **pseudorandom number**.
pseudorandom number	(PRN)
	The pseudorandom 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.
	Each satellite has its own unique PRN code, which together are used by the GPS receiver to calculate **code phase** positions.

raster	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.
real-time differential GPS	(also known as real-time differential correction, DGPS)
	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.
	Most real-time differential correction methods apply corrections to **code phase** positions. **RTK** uses **carrier phase** measurements.
real-time kinematic	See **RTK**.
rover	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.
roving mode	During RTK data collection, the TerraSync software logs line and area features, and between feature positions, in roving mode. Point features and vertices are logged in **static mode**.
	In roving mode, the TerraSync software records all RTK-corrected positions that meet the precision tolerances you have specified. All other positions are discarded.
RTCM	(Radio Technical Commission for Maritime Services)
	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 newer version 2 RTCM protocol.
RTK	(real-time kinematic)
	A **real-time differential GPS** method that uses **carrier phase** measurements for greater accuracy.
SBAS	(Satellite-Based Augmentation System)
	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.

signal-to-noise ratio

(SNR)

The signal strength of a satellite is a measure of the information content of the signal, relative to the signal's noise. The typical SNR of a satellite at 30° elevation is between 10.0 and 15.0 dBHz. The quality of a GPS position is degraded if the SNR of one or more satellites in the constellation falls below 4.0.

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 a satellite's SNR is below the configured minimum SNR, that satellite is not used to compute positions.

site

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 ***site***, or ***local site***.

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.

SNR

See **signal-to-noise ratio**.

SSF

(Standard Storage Format)

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.

static mode

During RTK data collection, the TerraSync software logs point features and vertices in static mode. Line features, area features, and between feature positions are logged in **roving mode**.

In static mode, the TerraSync software records only the RTK-corrected position with the best precision. All other positions are discarded.

synchronize	Synchronization is the process where ActiveSync technology compares information on a CE device with the corresponding information on the desktop computer, and then updates either computer with the latest information.

	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.

	For more information, refer to the ActiveSync Help.

true north	A bearing that is relative to true north uses the north celestial pole as its north reference.

UTC	Universal Time Coordinated.

	UTC is a time standard based closely on local solar meantime at the Greenwich meridian (GMT). GPS time is directly related to UTC.

UTM	Universal Transverse Mercator Map Projection.

	A special case of the Transverse Mercator projection. Abbreviated as UTM, it consists of 60 north/south zones, each 6 degrees wide in longitude.

vector	A vector graphic is a graphical image consisting of mathematical descriptions of lines, points, and areas.

	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.

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   (Virtual Reference Station)

A VRS system consists of GPS hardware, software, and communication links. It uses data from a network of **base stations** to provide corrections to each rover that are more accurate than corrections from a single base station.

To start using VRS corrections, the rover sends its position to the VRS server. The VRS server uses the base station data to model systematic errors (such as **ionospheric noise**) at the rover position. It then sends **RTCM** correction messages back to the rover.

WAAS   (Wide Area Augmentation System)

WAAS was established by the Federal Aviation Administration (FAA) for flight and approach navigation for civil aviation. WAAS improves the accuracy and availability of the basic GPS signals over its coverage area, which includes the continental United States and outlying parts of Canada and Mexico.

The WAAS system provides correction data for visible satellites. Corrections are computed from ground station observations and then uploaded to two geostationary satellites. This data is then broadcast on the L1 frequency, and is tracked using a channel on the GPS receiver, exactly like a GPS satellite.

Use WAAS when other correction sources are unavailable, to obtain greater accuracy than autonomous positions. For more information on WAAS, refer to the FAA website at **http://gps.faa.gov.**

The **EGNOS** service is the European equivalent and **MSAS** is the Japanese equivalent of WAAS.

waypoint   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.

Note – The TerraSync software does not support waypoints explicitly. However, if you transfer a waypoint file to a CE device running the TerraSync software, it is converted during transfer into a data file which contains only Waypoint point features. You can open this file as a data file or as a background file.

Web map server   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.

WGS-84   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.

The WGS-84 datum is based on the **ellipsoid** of the same name.

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