TerraSync Software Reference Manual

How to Obtain Warranty Service
To obtain warranty service for the Product, please contact your local Trimble authorized dealer. Alternatively, you may contact Trimble to request warranty service at +1-408-481-6940 (24 hours a day) or e-mail your request to trimble_support@trimble.com. Please be prepared to provide:
- your name, address and telephone numbers
- proof of purchase
- a copy of this Trimble warranty
- a description of the nonconforming Product including the model number
- an explanation of the problem

The customer service representative may need additional information from you depending on the nature of the problem.

Warranty Exclusions and Disclaimer
This Product limited warranty shall only apply in the event and to the extent that (a) the Product is properly and correctly configured, interfaced, maintained, stored, and operated in accordance with Trimble’s applicable operator’s manual and specifications, and; (b) the Product is not modified or misused. This Product limited warranty shall not apply to, and Trimble shall not be responsible for, defects or performance problems resulting from (i) the combination or utilization of the Product with hardware or software products, information, data, systems, interfaces, or devices not made, supplied, or specified by Trimble; (ii) the operation of the Product under any specification other than, or in addition to, Trimble’s standard specifications for its products; (iii) the unauthorized installation, modification, or use of the Product; (iv) damage caused by: accident, lightning or other electrical discharge, fresh or salt water immersion or spray (outside of Product specifications); or exposure to environmental conditions for which the Product is not intended; (v) normal wear and tear on consumable parts (e.g., batteries); or (vi) cosmetic damage. Trimble does not warrant or guarantee the results obtained through the use of the Product, or that software components will operate error free.

LIMITED WARRANTY TERMS AND CONDITIONS

Product Limited Warranty
Subject to the following terms and conditions, Trimble Navigation Limited ("Trimble") warrants that for a period of one (1) year from date of purchase this Trimble product (the “Product”) will substantially conform to Trimble’s publicly available specifications for the Product and that the hardware and any storage media components of the Product will be substantially free from defects in materials and workmanship.

Product Software
A Product software, whether built into hardware circuitry as firmware, provided as a standalone computer software product, embedded in flash memory, or stored on magnetic or other media, is licensed solely for use with or as an integral part of the Product and is not sold. If accompanied by a separate end user license agreement (“EULA”), use of any such software will be subject to the terms of such end user license agreement (including any differing limited warranty terms, exclusions, and limitations), which shall control over the terms and conditions set forth in this limited warranty.

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During the limited warranty period you will be entitled to receive such Fixes to the Product software that Trimble releases and makes commercially available and for which it does not charge separately, subject to the procedures for delivery to purchasers of Trimble products generally. If you have purchased the Product from an authorized Trimble dealer rather than from Trimble directly, Trimble may, at its option, forward the software Fix to the Trimble dealer for final distribution to you. Minor Updates, Major Upgrades, new products, or substantially new software releases, as identified by Trimble, are expressly excluded from this update process and limited warranty. Receipt of software Fixes or other enhancements shall not serve to extend the limited warranty period.

For purposes of this warranty the following definitions shall apply: (1) Fix(es) means an error correction or other update created to fix a previous software version that does not substantially conform to its Trimble specifications; (2) "Minor Update" occurs when enhancements are made to current features in a software program; and (3) "Major Upgrade" occurs when significant new features are added to software, or when a new product containing new features replaces the further development of a current product line. Trimble reserves the right to determine, in its sole discretion, what constitutes a Fix, Minor Update, or Major Upgrade.

Warranty Remedies
If the Trimble Product fails during the warranty period for reasons covered by this limited warranty and you notify Trimble of such failure during the warranty period, Trimble will repair or replace the nonconforming Product with new, equivalent to new, or reconditioned parts or Product, OR refund the Product purchase price paid by you, at Trimble’s option, upon your return of the Product in accordance with Trimble’s product return procedures then in effect.
PRODUCTS ARE ACQUIRED. IN SUCH A CASE, PLEASE CONTACT YOUR LOCAL TRIMBLE AUTHORIZED DEALER FOR APPLICABLE WARRANTY INFORMATION.

Official Language

THE OFFICIAL LANGUAGE OF THESE TERMS AND CONDITIONS IS ENGLISH. IN THE EVENT OF A CONFLICT BETWEEN ENGLISH AND OTHER LANGUAGE VERSIONS, THE ENGLISH LANGUAGE SHALL CONTROL.

Registration

To receive information regarding updates and new products, please contact your local dealer or visit the Trimble website at www.trimble.com/register. Upon registration you may select the newsletter, upgrade, or new product information you desire.
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Introduction

In this chapter:
- About the TerraSync software
- Related information
- Technical assistance
- Your comments

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, go to the Trimble website (www.trimble.com) for an interactive look at Trimble and GPS.

This manual assumes that you are familiar with the Microsoft® Windows® operating system that you are using.
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 Mapping and GIS 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 most common tasks performed using the TerraSync software

Online help

From the field computer, you can access the online help for the TerraSync software. The TerraSync Online Help is a screen-by-screen reference that tells you what each control on the screen does.

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

To access the TerraSync software context-sensitive help from:

- a Pocket PC or a handheld PC 2000, tap Help and then select Help.

If you tap Help and then select Help on a Pocket PC when the TerraSync software is not running, the main Help Contents topic appears. Select TerraSync to open the Contents topic of the TerraSync Help.

- a desktop computer, laptop computer, or Tablet PC, press [F1]. Alternatively, hold down the [Alt] key on the keyboard and then press [H].
Release Notes

The TerraSync Software Release Notes are included with the software in printed form and as a PDF file on the CD. The release notes 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 full 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:
- Elements and controls in the Map section
- Map tools
- Map layers
- Using the Map Section

Use the Map section to view a graphical display of the features in the open data file. You can also view a background image, GPS information, and navigation information in the Map section.

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

The color of an item on the map depends on which of the map layers the item belongs to.

Use the map tools 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 18.
Elements and controls in the Map section

To open the Map section, tap the Section list button and then select Map. A map displaying the features in the open data file appears.

Note – The TerraSync Standard edition software does not display background images or imported data files.

The map section includes the following elements:

- Buttons (see below)
- Icons (see page 7)
- Options (see page 8)
- Tools (see page 10)
- Layers (see page 11)

Table 2.1 Map section: Buttons

<table>
<thead>
<tr>
<th>Button</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Map Tools" /></td>
<td>Opens the map tool list. See Map tools, page 10.</td>
</tr>
<tr>
<td><img src="image" alt="Options" /></td>
<td>Options Opens the option list for the map. See page 8.</td>
</tr>
<tr>
<td><img src="image" alt="Layers" /></td>
<td>Layers Opens the layer option list for the map. See Map layers, page 11.</td>
</tr>
<tr>
<td><img src="image" alt="Create Feature" /></td>
<td>Starts a new feature without returning to the Data section. See Creating and ending features from the Map section, page 20.</td>
</tr>
<tr>
<td><img src="image" alt="End Feature" /></td>
<td>Closes the open feature without returning to the Data section. See Creating and ending features from the Map section, page 20.</td>
</tr>
<tr>
<td><img src="image" alt="Undo" /></td>
<td>Deletes the last digitized position recorded for the current feature. See Digitizing positions, page 20.</td>
</tr>
</tbody>
</table>
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 25.

Pause Pauses GPS position logging for the current feature. See Controlling logging from the Map section, page 25.

End Measurement Ends the current measurement. See Measuring, page 22.

<table>
<thead>
<tr>
<th>Item</th>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Lightbar" /></td>
<td>Lightbar</td>
<td>The lightbar uses colored icons to simulate the colored LEDs of a physical lightbar. The lightbar graphically guides you along the <strong>cross-track line</strong>, which is the shortest path between the navigation start and target. See <strong>Lightbar</strong>, page 88.</td>
</tr>
<tr>
<td><img src="image" alt="North arrow" /></td>
<td>North arrow</td>
<td>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.</td>
</tr>
<tr>
<td><img src="image" alt="GPS trail" /></td>
<td>GPS trail</td>
<td>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.</td>
</tr>
<tr>
<td><img src="image" alt="Current position" /></td>
<td>Current position</td>
<td>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.</td>
</tr>
<tr>
<td><img src="image" alt="Reference position" /></td>
<td>Reference position</td>
<td>The reference position for the base data file that is being collected. This icon only appears if a base data file is open.</td>
</tr>
<tr>
<td><img src="image" alt="Map point" /></td>
<td>Map point</td>
<td>A point that you have selected from the map which is not part of a feature. Tap a map point to display a tooltip showing information about the position. See <strong>Position information</strong>, page 8.</td>
</tr>
<tr>
<td><img src="image" alt="Navigation start" /></td>
<td>Navigation start</td>
<td>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. Use either the Map section or the Navigation section to navigate from the start to the navigation target.</td>
</tr>
<tr>
<td><img src="image" alt="Navigation target" /></td>
<td>Navigation target</td>
<td>An icon indicating the feature or point that is currently selected as the target for navigation. When a target is selected, use either the Map section or the Navigation section to navigate to its location.</td>
</tr>
<tr>
<td><img src="image" alt="Bearing to go arrow" /></td>
<td>Bearing to go arrow</td>
<td>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.</td>
</tr>
<tr>
<td><img src="image" alt="Features" /></td>
<td>Features</td>
<td>Features that have been logged in the current data file. Each feature type appears using the point feature symbol or line thickness defined in the data dictionary. The color of a feature 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.</td>
</tr>
</tbody>
</table>
Between feature GPS

A trail of small crosses that show all GPS positions logged but not associated with a feature.

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.

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

Scale

The scale at which the map is drawn. As you zoom in or out, the scale changes accordingly.

Table 2.2 Map section: Icons

<table>
<thead>
<tr>
<th>Item</th>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between feature GPS</td>
<td>A trail of small crosses that show all GPS positions logged but not associated with a feature.</td>
<td></td>
</tr>
<tr>
<td>Position information</td>
<td>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.</td>
<td></td>
</tr>
<tr>
<td>Digitized position</td>
<td>The last point that you digitized for the open feature.</td>
<td></td>
</tr>
<tr>
<td>Measured point</td>
<td>The last point that you measured.</td>
<td></td>
</tr>
<tr>
<td>Measurement information</td>
<td>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.</td>
<td></td>
</tr>
<tr>
<td>Command bar</td>
<td>A toolbar containing zooming and panning controls:</td>
<td></td>
</tr>
<tr>
<td>Scale</td>
<td>The scale at which the map is drawn. As you zoom in or out, the scale changes accordingly.</td>
<td></td>
</tr>
</tbody>
</table>

Table 2.3 Map section: Options

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zoom Extents</td>
<td>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, the Zoom extents option does not affect the map scale.</td>
</tr>
</tbody>
</table>
| 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 outside the displayed area on the map or is close to the edge of the map, the TerraSync software automatically pans to bring the GPS position to the center of the map. 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. |
Map Section

Table 2.3 Map section: Options

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
</table>
| 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 outside the displayed area on the map or is close to the edge of the map, the TerraSync software automatically pans to bring the selected feature to the center of the map. 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.** |
| Filter                | Opens the Filter By form in the Data section, where you can set or change filtering criteria (see page 56).                                  |
| Update Selected Feature| Opens the Data section and displays the Attribute Entry form for the currently selected feature, where you can update the attributes or position of the feature (see page 38). 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 in the Update Features screen in the Data section (see page 52).  
  
  **Note – Deleted features are never displayed in the map. Once a feature is deleted, it is hidden on the map. To undo a deleted feature, use the Update Features screen (see page 51).** |
| Set Nav Start         | Defines the position of the navigation start. See Setting and clearing the navigation start and target, page 23.                             |
| Set Nav Target        | Defines the position of the navigation target. See Setting and clearing the navigation start and target, page 23.                           |
| 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 88.       |
| Enter Coordinates     | Opens the Enter Coordinates form, where you can record a position for the open feature by entering its coordinates manually. See Creating manual positions, page 22.  
  
  **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 button and from the drop-down list select the tool you want to use.

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 – Use the Command bar to pan or zoom at any time without changing the map tool (see page 8). 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>
<thead>
<tr>
<th>Tool</th>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>![Select]</td>
<td>Select</td>
<td>When the Select tool is selected, tap a point on the map to highlight a position or a feature. Double-tap a feature to open it for update. See Selecting features and map points, page 18.</td>
</tr>
<tr>
<td>![Zoom In]</td>
<td>Zoom In</td>
<td>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 19.</td>
</tr>
<tr>
<td>![Zoom Out]</td>
<td>Zoom Out</td>
<td>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 19.</td>
</tr>
<tr>
<td>![Pan]</td>
<td>Pan</td>
<td>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 18.</td>
</tr>
<tr>
<td>![Digitize]</td>
<td>Digitize</td>
<td>When the Digitize tool is selected, tap a point on the map to create a position for a feature. See Digitizing positions, page 20.</td>
</tr>
<tr>
<td>![Measure]</td>
<td>Measure</td>
<td>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 22.</td>
</tr>
</tbody>
</table>
## 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>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
</table>
| 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 27). |
| 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 positions on the map (see page 8).                                                                                                                                     |
| 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 using the TerraSync Professional edition software. |
| GPS Trail               | Hides or displays the GPS trail (see page 7).                                                                                                                                                              |
| Background File         | Opens the **Background File** form where you can select a data or background file to be used as the map background, or clear the currently selected background (see page 12).  
This option is not available in the TerraSync Standard edition software. You can only open background files using the TerraSync Professional edition software. |
| Layer Formatting        | Opens the **Layer Formatting** form, where you can change the colors and line thicknesses used for the layers in the map (see page 15).                                                                  |
**Background File form**

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

Use the **Background File** form to select a file to be displayed in the background of the map, or to clear the current background selection.

To open the **Background File** form, in the Map section tap **Layers** and then select **Background file**.

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 2.60 of the TerraSync software. To use Shapefiles as background files, use the **Read from Shape form** in the Data section to convert Shapefiles into TerraSync software data files (see page 66).

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 software 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 address of the map server from the **URL** field, or set the **Location** field to Device and from the list of files select None.

   **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 2.4 Background File form: Fields**

<table>
<thead>
<tr>
<th>Field</th>
<th>Default</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Location</strong></td>
<td>Default</td>
<td>The location of the files to be listed in the <strong>Files</strong> 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.</td>
</tr>
<tr>
<td><strong>File Type</strong></td>
<td>Background</td>
<td>The type of file to list in the <strong>Files</strong> field. The options are:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- <strong>Background</strong> Data files that have been transferred to the field computer as background files, or raster (bitmap) image files</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- <strong>Data</strong> Data files in the <strong>SSF</strong> format, including .ssf, .imp, and .cor files</td>
</tr>
</tbody>
</table>

   This field does not appear if Internet is selected in the **Location** field.
### Table 2.4  Background File form: Fields (continued)

<table>
<thead>
<tr>
<th>Field</th>
<th>Default</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Files</td>
<td>None</td>
<td>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:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- BMP A bitmap (.bmp) file</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- JPEG A .jpg file</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- MrSID A .sid file</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- TIFF A .tif file</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Trimble A Trimble data file</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Vector A background file containing vector data</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- None No background file is selected</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Select a filename from this list. If you select None, the current background file is closed and no background information is displayed.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>This field only appears if Default or Card is selected in the Location field.</td>
</tr>
<tr>
<td>Server type</td>
<td>Open GIS</td>
<td>The type of Web map server to connect to. The options are:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- ArcIMS A map server that uses the ArcIMS protocol</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Open GIS A map server that conforms to the Open GIS standard</td>
</tr>
<tr>
<td>URL</td>
<td>None</td>
<td>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. Once you successfully connect to a server, the server is added to the drop-down list.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>This field only appears if Internet is selected in the Location field.</td>
</tr>
<tr>
<td>Service</td>
<td>None</td>
<td>The map service that you want to use from the selected ArcIMS Web map server.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>If you want to connect to an Open GIS server, leave this field blank. Open GIS servers do not provide services.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>This field only appears if Internet is selected in the Location field.</td>
</tr>
<tr>
<td>Coordinate system</td>
<td>None</td>
<td>This field only appears if Internet is selected in the Location field. The coordinate system that maps will be downloaded in. The selected option must match the coordinate system configured in the Coordinate System form in the Setup section (see page 151). Some servers do not let you select a coordinate system for the images you download. If this field is not available, set the coordinate system in the TerraSync software to match the coordinate system of the image. To do this, go to the website for the map server to determine the coordinate system required, and then select the same system in the Setup section.</td>
</tr>
<tr>
<td>Layers</td>
<td>None</td>
<td>This field only appears if Internet is selected in the Location field. The layers that you want to download. Under this heading, a check box appears for each layer in the selected service.</td>
</tr>
</tbody>
</table>
**Layer Formatting form**

Use the *Layer Formatting* form to change the colors assigned to items in the five Map layers (see page 11).

To open the *Layer Formatting* form, in the Map section tap **Layers** and then select **Layer Formatting**.

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 2.5  Layer Formatting form: Fields

<table>
<thead>
<tr>
<th>Field</th>
<th>Default</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Filtered Features</td>
<td>(none)</td>
<td>Sets the display options for the <strong>Filtered Features</strong> layer (see page 11).</td>
</tr>
<tr>
<td>Color Source</td>
<td>Layer color</td>
<td>Specifies whether to display filtered features using the layer color or the color specified in the data dictionary.</td>
</tr>
<tr>
<td>Color</td>
<td>Dark Green</td>
<td>The color for filtered features in the data file. This field only appears if the <strong>Color Source</strong> field is set to Layer Color (see page 15).</td>
</tr>
<tr>
<td>Unfiltered Features</td>
<td>(none)</td>
<td>Sets the display options for the <strong>Unfiltered Features</strong> layer (see page 11).</td>
</tr>
<tr>
<td>Color Source</td>
<td>Data dictionary</td>
<td>Specifies whether to display unfiltered features using the layer color or the color specified in the data dictionary.</td>
</tr>
<tr>
<td>Color</td>
<td>Black</td>
<td>The color for unfiltered features in the data file. This field only appears if the <strong>Color Source</strong> field is set to Layer Color (see page 15).</td>
</tr>
<tr>
<td>Vector Background</td>
<td>(none)</td>
<td>Sets the display options for the <strong>Background</strong> layer (see page 11).</td>
</tr>
<tr>
<td><strong>Note</strong> – This field is not available in the TerraSync Standard edition software.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Color Source</td>
<td>Data dictionary</td>
<td>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.</td>
</tr>
</tbody>
</table>
Enter Coordinates form

Use the Enter Coordinates form to record a manual position for the open feature by entering its coordinates.

To open the Enter Coordinates form, in the Map section tap Options and then select Enter Coordinates.

This option is only available if there is an open feature and the Map section is in Digitize mode (see page 10). 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 22.
Table 2.6   Enter Coordinates form: Fields

<table>
<thead>
<tr>
<th>Field</th>
<th>Default</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Latitude</td>
<td>?</td>
<td>This field only appears if the current coordinate system is Lat/Long. The latitude of the manual position. The value in this field is displayed in the units specified in the Coordinate System form (see page 151). <strong>Note</strong> – 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. <strong>Note</strong> – The symbols for degrees (°), minutes (‘), and seconds (”) can be omitted or replaced with a space, but you must include the decimal point (.).</td>
</tr>
<tr>
<td>Longitude</td>
<td>?</td>
<td>This field only appears if the current coordinate system is Lat/Long. The longitude of the manual position. The value in this field is displayed in the units specified in the Coordinate System form (see page 151).</td>
</tr>
<tr>
<td>North</td>
<td>?</td>
<td>This field only appears if the current coordinate system uses North/East. The northing of the manual position, in the coordinate units specified in the Coordinate System form (see page 151).</td>
</tr>
<tr>
<td>East</td>
<td>?</td>
<td>This field only appears if the current coordinate system uses North/East. The easting of the manual position, in the coordinate units specified in the Coordinate System form (see page 151).</td>
</tr>
<tr>
<td>USNG</td>
<td>?</td>
<td>This field only appears if you have enabled USNG display in the Coordinate System form (see page 151). The northing and easting of the manual position, in USNG format.</td>
</tr>
<tr>
<td>Altitude</td>
<td>?</td>
<td>This field only appears if you have enabled USNG display in the Coordinate System form (see page 151). The altitude of the manual position. The altitude is expressed as a <strong>Height Above Ellipsoid</strong> or <strong>Mean Sea Level</strong>, depending on the option configured in the Coordinate System form (see page 151), and is in the altitude units specified in this form.</td>
</tr>
</tbody>
</table>
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 27), it becomes the selected feature in the map.

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 *Update Features* screen (see page 51) in the Data section.

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 that is not a feature (see page 7), 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 10) and then tap 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 8) at the bottom of the Map section.
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 option (see page 8), 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.

- When you select the Auto Pan to Selection option (see page 9), the TerraSync software 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, select the Zoom In tool (see page 10) 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 8) to zoom in to 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, select the Zoom Out tool (see page 10) 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 Options list (see page 8). The map scale increases until all points in all the visible layers appear. The map layers that you can display include features in the data file and background file, the current GPS position, and past GPS positions (see page 11).

**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 data dictionary of the open file. 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 done one of the following, you will be asked to confirm that you want to close this feature:

- collected insufficient positions
- have not entered all the attribute values for the feature
- have set the Confirm End Feature field in the Logging Settings form to Yes (see page 127)

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.

---

**Digitizing positions**

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 20.

2. Make sure that GPS logging is paused.

---

**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 positions, page 20.
3. Select the Digitize tool (see page 10). 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 10), 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.

You can record manual positions when all of the following are true:

- A feature is open.
- GPS logging is paused.
- The Digitize tool (see page 10) is active.

For more information, see Digitizing positions, page 20.

To record a manual position:

1. Tap **Options** in the Map section.
2. From the drop-down list, select **Enter Coordinates**. The **Enter Coordinates** form appears. The fields that appear (Latitude, Longitude, and Altitude, or North, East, and Altitude) depend on the current coordinate system (see page 16).
3. Enter the coordinates of the position.
4. Tap **OK** to close the form and store the position.

Measuring

Use the Measure tool to measure the distance between points, or the area enclosed by a set of points. To measure a distance or area:

1. Select the Measure tool (see page 10). A tooltip appears in the top left corner of the map.
2. Tap on the map where you want to start measuring.
3. Tap 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 to 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.

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 to navigate (see page 88), 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. 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 required. 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).

   [Tip – A start icon also appears beside the selected feature in the Update Features screen (see page 51).]

The start icon appears over the selected map point, feature, or position.
**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 87), 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. 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 required. 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 appears (see page 59). 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 the **Update Features** screen (see page 51).

### 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 **Update Features** screen in the Data section. 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 have 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. 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 40.
Data Section

In this chapter:
- New File screen
- Collect Features screen
- Existing File screen
- Update Features screen
- File Manager
- Data Dictionary Editor

Use the Data section to open data files, collect new data, update existing data, and manage files in the field.

To display the Data section, tap the arrow on the Section button next to the status bar and from the drop-down list select Data.
New File screen

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

To display the New File screen, tap the arrow on the Subsection button below the Section button and then select New. The New File screen appears.

Select a file type, filename, and (for rover files only) a data dictionary, and then tap Create to create a new file. If the new file is:

- a rover file, the Collect Features screen appears (see page 35)
- a base file, the Base Station Setup wizard appears (see page 30)

💡 Tip – Once you have logged features to the new file, you can switch to the Update Features screen (see page 51) to edit the features you have collected so far.

<table>
<thead>
<tr>
<th>Table 3.1 New File screen: Fields</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>File Type</td>
<td>The type of data that will be stored in the new file. The options are:</td>
</tr>
<tr>
<td></td>
<td>• Rover The new file will contain feature, attribute, and position information.</td>
</tr>
<tr>
<td></td>
<td>• 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.</td>
</tr>
<tr>
<td>Location</td>
<td>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.</td>
</tr>
<tr>
<td>File Name</td>
<td>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:</td>
</tr>
<tr>
<td></td>
<td>• R or Base is the Filename Prefix.</td>
</tr>
<tr>
<td></td>
<td>• MM is the current month,</td>
</tr>
<tr>
<td></td>
<td>• DD is the current day of the month,</td>
</tr>
<tr>
<td></td>
<td>• HH is the current hour of the day,</td>
</tr>
<tr>
<td></td>
<td>• X increments within this hour, starting at A for the first file in that hour, then B for the second file, and so on.</td>
</tr>
<tr>
<td></td>
<td><strong>Note</strong> – You can change the prefix character for rover files in the Logging Settings form in the Setup section (see page 126).</td>
</tr>
</tbody>
</table>

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.
Confirm Antenna Height form

Use the **Confirm Antenna Height** form to specify the antenna height and measurement position, so that you can accurately record altitude data.

If the **Confirm** field in the **Antenna Settings** form (see page 129) is set to Per File, the **Confirm Antenna Height** form appears whenever you tap **Create** in the **New File** screen (see above), or tap **Open** in the **Existing File** screen (see page 49).

If the **Confirm** field in the **Antenna Settings** form is set to Per Feature, the **Confirm Antenna Height** form appears whenever you create a new feature or update position information for an existing feature.

The values shown in the **Confirm Antenna Height** form default to the values shown in the **Antenna Settings** form (see page 129). If you change either value, it is also changed in the **Logging Settings** form.

<table>
<thead>
<tr>
<th>Field</th>
<th>Default</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Height</strong></td>
<td>The current value set in the <strong>Height</strong> field of the <strong>Antenna Settings</strong> form.</td>
<td>The height of the GPS antenna that is connected to the GPS receiver. This is used as a vertical offset on each position.</td>
</tr>
<tr>
<td><strong>Measure To</strong></td>
<td>The current value set in the <strong>Measure To</strong> field of the <strong>Antenna Settings</strong> form.</td>
<td>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.</td>
</tr>
</tbody>
</table>
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 28) 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 187.

The following sections describe each step of the Base Station Setup wizard:

- Antenna Settings step, page 30
- Logging and GPS Settings step, page 31
- Real-Time Output step, page 31
- Reference Position step, page 34

Antenna Settings step

Use the Antenna Settings step of the Base Station Setup wizard to specify the antenna type that you are using and its height.

When you have made your changes, tap Next.

Click Cancel to close the wizard and return to the New File screen.

Table 3.3 Antenna Settings step: Fields

<table>
<thead>
<tr>
<th>Field</th>
<th>Default</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Height</td>
<td>0.00 m</td>
<td>The height of the GPS antenna that is connected to the GPS receiver. This is used as a vertical offset on each position.</td>
</tr>
<tr>
<td>Type</td>
<td>Unknown</td>
<td>The type of antenna that is connected to the GPS receiver. See Antenna Settings form, page 128.</td>
</tr>
<tr>
<td>Part Number</td>
<td>n/a</td>
<td>The part number of the antenna that is connected to the GPS receiver. See Antenna Settings form, page 128.</td>
</tr>
<tr>
<td>Measure Height To</td>
<td>(none)</td>
<td>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 128.</td>
</tr>
</tbody>
</table>
Logging and GPS Settings step

Use the Logging and GPS Settings step of the Base Station Setup wizard to specify the logging interval and GPS settings for the base station.

When you have made your changes, tap Next.

Click Cancel to close the wizard and return to the New File screen.

Table 3.4 Logging and GPS Settings step: Fields

<table>
<thead>
<tr>
<th>Field</th>
<th>Default</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Logging interval</td>
<td>5s</td>
<td>The logging interval, in seconds, for the base station data. Select an option from the drop-down list.</td>
</tr>
<tr>
<td>DOP Type</td>
<td>PDOP</td>
<td>The type of DOP value to use. This field is read-only.</td>
</tr>
<tr>
<td>Max PDOP</td>
<td>99.0</td>
<td>The maximum PDOP value. This field is read-only.</td>
</tr>
<tr>
<td>Min SNR</td>
<td>0.0</td>
<td>The minimum SNR value. The SNR is a measure of the quality of the signal from a satellite. When the SNR of a satellite falls below the minimum value, the TerraSync software stops using that satellite to calculate the GPS position of the base station.</td>
</tr>
<tr>
<td>Min Elevation</td>
<td>0°</td>
<td>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 GPS position of the base station.</td>
</tr>
</tbody>
</table>

Real-Time Output step

Use the Real-time Output step of the Base Station Setup wizard 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 made your changes, tap Next.

Click Cancel to close the wizard and return to the New File screen.
### Table 3.5 Real-Time Output step: Fields

<table>
<thead>
<tr>
<th>Field</th>
<th>Default</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Correction Output</td>
<td>Off</td>
<td>This field specifies whether differential corrections will be output for</td>
</tr>
<tr>
<td></td>
<td></td>
<td>broadcast. The options are:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Off  Do not output differential corrections. If this option is selected,</td>
</tr>
<tr>
<td></td>
<td></td>
<td>this is the only field on the form.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Receiver Port  Output differential corrections on the receiver port. To</td>
</tr>
<tr>
<td></td>
<td></td>
<td>configure the receiver port, tap the Setup button beside this field. The</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Receiver Port Settings form appears (see page 145).</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• R8 Internal Radio  Output corrections on the receiver’s internal transmit</td>
</tr>
<tr>
<td></td>
<td></td>
<td>radio. This options is only available if the receiver is an R8. To</td>
</tr>
<tr>
<td></td>
<td></td>
<td>configure the radio, tap the Setup button beside this field. The R8</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Internal Radio Settings form appears (see page 34).</td>
</tr>
</tbody>
</table>

**Note** – When you configure a GPS Pathfinder® receiver to output RTCM messages, the communication settings set in this form override the NMEA output and RTCM input settings defined in the NMEA Output Settings form (see page 135) and the Receiver Port Settings form (see page 145).

| Station ID             | 1       | The ID number that the base station will use to identify itself to rovers.  |
|                       |         | Enter a station ID number between 0 and 1023.                              |

| Real-time Protocol     | RTK/DGPS| The message format to be used. Select an option from the drop-down list.   |
|                       | 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.                                          |

| Message Interval       | 1s      | 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.                     |

⚠️ **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         | None    | 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.                                                                 |
Use the Receiver Port Settings form to configure communication settings between the GPS receiver port and the data radio that is used to broadcast the correction messages.

To display the Receiver Port Settings form, tap the Setup button in the Real-time Output step.

This form contains the same fields as the Receiver Port Settings form in the Real-time subsection of the Setup section (see page 145).
R8 Internal Radio Settings form

Use the R8 Internal Radio Settings form to configure the R8 receiver to broadcast corrections using its internal transmit radio.

To display the R8 Internal Radio Settings form, 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.

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

<p>| Table 3.6 R8 Internal Radio Settings form: Fields |</p>
<table>
<thead>
<tr>
<th>Button</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Channel</td>
<td>The channel that the R8 receiver’s internal radio will transmit corrections on.</td>
</tr>
</tbody>
</table>

Reference Position step

Use the Reference Position step of the Base Station Setup wizard to specify the location of the base receiver (its reference position).

<p>| Table 3.7 Reference Position step: Buttons |</p>
<table>
<thead>
<tr>
<th>Button</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Here</td>
<td>Sets the reference position to the current GPS position. <strong>Note</strong> – Because the current GPS position is autonomous, using the Here button will result in an inaccurate reference position. Trimble recommends that the base station is set up over a known, surveyed point, and that you 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. <strong>Tip</strong> – 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.</td>
</tr>
<tr>
<td>Back</td>
<td>Returns to the Real-Time Output step (see page 31).</td>
</tr>
<tr>
<td>OK</td>
<td>Closes the Base Station Setup wizard and begins logging base data. The Collect Base Data screen appears (see page 37).</td>
</tr>
<tr>
<td>Cancel</td>
<td>Cancels the Base Station Setup wizard and returns to the New File screen (see page 28).</td>
</tr>
</tbody>
</table>
Note – The Collect Features screen is only available when a data file is open. Use the New File screen to open a new data file (see page 28), or the Existing File screen to open an existing data file (see page 49).

Use the Collect Features screen to select a feature type to add.

To open the Collect Features screen, tap the arrow on the Subsection button below the Section button and then select Collect. The Collect Features screen appears.

To add a feature, select it from the Choose Feature list and tap Create. An attribute entry form appears.

Table 3.9 Collect Features screen form: Buttons

<table>
<thead>
<tr>
<th>Button</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Create</td>
<td>Adds a new feature of the selected type. When you tap Create, the Attribute Entry form for the feature selected in the Choose Feature list appears (see page 38).</td>
</tr>
</tbody>
</table>

Tip – The Map screen also has a Create Feature button (see page 6).
Table 3.10 Collect Features screen form: Fields

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>File</td>
<td>The filename of the open file. This field is read-only.</td>
</tr>
<tr>
<td>Choose Feature list</td>
<td>The feature types in the data dictionary. Select the type of feature you want to create. The list contains the following columns:</td>
</tr>
<tr>
<td></td>
<td>• Type The type of feature, indicated by the line or area icon, or the point symbol configured in the data dictionary.</td>
</tr>
<tr>
<td></td>
<td>• Name The name of the feature.</td>
</tr>
</tbody>
</table>

Table 3.11 Collect Features screen form: Options

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Logging interval</td>
<td>Opens the Logging Interval form where you can configure the logging interval for all features of the selected type in the open data file (see page 47).</td>
</tr>
<tr>
<td>Repeat</td>
<td>Sets the default attribute values for each new feature to the same values 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 169.</td>
</tr>
<tr>
<td>Log Now</td>
<td>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.</td>
</tr>
<tr>
<td>Log Later</td>
<td>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.</td>
</tr>
</tbody>
</table>
| Trigger <sensor name> | Sends a data request to the sensor. If the sensor is configured to fill in an attribute value, the value of the specified attribute is updated with the sensor message.  
**Note** – This option only appears if the sensor is configured to provide data when requested. To do this, open the Sensor Properties form (see page 155) and set the Receive Mode field 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 161. |
Collect Base Data form

Note – This screen is only available when a base file is open. Use the New File screen to open a new base file (see page 28).

Use the Collect Base Data form to monitor the status of the open base file, or to change the base station logging settings.

To open the Collect Base Data screen, tap the arrow on the Subsection button below the Section button and then select Collect. The Collect Base Data screen appears.

<table>
<thead>
<tr>
<th>Button</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Options</td>
<td>Opens the option list for this form. See the Options table below.</td>
</tr>
<tr>
<td>Close</td>
<td>Closes the current base file and returns to the New File screen (see page 28).</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>File</td>
<td>The filename of the open file.</td>
</tr>
<tr>
<td>Start</td>
<td>The time and date when the base file was opened.</td>
</tr>
<tr>
<td>Duration</td>
<td>The duration, in hours, minutes, and seconds, of the current base data logging session.</td>
</tr>
</tbody>
</table>

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>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Base Settings</td>
<td>Opens the Base File Logging Settings form where you can configure the logging interval and GPS settings for the open base file (see page 38).</td>
</tr>
</tbody>
</table>
**Base File Logging Settings form**

Use the *Base File Logging Settings* form to change the logging interval and GPS settings for the base data file that you are logging.

To open the *Base File Logging Settings* form, in the *Collect Base Data* form, tap *Options*, and then select the *Base Settings* option (see page 37).

Alternatively, tap the Setup button in the Skyplot section (see page 94) or the Satellite Information section (see page 99).

*Note* – If this form is already open, the *Logging Settings* and *GPS Settings* buttons in the Setup section are unavailable (see page 121).

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 31).

**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 and tap *Create* (see page 35).

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 53.

Table 3.15  Attribute entry form: Buttons

<table>
<thead>
<tr>
<th>Button</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="ok.png" alt="Ok" /> OK</td>
<td>Closes and saves the current feature and returns to the Collect Features screen (see page 35).</td>
</tr>
<tr>
<td><img src="cancel.png" alt="Cancel" /> Cancel</td>
<td>Returns to the Collect Features screen (see page 35) without saving the current feature.</td>
</tr>
<tr>
<td><img src="log.png" alt="Log" /> Log</td>
<td>Starts logging GPS positions.</td>
</tr>
<tr>
<td><img src="pause.png" alt="Pause" /> Pause</td>
<td>Suspends logging of GPS positions. See Pausing and resuming logging, page 40.</td>
</tr>
<tr>
<td><img src="resume.png" alt="Resume" /> Resume</td>
<td>Starts logging GPS positions again after you have paused logging. See Pausing and resuming logging, page 40.</td>
</tr>
<tr>
<td><img src="options.png" alt="Options" /> Options</td>
<td>Opens the option list for this form. For a detailed list of the available options, see the table below.</td>
</tr>
</tbody>
</table>

Table 3.16  Attribute entry form: Fields

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="mark.png" alt="Mark as updated" /> Mark as updated</td>
<td>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.</td>
</tr>
<tr>
<td><img src="attribute.png" alt="Attribute fields" /> Attribute fields</td>
<td>The attribute entry form includes a field for each attribute defined in the data dictionary for this feature type.</td>
</tr>
</tbody>
</table>

Table 3.17  Attribute entry form: Options

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="offset.png" alt="Offset" /> Offset</td>
<td>If a line or area feature is open, this option opens the Offset form where you can enter or edit the offset for the selected feature (see page 41). If a point feature is open, this option opens the Point Offset Type form where you can choose the type of offset to record for the selected point feature (see page 42).</td>
</tr>
<tr>
<td><img src="new_vertex.png" alt="New Vertex" /> New Vertex</td>
<td>Opens the Vertex form where you can record an averaged vertex for the selected line or area feature (see page 46).</td>
</tr>
<tr>
<td><img src="logging_interval.png" alt="Logging Interval" /> Logging Interval</td>
<td>Opens the Logging Interval form where you can change the logging interval for the selected feature type (see page 47).</td>
</tr>
</tbody>
</table>
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 set for line/area features).

Tip – You can also start, pause, and resume logging from the Map section (see page 5).
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 168.

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

Table 3.18 Offset form: Fields

<table>
<thead>
<tr>
<th>Field</th>
<th>Default</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direction</td>
<td>(none)</td>
<td>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.</td>
</tr>
<tr>
<td>Horizontal distance</td>
<td>0.00 m</td>
<td>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 field in the Units form is set to Horizontal/Vertical (see page 153).</td>
</tr>
<tr>
<td>Vertical distance</td>
<td>0.00 m</td>
<td>The vertical distance between your position and the feature. This field only appears if the Offset Format field in the Units form is set to Horizontal/Vertical (see page 153).</td>
</tr>
<tr>
<td>Slope distance</td>
<td>0.00 m</td>
<td>The distance from your position to the feature, including any difference in height. This field only appears if the Offset Format field in the Units form is set to Slope distance (see page 153).</td>
</tr>
<tr>
<td>Inclination</td>
<td>0.00°</td>
<td>The angle of inclination between your position and the feature. This field only appears if the Offset Format field in the Units form is set to Slope distance (see page 153).</td>
</tr>
</tbody>
</table>
Point Offset Type form

Use the Point Offset Type form to specify the type of offset to record.

When you select the Offset option in the attribute entry form for the feature (see page 38,) and the selected feature is a point feature, the Point Offset Type form appears.

Select an option and tap Next to open the corresponding form. For more information see:

- Distance-Bearing Offset form, page 42
- Distance-Distance Offset form, page 43
- Triple Distance Offset form, page 44
- Bearing-Bearing Offset form, page 45
- Triple Bearing Offset form, page 46

Distance-Bearing Offset form

Use the Distance-Bearing Offset form to specify a distance-bearing offset.

To display the Distance-Bearing Offset form, from the Point Offset Type form select the Distance-Bearing option.

When you set a distance-bearing offset, you must 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.

Table 3.19 Distance-Bearing Offset form: Fields

<table>
<thead>
<tr>
<th>Field</th>
<th>Default</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bearing</td>
<td>0.00°</td>
<td>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 153).</td>
</tr>
<tr>
<td>Horizontal distance</td>
<td>0.00 m</td>
<td>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 field in the Units form is set to Horizontal/Vertical (see page 153).</td>
</tr>
</tbody>
</table>
Data Section

Distance-Distance Offset form

Use the Distance-Distance Offset form to specify a distance-bearing offset.

To display the Distance-Distance Offset form, from the Point Offset Type form select the Distance-Distance option (see page 42).

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 166.

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 162.

Table 3.20 Distance-Distance offset form: Buttons

<table>
<thead>
<tr>
<th>Button</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Next</td>
<td>Moves to the next step in the sequence. When you have completed all steps, this button is replaced with the OK button.</td>
</tr>
<tr>
<td>Clear</td>
<td>Deletes all the offset and position data that you have recorded for this feature.</td>
</tr>
</tbody>
</table>
Use the **Triple Distance Offset form** to specify a triple-distance offset.

To display the **Triple Distance Offset form**, from the **Point Offset Type** form select the **Triple-Distance** option (see page 42).

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 166.

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 162.

The **Triple Distance Offset form** contains the same controls as the **Distance-Distance Offset form** (see page 43), 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.

### Table 3.21 Distance-Distance offset form: Fields

<table>
<thead>
<tr>
<th>Field</th>
<th>Default</th>
<th>Description</th>
</tr>
</thead>
</table>
| Reference position | (none) | 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.  |
| Distance     | (none) | The distance from the reference position to the feature. Depending on the current **Offset Format** set in the **Units form** (see page 153), the fields below this heading are either **Horizontal distance** and **Vertical distance** (see page 41), or **Slope distance** and **Inclination** (see page 41). The fields are repeated for each reference position.  |
| Direction    | (none) | The direction of the feature relative to the path between the reference positions. The options are left and right. |
Bearing-Bearing Offset form

Use the Bearing-Bearing Offset form to specify a bearing-bearing offset.

To display the Bearing-Bearing form, from the Point Offset Type form select the Bearing-Bearing option (see page 42).

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 167.

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 162.

Table 3.22  Bearing-Bearing Offset form: Buttons

<table>
<thead>
<tr>
<th>Button</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Next</td>
<td>Moves to the next step in the sequence. When you have completed all steps, this button is replaced with the OK button.</td>
</tr>
<tr>
<td>Clear</td>
<td>Deletes all the offset and position data recorded for this feature.</td>
</tr>
</tbody>
</table>

Table 3.23  Bearing-Bearing Offset form: Fields

<table>
<thead>
<tr>
<th>Field</th>
<th>Default</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reference position</td>
<td>(none)</td>
<td>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 on the Distance-Distance Offset form (see page 43).</td>
</tr>
<tr>
<td>Bearing</td>
<td>0.00°</td>
<td>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 153).</td>
</tr>
</tbody>
</table>
**Triple Bearing Offset form**

Use the *Triple Bearing Offset* form to specify a triple-bearing offset.

To display the *Triple Bearing Offset* form, from the Point Offset Type form select the *Triple-Bearing* option (see page 42).

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 167.

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 162.

The *Triple Bearing Offset* form contains the same buttons and fields as the *Bearing-Bearing Offset* form (see page 45), except that the repeated fields appear three times (for the three reference positions A, B, and C).

**Vertex form**

Use the *Vertex* form to log an averaged vertex for a line or area feature.

To display the *Vertex* form, from the attribute entry form select the *New Vertex* option (see page 38).

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. See *Recording averaged vertices*, page 170.
Tip – If you want a line or area feature to contain only vertices, use the Log Later function to pause logging before opening the feature (see page 36). 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.

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, 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. 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

Use the Logging Interval form to 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 made in this form are applied to all features of the selected type that you collect or update in the open data file.

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 in the Setup section (see page 126).

To open the Logging interval form, tap Options in one of the following screens and then select Logging interval:

- Collect Features screen (see page 35)
- Attribute entry form for a new feature (see page 38)
- Update Features screen (see page 51)
Use the Continue Feature form to resume logging of a feature that you have paused.

To display the Continue Feature form, from the Collect Features screen tap Options and select Continue (see page 35).

The Continue Feature form displays a list of line and area features that are paused but can be resumed.

To continue a feature, select it from the list and tap Continue. The attribute entry form for the selected feature appears (see page 38), and logging of GPS positions to this feature resumes. See Continuing line and area features, page 161.
Use the **Existing File** screen to open an existing data file.


To open the **Existing File** screen, tap the arrow on the Subsection button below the Section button and then select **Existing**.

**Note** – This screen is not available if a file is already open. To access this section, close the open data file.

Select an existing data file from the list of files and then tap **Open** to open this file and begin reviewing existing features in the **Update Features** screen (see page 51).

**Tip** – You can also switch to the **Collect Features** screen to add new features to the file (see page 35). 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 3.27 Existing File screen: Fields

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location</td>
<td>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.</td>
</tr>
</tbody>
</table>
| List of files | A list of all the data files that are available for update. The list contains the following columns:  
  - Name  
  - Time  
  - Size  
  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 appears (see page 51). |
| Features  | The number of features in the selected file.                                                                                                  |
| Positions | The number of position records in the selected file.                                                                                           |
| Status    | The update status of the selected file. The options are:  
  - Transferred  
  - Not Transferred  
  - Imported  
  *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 screen

Use the Update Features screen to review and maintain features and attributes that have already been collected. You can update attributes, offsets, and GPS positions, or delete features.

To open the Update Features screen, tap the arrow on the Subsection button below the Section button and then select Update.

Note – This subsection is only available when a file is open. Use the Existing File screen to open an existing data file (see page 49), or the New File screen to open a new data file (see page 28).

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

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.

### Table 3.28 Update Features screen: Buttons

<table>
<thead>
<tr>
<th>Button</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Begin</td>
<td>Opens the selected feature on the list for update. Tap <strong>Begin</strong> to open the attribute entry form for the selected feature.</td>
</tr>
</tbody>
</table>

### Table 3.29 Update Features screen: Fields

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>File</td>
<td>The filename of the open file. This field is read-only.</td>
</tr>
<tr>
<td>Choose Feature list</td>
<td>The list of features for review or update. The list contains the following columns:</td>
</tr>
<tr>
<td>#</td>
<td>The feature identification number. Each feature is given a unique number in the file.</td>
</tr>
<tr>
<td>Name</td>
<td>The name of the feature and its type, shown by the point, line, or area icon to the left of the feature name</td>
</tr>
<tr>
<td>Update</td>
<td>The update status (see page 54) of the feature:</td>
</tr>
<tr>
<td>• blank</td>
<td>The feature is new.</td>
</tr>
<tr>
<td>• ☐</td>
<td>The feature has been imported from the postprocessing software.</td>
</tr>
<tr>
<td>• ☑</td>
<td>The feature has been updated.</td>
</tr>
<tr>
<td>Filter</td>
<td>The filter status of the feature:</td>
</tr>
<tr>
<td>• (blank)</td>
<td>The feature does not meet the criteria of the filter, or no filter has been set.</td>
</tr>
<tr>
<td>• 🟢</td>
<td>The feature meets the filter criteria.</td>
</tr>
<tr>
<td>Distance</td>
<td>The distance from the feature to the GPS position.</td>
</tr>
</tbody>
</table>
### Table 3.29 Update Features screen: Fields (continued)

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positions</td>
<td>The number of GPS and digitized positions recorded for the selected feature in the list.</td>
</tr>
<tr>
<td>Carrier coverage</td>
<td>The carrier phase status of the selected feature. This field only appears if the selected feature has carrier phase data collection enabled.</td>
</tr>
<tr>
<td></td>
<td>Possible values are:</td>
</tr>
<tr>
<td></td>
<td>• &lt;carrier time&gt;  Enough carrier data has been collected for this feature. This field shows the length of the block, in mm:ss format.</td>
</tr>
<tr>
<td></td>
<td>• Continuing The carrier block that this feature belongs to is still being collected, and may provide enough carrier data to process this feature.</td>
</tr>
<tr>
<td></td>
<td>• Insufficient Not enough carrier data has been collected for this feature.</td>
</tr>
<tr>
<td>Length (2D)</td>
<td>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.</td>
</tr>
<tr>
<td>(3D)</td>
<td>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.</td>
</tr>
<tr>
<td>Area</td>
<td>The (two-dimensional) area of the feature. This field only appears if the selected feature is an area feature.</td>
</tr>
<tr>
<td>Labels</td>
<td>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 the correct feature is selected from the list.</td>
</tr>
</tbody>
</table>

### Table 3.30 Update Features screen: Options

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Show Filtered Features</td>
<td>Displays filtered features in the Choose Feature list and on the map. Filtered features are indicated by the filter icon  ( \checkmark ) in the Filter column. When filtered features are displayed, this option has a check mark (( \checkmark )) beside it.</td>
</tr>
<tr>
<td>Show Unfiltered Features</td>
<td>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 (( \checkmark )) beside it.</td>
</tr>
<tr>
<td>Filter</td>
<td>Opens the Filter By form where you can set or clear filtering conditions (see page 56).</td>
</tr>
<tr>
<td>Delete</td>
<td>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.</td>
</tr>
<tr>
<td>Undelete</td>
<td>Undeletes the selected feature. The line through the feature is removed. This option is only available if the selected feature is deleted.</td>
</tr>
<tr>
<td>Set Nav Start</td>
<td>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 ( \checkmark ). If there was already a navigation start selected, the icon of that feature changes from the start icon back to its usual point, line, or area icon.</td>
</tr>
</tbody>
</table>
Table 3.30  Update Features screen: Options (continued)

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Set Nav Target</td>
<td>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, the icon of that feature changes from the target icon back to its usual point, line, or area icon.</td>
</tr>
<tr>
<td>Clear Nav Targets</td>
<td>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.</td>
</tr>
<tr>
<td>Logging interval</td>
<td>Opens the Logging Interval form, where you can configure the logging interval for all features of the selected type in the open data file (see page 47).</td>
</tr>
<tr>
<td>Continue</td>
<td>Resumes logging a line or area feature that you logged previously. See Continuing line and area features, page 161.</td>
</tr>
</tbody>
</table>

**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 54.

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 reappears (see page 51). 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 40.
**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 in the *Update Features* screen (see page 51) shows the status of each feature:

<table>
<thead>
<tr>
<th>Icon</th>
<th>Update status</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>(blank)</td>
<td>New</td>
<td>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.</td>
</tr>
<tr>
<td>![Imported]</td>
<td>Imported</td>
<td>The feature has been transferred from the postprocessing software but has not been updated yet.</td>
</tr>
<tr>
<td>![Updated]</td>
<td>Updated</td>
<td>The feature has been transferred from the postprocessing software and has been updated since the transfer.</td>
</tr>
</tbody>
</table>

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

- Marking a feature as updated in the attribute entry form (see below)
- Updating positions using the **Log** button (see page 55)
- Digitizing positions (see page 20)
- Adding or changing offsets in an offset form (see Offsets, page 162)

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

**Marking a feature as updated**

When you change the attribute values, offset data, or GPS position of an existing feature, its Update status 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 status of the feature changes to Updated and the updated icon ( ![Updated] ) appears beside it in the *Choose Feature* list (see page 36).
If the feature has a date attribute that is set in the data dictionary to Auto Generate on Update, the value of the data attribute 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

1. Select the feature from the Choose Feature list (see page 36) and tap **Begin**. The attribute entry form appears.

2. Tap **Log**.

3. If the Allow Position Update field on the Logging Settings form (see page 127) is configured to require confirmation, or the feature is a line or area, a message box appears, asking you to select a logging option:

   - **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 161.
     - 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 reappears (see page 51). 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 digitize positions (see page 20) to update the positions of a feature.
**Filter By form**

Use the *Filter By* form to 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. You can also sort features by their filter status. See *Filtering features*, page 57.

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

To open the *Filter By* form, select the *Filter* option in the *Update Features* screen (see page 51).

Table 3.33  Filter By form: Fields

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Update Status</strong></td>
<td>Select this check box to filter by update status. If this check box is selected, the following fields appear below it:</td>
</tr>
<tr>
<td>• New</td>
<td></td>
</tr>
<tr>
<td>• Imported</td>
<td></td>
</tr>
<tr>
<td>• Updated</td>
<td></td>
</tr>
<tr>
<td>For each field, choose one of the following options:</td>
<td></td>
</tr>
<tr>
<td>• Unfiltered</td>
<td></td>
</tr>
<tr>
<td>• Filtered</td>
<td></td>
</tr>
<tr>
<td>If this check box is cleared, the <em>New</em>, <em>Imported</em>, and <em>Updated</em> fields do not appear, and the filter does not consider update status.</td>
<td></td>
</tr>
</tbody>
</table>

| **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, 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. |
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, in the Update Features screen (see page 51) or in the Map section (see page 5) tap Options and select Filter. The Filter By form (see page 56) appears.

The Filter By form lets you define conditions on the update status, deletion status, and feature type of each feature. 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 specified 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 set, it remains in the unfiltered group.

**Filtering features by status**

To set a filter on the update status of each feature, 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.

To set a filter on the deletion status of each feature, 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.

**Filtering by feature properties**

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 \( \checkmark \) appears in the Status bar. Each feature in the Update Features screen (see page 51) that is filtered has a filter icon \( \checkmark \) beside it. Unfiltered features have no icon.

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

Once a filter is active, 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 and the Show Unfiltered Features options in the Update Features screen (see page 52) 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 11.

**Note** – Deleted features are never displayed on the map.

### Construct Target Offset form

In the **Construct Target Offset** form to set a navigation target by specifying an offset from the current navigation start point.

To open the **Construct Target Offset** form, in the Update Features screen (see page 51), tap Options and then select Set Nav Target / Construct. The Construct Target Offset form appears.
Use the File Manager 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

To open the File Manager subsection, tap the Subsection list button and select File Manager.

Highlight a file and then tap Options to access a list of available options for the file (see page 62).

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 3.35  File Manager screen: Fields

<table>
<thead>
<tr>
<th>Field</th>
<th>Default</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Choose File Type</td>
<td>Data files</td>
<td>Select the type of file to display. The options are:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Data files SSF files (.cor, .imp, .phs, or .ssf files) containing feature and attribute information.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Base files SSF files containing reference base station data.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Dictionaries Data dictionary (.ddf) files containing feature definitions.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Background files Background image files in vector (.cor, .imp, .phs, .ssf) or raster (.bmp, .jpg, .sid, .tif) format.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Geoid files Files containing geoid definitions.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Configuration files .tcf files containing the TerraSync software configuration information.</td>
</tr>
<tr>
<td>Location</td>
<td>Default</td>
<td>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.</td>
</tr>
<tr>
<td>List of files</td>
<td>(no default)</td>
<td>The list of files that you can move, copy, rename, delete, or export to Shapefiles. The list contains the following columns:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Name The name of the file.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Start Time The date and time when the file was created or last updated.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- 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.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Size The size of the file, in kilobytes.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>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 selected column, the sort order is reversed.</td>
</tr>
<tr>
<td>Features</td>
<td>(no default)</td>
<td>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. The number of features in the selected file.</td>
</tr>
<tr>
<td>Positions</td>
<td>(no default)</td>
<td>This field does not appear unless the Data files option is selected in the Choose File Type list. The number of position records in the file.</td>
</tr>
</tbody>
</table>
Table 3.35  File Manager screen: Fields (continued)

<table>
<thead>
<tr>
<th>Field</th>
<th>Default</th>
<th>Description</th>
</tr>
</thead>
</table>
| Status      | (no default)     | This field does not appear unless the Data files option is selected in the Choose File Type list. The update status of the selected file. The status is one of the following:  
  • 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 status of the file is Imported, but you are using the TerraSync Standard edition software so you cannot update it. |
| DD          | (no default)     | This field does not appear unless the Data files option is selected in the Choose File Type list. The name of the data dictionary associated with the selected file. |

Table 3.36  File Manager screen: Options

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Delete</td>
<td>Deletes the highlighted file.</td>
</tr>
<tr>
<td>Copy to</td>
<td>Makes a copy of the highlighted file and stores that copy in the selected storage location. Each storage location on the field computer appears as an option on the submenu.</td>
</tr>
<tr>
<td>Rename</td>
<td>Enables you to change the name of the highlighted file, using the keyboard of the field device or the integrated keyboard.</td>
</tr>
<tr>
<td>Move to</td>
<td>Moves the highlighted file to the selected storage location. Each storage location on the field computer appears as an option on the submenu.</td>
</tr>
<tr>
<td>Send via E-mail</td>
<td>Opens the Send via E-mail form (see page 63).</td>
</tr>
<tr>
<td>Receive via E-mail</td>
<td>Opens the Receive via E-mail form (see page 64).</td>
</tr>
</tbody>
</table>
| Edit dictionary         | Opens the Edit Dictionary form (see page 70). 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 subsequently created using this data dictionary. Changes do not affect data files already created using this data dictionary.  
  If you edit the embedded dictionary of a data file, 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, where you can specify a name for the new data dictionary (see page 70).                                              |
| Read dictionary from data| Opens the Read Dictionary from Data form (see page 65).                                                                                                           |
| Read data from Shape    | Opens the Read from Shape form (see page 66). The name of this option and the name of the form depend on the file type that is selected in the Choose File field. |
Note – This option is only available on field computers that have e-mail support.

Use the Send via E-mail form to specify the recipient and the subject line for an e-mail.

To open the Send via E-mail form, in the File Manager screen (see page 60) tap Options and then select Send via 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 3.37  Send via E-mail form: Fields

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>To</td>
<td>The e-mail address you want to send the selected file to.</td>
</tr>
<tr>
<td></td>
<td>If you have sent files from the TerraSync software before, this field defaults to the last e-mail address used.</td>
</tr>
<tr>
<td>Subject Prefix</td>
<td>A subject line for the e-mail.</td>
</tr>
<tr>
<td></td>
<td>If you have sent files from the TerraSync software before, this field defaults to the last subject line used.</td>
</tr>
</tbody>
</table>
Table 3.37  Send via E-mail form: Fields (continued)

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Service</td>
<td>This field only appears if the field computer is a CE device. 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.</td>
</tr>
<tr>
<td>Delete after send</td>
<td>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.</td>
</tr>
</tbody>
</table>

**Receive via E-mail form**

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

Use the Receive via E-mail 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). 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

To open the Receive via E-mail form, in the File Manager screen (see page 60) tap **Options** and then select **Receive via E-mail**.

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

The TerraSync software searches the inbox of your e-mail program, selects any unread e-mails whose subject line includes the text 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 specified in Data Transfer matches the text specified 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.

Table 3.38  Receive via E-mail form: Fields

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subject must contain</td>
<td>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 used.</td>
</tr>
<tr>
<td>Allow file overwrites</td>
<td>This field specifies whether to allow received files to overwrite existing files of the same name.</td>
</tr>
<tr>
<td>Service</td>
<td>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.</td>
</tr>
</tbody>
</table>

Read dictionary from data form

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

To open the *Read dictionary from data* form, in the File Manager screen (see page 60) tap **Options** and then select *Read dictionary from data*.

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. The new file appears in the list of files when you select Dictionaries from the *Choose File Type* drop-down list (see page 61).
Use the Read from Shape 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 from the Choose File Type drop-down list 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 from the Choose File drop-down list. 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 151.

To open the Read from Shape form, in the File Manager screen (see page 60) tap Options and then select Read data from Shape. The Read from Shape form appears.

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.

### Table 3.39 Read dictionary from data form: Fields

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Create dictionary file</td>
<td>The name of the new data dictionary file. TerraSync 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.</td>
</tr>
<tr>
<td>Data File</td>
<td>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 60).</td>
</tr>
</tbody>
</table>
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 60). The new file appears in the List of files.

<table>
<thead>
<tr>
<th>Table 3.40 Read from Shape form: Fields</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Field</strong></td>
</tr>
<tr>
<td>Create &lt;file type&gt; file</td>
</tr>
<tr>
<td>From Shape file(s) in</td>
</tr>
<tr>
<td>In coordinate system</td>
</tr>
<tr>
<td>Include</td>
</tr>
</tbody>
</table>
Write to Shape form

Use the Write to Shape 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.

To open the Write to Shape form, in the File Manager screen (see page 60) tap Options and then select the Write data to Shape option. The Write to Shape form appears.

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. 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.

Table 3.41 Write to Shape form: Fields

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Convert file</td>
<td>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.</td>
</tr>
<tr>
<td>Write Shape file(s) to</td>
<td>The folder where the Shapefile(s) will be stored.</td>
</tr>
<tr>
<td>Coordinate system</td>
<td>This field shows the current coordinate system, which is the coordinate system that will be used for the new data file. Use the Coordinate System form in the Setup section (see page 151) to change the coordinate system if necessary.</td>
</tr>
<tr>
<td>Zone</td>
<td>The currently selected coordinate system zone.</td>
</tr>
<tr>
<td>Datum</td>
<td>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.</td>
</tr>
</tbody>
</table>
Extract Data form

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

Use the Extract Data form to 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.

To open the Extract Data form, in the File Manager screen (see page 60) tap Options and then select the Extract data from File option. The Extract Data form appears.

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. To change the selected file, return to the File Manager screen and select a different file.

Note – You must close the input file before proceeding.

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.

Table 3.42  Extract Data form: Fields

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Original file</td>
<td>The name of the original file.</td>
</tr>
<tr>
<td>Extract data to file</td>
<td>The name of the file that will contain the new features. A default filename is provided, but you can change or replace this name.</td>
</tr>
<tr>
<td>Include updated features</td>
<td>To extract features that are flagged as updated, select the check box.</td>
</tr>
</tbody>
</table>
Data Dictionary Editor

The Data Dictionary Editor consists of several screens used for creating features and attributes in the data dictionary. See:

- New dictionary form, page 70
- Edit dictionary form, page 70
- Edit Feature form, page 73
- New Attribute Type form, page 77
- Edit Attribute form, page 78
- Edit Attribute Value form, page 80
- Settings for All Features form, page 81

New dictionary form

Use the New Dictionary form to specify a name for the new data dictionary.

To open the New Dictionary form, in the File Manager screen (see page 60) tap Options and then select the New dictionary option. The New dictionary form appears.

Enter a name for the dictionary and then tap OK. The Edit Dictionary form appears.

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Create dictionary file</td>
<td>A name for the new data dictionary. A default filename is provided, but you can change or replace this name.</td>
</tr>
</tbody>
</table>

Edit dictionary form

Use the Edit Dictionary form to add features or attributes to the selected data dictionary, or to edit the existing features and attributes.

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

To open the Edit Dictionary form, in the File Manager screen (see page 60) tap Options and then select the Edit dictionary option. Alternatively, tap OK in the New dictionary form. The Edit dictionary form appears.
Note – Changes that you make to a data dictionary file affect all data files that subsequently created 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. 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 3.44  Edit dictionary form: Fields

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Filename</td>
<td>The filename of the open file. This field is read-only</td>
</tr>
<tr>
<td>List of features and attributes</td>
<td>The features and attributes in the data dictionary.</td>
</tr>
<tr>
<td>Properties</td>
<td>The properties of the selected feature or attribute. The information shown depends on the type of feature or attribute selected.</td>
</tr>
</tbody>
</table>

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 3.45   Edit dictionary form: Edit options

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Edit Feature</td>
<td>Displays the Edit Feature form (see page 73). Use this form to view or edit the properties of the selected feature.</td>
</tr>
<tr>
<td>Edit Attribute</td>
<td>Displays the Edit Attributes (see page 78). Use this form to view or edit the properties of the selected attribute.</td>
</tr>
<tr>
<td>Delete Feature</td>
<td>Deletes the selected feature. A message appears, asking you to confirm the deletion. Tap Yes to continue.</td>
</tr>
<tr>
<td>Delete Attribute</td>
<td>Deletes the selected attribute. A message appears, asking you to confirm deletion. Tap Yes to continue.</td>
</tr>
<tr>
<td>New Feature</td>
<td>Displays the Edit Feature form (see page 73). Use this form to add a new feature to the data dictionary.</td>
</tr>
<tr>
<td>New Attribute</td>
<td>Displays the Edit Attributes (see page 78). Use this form to specify the type of attribute to add to the selected feature.</td>
</tr>
<tr>
<td>Undo</td>
<td>Undoes the last action.</td>
</tr>
<tr>
<td>Cut</td>
<td>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.</td>
</tr>
<tr>
<td>Copy</td>
<td>Copies the selected feature or attribute. Before you paste the copy, select the feature or attribute that you want to paste it after.</td>
</tr>
<tr>
<td>Paste</td>
<td>Pastes the cut or copied feature or attribute after the selected feature or attribute.</td>
</tr>
<tr>
<td>Move Up</td>
<td>Moves the selected feature or attribute one position higher in the list.</td>
</tr>
<tr>
<td>Move Down</td>
<td>Moves the selected feature or attribute one position lower in the list.</td>
</tr>
<tr>
<td>Expand All Features</td>
<td>Expands all features in the data dictionary, so that all attributes are visible.</td>
</tr>
<tr>
<td>Contract All Features</td>
<td>Collapses all features in the data dictionary, so that no attributes are visible.</td>
</tr>
</tbody>
</table>

Table 3.46   Edit dictionary form: Options

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Settings for All Features</td>
<td>Opens the Settings for All Features form (see page 81).</td>
</tr>
<tr>
<td>Auto-generation of Labels</td>
<td>Automatically sets the two labels for each feature type to the first two attributes of that feature type.</td>
</tr>
<tr>
<td>Unique Feature Names</td>
<td>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.</td>
</tr>
<tr>
<td>Numeric Defaults Required</td>
<td>This field specifies whether each numeric attribute in the data dictionary is required to have a default value.</td>
</tr>
</tbody>
</table>
**Edit Feature form**

Use the *Edit Feature* form to specify the feature type (point, line, or area), its default logging setting, and its display settings.

This form appears when you open a new feature, or open a feature for editing. 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.

<table>
<thead>
<tr>
<th>Tab</th>
<th>Availability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Properties</td>
<td>Available for all feature types.</td>
</tr>
<tr>
<td>Default Settings</td>
<td>Available for all feature types.</td>
</tr>
<tr>
<td>Symbol</td>
<td>Available for point features only.</td>
</tr>
<tr>
<td>Line Style</td>
<td>Available for line and area features only.</td>
</tr>
</tbody>
</table>

**Properties tab**

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

**Table 3.47 Properties tab: Fields**

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Feature</td>
<td>The name of the feature. You can enter up to 20 characters, including spaces and underscores, but you cannot use punctuation.</td>
</tr>
<tr>
<td>Comment</td>
<td>An optional description of the feature, or any other comments. You can enter up to 40 characters, including punctuation.</td>
</tr>
<tr>
<td>Feature Classification</td>
<td>The feature type. The options are:</td>
</tr>
<tr>
<td></td>
<td>• Point A single geographical location, such as a tree or road sign.</td>
</tr>
<tr>
<td></td>
<td>• Line A connected series of positions, such as a fenceline, road, or river.</td>
</tr>
<tr>
<td></td>
<td>• Area A polygon or closed line, such as a lake or park.</td>
</tr>
</tbody>
</table>
**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>
<thead>
<tr>
<th>Table 3.48</th>
<th>Default Settings tab, Edit Feature form: Buttons</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Button</strong></td>
<td><strong>Description</strong></td>
</tr>
<tr>
<td>Default</td>
<td>Resets the general feature properties to their default settings, as defined in the Settings for All Features form (see page 81).</td>
</tr>
<tr>
<td>Change Format</td>
<td>Switches between displaying offsets in Horizontal/Vertical format and displaying them in Distance/Inclination format.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Table 3.49</th>
<th>Default Settings tab, Edit Feature form: Fields</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Field</strong></td>
<td><strong>Default</strong></td>
</tr>
<tr>
<td>Logging interval</td>
<td>Time</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Time</td>
<td>5 seconds</td>
</tr>
<tr>
<td>Distance</td>
<td>5 meters</td>
</tr>
<tr>
<td>Minimum Positions</td>
<td>1</td>
</tr>
<tr>
<td>Accuracy</td>
<td>Code</td>
</tr>
<tr>
<td>Direction</td>
<td>Left</td>
</tr>
</tbody>
</table>
**Symbol tab**

*Note – This tab only appears if the selected feature is a point feature.*

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.

**Tip –** In the **Map section** (see page 5), 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>
<thead>
<tr>
<th>Table 3.50</th>
<th>Symbol tab, Edit Feature form: Buttons</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Button</strong></td>
<td><strong>Description</strong></td>
</tr>
<tr>
<td>Default</td>
<td>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).</td>
</tr>
<tr>
<td>Change</td>
<td>Selects a different font or symbol style.</td>
</tr>
</tbody>
</table>
Table 3.51  Symbol tab, Edit Feature form: Fields

<table>
<thead>
<tr>
<th>Field</th>
<th>Default</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Font</td>
<td>Trimble GPS Pathfinder</td>
<td>The font to use for the point feature symbol. Select any font that is installed on the field computer.</td>
</tr>
<tr>
<td>Style</td>
<td>33</td>
<td>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.</td>
</tr>
<tr>
<td>Size</td>
<td>15</td>
<td>The size that the symbol is displayed at.</td>
</tr>
<tr>
<td>Foreground</td>
<td>Black</td>
<td>The color of the point symbol.</td>
</tr>
<tr>
<td>Background</td>
<td>Transparent</td>
<td>The background color of the point symbol. When TerraSync is installed on a CE device, this field is read-only.</td>
</tr>
</tbody>
</table>

Table 3.52  Line Style tab, Edit Feature form: Buttons

<table>
<thead>
<tr>
<th>Button</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Default</td>
<td>Resets the line style properties to their default settings (thin black joined line).</td>
</tr>
</tbody>
</table>

Table 3.53  Line Style tab, Edit Feature form: Fields

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Color</td>
<td>The color of the feature.</td>
</tr>
<tr>
<td>Thickness</td>
<td>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).</td>
</tr>
<tr>
<td>Note – Thicker lines take longer for the software to draw. Use thin lines to maximize the drawing speed of the Map screen.</td>
<td></td>
</tr>
<tr>
<td>Join</td>
<td>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.</td>
</tr>
<tr>
<td>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.</td>
<td></td>
</tr>
</tbody>
</table>
New Attribute Type form

Use the *New Attribute Type* 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 78), where you can give the attribute a name and set its properties.

### Table 3.54  New Attribute Type form: Attribute types

<table>
<thead>
<tr>
<th>Attribute type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Menu</strong></td>
<td>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.</td>
</tr>
<tr>
<td><strong>Numeric</strong></td>
<td>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.</td>
</tr>
<tr>
<td><strong>Text</strong></td>
<td>The value to be stored in the attribute is a string of characters, such as the name of a street.</td>
</tr>
<tr>
<td><strong>Date</strong></td>
<td>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.</td>
</tr>
<tr>
<td><strong>Time</strong></td>
<td>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.</td>
</tr>
<tr>
<td><strong>File Name</strong></td>
<td>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.</td>
</tr>
<tr>
<td><strong>Separator</strong></td>
<td>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.</td>
</tr>
</tbody>
</table>
**Edit Attribute form**

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

The title of the form 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.

This form appears when you do one of the following:

- In the *Edit Dictionary* form, tap **Options** and then select *Edit Attribute*
- In the *New Attribute Type* form, tap **Add**

### Table 3.55  Edit Attribute form: Buttons (for menu attributes only)

<table>
<thead>
<tr>
<th>Button</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>New</td>
<td>Opens the <em>Edit Attribute Value</em> form (see page 80). Use this form to add new attribute values.</td>
</tr>
<tr>
<td>Edit</td>
<td>Opens the <em>Edit Attribute Value</em> form (see page 80). Use this form to edit the selected attribute value.</td>
</tr>
<tr>
<td>Delete</td>
<td>Deletes the selected attribute value.</td>
</tr>
<tr>
<td>Up arrow</td>
<td>Moves the selected attribute value to the previous position in the list.</td>
</tr>
<tr>
<td>Down arrow</td>
<td>Moves the selected attribute value to the next position in the list.</td>
</tr>
</tbody>
</table>

### Table 3.56  Edit Attribute form: Fields

<table>
<thead>
<tr>
<th>Field</th>
<th>Default</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attribute Name</td>
<td>(none)</td>
<td>The name of the attribute. You can enter up to 20 characters, including spaces and underscores, but you cannot use punctuation.</td>
</tr>
<tr>
<td>Comment</td>
<td>(none)</td>
<td>An optional description of the attribute, or any other comments. You can enter up to 40 characters, including punctuation.</td>
</tr>
<tr>
<td>On Creation</td>
<td>Normal</td>
<td>Editing rules for the attribute when a new feature is opened. The options are:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Normal</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Required</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Not Permitted</td>
</tr>
<tr>
<td>On Update</td>
<td>Normal</td>
<td>Editing rules for the attribute when the feature is opened for update. The options are the same as for the <em>On Creation</em> field.</td>
</tr>
<tr>
<td>Field</td>
<td>Default</td>
<td>Description</td>
</tr>
<tr>
<td>-------</td>
<td>---------</td>
<td>-------------</td>
</tr>
<tr>
<td>Menu Attribute Values</td>
<td>(none)</td>
<td>This field only appears if the attribute type is Menu. The list of values for a menu attribute. Use the <strong>New</strong> and <strong>Edit</strong> buttons to add or edit values in this list.</td>
</tr>
<tr>
<td>Decimal Places</td>
<td>0</td>
<td>This field only appears if the attribute type is Numeric. The number of decimal places for a numeric attribute.</td>
</tr>
<tr>
<td>Minimum</td>
<td>0</td>
<td>This field only appears if the attribute type is Numeric. A minimum value for a numeric attribute.</td>
</tr>
<tr>
<td>Maximum</td>
<td>0</td>
<td>This field only appears if the attribute type is Numeric. A maximum value for a numeric attribute.</td>
</tr>
</tbody>
</table>
| Auto-Incrementing | No Increment | This field only appears if the attribute type is Numeric or Text. 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. |
| Step Value | +1 | This field only appears if the attribute type is Numeric or Text. The amount by which the attribute value increments or decrements. |
| Length | 30 | This field only appears if the attribute type is Text. The maximum length for a text attribute. The length can be any integer from 1 to 100. |
| Default | (none) | A default value for the attribute. |
| Auto Generate on Creation | Selected | 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. |
| Auto Generate on Update | Not selected | 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. |
| Format | Year-Month-Day (for Date attributes) or 24 Hour (for Time attributes) | This field only appears if the attribute type is Date or Time. 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 |
Edit Attribute Value form

Use the Edit Attribute Value 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.

To open this form, tap New or Edit in the Edit Attribute form (see page 78).

Table 3.57 Edit Attribute Value form: Buttons

<table>
<thead>
<tr>
<th>Button</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Add/OK</td>
<td>Adds the new value to the list, or confirms the changes that you have made to the existing value.</td>
</tr>
<tr>
<td></td>
<td>If you opened this form by tapping Add in the Edit Attribute form (see page 78), this button is labeled Add. Tap Add to keep the form open and add another value to the list.</td>
</tr>
<tr>
<td></td>
<td>If you opened this form by tapping Edit in the Edit Attribute form (see page 78), this button is labeled OK. Tap OK to close the form.</td>
</tr>
<tr>
<td>Cancel/Close</td>
<td>Closes this form.</td>
</tr>
<tr>
<td></td>
<td>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.</td>
</tr>
<tr>
<td></td>
<td>If you have saved changes by tapping Add, this button is labeled Close.</td>
</tr>
</tbody>
</table>

Table 3.58 Edit Attribute Value form: Fields

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attribute Value</td>
<td>The value of the attribute. The value can be up to 20 characters long.</td>
</tr>
<tr>
<td>Default</td>
<td>This field specifies whether this value is the default value in the list.</td>
</tr>
<tr>
<td>Code Value 1</td>
<td>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.</td>
</tr>
<tr>
<td>Code Value 2</td>
<td>A second code value for this attribute value.</td>
</tr>
</tbody>
</table>
Settings for All Features form

Use the Settings for All Features form to specify default logging settings for all features in the data dictionary. When you create a new feature, or tap Default in the Default Settings tab of the Edit Feature form (see page 74), the logging settings for the feature 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 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 of the Edit Feature form.

CAUTION – Changes made 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
- 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 to navigate to the target from a distance.
- Close-Up screen to navigate to the exact location of the target.

In either mode, you can use the lightbar 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 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.

**Note** – You cannot set the navigation target in the Navigation section. Select a target from the Data section (see page 27) or the Map section (see page 5).

Table 4.1 Direction Dial: Fields and icons

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Target</td>
<td>This field indicates the current navigation target:</td>
</tr>
<tr>
<td></td>
<td>• If a feature is selected, the feature ID and feature type appear.</td>
</tr>
<tr>
<td></td>
<td>• If you have selected a map point, the text <strong>Map Point</strong> appears.</td>
</tr>
<tr>
<td></td>
<td>• If you have constructed a target by specifying an offset from the navigation start, the text <strong>Constructed</strong> appears.</td>
</tr>
<tr>
<td></td>
<td>• If no target is selected, the text <strong>No Target</strong> appears.</td>
</tr>
<tr>
<td>Nav Start</td>
<td>If you have specified a navigation start and target, but the start is further away from your position than the configured Range (see page 92), you must navigate to the start before you can navigate to the target. While you are navigating to the start, the <strong>Nav Start</strong> field appears instead of the <strong>Target</strong> field. Once you have navigated within close-up range of the start, the <strong>Nav Start</strong> field is replaced by the <strong>Target</strong> field and you can start navigating to the target.</td>
</tr>
<tr>
<td></td>
<td>• If a feature is selected, the feature ID and feature type appear.</td>
</tr>
<tr>
<td></td>
<td>• If you have selected a map point, the text <strong>Map Point</strong> appears.</td>
</tr>
<tr>
<td>Lightbar</td>
<td>The lightbar guides you along the shortest path between the navigation start and the target (see <strong>Lightbar</strong>, page 88).</td>
</tr>
<tr>
<td>Heading</td>
<td>The top of the dial indicates your direction of travel (heading).</td>
</tr>
<tr>
<td>Turn arrow</td>
<td>The turn arrow indicates your direction of travel (heading).</td>
</tr>
</tbody>
</table>
Using the Direction Dial

To activate navigation, use the Data section (see page 27) or the Map section (see page 5) 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 at the bottom of the screen display relevant text information (see Information Fields, page 89). 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.

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

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 91.

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

If you also select a navigation start, you can use the lightbar to navigate along the shortest path from the start to the target (see page 88). This path is called the cross-track line. If you are not within the configured range of the navigation start (see page 92), you must first navigate to the start before you can navigate to the target.

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 new location of the feature.
Close-up Screen

When you come within the specified close-up range of the target (see page 87), the navigation proximity alarm sounds, and the Close-up graphical screen replaces the Direction Dial screen:

![Close-up Screen Diagram]

Table 4.2 Close-up Screen: Fields and icons

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Target</td>
<td>This field identifies the current navigation target:</td>
</tr>
<tr>
<td></td>
<td>• If a feature is selected, the feature ID and feature type appear.</td>
</tr>
<tr>
<td></td>
<td>• If you have selected a map point, the text Map Point appears.</td>
</tr>
<tr>
<td></td>
<td>• If you have constructed a target by specifying an offset from the navigation start, the text Constructed appears.</td>
</tr>
<tr>
<td></td>
<td>• If no target is selected, the text No Target appears.</td>
</tr>
<tr>
<td>Lightbar</td>
<td>The lightbar guides you along the shortest path between the navigation start and the target (see Lightbar, page 88).</td>
</tr>
<tr>
<td>Bull’s-eye</td>
<td>The bull’s-eye represents the navigation target.</td>
</tr>
<tr>
<td>Cross</td>
<td>The cross represents the current GPS position.</td>
</tr>
<tr>
<td>Message line</td>
<td>The message line displays messages relating to navigation (see Message Line, page 91).</td>
</tr>
<tr>
<td>Information fields</td>
<td>The information fields at the bottom of the screen provide navigational information (see Information Fields, page 89).</td>
</tr>
</tbody>
</table>

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 selected (see Close-up Style, page 87), 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 89) that depend on the heading are automatically locked as well. See Heading locked, page 91.

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.

Configure the close-up range values from the Navigation Options form (see page 92).

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 92).
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 5). 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. To do this, in the Map section tap Options and then select Cross-Track Light Bar.

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 27) or the Map section (see page 5).

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 appearance and behavior of the lightbar 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 Inner Lightbar Spacing setting (see page 92). 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 92). 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 84) and on the Close-up screen (see page 86).

*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 of 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 – Use the Units form (see page 153) 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 show data when no target is selected. If no target is selected, all other fields show the value N/A, and the message line prompts you to select a target (see Message Line, page 91). If you are stationary or are not moving fast enough for the software to calculate a heading, these fields show the value ?. If you are stationary or are not moving fast enough for the software to calculate a heading, these fields show the value ?. If you are stationary or are not moving fast enough for the software to calculate a heading, these fields show the value ?. If you are stationary or are not moving fast enough for the software to calculate a heading, these fields show the value ?.

### Table 4.3 Navigation section: Information fields

<table>
<thead>
<tr>
<th>Field</th>
<th>Label</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Distance</td>
<td>Dist.</td>
<td>The distance to the navigation target. This is the shortest great-circle distance to the target, computed on the local datum.</td>
</tr>
<tr>
<td>Bearing</td>
<td>Bear.</td>
<td>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.</td>
</tr>
<tr>
<td>Turn</td>
<td>Turn</td>
<td>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.</td>
</tr>
<tr>
<td>Heading</td>
<td>Head</td>
<td>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.</td>
</tr>
<tr>
<td>Cross-track</td>
<td>X-Tk</td>
<td>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.</td>
</tr>
<tr>
<td>Time to Go</td>
<td>TTG</td>
<td>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.</td>
</tr>
<tr>
<td>ETA</td>
<td>ETA</td>
<td>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 &gt;24 hr.</td>
</tr>
<tr>
<td>Velocity</td>
<td>Vel.</td>
<td>Your two-dimensional velocity. The velocity is displayed whether or not you have chosen a target.</td>
</tr>
<tr>
<td>Altitude</td>
<td>Alt.</td>
<td>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.</td>
</tr>
<tr>
<td>Go Up/Go Down</td>
<td>Up/Down</td>
<td>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.</td>
</tr>
</tbody>
</table>

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.

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.
The message line appears above the information fields (see page 89). It displays important messages relevant to navigation. The following messages may appear:

Table 4.4 Navigation section: Messages

<table>
<thead>
<tr>
<th>Message</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heading locked</td>
<td>You are stationary or moving too slowly for an accurate heading to be computed. This message flashes alternately with the message <strong>Start moving</strong>. The direction dial arrow and any Information fields affected freeze. To unlock the heading, start moving faster than the <strong>cutoff velocity</strong> of 0.35 meters/second (1.26 kilometers/hour, or 0.78 miles/hour).**</td>
</tr>
<tr>
<td></td>
<td><strong>Note – The heading is always locked when the Close-up screen is visible.</strong></td>
</tr>
<tr>
<td>Heading not available</td>
<td>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 <strong>Start moving</strong> until you begin to move.</td>
</tr>
<tr>
<td>No GPS</td>
<td>The TerraSync software is not connected to a GPS receiver.</td>
</tr>
<tr>
<td>Old navigation</td>
<td>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.</td>
</tr>
<tr>
<td>Set your navigation target in the Map or Data section</td>
<td>You have not selected a navigation target. Select a target in the Map section (see page 5) or the Data section (see page 27).</td>
</tr>
<tr>
<td>Start moving</td>
<td>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.</td>
</tr>
</tbody>
</table>

The message line appears above the information fields (see page 89). It displays important messages relevant to navigation. The following messages may appear:
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 4.5  Navigation Options Form: Fields

<table>
<thead>
<tr>
<th>Field</th>
<th>Default</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Range</td>
<td>5.00 m</td>
<td>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.</td>
</tr>
<tr>
<td>Style</td>
<td>Target-centered</td>
<td>The style for the Close-up screen. The options are:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Target-centered The target remains still in the center of the screen and your GPS position is displayed relative to it.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• GPS-centered Your GPS position remains still in the center of the screen and the target is displayed relative to it.</td>
</tr>
<tr>
<td>Mode</td>
<td>Center</td>
<td>The lightbar mode. The options are:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Chase The center of the lightbar represents your current heading, and the lit arrow icons represent the direction of the cross-track line.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Center The center of the lightbar represents the direction of the cross-track line, and the lit arrow icons represent your current heading.</td>
</tr>
<tr>
<td>Inner Lightbar Spacing</td>
<td>0.5 m</td>
<td>The amount of cross-track error that each small inner arrow icon represents.</td>
</tr>
<tr>
<td>Outer Lightbar Spacing</td>
<td>15 m</td>
<td>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.</td>
</tr>
<tr>
<td>Look Ahead Time</td>
<td>0.5 s</td>
<td>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. 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.</td>
</tr>
</tbody>
</table>
Use the Status section to view information about external connections, including the GPS receiver and any real-time differential correction source. The Status section has nine subsections.

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

In this chapter:

- Skyplot
- Satellite Information
- Receiver
- Real-time
- Plan
- Sensor
- Comms
- UTC Time
- About
Skyplot

Use the Skyplot screen to view a graphical display of the satellites available to the receiver. The Skyplot screen is the default screen displayed when you open the Status section.

To access the Skyplot screen when another screen in the Status section is visible, tap the arrow on the Subsection button and from the drop-down list select Skyplot.

The Skyplot screen includes the following items:

- Skyplot (see page 94)
- SNR graph (see page 96)
- Satellite geometry indicator (see page 96)
- Information fields (see page 97)
- Message line (see page 97)
- GPS settings area (see page 98)

Skyplot

When you turn on the receiver, 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 possible obstructions. If the receiver is still not computing positions, see Troubleshooting, page 199.
Numbered boxes represent the satellites currently available to the TerraSync software.

- 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 (for example, if their elevation is too low).
- Satellites shown without boxes are available, but are not being tracked (for example, if their signal is blocked by a tall building).
- If an SBAS satellite is being tracked, its location is indicated by this icon: 🌍.

The black outer circle represents the horizon (at 0°).

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.

The inner circle, which is red on a color screen, represents the configured minimum elevation (see Min Elevation, page 133). 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.

The skyplot rotates (like a compass) to indicate the direction that you are travelling 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.*

Tap the skyplot to display a tooltip showing details about the area you have tapped. See Tooltips, page 96.
SNR graph

The Signal-to-Noise Ratio (SNR) bar graph to the left of the skyplot 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.*

Tap the SNR graph to display a tooltip showing details about the area you have tapped. See Tooltips below.

Satellite geometry indicator

The satellite geometry indicator to the right of the skyplot 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.

Tap the satellite geometry indicator to display a tooltip showing details about the area that you tapped. See Tooltips below.

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 an item in the Skyplot screen, a tooltip appears. The tooltip provides detailed information about the selected item.

<table>
<thead>
<tr>
<th>Skyplot screen element</th>
<th>Tooltip</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bar on SNR graph</td>
<td>Satellite pseudo-random number (PRN) and SNR value(s)</td>
</tr>
<tr>
<td>White box on indicator below SNR graph</td>
<td>Configured minimum SNR value</td>
</tr>
<tr>
<td>Geometry indicator</td>
<td>Current PDOP or HDOP value</td>
</tr>
<tr>
<td>Horizontal bar on geometry indicator</td>
<td>Configured maximum PDOP or HDOP value</td>
</tr>
<tr>
<td>Satellite on skyplot</td>
<td>Satellite PRN, SNR value(s), elevation, and bearing</td>
</tr>
<tr>
<td>Inner circle on skyplot</td>
<td>Configured minimum elevation value</td>
</tr>
</tbody>
</table>
Information fields

Information fields show the current GPS position and settings.

*Note* – If the screen on the field computer uses a landscape orientation, the information fields appear to the right of the skyplot.

Table 5.2 Skyplot screen: Information fields

<table>
<thead>
<tr>
<th>Display</th>
<th>Description</th>
</tr>
</thead>
</table>
| 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 in the Setup section (see page 151).  
  *Note* – Positions viewed on the screen are not saved. To save them, open a data file and start a feature. |
| PDOP       | This field only appears if you have configured a maximum PDOP. The **Position Dilution of Precision** (PDOP) is a numeric value representing the satellite geometry. If you set a maximum PDOP value (see **Max PDOP**, page 132), and the PDOP rises above the value set, the TerraSync software stops computing positions. To set the maximum PDOP value, use the GPS slider bar in the GPS settings area (see page 98), or tap the Setup button to open the GPS Settings form (see page 130). |
| HDOP       | This field only appears if you have configured a maximum HDOP. The **Horizontal Dilution of Precision** (HDOP) represents the horizontal component of the PDOP. If you set a maximum HDOP value (see **Max HDOP**, page 132), and the HDOP rises above the value 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 130). |

Message line

The message line is displayed midway down the Skyplot screen, below the skyplot. The message line displays error or warning messages.

*Note* – The message line also appears below the table in the Satellite Information section (see page 99).

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 Messages

<table>
<thead>
<tr>
<th>Message</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>GPS disconnected</td>
<td>The GPS receiver is not connected.</td>
</tr>
<tr>
<td>Attempting to connect to GPS receiver</td>
<td>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.</td>
</tr>
<tr>
<td>Antenna is not connected to GPS receiver</td>
<td>The GPS receiver cannot detect the antenna, or the antenna cable is not connected to the GPS receiver.</td>
</tr>
</tbody>
</table>
The GPS settings area appears at the bottom of the Skyplot screen and the Satellite Information screen (see page 97). It shows the current GPS settings. The Setup area has two modes: Slider and Custom.

**Note** – If you are using a GPS Pathfinder XB or XC receiver, you cannot configure GPS settings. The default settings for the receiver appear in the GPS settings area as read-only fields.

### Slider mode

In Slider mode, the GPS settings area displays the **GPS slider bar**. The position of the GPS slider bar indicates the current GPS settings. The GPS slider bar 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 GPS slider bar is the most productive setting at which the precision specifications of the GPS receiver are met. See Minimum SNR values for GPS slider bar positions, page 130.

To change GPS settings in Slider mode, move the slider control to the left or right. The same GPS slider bar appears in the **GPS Settings** form in the Setup section (see page 130). Any changes made to one GPS slider bar is reflected in the other.

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

In Custom mode, the GPS settings area shows the configured limits for PDOP or HDOP, elevation, and SNR. To change to Custom mode, tap the Setup button below the status bar to open the GPS Settings form in the Setup section (see page 130). Then clear the Slider check box.

Satellite Information

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

To display the Satellite information screen, tap the Subsection list button and from the drop-down list select Sat Info.

The table below describes the information in each column of the table that appears in the Satellite Information section.

Table 5.4 Satellite Information screen: Columns

<table>
<thead>
<tr>
<th>Column</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Use indicator</td>
<td>Filled circle (●) Satellite is being used to calculate positions.</td>
</tr>
<tr>
<td></td>
<td>Empty circle (○) Satellite is visible but is not being used to calculate positions (for example, if the satellite's elevation is below the configured minimum elevation).</td>
</tr>
<tr>
<td></td>
<td>No circle Satellite is available, but is not being tracked by the TerraSync software (for example, if the satellite's signal is blocked by a tall building).</td>
</tr>
<tr>
<td>PRN</td>
<td>The pseudo-random number of each satellite. A satellite is identified by its unique PRN.</td>
</tr>
<tr>
<td>L1 SNR</td>
<td>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 133) is not used to compute positions.</td>
</tr>
<tr>
<td>L2 SNR</td>
<td>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. The current signal-to-noise ratio of the L2 signal from each satellite, in dBHz. <strong>Note</strong> – If a satellite is marked as “unhealthy” by the GPS Control Segment, the characters U/H appear in the SNR columns for that satellite.</td>
</tr>
<tr>
<td>Elev</td>
<td>The current elevation above the horizon of each satellite. A satellite that is below the configured Min Elevation (see page 133) is not used to compute positions.</td>
</tr>
<tr>
<td>Br(T) or Br(M)</td>
<td>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 153).</td>
</tr>
</tbody>
</table>
As in the Skyplot screen, the following appear at the bottom of the Satellite Information screen:

- Information fields (see page 100)
- Message line (see page 97)
- GPS settings area (see page 98)

**Information fields**

Information fields show the current GPS position and settings.

*Note – If the screen on the field computer uses the landscape orientation, the information fields appear to the right of the satellite information table.*

**Table 5.5  Satellite Information screen: Information fields**

<table>
<thead>
<tr>
<th>Display</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Almanac</td>
<td>The date of the last almanac received from satellite broadcasts.</td>
</tr>
<tr>
<td>PDOP</td>
<td>This field only appears if you have configured a maximum PDOP. The current PDOP value (see PDOP, page 97).</td>
</tr>
<tr>
<td>HDOP</td>
<td>This field only appears if you have configured a maximum HDOP. The current HDOP value (see HDOP, page 97).</td>
</tr>
</tbody>
</table>

**Receiver**

Use the Receiver screen to view information about the connected GPS receiver.

To display the Receiver screen, tap the Subsection button and from the drop-down list select Receiver.
### Table 5.6 Receiver screen: Fields

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>GPS</strong></td>
<td>The current status of the GPS receiver connection. The options are:</td>
</tr>
<tr>
<td>• Connected</td>
<td>The TerraSync software is connected to the GPS receiver.</td>
</tr>
<tr>
<td>• Attempting to connect to GPS</td>
<td>The TerraSync software is trying to connect to the receiver. If this message appears, no other fields appear.</td>
</tr>
<tr>
<td>• GPS is disconnected</td>
<td>The receiver has been disconnected from the TerraSync software. If this message appears, no other fields appear.</td>
</tr>
<tr>
<td>• No GPS detected. Check cables, batteries etc</td>
<td>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 130), or has no power. If this message appears, no other fields appear.</td>
</tr>
<tr>
<td><strong>Antenna</strong></td>
<td>The current status of the antenna connection. The options are:</td>
</tr>
<tr>
<td>• Connected</td>
<td>The TerraSync software is connected to a GPS receiver, and the receiver is connected to a GPS antenna.</td>
</tr>
<tr>
<td>• Not connected</td>
<td>No antenna is connected. The antenna icon also appears in the Status bar.</td>
</tr>
<tr>
<td><strong>Position status</strong></td>
<td>An indicator of the GPS status. The options are:</td>
</tr>
<tr>
<td>• Calculating positions</td>
<td>The receiver is computing GPS position fixes. The current satellite constellation is therefore acceptable.</td>
</tr>
<tr>
<td>• Poor satellite geometry</td>
<td>The current PDOP or HDOP value is greater than the maximum value, so the GPS receiver is not computing GPS positions.</td>
</tr>
<tr>
<td>• Too few satellites</td>
<td>The GPS receiver has acquired satellites, has not acquired enough satellites to compute a position.</td>
</tr>
<tr>
<td>• Unavailable</td>
<td>No position is available. For example, there may be no antenna connected to the receiver.</td>
</tr>
<tr>
<td><strong>Carrier time</strong></td>
<td>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.</td>
</tr>
<tr>
<td><strong>Almanac</strong></td>
<td>The date of the almanac.</td>
</tr>
<tr>
<td><strong>Battery</strong></td>
<td>The current level of charge in the GPS receiver battery. This value appears as a percentage.</td>
</tr>
<tr>
<td><strong>Receiver type</strong></td>
<td>The name of the receiver model currently connected to the field computer.</td>
</tr>
</tbody>
</table>

*Note – If the connected receiver is integrated with or powered by the field computer, the field computer’s battery level appears in this field. If the receiver does not report any battery status, this field is not displayed.*
Real-time

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

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

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

- *External Source* status screen (see page 105)
- *External Beacon* status screen (see page 106)
- *Integrated Beacon* status screen (see page 108)
- *Integrated Satellite* status screen (see page 109)
- *Integrated SBAS* status screen (see page 111)
- *Integrated RTK Radio* status screen (see page 112)

Use the Summary list button to move between the real-time status screens. Tap the Summary list button to display a list of status screens and then select an option to open the corresponding screen.

### Table 5.6 Receiver screen: Fields (continued)

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Navigation version</td>
<td>The version number of the navigation firmware that is installed in the connected GPS receiver.</td>
</tr>
<tr>
<td>Signal processor version</td>
<td>The version number of the signal processing firmware that is installed in the connected GPS receiver.</td>
</tr>
<tr>
<td>OmniSTAR ID</td>
<td>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.</td>
</tr>
</tbody>
</table>
Real-time Summary screen

The Real-time Summary screen contains a heading for each real-time correction source you have set up. The heading shows the name of the source. The order of the correction sources matches the order of the choices made in the Setup section using the Real-time Settings form (see page 138).

The correction source currently in use for real-time differential 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 correction 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 flashes to indicate that real-time differential corrections are not available.

Brief summary information on each configured real-time correction source is included in this screen. For more information about the summary information provided for each real-time correction source, see Table 5.7 through Table 5.11 on pages 103 to 105.

For full status information on any correction source you have configured, tap the Summary list button and select the source name. The screen also includes a Setup button below the status bar for quick access to real-time correction source settings in the Real-time Settings form (see page 138).

Table 5.7 Real-time Summary screen: External Beacon fields

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>External Beacon</td>
<td>The status of the External Beacon real-time correction source. The options are the same as the options for the External Source status field (see Table 5.7). When the GPS receiver is using an external beacon receiver for real-time corrections, the external beacon icon  appears to the left of this field.</td>
</tr>
<tr>
<td>Frequency</td>
<td>The current beacon frequency being tracked or locked on to by the external beacon receiver.</td>
</tr>
<tr>
<td>State</td>
<td>The real-time operating status of the external beacon receiver.</td>
</tr>
<tr>
<td>SNR</td>
<td>The signal-to-noise ratio of the beacon signal that is being monitored.</td>
</tr>
</tbody>
</table>
Table 5.8  Real-time Summary screen: Integrated Beacon fields

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Integrated Beacon</td>
<td>The status of the Integrated Beacon real-time correction source. The options are the same as for the External Source status field (see Table 5.7), with the addition of this option:</td>
</tr>
<tr>
<td></td>
<td>Not supported  The connected GPS receiver does not support real-time differential corrections from this source.</td>
</tr>
<tr>
<td></td>
<td>When the GPS receiver is using an integrated beacon receiver for real-time corrections, the integrated beacon icon appears to the left of this field.</td>
</tr>
<tr>
<td>Frequency</td>
<td>The current beacon frequency being tracked or locked on to.</td>
</tr>
<tr>
<td>State</td>
<td>The real-time operating status of the integrated beacon receiver.</td>
</tr>
<tr>
<td>SNR</td>
<td>The signal-to-noise ratio of the signal that is being monitored.</td>
</tr>
</tbody>
</table>

Table 5.9  Real-time Summary screen: Integrated Satellite fields

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Integrated Satellite</td>
<td>The status of the Integrated Satellite real-time correction source. The options are the same as the options for the Integrated Beacon status field (see Table 5.8).</td>
</tr>
<tr>
<td></td>
<td>When the GPS receiver is using an integrated satellite receiver for real-time corrections, the integrated satellite icon appears to the left of this field.</td>
</tr>
<tr>
<td>Service Provider</td>
<td>The name of the satellite differential service provider that the satellite in use belongs to.</td>
</tr>
<tr>
<td>Frequency</td>
<td>The current satellite frequency being tracked or locked on to.</td>
</tr>
<tr>
<td>State</td>
<td>The real-time operating status of the integrated satellite receiver.</td>
</tr>
<tr>
<td>SNR</td>
<td>The signal-to-noise ratio of the satellite signal that is being monitored.</td>
</tr>
</tbody>
</table>

Table 5.10  Real-time Summary screen: SBAS fields

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Integrated SBAS</td>
<td>The status of the Integrated SBAS real-time correction source. The options are the same as the options for the Integrated Beacon status field (see Table 5.8).</td>
</tr>
<tr>
<td></td>
<td>When the GPS receiver is using an integrated SBAS receiver for real-time corrections, the integrated SBAS icon appears to the left of this field.</td>
</tr>
<tr>
<td>SNR</td>
<td>The signal-to-noise ratio of the SBAS satellite signal that is being monitored.</td>
</tr>
</tbody>
</table>
Setup button

A Setup button below the status bar in each screen in the Real-time section provides a shortcut to the Real-time Settings form (see page 138) in the Setup section.

To configure real-time settings, tap the Setup button. The Real-time Settings form appears. Make any required changes and then tap OK to return to the status screen for the real-time correction source.

External Source status screen

Note – If an external beacon is configured as the external source, the External Beacon status screen (see page 106) is available instead of the External Source status screen.

The External Source status screen shows detailed information about the external real-time correction source you have set up.

To display the External Source status screen, open the Real-time section (see page 102). Then tap the arrow on the Summary list button below the status bar, and from the drop-down list select External.
External Beacon status screen

Note – If you have configured an external source that is not an external beacon receiver, the External Source status screen (see page 105) is available instead of the External Beacon status screen.

The External Beacon status screen shows detailed information about the external beacon receiver you have set up as an external real-time correction source.

To display the External Beacon status screen, open the Real-time section (see page 102). Then tap the arrow on the Summary list button below the status bar, and from the drop-down list select Ext. Beacon
Table 5.13  External Beacon status screen: Fields

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>External Beacon</strong></td>
<td>The status of the external beacon receiver. The options are:</td>
</tr>
<tr>
<td></td>
<td>• In use The external beacon receiver is currently being used to correct positions in real time.</td>
</tr>
<tr>
<td></td>
<td>• 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 receiver if it becomes available and it is the highest-ranked available source.</td>
</tr>
<tr>
<td></td>
<td>• Not in use The external beacon receiver is set up but is not currently being used for real-time differential corrections.</td>
</tr>
<tr>
<td></td>
<td>• Not supported The connected GPS receiver does not support real-time differential corrections from an external beacon receiver.</td>
</tr>
<tr>
<td><strong>Frequency</strong></td>
<td>The current beacon station frequency being tracked or locked on to by the external beacon receiver.</td>
</tr>
<tr>
<td></td>
<td><strong>Note</strong> – Use the configuration software provided with the beacon receiver to set the external beacon frequency.</td>
</tr>
<tr>
<td><strong>State</strong></td>
<td>The operating state of the external beacon receiver. Select an option from the drop-down list.</td>
</tr>
<tr>
<td><strong>SNR</strong></td>
<td>The signal-to-noise ratio, in decibels, of the beacon signal the external beacon receiver is monitoring.</td>
</tr>
<tr>
<td><strong>Last correction</strong></td>
<td>The time, in seconds, since the last correction message from this source was received by the GPS receiver.</td>
</tr>
<tr>
<td><strong>Beacon mode</strong></td>
<td>The mode the external beacon receiver is operating in. The options are:</td>
</tr>
<tr>
<td></td>
<td>• Best The external beacon receiver tracks the best frequency available and automatically switches frequency if a better signal is available.</td>
</tr>
<tr>
<td></td>
<td>• Fixed The external beacon receiver tracks only the frequency specified in the beacon receiver configuration software.</td>
</tr>
<tr>
<td><strong>Filter applied</strong></td>
<td>This field specifies whether a filter has been applied to the list of frequencies the external beacon receiver can track.</td>
</tr>
<tr>
<td><strong>External beacon battery level</strong></td>
<td>The remaining battery power of the external beacon receiver, as a percentage.</td>
</tr>
<tr>
<td><strong>Diagnostic Information</strong></td>
<td>A heading used to group together fields that contain information for troubleshooting the beacon service.</td>
</tr>
<tr>
<td><strong>Error Rate</strong></td>
<td>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.</td>
</tr>
<tr>
<td><strong>Input Level</strong></td>
<td>The intensity level of the electromagnetic field. This value should be between 10 and 100 dBuV/M.</td>
</tr>
<tr>
<td><strong>Data Rate</strong></td>
<td>The data modulation rate from the beacon.</td>
</tr>
<tr>
<td><strong>Health</strong></td>
<td>The health of the beacon signal. Select an option from the drop-down list.</td>
</tr>
</tbody>
</table>
Integrated Beacon status screen

The Integrated Beacon status screen shows detailed information about the integrated beacon source you have set up as a real-time correction source.

To display the Integrated Beacon status screen, open the Real-time section (see page 102). Then tap the arrow on the Summary list button below the status bar, and from the drop-down list select Beacon.

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Integrated Beacon</td>
<td>The status of this real-time correction source. The options are:</td>
</tr>
<tr>
<td>In use</td>
<td>A beacon is currently being used to correct positions in real time.</td>
</tr>
<tr>
<td>Waiting</td>
<td>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.</td>
</tr>
<tr>
<td>Not in use</td>
<td>A beacon real-time correction source is set up but is not currently being used for real-time differential corrections.</td>
</tr>
<tr>
<td>Not supported</td>
<td>The connected GPS receiver does not support real-time differential corrections from a beacon.</td>
</tr>
<tr>
<td>Frequency</td>
<td>The current beacon frequency being tracked or locked on to.</td>
</tr>
<tr>
<td>State</td>
<td>The operating state of the integrated beacon receiver. Select an option from the drop-down list.</td>
</tr>
<tr>
<td>SNR</td>
<td>The signal-to-noise ratio, in decibels, of the beacon station being tracked. An SNR above 6.0 dBHz indicates that the signal is usable.</td>
</tr>
<tr>
<td>Last correction</td>
<td>The time, in seconds, since the last correction message from this source was received by the GPS receiver.</td>
</tr>
<tr>
<td>Diagnostic Information</td>
<td>A heading used to group together fields that contain information for troubleshooting the beacon service.</td>
</tr>
<tr>
<td>Error Rate</td>
<td>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.</td>
</tr>
<tr>
<td>Input Level</td>
<td>The intensity level of the electromagnetic field. This value should be between 10 and 100 dBuV/M.</td>
</tr>
<tr>
<td>Data Rate</td>
<td>The data modulation rate from the beacon.</td>
</tr>
<tr>
<td>Health</td>
<td>The health of the beacon signal. Select an option from the drop-down list.</td>
</tr>
</tbody>
</table>
Integrated Satellite status screen

The *Integrated Satellite* status screen shows detailed information about the satellite differential service you have set up as a real-time correction source.

To display the *Integrated Satellite* status screen, open the Real-time section (see page 102). Then tap the arrow on the Summary list button below the status bar, and from the drop-down list select *Satellite*.

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Integrated Satellite</td>
<td>The status of this real-time correction source. The options are:</td>
</tr>
<tr>
<td></td>
<td>• In use The integrated satellite real-time correction source is being used to correct positions in real time.</td>
</tr>
<tr>
<td></td>
<td>• 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.</td>
</tr>
<tr>
<td></td>
<td>• Not in use An integrated satellite real-time correction source is set up but is not currently being used for real-time differential corrections.</td>
</tr>
<tr>
<td></td>
<td>• Not supported The connected GPS receiver does not support corrections from a satellite differential service.</td>
</tr>
<tr>
<td>Service Provider</td>
<td>The name of the provider of the satellite differential service being used.</td>
</tr>
<tr>
<td>Frequency</td>
<td>The current satellite frequency being tracked or locked on to.</td>
</tr>
<tr>
<td>State</td>
<td>The operating state of the integrated satellite receiver. Select an option from the drop-down list.</td>
</tr>
<tr>
<td>SNR</td>
<td>The signal-to-noise ratio, in decibels, of the selected satellite signal. An SNR above 3.0 dBHz indicates that the signal is usable.</td>
</tr>
<tr>
<td>Last correction</td>
<td>The time, in seconds, since the last correction message from this source was received by the GPS receiver.</td>
</tr>
<tr>
<td>Real-time Service Information</td>
<td>A heading used to group together fields that contain information about the satellite differential service subscription.</td>
</tr>
<tr>
<td>User access</td>
<td>Specifies whether the selected satellite differential service has been enabled for the GPS receiver. The options are:</td>
</tr>
<tr>
<td></td>
<td>• Enabled The service is enabled.</td>
</tr>
<tr>
<td></td>
<td>• Disabled The activation has expired.</td>
</tr>
<tr>
<td></td>
<td>• Unknown The service has not yet been activated on this receiver, or the receiver has not yet determined the activation status.</td>
</tr>
</tbody>
</table>
Table 5.15  Integrated Satellite status screen: Fields (continued)

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Decoder state</td>
<td>The current status of the satellite activation. The options are:</td>
</tr>
<tr>
<td></td>
<td>• Initializing The real-time correction decoder is initializing.</td>
</tr>
<tr>
<td></td>
<td>• Receiving corrections The decoder is providing corrections.</td>
</tr>
<tr>
<td></td>
<td>• No recent data Real-time correction data has not been received from the decoder in the last 10 seconds.</td>
</tr>
<tr>
<td></td>
<td>• Decoder unavailable The decoder is not available or is not operating correctly.</td>
</tr>
<tr>
<td></td>
<td>• Decoder reset A reset has been detected in the decoder.</td>
</tr>
<tr>
<td></td>
<td>• Invalid link The decoder is using a satellite link that is not valid for the subscription.</td>
</tr>
<tr>
<td></td>
<td>• Invalid region The decoder is being used in a region that is not covered by the current subscription.</td>
</tr>
<tr>
<td></td>
<td>• Update required The decoder requires an update from the master station before corrections can be provided.</td>
</tr>
<tr>
<td></td>
<td>• No offshore The decoder is being used in a marine area but the current subscription does not provide for offshore operation.</td>
</tr>
<tr>
<td>Expiration</td>
<td>The date on which the satellite differential service subscription expires, or the time remaining until the subscription expires.</td>
</tr>
<tr>
<td>Diagnostic Information</td>
<td>A heading used to group together fields that contain information for troubleshooting the satellite differential service.</td>
</tr>
<tr>
<td>Quality figure</td>
<td>The percentage of error-free data received from the satellite in the last data block. This value should be 90% or higher.</td>
</tr>
<tr>
<td>Decoder version</td>
<td>The version number of the satellite decoder in the GPS receiver.</td>
</tr>
</tbody>
</table>
### Integrated SBAS status screen

The *Integrated SBAS* status screen shows detailed information about the SBAS correction service you have set up as a real-time correction source.

To display the *Integrated SBAS* status screen, open the Real-time section (see page 102). Then tap the arrow on the Summary list button below the status bar, and from the drop-down list select *SBAS*.

![Integrated SBAS status screen](image)

#### Table 5.16 Integrated SBAS status screen: Fields

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Integrated SBAS</strong></td>
<td>The status of this real-time correction source. The options are:</td>
</tr>
<tr>
<td></td>
<td>• In use The SBAS real-time correction source is being used to correct positions in real time.</td>
</tr>
<tr>
<td></td>
<td>• 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.</td>
</tr>
<tr>
<td></td>
<td>• Not in use The SBAS real-time correction source is set up but is not currently being used for real-time differential corrections.</td>
</tr>
<tr>
<td></td>
<td>• Not supported The connected GPS receiver does not support corrections from an SBAS satellite.</td>
</tr>
<tr>
<td><strong>SNR</strong></td>
<td>The signal-to-noise ratio, in decibels, of the SBAS satellite being monitored. An SNR above 3.0 dBHz indicates that the signal is usable.</td>
</tr>
<tr>
<td><strong>Last correction</strong></td>
<td>The time, in seconds, since the last correction message from this source was received by the GPS receiver.</td>
</tr>
<tr>
<td><strong>Satellites corrected</strong></td>
<td><em>Note</em> – <em>This field only appears if the connected GPS receiver is a GPS Pathfinder XB or XC receiver.</em></td>
</tr>
<tr>
<td></td>
<td>Indicates how many of the GPS satellites used have SBAS corrections applied to them (the first number), and how many satellites are being used to calculate your position (the second number). If more than 75 % of the satellites used have SBAS corrections, then the TerraSync software treats the current GPS position as SBAS-corrected. Otherwise, the TerraSync software treats the position as an autonomous position, and the Integrated SBAS icon in the status bar flashes.</td>
</tr>
<tr>
<td></td>
<td>If you are within the coverage area of the SBAS system you are using, and the receiver has a clear view of the SBAS and GPS satellites, the number of SBAS-corrected satellites will usually be above the 75 % threshold.</td>
</tr>
</tbody>
</table>
Integrated RTK Radio status screen

The *Integrated RTK Radio Status* screen shows detailed information about the corrections being received by the GPS receiver’s internal RTK radio.

To display the *Integrated RTK Radio Status* screen, open the Real-time section (see page 102). Then tap the arrow on the Summary list button below the status bar, and from the drop-down list select *RTK Radio*.

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

The Plan screen enables you to 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 116.

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

The Plan screen includes:

- Planning skyplot (see page 114)
- Message line (see page 115)
- DOP graph (see page 115)
- Buttons, see below

Table 5.18 Plan screen: Buttons

<table>
<thead>
<tr>
<th>Button</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Play</td>
<td>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.</td>
</tr>
<tr>
<td>Now</td>
<td>Tap Now to set the session to the current time. The time shown on the skyplot and position of the slider control on the DOP graph (see page 115) change to match the current time.</td>
</tr>
<tr>
<td>Report</td>
<td>Tap the Report button to create a text file in the TerraSync documents folder that contains details of the current planning session.</td>
</tr>
<tr>
<td>Setup</td>
<td>Tap the Setup button to open the GPS Settings form (see page 130).</td>
</tr>
</tbody>
</table>
Terrestrial Software Reference Manual

The planning skyplot is similar to the skyplot shown in the Skyplot screen (see page 94). The outer black circle represents the horizon, while 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 pseudo-random number (PRN) of the satellite. Each satellite is colored for easy identification.

Note – Unlike the skyplot in the Skyplot screen, 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 skyplot in the Skyplot screen (see page 94).

The time displayed in the lower right corner of the planning skyplot indicates the exact time that the skyplot is showing. This is the time selected on the slider control on the DOP graph (see page 115).

When you open the Plan screen, the orientation of the planning skyplot matches the current heading shown on the skyplot in the Skyplot screen. The planning skyplot does not rotate as your heading changes, but if your heading becomes locked then the orientation is updated to this locked heading. This can happen, for example, if you are not moving fast enough for an accurate heading to be calculated.

---

Table 5.19 Plan screen: Options

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Show Orbits</td>
<td>Select the type of orbit information to display on the skyplot. The options are:</td>
</tr>
<tr>
<td></td>
<td>• Off  Do not show any orbit information.</td>
</tr>
<tr>
<td></td>
<td>• Trails Show an orbit trail for each satellite. During session playback, the entire trajectory of each satellite is visible, showing where it will travel during the session. The trajectory is a solid line in the same color that is used to represent the satellite.</td>
</tr>
<tr>
<td></td>
<td>• Trajectories Show an orbit trajectory for each satellite. At the beginning of playback, the entire trajectory of each satellite 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.</td>
</tr>
<tr>
<td>Hours</td>
<td>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.</td>
</tr>
</tbody>
</table>
**DOP graph**

The DOP graph shows the projected PDOP or HDOP values over the specified time period.

![DOP graph diagram]

The horizontal line indicates the currently configured maximum PDOP or HDOP. The slider control shows the time period that is selected in the Hours list (see page 114) of the Plan screen. Drag the slider control across the graph, or tap the left or right arrow button, to view the skyplot for a specific time. As the position of the slider control changes, the skyplot and time display change to match the selected time.

<table>
<thead>
<tr>
<th>Appearance</th>
<th>PDOP</th>
<th>HDOP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cyan bar</td>
<td>&lt; 4</td>
<td>&lt; 2.5</td>
</tr>
<tr>
<td>Green bar</td>
<td>4 to 6</td>
<td>2.5 to 4</td>
</tr>
<tr>
<td>Yellow bar</td>
<td>6 to 8</td>
<td>4 to 5.5</td>
</tr>
<tr>
<td>Red bar</td>
<td>&gt; 8</td>
<td>&gt; 5.5</td>
</tr>
<tr>
<td>Blank with black left and right borders</td>
<td>Not enough satellites are available to compute a position.</td>
<td></td>
</tr>
</tbody>
</table>

**Message line**

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

<table>
<thead>
<tr>
<th>Message</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recording almanac</td>
<td>The TerraSync software is downloading an almanac from the connected GPS receiver.</td>
</tr>
<tr>
<td>Need almanac</td>
<td>The TerraSync software does not have a current almanac of satellite locations.</td>
</tr>
<tr>
<td>Need position</td>
<td>The GPS receiver has stopped computing positions.</td>
</tr>
<tr>
<td>Heading locked</td>
<td>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.</td>
</tr>
</tbody>
</table>
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 installing 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 screen.

Before you use the Plan screen, tap the Setup button to open the GPS settings form (see page 130) in the Setup section and then configure GPS settings to your data collection requirements. Any changes made are reflected in the planning skyplot and DOP graph in the Plan screen. 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 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 to show the current time, drag the slider on the DOP graph (see page 115) 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.
Sensor

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

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.

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

Use the Sensor Mode button to move between the sensor status screens. Tap the Sensor Mode button to display a list of sensors and then 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>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;Sensor name&gt;</td>
<td>The name of the sensor, as defined in the Sensor Properties form (see page 155).</td>
</tr>
<tr>
<td>Feature Count</td>
<td>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.</td>
</tr>
<tr>
<td>Total Count</td>
<td>The total number of messages received from the sensor.</td>
</tr>
<tr>
<td>Last String</td>
<td>The last message string received from the sensor.</td>
</tr>
</tbody>
</table>
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 5.22 Comms screen: Fields

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>GPS</td>
<td>A GPS receiver is connected.</td>
</tr>
<tr>
<td>Laser</td>
<td>A laser rangefinder is connected.</td>
</tr>
<tr>
<td>&lt;Sensor name&gt;</td>
<td>An external sensor is connected.</td>
</tr>
<tr>
<td>Unknown Application</td>
<td>Another application is using the port.</td>
</tr>
<tr>
<td>None</td>
<td>No device is connected to the port.</td>
</tr>
</tbody>
</table>

UTC Time

The UTC screen displays the current Universal Time Coordinated (UTC) time, calculated from the GPS time reported by the connected GPS receiver.

To display the UTC Time section, tap the arrow on the Section button next to the status bar and from the drop-down list select 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 extension 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 and is replaced with the message Time not available. Connect to GPS.


**About**

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

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

The *About* screen also contains the **System Report** button. Tap this button to create a text file in the TerraSync documents folder describing the configuration of the field computer. 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 5.23 About screen: Fields

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Version number</td>
<td>The version and edition of the TerraSync software that is installed.</td>
</tr>
<tr>
<td>Serial number</td>
<td>The serial number of this copy of the TerraSync software. This is the serial number you entered during installation.</td>
</tr>
<tr>
<td>Support Expiration Date</td>
<td>The date until which you are entitled to telephone support, e-mail support, and upgrades to later versions of the TerraSync software.</td>
</tr>
<tr>
<td>Copyright</td>
<td>Copyright information.</td>
</tr>
<tr>
<td>Acknowledgments</td>
<td>Acknowledgments for the parts of the TerraSync software that were developed by other companies.</td>
</tr>
</tbody>
</table>
Use the *Setup* section to configure the TerraSync software.

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

Use the Setup screen to perform common setup tasks, and to access the six subsections of the Setup section. See:

- Logging Settings, page 126
- GPS Settings, page 130
- Real-time Settings form, page 138
- Coordinate System, page 151
- Units, page 153
- External Sensors, page 154

Table 6.24 Setup screen: Buttons

<table>
<thead>
<tr>
<th>Button</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ext Source</td>
<td>This button appears only if you have configured a VRS External Source as the preferred real-time source, and TerraSync is connected to GPS. Connects to or disconnects from an external VRS correction source. This button is a shortcut to the Connect and Disconnect from External Source options (see Table 6.24).</td>
</tr>
<tr>
<td>GPS</td>
<td>Connects to or disconnects from the GPS receiver. This button is a shortcut to the Connect and Disconnect from GPS options (see Table 6.26).</td>
</tr>
<tr>
<td>Reload</td>
<td>Re-applies the settings from the selected configuration file. Any changes made to the configuration will be lost.</td>
</tr>
<tr>
<td>Change</td>
<td>If the current configuration file specifies that you cannot change configurations, this button is not available. Opens the Choose Configuration form (see page 125). Use this form to change to a different configuration file.</td>
</tr>
<tr>
<td>Lock</td>
<td>Locks the current configuration, or opens the Enter Password form (see page 126). Use this form to unlock the current configuration.</td>
</tr>
<tr>
<td>Logging Settings</td>
<td>If a base data file is open, this button is unavailable. Opens the Logging Settings form (see page 126).</td>
</tr>
<tr>
<td>GPS Settings</td>
<td>If a base data file is open, this button is unavailable. Opens the GPS Settings form (see page 130).</td>
</tr>
<tr>
<td>Real-time Settings</td>
<td>Opens the Real-time Settings form (see page 138).</td>
</tr>
<tr>
<td>Coordinate System</td>
<td>Opens the Coordinate System form (see page 151).</td>
</tr>
<tr>
<td>Units</td>
<td>Opens the Units form (see page 153).</td>
</tr>
<tr>
<td>External Sensors</td>
<td>Opens the External Sensors form (see page 154).</td>
</tr>
</tbody>
</table>
The configuration of the TerraSync software determines how data is collected, entered, and communicated with external devices. Use configuration files to ensure that data collected by different field crews or on different days is collected in a consistent way.

A configuration file contains instructions that define, and optionally lock, the configuration of the TerraSync software.

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.

**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 permits you to change 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 125) and then 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 126), enter the password for the configuration file. Once you have unlocked the configuration, you can edit all settings and access all menu items. Either leave the configuration unlocked, or tap Lock to lock it again.

**Reloading a configuration**

Once you have changed settings from those defined in the selected configuration file, the name of the configuration file in the Current Configuration field of the Settings screen (see page 123) 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.

**Resetting to factory defaults**

The Factory Defaults configuration file is always available, and is loaded in the same way as any other configuration file. Provided the current configuration allows you to change configurations, click the Reload button to reset the software to the factory default settings.

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

Use the Choose Configuration form to select the configuration file you want to use to configure the TerraSync software.

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>
<thead>
<tr>
<th>Table 6.27 Choose Configuration form: Buttons</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Button</strong></td>
</tr>
<tr>
<td>Load</td>
</tr>
<tr>
<td>Cancel</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Table 6.28 Choose Configuration form: Fields</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Field</strong></td>
</tr>
<tr>
<td>List of files</td>
</tr>
</tbody>
</table>
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 Troubleshooting, page 199.

Table 6.29 Enter Password form: Fields

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enter Password</td>
<td>The password for the current locked configuration file.</td>
</tr>
</tbody>
</table>

Logging Settings

Use the Logging Settings form to configure settings that control what data is stored, and how.

To open the Logging Settings form, tap Logging Settings in the Setup screen.

SuperCorrect records are always logged, except where logging carrier data makes SuperCorrect logging unnecessary. With SuperCorrect logging you can get better precision with postprocessing. You can also postprocess all data, including real-time corrected data and data collected using different satellites from those visible at the base station.

Table 6.30 Logging Settings form: Fields

<table>
<thead>
<tr>
<th>Field</th>
<th>Default</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Log Velocity Data</td>
<td>No</td>
<td>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 – The GPS Pathfinder XB, XC, and Recon GPS CF Card receivers do not support logging of velocity data.</td>
</tr>
</tbody>
</table>
Log H-Star Data

This field specifies whether to log H-Star™ data as well as GPS position records. If you log H-Star data you can use Trimble postprocessing software to perform H-Star processing for improved accuracy.

- **Auto**: Select this option if you have a GPS receiver that has H-Star technology and you want to log H-Star data.
  
  *Note – If your GPS receiver does not have H-Star technology, then no H-Star data will be logged.*

- **No**: Select this option if you have a GPS receiver that has H-Star technology but you do not want to log H-Star data.

Antenna Height

This read-only field displays the height of the GPS antenna. To specify antenna details, tap the Setup button beside this field. The Antenna Settings form appears (see page 128).

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 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 attributes or position information of the feature. Select the No option to disable the confirmation message.

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.*

Style Time

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.

---

<table>
<thead>
<tr>
<th>Field</th>
<th>Default</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Log H-Star Data</td>
<td>Auto</td>
<td>This field specifies whether to log H-Star™ data as well as GPS position records. If you log H-Star data you can use Trimble postprocessing software to perform H-Star processing for improved accuracy.</td>
</tr>
</tbody>
</table>
|                     |         | - **Auto**: Select this option if you have a GPS receiver that has H-Star technology and you want to log H-Star data.  
  
  *Note – If your GPS receiver does not have H-Star technology, then no H-Star data will be logged.* 

- **No**: Select this option if you have a GPS receiver that has H-Star technology but you do not want to log H-Star data. |
| Antenna Height      | 0.00 m  | This read-only field displays the height of the GPS antenna. To specify antenna details, tap the Setup button beside this field. The Antenna Settings form appears (see page 128). |
| Allow Position Update | Confirm | 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 End Feature | No      | 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 attributes or position information of the feature. Select the No option to disable the confirmation message. |
| Filename Prefix     | R       | 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.* |
| Style               | Time    | 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. |
Use the Antenna Settings form to specify the antenna type you want to use, and the height of the antenna.

To open the Antenna Settings form, tap the Setup button beside the Antenna Height field on the Logging Settings form (see page 126).
Table 6.31 Antenna Settings form: Fields

<table>
<thead>
<tr>
<th>Field</th>
<th>Default</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Height</td>
<td>0.00 m</td>
<td>The height of the GPS antenna that is connected to the GPS receiver. This is used as a vertical offset on each position.</td>
</tr>
<tr>
<td>Confirm</td>
<td>Per File</td>
<td>How often the software asks you to confirm the configured antenna height during data collection. The options are:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Never: Do not confirm the antenna height before logging positions.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Per File: Display the Confirm Antenna Height form (see page 29) whenever you open a new or existing data file.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Per Feature: Display the Confirm Antenna Height form (see page 29) when you start a new feature, or when you update the position information of an existing feature.</td>
</tr>
<tr>
<td>Type</td>
<td>Unknown</td>
<td>The type of antenna that is connected to the GPS receiver. If TerraSync is connected to a receiver that can only connect to an internal antenna, this field automatically shows the correct antenna type.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>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. When you change a value in one of these two fields, the other field updates accordingly.</td>
</tr>
<tr>
<td>Part Number</td>
<td>n/a</td>
<td>The part number of the antenna that is connected to the GPS receiver. If the receiver can only connect to an internal antenna, this field automatically shows the correct part number.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>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.</td>
</tr>
<tr>
<td>Measure Height To</td>
<td>(none)</td>
<td>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. 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.</td>
</tr>
</tbody>
</table>
**GPS Settings**

Use the GPS Settings 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.

To open the GPS Settings form, do one of the following:

- In the Setup section, tap **GPS Settings**.
- In the Status section tap the Setup button at the bottom of the Skyplot screen (see page 94), or at the bottom of the Satellite Information screen (see page 99).

There are two configuration modes in the GPS Settings form: Slider and Custom.

*Note – If you are using a GPS Pathfinder XB or XC receiver, you cannot configure GPS settings. The GPS slider does not appear, and the default settings for these receivers are shown as read-only fields.*

**Configuring GPS settings in Slider mode**

To configure GPS settings in Slider mode, select the Slider check box. The slider control appears on the GPS slider bar, and the other fields in the form become read-only. The values in these fields change as the position of the slider control changes. Slider mode enables you to change the level of accuracy without needing to know the best values for each precision setting.

The GPS slider bar 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 bar is the same as the GPS slider bar in the Skyplot and Satellite information screens. If you change the slider control position in the GPS Settings form, it changes the slider control position in the other screens.*

For information about the fields in the GPS Settings form, see Table 6.34 on page 132.

**Minimum SNR values for GPS slider bar positions**

Version 2.50 and later of the TerraSync software stores and displays signal-to-noise ratio (SNR) values as Carrier-to-Noise ratio (C/No) values, measured in decibel-Hertz (dBHz). Previously, 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 dBHz through 43 dBHz. Typical SNR values for the Recon GPS CF Card receiver range from 14 dBHz through 26 dBHz. The GPS Pathfinder XB and XC receivers have a minimum SNR of 12 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.

For all supported Trimble Mapping and GIS receivers except the Recon GPS CF Card receiver, the positions on the GPS slider bar correspond to the minimum signal-to-noise ratio (SNR) values and Amplitude Measurement Unit (AMU) values shown in Table 6.32:

Table 6.32 SNR values

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

For the Recon GPS CF Card receiver, the positions on the GPS slider bar correspond to the SNR values (in dBHz) shown in Table 6.33:

Table 6.33 GPS slider SNR values for Recon GPS CF Card receiver

<table>
<thead>
<tr>
<th>Position on GPS slider</th>
<th>Min SNR for Recon GPS CF Card receiver</th>
<th>Min SNR for other receivers</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 (Maximum productivity)</td>
<td>14</td>
<td>33</td>
</tr>
<tr>
<td>2</td>
<td>14</td>
<td>35</td>
</tr>
<tr>
<td>3</td>
<td>14</td>
<td>37</td>
</tr>
<tr>
<td>4</td>
<td>14</td>
<td>38</td>
</tr>
<tr>
<td>5 (Default)</td>
<td>14</td>
<td>39</td>
</tr>
<tr>
<td>6</td>
<td>17</td>
<td>40</td>
</tr>
<tr>
<td>7</td>
<td>20</td>
<td>41</td>
</tr>
<tr>
<td>8</td>
<td>23</td>
<td>42</td>
</tr>
<tr>
<td>9 (Maximum precision)</td>
<td>26</td>
<td>43</td>
</tr>
</tbody>
</table>
Configuring GPS settings in Custom mode

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 required GPS settings.

Table 6.34  GPS Settings form: Fields

<table>
<thead>
<tr>
<th>Field</th>
<th>Default</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>GPS Receiver Port</td>
<td>COM1</td>
<td>The port on the field computer that the receiver is connected to.</td>
</tr>
<tr>
<td>DOP Type</td>
<td>PDOP</td>
<td>This field does not appear in Slider mode. The type of maximum DOP value to use. The options are:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• PDOP  Set a maximum PDOP. When you select this option, the Max PDOP field appears (see page 132).</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• HDOP  Set a maximum HDOP. When you select this option, the Max HDOP field appears (see page 132).</td>
</tr>
<tr>
<td>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.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Note – When using a GPS Pathfinder XB or XC receiver, the DOP Type is set to PDOP.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Max PDOP</td>
<td>6.0</td>
<td>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.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>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.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Specify a lower maximum PDOP to collect fewer, more precise positions. Specify a higher maximum PDOP to collect more, less precise positions.</td>
</tr>
<tr>
<td>Note – When using a GPS Pathfinder XB or XC receiver, the Max PDOP is set to 99.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Max HDOP</td>
<td>4.0</td>
<td>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.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>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).</td>
</tr>
<tr>
<td></td>
<td></td>
<td>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.</td>
</tr>
<tr>
<td>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.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Min SNR 39.0 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.
The SNR is a measure of the quality of the signal from a satellite. When the SNR of a satellite falls below the minimum value, the TerraSync software stops using that satellite to calculate your GPS position.

Note – When using a GPS Pathfinder XB or XC receiver, the Min SNR is set to 12 dBHz.

Min Elevation 15° 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 specified 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°.

Note – When using a GPS Pathfinder XB or XC receiver, the Min Elevation is set to 5°.

Velocity Filter Off 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 at least one valid real-time correction source is selected in the choice fields in the Real-time Settings form, and the last choice field is set to Wait for Real-time, only real-time positions are filtered. Otherwise, all 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.

Note – When using a Recon GPS CF Card or GPS Pathfinder XB or XC receiver, velocity filtering is unavailable. The Auto option corresponds to Off for these receivers.

<table>
<thead>
<tr>
<th>Field</th>
<th>Default</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Min SNR</strong></td>
<td>39.0</td>
<td>The minimum L1 SNR value. In Slider mode, this field is read-only, and its</td>
</tr>
<tr>
<td></td>
<td></td>
<td>value is the minimum SNR value for the current slider position. The SNR is</td>
</tr>
<tr>
<td></td>
<td></td>
<td>a measure of the quality of the signal from a satellite. When the SNR of a</td>
</tr>
<tr>
<td></td>
<td></td>
<td>satellite falls below the minimum value, the TerraSync software stops using</td>
</tr>
<tr>
<td></td>
<td></td>
<td>that satellite to calculate your GPS position.</td>
</tr>
<tr>
<td><strong>Min Elevation</strong></td>
<td>15°</td>
<td>The minimum elevation. In Slider mode, this field is read-only, and its value</td>
</tr>
<tr>
<td></td>
<td></td>
<td>is the minimum elevation value for the current slider position. Signals from</td>
</tr>
<tr>
<td></td>
<td></td>
<td>satellites that have a low elevation from the horizon can be of poor quality.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>The TerraSync software does not use any satellite that is below the minimum</td>
</tr>
<tr>
<td></td>
<td></td>
<td>value to calculate your GPS position.</td>
</tr>
<tr>
<td><strong>Velocity Filter</strong></td>
<td>Off</td>
<td>This field specifies whether to apply velocity filtering to GPS positions.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Velocity filtering reduces “spikes” in GPS data that are caused by poor GPS</td>
</tr>
<tr>
<td></td>
<td></td>
<td>conditions. The options are:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Auto Apply velocity filtering.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>If at least one valid real-time correction source is selected in the choice</td>
</tr>
<tr>
<td></td>
<td></td>
<td>fields in the Real-time Settings form, and the last choice field is set to</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Wait for Real-time, only real-time positions are filtered. Otherwise, all</td>
</tr>
<tr>
<td></td>
<td></td>
<td>positions are filtered.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Off Do not apply velocity filtering to any positions.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Note – Trimble recommends that you do not use velocity filtering in good GPS</td>
</tr>
<tr>
<td></td>
<td></td>
<td>conditions.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Note – When using a Recon GPS CF Card or GPS Pathfinder XB or XC receiver,</td>
</tr>
<tr>
<td></td>
<td></td>
<td>velocity filtering is unavailable. The Auto option corresponds to Off for these</td>
</tr>
<tr>
<td></td>
<td></td>
<td>receivers.</td>
</tr>
</tbody>
</table>
Outputting power from the GPS receiver

GPS Pathfinder Pro XRS receivers can output power on their serial ports.

*Note* – Other supported Mapping and GIS receivers do not output power. When one of these receivers is connected, you cannot select the On option in the Receiver Power Output field.

Outputting power on the GPS receiver’s serial port 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.

### Table 6.34 GPS Settings form: Fields (continued)

<table>
<thead>
<tr>
<th>Field</th>
<th>Default</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Receiver Power Output</td>
<td>Auto</td>
<td><strong>Note</strong> – 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. Specifies whether the connected receiver outputs power. If the connected GPS receiver is a GPS Pathfinder Pro XRS receiver, use this field to enable power output for an external device such as a DGPS radio. See Outputting power from the GPS receiver below. The options are:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Auto Corresponds to the On option for a survey receiver; corresponds to Off for all supported Mapping and GIS receivers.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• On Enable power output (Pro XRS receivers only).</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Off Disable power output.</td>
</tr>
<tr>
<td>NMEA Output</td>
<td>Off</td>
<td>Specifies whether the GPS receiver will output NMEA messages. Tap the Setup button beside this field to open the NMEA Output Settings form, where you can configure NMEA communication settings and the messages that will be generated (see page 135). <strong>Note</strong> – The TerraSync software does not support NMEA output from Recon GPS CF Card or GPS Pathfinder XB and XC receivers.</td>
</tr>
<tr>
<td>RTK Precisions</td>
<td>5 cm, 5 cm, 10 cm, 15 cm</td>
<td>Summarizes the required precisions for RTK-corrected positions. When you log data using RTK corrections, each position generated has precision estimates associated with it. Use these estimates to filter out positions that do not meet the required accuracy. 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 appears (see page 137).</td>
</tr>
</tbody>
</table>
If you enable power output, power is supplied to all ports on the GPS receiver. When you select the Auto or On option in the Receiver Power Output field (see page 134), the TerraSync software displays a warning message to remind you that power will be supplied to the field computer and to the external device.

To supply power from a GPS Pathfinder Pro XRS receiver to an external device, complete the following steps:

1. Enable power output in the GPS Settings form (see page 134).
2. 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 43197) to a powered cable.
3. Connect the external device to the GPS receiver using a powered connection such as the curly straight-through cable (P/N 30236).

**NMEA Output Settings form**

If your GPS receiver supports NMEA messages, use the NMEA Output Settings 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.*

To open the NMEA Output Settings form, in the GPS Settings form tap the Setup button beside the NMEA Output field.
### Table 6.35  NMEA Output Settings form: Fields

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

Use the *RTK Precision Settings* 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.

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

---

**Table 6.36  RTK Precision Settings form: Fields**

<table>
<thead>
<tr>
<th>Field</th>
<th>Default</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Static Precision</td>
<td>(none)</td>
<td>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.</td>
</tr>
<tr>
<td>Horizontal</td>
<td>5.0 cm</td>
<td>The minimum horizontal precision for positions collected in static mode.</td>
</tr>
<tr>
<td>Vertical</td>
<td>5.0 cm</td>
<td>The minimum vertical precision for positions collected in static mode.</td>
</tr>
<tr>
<td>Roving Precision</td>
<td>(none)</td>
<td>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.</td>
</tr>
<tr>
<td>Horizontal</td>
<td>10.0 cm</td>
<td>The minimum horizontal precision for positions collected in roving mode.</td>
</tr>
<tr>
<td>Vertical</td>
<td>15.0 cm</td>
<td>The minimum vertical precision for positions collected in roving mode.</td>
</tr>
</tbody>
</table>
Real-time Settings form

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

**Note** – Data collected using a Recon GPS CF Card receiver cannot be differentially corrected, either in real time or using postprocessing.

To open the Real-time Settings form, do one of the following:

- In the Setup section, tap Real-time Settings.
- In any screen in the Real-time section, tap the Setup button.

To configure your choice of real-time differential correction sources:

1. In the Choice 1 field, select the real-time correction source that you would prefer to receive real-time corrections from. Depending on the type of GPS receiver you are using, the options are:

<table>
<thead>
<tr>
<th>Source</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>External Source</td>
<td>Use corrections from an external correction source (for example a radio or an external beacon receiver).</td>
</tr>
<tr>
<td>Integrated Beacon</td>
<td>This option only appears if the connected GPS receiver is a GPS Pathfinder Pro XRS receiver. Use corrections from a beacon, using the GPS receiver's integrated beacon receiver.</td>
</tr>
<tr>
<td>Integrated Satellite</td>
<td>This option only appears if the connected GPS receiver is a GPS Pathfinder Pro XRS receiver. Use corrections from a satellite differential correction service, using the GPS receiver's integrated satellite receiver.</td>
</tr>
<tr>
<td>Integrated SBAS</td>
<td>Use corrections from a Satellite Based Augmentation System (SBAS) using the GPS receiver's integrated SBAS receiver.</td>
</tr>
<tr>
<td>RTK Radio</td>
<td>Use RTK corrections from an integrated data radio in the GPS receiver (survey receivers only).</td>
</tr>
<tr>
<td>Use Uncorrected GPS</td>
<td>Log autonomous GPS positions without applying real-time corrections.</td>
</tr>
<tr>
<td>Wait for Real-time</td>
<td>Suspend logging until a real-time correction source becomes available.</td>
</tr>
</tbody>
</table>

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.

2. If a Setup button appears next to the Choice 1 field, click the Setup button to open the relevant dialog and set up options for the selected real-time correction source. For more information, see:
3. If you want to configure a second source for real-time corrections if your first choice is not available, select the type of source in the Choice 2 field.

**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.

4. Repeat steps 2 and 3 for all the choice fields that appear, or until you have selected all the real-time correction sources that you want to use. For information about valid combinations of real-time correction sources, see Table 6.37 on page 140.

5. If the Real-Time Age Limit field appears, select a maximum age at which a correction message will be used.

6. Click **OK**.

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.

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.

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 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.

Table 6.37 summarizes the valid combinations of real-time correction sources.

<table>
<thead>
<tr>
<th>Choice 1</th>
<th>Choice 2</th>
<th>Choice 3</th>
<th>Choice 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>External Source</td>
<td>Integrated Beacon</td>
<td>Integrated SBAS</td>
<td>Use Uncorrected GPS</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Wait for Real-time</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Use Uncorrected GPS –</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Wait for Real-time –</td>
<td></td>
</tr>
<tr>
<td>Integrated Satellite</td>
<td>Integrated SBAS</td>
<td>Use Uncorrected GPS</td>
<td>Wait for Real-time</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Use Uncorrected GPS –</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Wait for Real-time –</td>
<td></td>
</tr>
<tr>
<td>Integrated SBAS</td>
<td></td>
<td>Use Uncorrected GPS –</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Wait for Real-time –</td>
<td></td>
</tr>
<tr>
<td>Use Uncorrected GPS</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wait for Real-time</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Integrated Beacon</td>
<td>Integrated SBAS</td>
<td>Use Uncorrected GPS –</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Wait for Real-time –</td>
<td></td>
</tr>
<tr>
<td>Use Uncorrected GPS</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wait for Real-time</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Integrated Satellite</td>
<td>Integrated SBAS</td>
<td>Use Uncorrected GPS –</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Wait for Real-time –</td>
<td></td>
</tr>
<tr>
<td>Use Uncorrected GPS</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wait for Real-time</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Integrated SBAS</td>
<td>Use Uncorrected GPS</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Wait for Real-time</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Use Uncorrected GPS</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wait for Real-time</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Use Uncorrected GPS</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wait for Real-time</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 6.38 describes the fields available in the Real-time Settings form.

### Table 6.38  Real-time Settings form: Fields

<table>
<thead>
<tr>
<th>Field</th>
<th>Default</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Choice 1</td>
<td>Integrated Beacon</td>
<td>The preferred source of real-time corrections. The options are:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• External Source: Use an external correction source such as a virtual reference station (VRS), data radio, or GeoBeacon receiver.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Integrated Beacon: Use corrections from an integrated beacon receiver (Pro XRS receivers only).</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Integrated Satellite: Use corrections from an integrated satellite receiver (Pro XRS receivers only).</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Integrated SBAS: Use corrections from an integrated SBAS receiver. The following receivers support SBAS corrections:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• GeoExplorer series handhelds (GPS firmware version 1.03 or later is required for EGNOS)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• GPS Pathfinder Pro XRS 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</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• GPS Pathfinder Pro series (ProXH and ProXT) receivers</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• GPS Pathfinder XB and XC receivers</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• 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.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Use Uncorrected GPS: Log autonomous GPS positions without applying real-time corrections.</td>
</tr>
<tr>
<td>Choice 2</td>
<td>Use Uncorrected GPS</td>
<td>This field does not appear if you selected Use Uncorrected GPS in the Choice 1 field.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>The source of real-time corrections to use when the first choice is not available.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>The options are as for the Choice 1 field except that External Source is not available, and the following additional option is available:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Wait for Real-time: Suspend logging until a real-time correction source becomes available.</td>
</tr>
<tr>
<td>Choice 3</td>
<td>Use Uncorrected GPS</td>
<td>This field does not appear if you selected Use Uncorrected GPS in the Choice 2 field.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>The source of real-time corrections to use when the first and second choices are not available. The options are:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Use Uncorrected GPS</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Wait for Real-time</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Integrated SBAS</td>
</tr>
<tr>
<td>Choice 4</td>
<td>Use Uncorrected GPS</td>
<td>This field does not appear if you selected Use Uncorrected GPS in the Choice 3 field.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>The source of real-time corrections to use when none of the other preferred real-time correction sources are available. The options are:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Use Uncorrected GPS</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Wait for Real-time</td>
</tr>
</tbody>
</table>
Use the External Source Settings form to configure settings specific to an external real-time source, such as a GeoBeacon receiver or a virtual reference station (VRS).

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

Real-time VRS differential correction is supported by the following Mapping and GIS receivers:

- GeoExplorer 2005 series handhelds (GeoXH, GeoXT, or GeoXM handhelds)
- GeoExplorer series handhelds (GeoXT or GeoXM handhelds) with GPS firmware version 1.03 or later installed
- GPS Pathfinder ProXH or ProXT receivers
- GPS Pathfinder Pro XRS receivers with firmware version 1.50 or later installed

For more information on connecting to a VRS, see [Using corrections from a VRS system](#), page 171.

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 that appears beside the Choice 1 field.

Table 6.39 describes the fields in the External Source Settings form.
**Table 6.39 External Source Settings form: Fields**

<table>
<thead>
<tr>
<th>Field</th>
<th>Default</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Type</strong></td>
<td>Single Base</td>
<td>The type of source. The options are:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Single Base: Corrections are sent by a single base station.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• 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.</td>
</tr>
<tr>
<td><strong>Connection Method</strong></td>
<td>Serial Port</td>
<td>How TerraSync connects to the external correction source. The options are:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• 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 TerraSync.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Direct Dial: The TerraSync software communicates with a VRS server using a dial-up modem connection.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• 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.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• 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 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 145) appears.</td>
</tr>
<tr>
<td><strong>Address</strong></td>
<td>(blank)</td>
<td>This field only appears if the Connection Method field is set to Internet. 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 (for example, an NTRIP server) manages authentication and password control for differential correction sources such as virtual reference station (VRS) networks, and relays corrections from the source that you select to the TerraSync software.</td>
</tr>
<tr>
<td><strong>Port</strong></td>
<td>COM1 (Serial Port) or 80 (Internet)</td>
<td>This field only appears if the Connection Method field is set to Serial Port or Internet. When the Connection Method field is set to:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Serial Port: specifies the serial (COM) port on the field computer that the external correction source is connected to. Tap the Setup button beside the Port field to open the Serial Port Settings form (see page 145), and configure the serial port settings.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Internet: specifies the port on the VRS server to connect to.</td>
</tr>
<tr>
<td><strong>Modem Type</strong></td>
<td>(blank)</td>
<td>This field only appears if the Connection Method field is set to Direct Dial. The type of modem you are using to connect to the VRS server.</td>
</tr>
</tbody>
</table>
Table 6.39  External Source Settings form: Fields (continued)

<table>
<thead>
<tr>
<th>Field</th>
<th>Default</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phone Number</td>
<td>(blank)</td>
<td>This field only appears if the Connection Method field is set to Direct Dial. The telephone number of the VRS server.</td>
</tr>
<tr>
<td>Source</td>
<td>Not Applicable</td>
<td>This field only appears if the Connection Method field is set to Internet. 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 147) appears. Select the VRS server that you want to use and tap OK to return to the External Source Settings form.</td>
</tr>
<tr>
<td>User name</td>
<td>(blank)</td>
<td>This field only appears if the VRS server you want to use requires authentication. Specifies the username that you use to log on to the broadcast server.</td>
</tr>
<tr>
<td>Password</td>
<td>(blank)</td>
<td>This field only appears if the VRS server you want to use requires authentication. Specifies the password that you use to log on to the broadcast server.</td>
</tr>
</tbody>
</table>
| Connection Control| Auto   | This field only appears if the Connection Method field is set to Internet or Direct Dial. Specifies how communication with the server is controlled. The options are:  
  - 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 121). |
| Real-time Protocol| RTCM   | 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. |
| Station ID        | Any    | This field is only displayed if the Type field (on this form) is set to Single Base. 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. |
Receiver Port Settings form

Use the Receiver Port Settings form to configure communication settings when an external correction source is connected to a port on the receiver, or to configure communication settings when you choose to output corrections while collecting base station data.

To open the Receiver Port Settings form, do one of the following:

- In the External Source Settings form (see page 142), tap the Setup button beside the Connection Method field.
- In the Real-time Output step of the Base Station Setup wizard, tap the Setup button beside the Receiver Port field (see Real-Time Output step, page 31).

Table 6.40 Receiver Port Settings form: Fields

<table>
<thead>
<tr>
<th>Field</th>
<th>Default</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Receiver Port</td>
<td>Port 3 (5700) or Port 1 (other receivers)</td>
<td>The port on the GPS receiver that the external device is connected to. When a 5700 receiver is connected, the only option available for this field is Port 3.</td>
</tr>
<tr>
<td>Port Configuration</td>
<td>Custom</td>
<td>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 default settings of the radio. 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 current settings of the device. 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.</td>
</tr>
<tr>
<td>Baud Rate</td>
<td>9600</td>
<td>This field is read-only unless you select Custom in the Port Configuration field. The baud rate the GPS receiver and external source communicate at. Select the rate from the drop-down list.</td>
</tr>
<tr>
<td>Data Bits</td>
<td>8</td>
<td>This field is read-only unless you select Custom in the Port Configuration field. The number of data bits used when the external correction source and GPS receiver communicate. The options are 7 or 8.</td>
</tr>
</tbody>
</table>
Use the Serial Port Settings form to configure communication settings when an external correction source is connected to an external COM port.

To open the Serial Port Settings form, tap the Setup button beside the Port field in the External Source Settings form (see page 142).

**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 specified in this form are only applied if the port is not in use by another application.

Table 6.41 Serial Port Settings form: Fields

<table>
<thead>
<tr>
<th>Field</th>
<th>Default</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baud Rate</td>
<td>9600</td>
<td>This field is read-only unless you select Custom in the Port Configuration field. The baud rate the GPS receiver and external source communicate at. Select the rate from the drop-down list.</td>
</tr>
<tr>
<td>Data Bits</td>
<td>8</td>
<td>This field is read-only unless you select Custom in the Port Configuration field. The number of data bits used when the external correction source and GPS receiver communicate. The options are 7 or 8.</td>
</tr>
<tr>
<td>Port Configuration</td>
<td>Custom</td>
<td>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 default settings of the radio. 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 current settings of the device. 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.</td>
</tr>
<tr>
<td>Parity</td>
<td>None</td>
<td>The parity setting used when the GPS receiver and external source communicate. Select an option from the drop-down list.</td>
</tr>
<tr>
<td>Stop Bits</td>
<td>1</td>
<td>The number of stop bits used when the external correction source and GPS receiver communicate. The options are 1 or 2.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Field</th>
<th>Default</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stop Bits</td>
<td>1</td>
<td>This field is read-only unless you select Custom in the Port Configuration field. The number of stop bits used when the external correction source and GPS receiver communicate. The options are 1 or 2.</td>
</tr>
</tbody>
</table>
Use the **Select Server** form to select the VRS server that you want to receive corrections from.

To open the **Select Server** form, do one of the following in the **External Source Settings** form (see page 142):

- tap the Setup button 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.

**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. 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 selected column, 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 6.42 Select Server form: Fields

<table>
<thead>
<tr>
<th>Field</th>
<th>Default</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Server</td>
<td></td>
<td>The identification code of the VRS server.</td>
</tr>
<tr>
<td>Name</td>
<td></td>
<td>A description of the VRS server.</td>
</tr>
<tr>
<td>Country</td>
<td></td>
<td>The three-letter code for the country where the VRS server is located.</td>
</tr>
<tr>
<td>Carrier</td>
<td></td>
<td>This field specifies whether the VRS data stream includes carrier phase data.</td>
</tr>
<tr>
<td>Format</td>
<td></td>
<td>The format of the data stream, such as RTCM, raw data, or CMR.</td>
</tr>
</tbody>
</table>

**Note** – Currently, TerraSync does not support VRS data in CMR format.
Integrated Beacon Settings form

Use the Integrated Beacon Settings form to configure settings that are specific to an integrated beacon real-time source.

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 that appears beside the Choice field.

Table 6.43 Integrated Beacon Settings form: Fields

<table>
<thead>
<tr>
<th>Field</th>
<th>Default</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mode</td>
<td>Auto Range</td>
<td>The radio-beacon signal tracking mode in which to operate the integrated beacon receiver. The options are:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Auto Power The receiver tracks and locks on to the most powerful radio-beacon signal.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Auto Range The receiver tracks and locks on to the nearest radio-beacon signal.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Manual The receiver tracks only the frequency specified in the Frequency field.</td>
</tr>
<tr>
<td>Frequency</td>
<td>283.5 kHz</td>
<td>The frequency used when you select Manual in the Mode field.</td>
</tr>
</tbody>
</table>
**Integrated Satellite Settings form**

Use the *Integrated Satellite Settings* form to configure settings that are specific to an integrated satellite real-time source.

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 that appears beside the *Choice* field.

<table>
<thead>
<tr>
<th>Field</th>
<th>Default</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Service Provider</td>
<td>OmniSTAR</td>
<td>The satellite differential service provider. Select an option from the drop-down list.</td>
</tr>
<tr>
<td>Name</td>
<td>Custom</td>
<td>The satellite used for satellite differential corrections. The options in this list depend on the satellite differential service provider that is selected.</td>
</tr>
<tr>
<td>Frequency</td>
<td>1538.053 MHz</td>
<td>The frequency used when you select Custom in the <em>Name</em> field.</td>
</tr>
<tr>
<td>Data Rate</td>
<td>600</td>
<td>The data rate used when you select Custom in the <em>Name</em> field. Select an option from the drop-down list.</td>
</tr>
</tbody>
</table>

**Integrated SBAS Settings form**

Use the *Integrated SBAS Settings* form to configure the SBAS satellite settings.

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 that appears beside the *Choice* field.
Use the RTK Radio Settings 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.

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.

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 142) to configure communication between the external data radio and the receiver.
Coordinate System

Use the Coordinate System 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 the coordinate system, the coordinates of the current data file 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 the coordinate system, any open background image is unloaded.

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

<table>
<thead>
<tr>
<th>Field</th>
<th>Default</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Select By</td>
<td>Coordinate system and zone</td>
<td>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:</td>
</tr>
<tr>
<td></td>
<td>(none)</td>
<td>This field does not appear if you have not transferred sites to the TerraSync software. If you selected Site in the Select By field, this field shows the site name.</td>
</tr>
<tr>
<td>System</td>
<td>Latitude/Longitude</td>
<td>The coordinate system to be used in the TerraSync software. If you selected Site in the Select By field, this field is read-only.</td>
</tr>
</tbody>
</table>
Table 6.47  Coordinate System form: Fields (continued)

<table>
<thead>
<tr>
<th>Field</th>
<th>Default</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zone</td>
<td>(none)</td>
<td>This field does not appear if the selected coordinate system does not have zones. The zone in the coordinate system. If you selected Site in the Select By field, this field appears but is read-only.</td>
</tr>
<tr>
<td>Datum</td>
<td>WGS 1984</td>
<td>The datum that the selected coordinate system and zone are associated with.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• If the system can be associated with only one datum, this field is read-only.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• 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.</td>
</tr>
<tr>
<td>Altitude Reference</td>
<td>Height Above Ellipsoid (HAE)</td>
<td>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).</td>
</tr>
<tr>
<td>Coordinate Units</td>
<td>(none)</td>
<td>Select the unit of measurement to be used for coordinate values. Select an option from the drop-down list.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Note</strong> – This setting is for Northing and Easting distances only. Units for direct measures of distance are controlled by the Distance Units field on the Units form (see page 153).</td>
</tr>
<tr>
<td>Altitude Units</td>
<td>Meters</td>
<td>The unit of measurement to be used for altitude values. Options in the drop-down list are as for the Coordinate Units field.</td>
</tr>
<tr>
<td>Display USNG</td>
<td>Off</td>
<td>The level of precision for northing and easting values when displaying U.S. National Grid (USNG) coordinates. The options are:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Off Disable the display of USNG values, and display coordinates to 2 decimal places</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• 10,000 m Display USNG coordinates to 2 digits</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• 1,000 m Display USNG coordinates to 4 digits</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• 100 m Display USNG coordinates to 6 digits</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• 10 m Display USNG coordinates to 8 digits</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• 1 m Display USNG coordinates to 10 digits</td>
</tr>
</tbody>
</table>
**Units**

To open the *Units* form, in the *Setup* screen tap **Units**.

Use the *Units* form to specify the units used for measurements and display.

**Table 6.48 Units form: Fields**

<table>
<thead>
<tr>
<th>Field</th>
<th>Default</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Distance Units</td>
<td>Meters</td>
<td>The unit that distances are measured and displayed in. Select an option from the drop-down list. <em>Note</em> – This setting is for direct measures of distance only. Units for Northing and Easting distances are controlled by the Coordinate Units field on the Coordinate System form (see page 152).</td>
</tr>
<tr>
<td>Area Units</td>
<td>Square Meters</td>
<td>The unit that areas are measured and displayed in. Select an option from the drop-down list.</td>
</tr>
<tr>
<td>Velocity Units</td>
<td>Kilometers per Hour</td>
<td>The unit that velocities are measured and displayed in. Select an option from the drop-down list.</td>
</tr>
<tr>
<td>Angle Units</td>
<td>Degrees</td>
<td>The unit that angles are measured and displayed in. Select an option from the drop-down list.</td>
</tr>
<tr>
<td>Lat/Long Format</td>
<td>DD°MM'SS.ss&quot;</td>
<td>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.</td>
</tr>
<tr>
<td>Offset Format</td>
<td>Horizontal/Vertical</td>
<td>How offset distances are measured. The options are:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Horizontal/Vertical The offset is defined as the two-dimensional distance and vertical distance to the feature.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Slope/Inclination The offset is defined as the three-dimensional distance to the feature and the inclination of the slope.</td>
</tr>
<tr>
<td>North Reference</td>
<td>True</td>
<td>Specifies whether north references are relative to true north or magnetic north.</td>
</tr>
<tr>
<td>Magnetic Declination</td>
<td>Auto</td>
<td>This field is only available if you have selected Magnetic in the North Reference field. The magnetic declination, in degrees. Select Auto or enter a number in the field. The number must be between –90° and 90°.</td>
</tr>
</tbody>
</table>
External Sensors


Use the External Sensors form to enable and configure external sensors, such as laser rangefinders and geiger counters.

To open the External Sensors form, in the Setup screen tap External Sensors.

Table 6.49 External Sensors form: Buttons

<table>
<thead>
<tr>
<th>Button</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Properties</td>
<td>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.</td>
</tr>
</tbody>
</table>

Table 6.50 External Sensors form: Fields

<table>
<thead>
<tr>
<th>Field</th>
<th>Default</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Check box</td>
<td>(cleared)</td>
<td>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.</td>
</tr>
</tbody>
</table>

<Sensor name> Laser or Sensor # 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.
**Sensor Properties form**

To open the *Sensor Properties* form, in the *External Sensors* form tap a **Properties** button.

![Sensor Properties form](image)

<table>
<thead>
<tr>
<th>Field</th>
<th>Default</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>(none)</td>
<td>The name of the sensor.</td>
</tr>
<tr>
<td>Port</td>
<td>None</td>
<td>The serial (COM) port that the sensor is connected to.</td>
</tr>
<tr>
<td>Baud Rate</td>
<td>9600</td>
<td>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.</td>
</tr>
<tr>
<td></td>
<td>4800</td>
<td></td>
</tr>
</tbody>
</table>

**Note** – The following fields do not appear if the Laser sensor is selected:

<table>
<thead>
<tr>
<th>Field</th>
<th>Default</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data Bits</td>
<td>8</td>
<td>The number of data bits used when the field computer and external sensor communicate. The options are 7 or 8.</td>
</tr>
<tr>
<td>Stop Bits</td>
<td>1</td>
<td>The number of stop bits used when the field computer and external sensor communicate. The options are 1 or 2.</td>
</tr>
<tr>
<td>Parity</td>
<td>None</td>
<td>The parity setting used when the field computer and external sensor communicate. Select an option from the drop-down list.</td>
</tr>
<tr>
<td>Prefix String</td>
<td>(none)</td>
<td>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. <strong>Note</strong> – 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.</td>
</tr>
<tr>
<td>Suffix String</td>
<td>(none)</td>
<td>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. <strong>Note</strong> – 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.</td>
</tr>
</tbody>
</table>
Setup Section

Table 6.51 Sensor Properties: Fields (continued)

<table>
<thead>
<tr>
<th>Field</th>
<th>Default</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max Bytes</td>
<td>(none)</td>
<td>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. <strong>Do not enter 0.</strong> The maximum value for the Max Bytes field is 242. This is the maximum length for UNINTERPRETED_SENSOR_DATA SSF records.</td>
</tr>
<tr>
<td>Time Out</td>
<td>0.10s</td>
<td>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.</td>
</tr>
</tbody>
</table>
| Receive Mode        | Unsolicited | 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>** option in the Collect Features screen (see page 36) to request data when you need it. |
| Request String      | (none)    | This field only appears if the Receive Mode field is set to Requested. The string that the TerraSync software sends to the sensor to request data. Note – You can include non-printable characters (for example, line feeds) and system commands in the request string. See Request Codes, page 157. |
| Point Feature       | All       | The interval at which data is requested or read from the sensor for point features. The options are:  
  - Off: Data from this sensor is not recorded for point features.  
  - 5s: Data from this sensor is requested or read every five seconds.  
  - All: This option is only available if the Receive Mode field in the Sensor Properties form is set to Unsolicited. All data sent by the sensor is read.  
  - Trigger: This option is only available if the Receive Mode field in the Sensor Properties form is set to Requested. Data is requested when the **Trigger <sensor name>** option in the Collect Features screen (see page 36) is selected. You can also enter an interval, in seconds, in this field. |
| Line/Area Feature   | All       | The interval at which data is requested or read from the sensor for line and area features. The options are as for Point Feature above. |
| Not in Feature      | All       | The interval at which data is requested or read from the sensor for between feature positions. The options are as for Point Feature above. |
Table 6.51  Sensor Properties: Fields (continued)

<table>
<thead>
<tr>
<th>Field</th>
<th>Default</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data</td>
<td>Uninterpreted</td>
<td>How the sensor data should be saved in the data file. The options are:</td>
</tr>
<tr>
<td>Destination</td>
<td></td>
<td>• Uninterpreted The data is stored in the data file in independent</td>
</tr>
<tr>
<td></td>
<td></td>
<td>UNINTERPRETED_SENSOR_DATA records.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• As attribute The data is stored in an attribute of the current feature.</td>
</tr>
<tr>
<td>Attribute Name</td>
<td>(not displayed)</td>
<td>Use the Attribute Name field below to specify which attribute to use.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>The name of the attribute that the sensor data is to be saved in. If the</td>
</tr>
<tr>
<td></td>
<td></td>
<td>feature does not contain an attribute with this name, the data is ignored.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Note</strong> — 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 value range for the attribute 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.</td>
</tr>
</tbody>
</table>

**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:

<table>
<thead>
<tr>
<th>Code</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>\00</td>
<td>nul</td>
</tr>
<tr>
<td>\01</td>
<td>soh</td>
</tr>
<tr>
<td>\02</td>
<td>stx</td>
</tr>
<tr>
<td>\03</td>
<td>etx</td>
</tr>
<tr>
<td>\04</td>
<td>eot</td>
</tr>
<tr>
<td>\05</td>
<td>enq</td>
</tr>
<tr>
<td>\06</td>
<td>ack</td>
</tr>
<tr>
<td>\07</td>
<td>bel</td>
</tr>
<tr>
<td>\08</td>
<td>bs</td>
</tr>
<tr>
<td>\09</td>
<td>tab</td>
</tr>
<tr>
<td>\0a</td>
<td>lf</td>
</tr>
<tr>
<td>\0b</td>
<td>vt</td>
</tr>
<tr>
<td>\0c</td>
<td>ff</td>
</tr>
<tr>
<td>\0d</td>
<td>cr</td>
</tr>
<tr>
<td>\0e</td>
<td>so</td>
</tr>
<tr>
<td>\0f</td>
<td>si</td>
</tr>
<tr>
<td>\10</td>
<td>dle</td>
</tr>
<tr>
<td>\11</td>
<td>dc1</td>
</tr>
<tr>
<td>\12</td>
<td>dc2</td>
</tr>
<tr>
<td>\13</td>
<td>dc3</td>
</tr>
<tr>
<td>\14</td>
<td>dc4</td>
</tr>
<tr>
<td>\15</td>
<td>nak</td>
</tr>
<tr>
<td>\16</td>
<td>syn</td>
</tr>
<tr>
<td>\17</td>
<td>etb</td>
</tr>
<tr>
<td>\18</td>
<td>can</td>
</tr>
<tr>
<td>\19</td>
<td>em</td>
</tr>
<tr>
<td>\1a</td>
<td>sub</td>
</tr>
<tr>
<td>\1b</td>
<td>ec</td>
</tr>
<tr>
<td>\1c</td>
<td>fs</td>
</tr>
<tr>
<td>\1d</td>
<td>gs</td>
</tr>
<tr>
<td>\1e</td>
<td>rs</td>
</tr>
<tr>
<td>\1f</td>
<td>us</td>
</tr>
</tbody>
</table>
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 35) 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 (see page 35) and then select Log Later from the drop-down list.

Recording between feature positions

The GPS data collected using the TerraSync software is recorded in files. You can collect positions in a file without collecting feature and attribute data. These positions are called *between feature positions*. They appear in their own layer on the Map graphical screen.

Recording GPS positions only is useful if you do not need to record feature and attribute data. For example, you may want to record a trail of the day’s activities to track where you have been. In this case, you would not want to collect feature or attribute information, only the positions. You can also use between feature logging to record the route traveled from one feature to the next.

By default, the TerraSync software does not record between feature positions. Use the *Logging Settings* form (see page 126) 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 the positions of an existing feature with new GPS or digitized positions, the Continue option treats the feature as a new feature, so it can be continued.

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

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 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 reappears.
4. Tap **Options**. From the option list, select **Continue**. The **Continue Feature** form 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 164.

To view or enter the offset for the feature being collected or updated, tap **Options** in the attribute entry form and then select **Offset**.
You can also use offsets for line and area features. For example, when collecting a line feature such as a fence, it may be easier to drive along the road beside the fence and record the positions of the fence as an offset. When collecting an area feature such as a lake, you could walk some distance from the lake edge and record its perimeter using an offset.

**Note** – A feature (point, line, or area) can have only one offset associated with it. To collect a line or area feature using offsets, the same offset value must apply to the whole feature. This may require a test run around or along an object to make sure that you can remain a consistent distance from it.

**Note** – You can record a line feature as a series of joined line segments, each with a different offset. See also Segmenting line features, page 169.

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 168.
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 appears.

**Note** – You can also record complex offsets for point features (see below).

**Complex offsets**

When you record a complex offset, you do not record any position information for the feature. Instead, you record GPS positions for two or three reference positions and measure the distance or direction from each reference position to the feature. The TerraSync software uses coordinate geometry (COGO) to calculate the location of the feature, in much the same way as a GPS receiver uses the distances to GPS satellites at known locations to calculate GPS positions.

In the TerraSync software, 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 (see page 166)
- Triple distance offset (see page 166)
- Bearing-bearing offset (see page 167)
- Triple bearing offset (see page 167)

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** applies to complex offsets, so you should choose reference positions that are widely spaced.

For detailed instructions, see Recording a complex offset, page 165.
Recording a complex offset

To record a complex point offset:

1. Start the point feature.

2. In the attribute entry form, tap Options and then select Offset. The Point Offset Type form appears.

3. Select the type of offset you want to record and 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 Using a laser rangefinder to record offsets, page 168.
   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 position of the feature.

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 appears.
**Distance-distance offset**

A distance-distance offset uses the distance between the feature and two reference positions (A and B) to specify the position of the feature. The feature lies at the point where the circles centered on A and B intersect. Because there are two points where the circles intersect, you need to specify which direction the feature is in, relative to the path from A to B.

![Distance-distance offset diagram](image)

**Triple distance offset**

A triple distance offset uses the distance between the feature and three reference positions (A, B, and C) to specify the position of the feature. The feature lies at the point where the circles centered on A, B, and C intersect. There can be only one point where the three circles intersect, so you usually do not need to specify a direction.

A triple distance offset is similar to a distance-distance offset, but a third measurement provides some mathematical redundancy that can improve accuracy.

![Triple distance offset diagram](image)
**Bearing-bearing offset**

A bearing-bearing offset uses the bearing from north from each of two reference points (A and B) to the feature to specify the position of the feature. The feature lies at the point where the two bearing lines intersect.

![Bearing-bearing offset diagram](image)

**Triple bearing offset**

A triple bearing offset uses the bearing from north from each of three reference points (A, B, and C) to the feature to specify the position of the feature. The feature lies at the point where the three bearing lines intersect.

A triple bearing offset is similar to a bearing-bearing offset, but a third measurement provides some mathematical redundancy that can improve accuracy.

![Triple bearing offset diagram](image)
Using a laser rangefinder to record offsets

You can use a laser rangefinder to record accurate offsets for a feature. To use a rangefinder with the TerraSync software, you only need to specify which serial (COM) port on the field device the rangefinder is connected to.

For a list of the laser rangefinders that the TerraSync software supports, go to www.trimble.com/terrasync_specs.shtml.

To record an offset from a laser rangefinder, make sure that a feature is open, and that the attribute entry form for the feature, the appropriate offset form, or the Map screen is open. Then fire the laser rangefinder. The TerraSync software stores the distance and, if the laser rangefinder supports it, the bearing, in the appropriate field(s) in the offset form.

Before storing an offset from a laser rangefinder, the TerraSync software subtracts the antenna height from the measurement (see page 127). The antenna height is specified in the Setup section.

An incorrect antenna height can reduce the vertical accuracy of the position of the feature. If vertical accuracy is important, make sure that you do the following:

- Set the antenna height to the vertical distance from the laser rangefinder to the antenna, not to the distance from the ground to the antenna. You can use a configuration file to do this.
- Keep the laser rangefinder as close to the antenna phase center as possible when shooting.
- Shoot at a higher position on the feature to compensate for the antenna height being subtracted from the altitude of the feature.

For more information on configuring a laser rangefinder to work with the TerraSync software, see External Sensors, page 154.

You can also use a laser rangefinder as an external sensor (see below).

Using an external sensor

You can use an external sensor with the TerraSync software. The data recorded by the sensor can be stored as an attribute, or it can be stored in the data file as an uninterpreted sensor data record. You can export uninterpreted sensor data from the GPS Pathfinder Office software to the GIS or processing software.

Depending on the way you want to store the sensor data, and the capabilities of the sensor, you can configure the TerraSync software to read data from the sensor at specified intervals, or only when you request it.

For more information on configuring an external sensor to work with the TerraSync software, see External Sensors, page 154.

Note – A laser rangefinder can be used either as an external sensor, as described here, or to supply data for feature offsets. See Using a laser rangefinder to record offsets, page 168.
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 35), tap **Options** and then select **Repeat**. When Repeat is selected a check mark (✓) appears beside it in the option list.
2. Select a feature from the **Choose Feature** list and 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, tap **Options** and then select **Repeat**. The check mark disappears.

*Note* – When Repeat is not selected, the data dictionary determines default attribute values. Where appropriate, the data dictionary specifies a default value for each attribute of a feature.

Segmenting line features

Use segmenting to record a line as several segments that are joined together, each with different attribute values. For example, you can record a road feature that has one surface for part of its length, and a different surface for the rest of its length.

When you segment a line feature, the TerraSync software immediately records a position, even if the logging interval does not require a position at that time. This position becomes the last position in the old line and the first position in the new line. Recording a position at the segmentation point ensures that the two line segments join up in the Trimble postprocessing software and the GIS.

The offset of the new line segment defaults to the offset of the previous line segment, if there is one. The new line feature has the same attribute values as the previous line segment, except that any auto-incrementing attributes are incremented to the next value.

*Note* – If the line feature has an offset, the two line segments may not “snap” together.

To segment a line feature:

1. While logging a line feature, in the attribute entry form (see page 38), tap **Options** and then 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 attributes of the new feature.
**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 217) 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 for the line or area feature (see page 38), tap **Options** and then 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. 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 offset of the feature using the line/area **Offset** form (see page 41).
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 160.

**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 location of the rover.
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 TerraSync with:

- GeoExplorer series handhelds with GPS firmware version 1.03 or later:
  - GeoXH™ handheld
  - GeoXT™ handheld
  - GeoXM™ handheld
- GPS Pathfinder Pro series receivers:
  - GPS Pathfinder ProXT receiver
  - GPS Pathfinder ProXH receiver
- GPS Pathfinder Pro XRS receivers with firmware version 1.52 or later
- 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, TerraSync 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 (see page 173)**
  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 (see page 175)**
  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 (see page 177)**
  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 (an NTRIP server is an example of a 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.
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 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 TerraSync.
   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 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 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 then 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 *Setup* section of the TerraSync software, 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 TerraSync.

**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.
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 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 then select Connect to External Source.
   c. If necessary, enter your username and password in the terminal window that appears.

2. Proceed with data collection. Use the Real-time Summary screen in the Status section if you want to check the VRS status.

3. When you have finished using the VRS correction source:
   a. To manually disconnect from the VRS server, in the Setup section of the TerraSync software, tap Options and then select Disconnect from External Source.
   b. To ensure that the call is ended, use the End Call command on the cellphone.

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 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.
   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 215) 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 or a GeoExplorer GeoXH handheld. 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 XRS, ProXT, or ProXH receiver, or from a GeoXH or 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, page 181.
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 TerraSync 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, TerraSync 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.
2. Tap *Logging Settings*. The *Logging Settings* form appears.
3. Make sure that the *Log H-Star Data* field is set to Auto.
4. Tap *OK* to close this form and confirm the changes you have made.

*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.*

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 Postprocessed 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 required accuracy 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 required accuracy.
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 using a GPS Pathfinder XB or XC receiver, a Recon GPS CF Card 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 184).

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 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.

*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 135). 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 File Manager screen (see page 60). 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, 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.
3. Tap Logging Settings. The Logging Settings form 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 they are, the TerraSync software starts to log carrier data in the background. This allows the carrier block to start as soon as you open the file, not just when you begin to log a feature. 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. When the TerraSync software has logged carrier phase data continuously for the minimum time (10 minutes), the success beep sounds.

If you try to close a file before the minimum time is up, the TerraSync software asks you to confirm that you want to close the file. If you do close the file, you may lose carrier accuracy for some features.

Once the counter is running, you can choose to end the current feature and stay where you are until the minimum time is up. When the success beep sounds, move to the next feature. Using this method, you can be sure that you have sufficient data to generate precise positions.

Alternatively, if you think you are unlikely to lose lock, you can move to the next feature *before* sufficient carrier phase data has been collected. This is possible because all features recorded during a block achieve the precision associated with that block. Provided that a block eventually contains enough useful data, you can generate precise positions for any feature recorded within it.

---

**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 using a GPS Pathfinder receiver, a Recon GPS CF Card 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 *Setting up a base station*, page 187.

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 *Using corrections from a VRS system*, page 171.

Configuring the TerraSync software for RTK data collection

To configure the TerraSync software to use RTK corrections:

1. Open the Setup section.
2. Tap **Real-time Settings**. The Real-time Settings form appears.
3. 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 appears. Select the radio channel and the base radio type at the correct wireless data rate, and then tap OK.
   
   - If you selected External Source, the External Source Settings form appears. To use a data radio connected to the receiver, select Receiver Port in the Connection Method field, and then select appropriate settings for the other fields. To use corrections from a VRS, select appropriate settings depending on the VRS source and the communication method used (see Using corrections from a VRS system, page 171). 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 appears.
   
   b. Tap the Setup button beside the RTK Precisions field. The RTK Precision Settings form 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 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.

The TerraSync software uses these estimates to reject any positions that do not fall within the specified precision tolerances. 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, TerraSync 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 to record. Instead, you only need to collect one position that is within the required precision tolerances. To do this, simply remain stationary until the logging icon in the status bar 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 to:

- Log base data to a file (see below), which can be used to postprocess rover data in Trimble postprocessing software.
- Generate real-time corrections for broadcast to DGPS or RTK rovers (see page 188).

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:

<table>
<thead>
<tr>
<th>GPS receiver</th>
<th>Log to base file</th>
<th>Output DGPS corrections</th>
<th>Output RTK corrections</th>
</tr>
</thead>
<tbody>
<tr>
<td>GeoXH</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>GeoXT</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>GPS Pathfinder ProXH</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>GPS Pathfinder Pro XRS</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>GPS Pathfinder ProXT</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>5700</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>5800</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>R8</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

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 189).

Logging base data to a file

The following receivers can log base data to a file, for use in Trimble postprocessing software:

- GPS Pathfinder ProXH receiver
- GPS Pathfinder ProXT receiver
- GPS Pathfinder Pro XRS receiver
- GeoExplorer GeoXH handheld
- GeoExplorer GeoXT handheld

To log base data to a file, open the New File screen (see page 28) and start a new base data file. Then step through the Base Station Setup wizard (see page 30).
Generating real-time corrections

The following receivers can output real-time corrections:

- GPS Pathfinder Pro XRS receiver
- All supported survey receivers

To broadcast real-time corrections, configure the base receiver to generate real-time correction messages. Then either use the internal transmit radio in an R8 receiver, or connect the base receiver to a data radio, such as a TRIMTALK or TRIMMARK™ radio, which broadcasts the correction messages.

Survey receivers can output DGPS corrections in the RTCM 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 Outputting power from the GPS receiver, page 134.

To output real-time corrections:

1. Open the New File screen (see page 28) and start a new base data file.
2. Step through the Base Station Setup wizard. In the Real-Time Output step (see page 31), 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 screen (see page 28) and start a new base data file.
3. Step through the Base Station Setup wizard. In the Real-Time Output step (see page 31), make sure that you set the Correction Output field to Receiver Port, to enable real-time output.
4. If the base receiver is a survey receiver, a message appears before the new base file is opened, warning that you cannot collect base data using this receiver. Tap OK to continue.
5. To confirm that the receiver is generating correction messages, make sure that the base station icon is visible in the status bar.
6. Disconnect the TerraSync software from the base receiver. Do one of the following:
   – Physically disconnect the field device from the base receiver.
   – In the TerraSync software, disconnect from GPS.
   – Exit the TerraSync software without closing the base file.

Tip – Whenever you close the base file while the TerraSync software is connected to the receiver, the receiver stops generating real-time output. If you want the base receiver to continue operating unattended, do not close the base file before disconnecting from the base receiver.
Coordinate Systems

In this chapter:

- Coordinate systems and datums
- Coordinate systems available in the TerraSync software
- Using the Coordinate System Manager utility
- Transferring coordinate systems
- Configuring coordinate systems

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 configured coordinate system.

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 represents the coordinates of geographic features in a locality of interest using a rectangular grid (running North and East), and presumes that the earth is locally flat. 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 gravity of the earth is constant. (The geoid represents mean sea level.)

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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 systems, the coordinates of the current data file are recalculated, which may take some time.

**Note** – Each background image is associated permanently with a coordinate system. To display correctly when opened, the coordinate system of a background image must match the current TerraSync coordinate system.

**Tip** – If no coordinate system has been assigned to an image when you open it in the background, the TerraSync software associates it with the current coordinate system. To change the coordinate system that is associated with a background image, change the coordinate system of the image using Trimble postprocessing software and transfer the image to the TerraSync software again. Alternatively, delete the corresponding .cs file in the TerraSync documents folder, change to the required coordinate system in the TerraSync software, and open the image in the Map background.

The geoid separation models used by the TerraSync software and the GPS Pathfinder Office software differ in accuracy. The TerraSync software is necessarily approximate, while GPS Pathfinder Office software is more accurate. If you require altitudes relative to a different reference level, or relative to a more accurate (perhaps local) mean sea level model, you will need to process the heights in GPS Pathfinder Office before exporting them to the GIS.

The TerraSync software lets you specify a datum transformation and a map projection so that you can see your GPS position (and the position of features you may have recorded) in the local coordinate system. This makes it easy for you to check your position or to navigate using a map produced by your GIS. It also lets you specify whether heights will be shown relative to the local ellipsoid, or relative to mean sea level.
For your convenience, the TerraSync software hides the complexities of datum transformations and map projections behind the common names for the coordinate systems with which you may be familiar. Each named coordinate system has an associated datum (which encapsulates an ellipsoid) and a number of zones (each of which is a named instance of a particular map projection).

**Coordinate systems available in the TerraSync software**

The TerraSync software is supplied with a large number of coordinate systems and datums, including most National Coordinate Systems.

You can also create your own coordinate systems and sites using the Coordinate System Manager utility in the GPS Pathfinder Office software. You can easily load these coordinate systems into the TerraSync software using the Trimble Data Transfer utility.

*Note – The default geoid in the TerraSync software is the DMA 10x10 (Global) model. This is different from the default used by the GPS Pathfinder Office software. As a result, MSL heights in the TerraSync software may differ from those displayed in the GPS Pathfinder Office software.*

**Using the Coordinate System Manager utility**

Use the Coordinate System Manager utility in the GPS Pathfinder Office software to create and edit custom coordinate systems and sites for use with the TerraSync software. This data can be saved to a coordinate system export file, which you can then transfer to the field device.

To use the Coordinate System Manager utility:

1. On the office computer, start the Coordinate System Manager utility from the GPS Pathfinder Office software.
2. Use the tabs in the main window to select or edit coordinate systems, zones, and sites.

*CAUTION – When you transfer a new coordinate system file to the field device, it replaces all coordinate systems already stored in the TerraSync software. Make sure that the new file includes all the coordinate systems that you want to use in the TerraSync software.*

4. Select the *Selected records only* option in the *Export* dialog.
5. Click **OK**. The *Save As* dialog appears.
6. Specify the filename and click **Save**.

When you have saved the coordinate system database files and the related support files, use the Data Transfer utility to transfer the coordinate system export file to the TerraSync software (see Transferring coordinate systems, page 195).
For more information on using the Coordinate System Manager utility, refer to the GPS Pathfinder Office Online Help.

**Transferring coordinate systems**

There are two ways to transfer coordinate systems or sites to the TerraSync software:

- You can transfer a single coordinate system or site which you select at the time of transfer (see page 196).
- You can use the Coordinate System Manager utility to create a coordinate system export file that contains a number of coordinate systems, zones, datums and sites, and then transfer this file to the TerraSync software (see below).

The TerraSync software stores all its coordinate systems in one file. When you load a new coordinate system into the TerraSync software, the new file replaces any existing coordinate system or systems in the software. If you transfer a single coordinate system or site, all existing systems in the software are lost. If you transfer a coordinate system export file, make sure that you include any coordinate systems that you want to keep, plus any new systems that you want to transfer to the TerraSync software.

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**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.

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**Transferring a coordinate system export file**

Use the Trimble Data Transfer utility to transfer a coordinate system export file to the TerraSync software. A coordinate system export file can contain a number of coordinate systems and sites.

To transfer a coordinate system export file:

1. Connect the field device to the office computer, start the Data Transfer utility, and connect to the appropriate device definition. For detailed instructions, see the TerraSync Software Getting Started Guide.
2. Select the Send tab.
3. Click Add and select Coordinate System Export File from the drop-down list. The Open dialog appears, showing all coordinate system export (.cse and .csw) files in the default location for coordinate system files, C:\Program Files\Common Files\Trimble\Geodata.
4. Browse for the correct drive and folder if necessary, then select a .cse file and click Open.

**Note** – If you select more than one .cse or .csw file to send, only the coordinate systems in the last file you transfer will be loaded into the TerraSync software. Each transferred file replaces any previously transferred files.
5. The Open dialog disappears. The selected coordinate system export file is added to the Send list in the Data Transfer dialog.

6. Click Transfer.

7. If coordinate systems or sites in the selected export file reference other files such as geoid grid files, the Associated Files dialog appears. Select the appropriate check box to send each file required, and then click OK.

The selected coordinate system export file and any associated files are transferred to the field computer, replacing any coordinate systems stored in the TerraSync software. For more information, refer to the GPS Pathfinder Office software Online Help.

**Transferring a single coordinate system**

⚠️ CAUTION – To prevent the loss of coordinate system information in the TerraSync software, Trimble strongly recommends that you transfer coordinate systems to the field device in a coordinate system export file. This is preferable to selecting and sending a single coordinate system.

Use the Trimble Data Transfer utility to transfer a single coordinate system to the TerraSync software.

To transfer a coordinate system:

1. Connect the field device to the office computer, start the Data Transfer utility, and connect to the appropriate device definition. For detailed instructions, see the TerraSync Software Getting Started Guide.

2. Select the Send tab.

3. Click Add and select Coordinate System from the drop-down list. The Coordinate System dialog appears.

4. 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 selected coordinate system or site is added to the Send list in the Data Transfer dialog.

7. Click Transfer.

8. If the selected coordinate system references other files such as geoid grid files, the Associated Files dialog appears. Select the appropriate check box to send each file required, and then click OK.
The selected coordinate system and associated files are transferred to the field computer, replacing any coordinate systems stored in the TerraSync software. For more information, refer to the GPS Pathfinder Office software Online Help.

**Configuring coordinate systems**

Use the Coordinate System form to edit the coordinate system, zone, and datum parameters. The TerraSync software lets you specify a datum transformation and a map projection so that you can see your GPS position, and the position of features you collect, in your local coordinate system. This makes it easy for you to check your position or to navigate using a map produced by your GIS.

To configure the Coordinate System form:

1. In the Setup section, tap Coordinate System.
   
   The Coordinate System form appears.

2. Use this form to specify the coordinate system, site, zone, datum, and altitude reference. You can also specify the units used to display the coordinates and altitude. For more information, see Coordinate System, page 151.

3. Tap OK when you have finished.

   The Coordinate System form closes and any changes made are applied immediately throughout the TerraSync software. If any points in the Map section are not within the selected coordinate system, a warning message appears, asking you to confirm that you want to apply the new coordinate system. If you do, the map points that are outside this system are not displayed on the map.
Troubleshooting

In this chapter:

- Communications
- Field computer
- GPS
- Real-time differential correction
- Using the TerraSync software
- Position accuracy

This section lists possible causes of, and solutions to, problems you may encounter when using the TerraSync software.
**Communications**

The table below describes possible causes of communication problems.

<table>
<thead>
<tr>
<th>Problem</th>
<th>Possible cause</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>The ActiveSync technology does not connect to the field device.</td>
<td>The Windows CE device is not connected securely to the cradle or data cable.</td>
<td>Check cabling and then try to connect again.</td>
</tr>
<tr>
<td></td>
<td>ActiveSync technology has timed out.</td>
<td>Lift the Windows CE device out of the cradle and then replace it.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Unplug the data cable of the Windows CE device and then plug it in again.</td>
</tr>
<tr>
<td></td>
<td>The TerraSync software is trying to connect to the GPS receiver using the COM port that ActiveSync technology is using.</td>
<td>Disconnect from GPS (see page 123), or exit the TerraSync software.</td>
</tr>
<tr>
<td></td>
<td>The serial (COM) port is configured in the TerraSync software for use with a laser rangefinder.</td>
<td>Exit the TerraSync software.</td>
</tr>
<tr>
<td></td>
<td>In ActiveSync technology, delete any partnerships with other Windows CE devices.</td>
<td>Change the selected port in the Laser port field on the Logging Settings form (see page 126).</td>
</tr>
<tr>
<td></td>
<td>An ActiveSync technology partnership with another Windows CE device is interfering with connection to the device.</td>
<td>Use a guest relationship, not a partnership.</td>
</tr>
<tr>
<td>Data transfer is slow.</td>
<td>The Windows CE device is not configured to connect at the maximum baud rate available.</td>
<td>Increase the connection speed. See the installation instructions.</td>
</tr>
<tr>
<td>The TerraSync software does not list the COM port that you want to use.</td>
<td>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.</td>
<td>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. <strong>Note</strong> – On a GeoExplorer series handheld, the COM1 serial port is always defined, even if the serial clip is not connected to the handheld.</td>
</tr>
<tr>
<td></td>
<td>The port is a Bluetooth port that is no longer available.</td>
<td>Re-enable Bluetooth to re-configure the COM port.</td>
</tr>
<tr>
<td>The desktop computer does not connect to the field device.</td>
<td>The Windows CE device is not set up to establish a PC connection.</td>
<td>Open the Communications Properties dialog on the device. For information on how to do this, refer to the documentation for the device. Select the PC Connection tab and check that the Allow connection with desktop computer when device is attached check box is selected.</td>
</tr>
<tr>
<td></td>
<td>Another application is using the COM port.</td>
<td>Exit the other application, or disconnect it from the COM port.</td>
</tr>
</tbody>
</table>
This section lists describes problems you may encounter when using a field computer.

<table>
<thead>
<tr>
<th>Problem</th>
<th>Possible cause</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>You cannot send or receive data files by e-mail from within the TerraSync software.</td>
<td>The TerraSync software cannot connect to your ISP because it does not have your account login details.</td>
<td>In the settings for the e-mail service that you are using, specify the login details for connecting to your ISP.</td>
</tr>
<tr>
<td>The data files attached to e-mails are not being downloaded from the mail server.</td>
<td></td>
<td>Configure the e-mail service that you are using to download the entire message and any attachments, not just the message header.</td>
</tr>
<tr>
<td>The field computer does not support e-mail.</td>
<td></td>
<td>Use the Trimble Data Transfer utility to transfer files to or from the TerraSync software.</td>
</tr>
<tr>
<td>The field computer does not turn on, or turns off immediately after being turned on.</td>
<td>The field computer’s batteries are dead.</td>
<td>Replace or recharge the field computer batteries.</td>
</tr>
<tr>
<td></td>
<td>Connect to an external power source.</td>
<td></td>
</tr>
<tr>
<td>The message Not enough memory appears.</td>
<td>Not enough memory on the Windows CE device is allocated to programs, because too much is allocated for storage.</td>
<td>Adjust memory allocation, see the TerraSync Software Getting Started Guide.</td>
</tr>
<tr>
<td></td>
<td>There is not enough free memory on the field computer.</td>
<td>Delete unwanted files.</td>
</tr>
<tr>
<td>The screen is not visible outside or in bright light.</td>
<td>The screen contrast is too low.</td>
<td>Adjust the screen contrast. See the TerraSync Software Getting Started Guide.</td>
</tr>
<tr>
<td>A file attached to a filename field does not open or play on a desktop computer.</td>
<td>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.</td>
<td>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.</td>
</tr>
<tr>
<td>A TerraSync software data file has been corrupted.</td>
<td>The field computer was reset or the batteries were removed while the software was logging data.</td>
<td>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.</td>
</tr>
</tbody>
</table>

Field computer

This section lists describes problems you may encounter when using a field computer.
## GPS

This section lists describes problems you may encounter when using GPS or a GPS receiver:

<table>
<thead>
<tr>
<th>Problem</th>
<th>Possible cause</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>The message No GPS detected appears.</td>
<td>The cable connecting the field computer to the GPS receiver has not been connected, has been connected incorrectly, or is faulty.</td>
<td>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.</td>
</tr>
<tr>
<td></td>
<td>The COM port on the field computer is faulty.</td>
<td>Check that the COM port is undamaged. If it appears to be damaged, the field computer may require servicing.</td>
</tr>
<tr>
<td></td>
<td>The GPS receiver's battery has not been connected correctly.</td>
<td>Check that the battery is correctly connected.</td>
</tr>
<tr>
<td></td>
<td>The GPS receiver's battery is dead.</td>
<td>Recharge the GPS receiver's battery.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Connect to an external power source.</td>
</tr>
<tr>
<td>The receiver has not acquired a satellite within three minutes of starting the TerraSync software.</td>
<td>The receiver is still looking for satellites.</td>
<td>Check the Satellite Information section (see page 99) to see how many satellites are being tracked by the receiver.</td>
</tr>
<tr>
<td></td>
<td>The expected satellites are being obstructed.</td>
<td>The obstruction may be a building, a tree, or a large vehicle. Identify the obstruction and move away from it. Note – GPS does not work indoors.</td>
</tr>
<tr>
<td></td>
<td>The GPS receiver’s external antenna (or antenna cable) has not been connected, has been connected incorrectly, or is faulty.</td>
<td>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.</td>
</tr>
<tr>
<td></td>
<td>The receiver has not been used for a very long time, and the almanac stored in the receiver is outdated.</td>
<td>Wait for up to 15 minutes until a new almanac has been recorded. Subsequent restarts should then be rapid.</td>
</tr>
<tr>
<td></td>
<td>The receiver has been set to Base mode by another application.</td>
<td>Reset the GPS receiver. To do this, open the Setup Section (see page 121), tap Options and then select Reset GPS receiver.</td>
</tr>
<tr>
<td>The receiver is not able to compute a GPS position within one minute of starting the TerraSync software.</td>
<td>There are not enough satellites available. Four SVs are required to compute a position.</td>
<td>Use mission planning to check that there are sufficient satellites visible at this time. In the GPS Settings form (see page 130), check that the minimum elevation value is not too high. In the GPS Settings form (see page 130), check that the minimum SNR value is not too high.</td>
</tr>
<tr>
<td></td>
<td>The current DOP value is too high.</td>
<td>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 130), check that the configured maximum DOP value (PDOP or HDOP) is not too low.</td>
</tr>
</tbody>
</table>
## Real-time differential correction

This section lists describes problems you may encounter when using real-time differential corrections or real-time differential correction sources:

<table>
<thead>
<tr>
<th>Problem</th>
<th>Possible cause</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not all positions are corrected in real time.</td>
<td>You have chosen to use uncorrected GPS if no real-time corrections are available.</td>
<td>In the last Choice field on the <em>Real-time Settings</em> form (see page 138), select Wait for real-time.</td>
</tr>
<tr>
<td>The TerraSync software is not using the first choice real-time correction source.</td>
<td>The first choice correction source is not available, so the second or third choice is not being used.</td>
<td>In the Real-time section (see page 102), check the status of your preferred correction source. If necessary, change the configuration in the <em>Real-time Settings</em> form (see page 138), or wait until this source is available again.</td>
</tr>
<tr>
<td>The integrated beacon component (Pro XRS receivers only) does not appear to work.</td>
<td>You have set the real-time source incorrectly.</td>
<td>In the <em>Real-time Settings</em> form (see page 138), set one of the Choice fields to Integrated Beacon. If integrated beacon is your preferred correction source, set the <em>Choice 1</em> field to Integrated Beacon.</td>
</tr>
<tr>
<td>The integrated satellite component (Pro XRS receivers only) does not appear to work.</td>
<td>You have set the real-time source incorrectly.</td>
<td>In the <em>Real-time Settings</em> form (see page 138), set one of the Choice fields to Integrated Satellite. If integrated satellite is your preferred correction source, set the <em>Choice 1</em> field to Integrated Satellite.</td>
</tr>
<tr>
<td>You have not enabled the integrated satellite component of the receiver.</td>
<td>You have not enabled the integrated satellite component of the receiver.</td>
<td>For information on how to enable the integrated satellite component, refer to the <em>GPS Pathfinder Systems Receiver Manual</em>.</td>
</tr>
<tr>
<td>You have entered the incorrect provider, satellite, and/or frequency.</td>
<td>You have entered the incorrect provider, satellite, and/or frequency.</td>
<td>In the <em>Real-time Settings</em> form (see page 138), select appropriate options in the <em>Service Provider</em>, <em>Name</em>, and <em>Frequency</em> fields.</td>
</tr>
<tr>
<td>Your satellite differential subscription has expired or has not yet been activated.</td>
<td>Your satellite differential subscription has expired or has not yet been activated.</td>
<td>In the <em>Integrated Satellite Settings</em> form (see page 149), check the expiry date of the satellite differential subscription. For information on how to renew or acquire a subscription, refer to the <em>GPS Pathfinder Systems Receiver Manual</em>.</td>
</tr>
</tbody>
</table>
### Using the TerraSync software

This section lists describes problems you may encounter within the TerraSync software.

<table>
<thead>
<tr>
<th>Problem</th>
<th>Possible cause</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>You cannot update a feature, add new features, or open a data file.</strong></td>
<td>You are using the TerraSync Standard edition software, which does not allow you to open imported files. In this edition of the software, any file that you transfer from the office computer, create from Shapefiles, or receive by e-mail is marked Not Usable.</td>
<td>Upgrade to the fully functional TerraSync Professional edition software.</td>
</tr>
<tr>
<td></td>
<td>The file is already open in the background of the Map section.</td>
<td>Set the map background file to None. Select another file for the map background.</td>
</tr>
<tr>
<td></td>
<td>Position updates are not allowed.</td>
<td>Set the Allow Position Update field (see page 127) on the Logging Settings form to Yes or Confirm.</td>
</tr>
<tr>
<td><strong>You cannot change settings or use some menu items.</strong></td>
<td>The setting or menu item is locked by the current configuration. A locked icon (🔒) appears beside locked settings and menu items.</td>
<td>Unlock the configuration file.</td>
</tr>
<tr>
<td><strong>You cannot unlock a configuration file.</strong></td>
<td>You have forgotten the password for the configuration file.</td>
<td>Use the manager’s password, TrimbleTerraSync.</td>
</tr>
<tr>
<td><strong>Automatically generated time attributes are incorrect.</strong></td>
<td>The internal clock on the field computer has been set incorrectly, or the selected time zone is incorrect.</td>
<td>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.</td>
</tr>
<tr>
<td><strong>File dates are incorrect.</strong></td>
<td>The internal clock on the field computer has been set incorrectly, or the selected time zone is incorrect.</td>
<td>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.</td>
</tr>
</tbody>
</table>
## Troubleshooting

<table>
<thead>
<tr>
<th>Problem</th>
<th>Possible cause</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Some or all features are missing from the <strong>Update Features</strong> screen or the <strong>Map</strong> section.</td>
<td>There is no data file open.</td>
<td>Use the <em>New File</em> form to create a new file (see page 28), or the <em>Existing File</em> screen (see page 49) to open an existing file.</td>
</tr>
<tr>
<td></td>
<td>There are no features in the file to display.</td>
<td>Open the <em>Collect Features</em> screen to collect some features (see page 35).</td>
</tr>
<tr>
<td></td>
<td>The layer in the <strong>Map</strong> section that the features belong to has been turned off, or the group in the <strong>Data</strong> section that the features belong to has been hidden.</td>
<td>In the <strong>Map</strong> section, tap <strong>Layers</strong> and select <strong>Filtered Features</strong>, or <strong>Unfiltered Features</strong>, to display the appropriate layer (see page 11).</td>
</tr>
<tr>
<td></td>
<td>The background file in the <strong>Map</strong> section is turned off or has not been selected.</td>
<td>If the data you want to see is in a background file, use the <em>Background File</em> form to check that the map is set to display this file (see page 12). Then tap <strong>Layers</strong> and make sure that the <strong>Background</strong> option has a check mark beside it.</td>
</tr>
<tr>
<td></td>
<td>The zoom scale is incorrect.</td>
<td>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.</td>
</tr>
<tr>
<td></td>
<td>You are viewing the wrong area in the <strong>Map</strong> screen.</td>
<td>Use the Pan map tool (see page 10) or the Pan button on the Command bar (see page 8) to pan the display to the appropriate area. Use the Zoom Extents mode (see page 8) or the Zoom Extents button on the Command bar (see page 8) to zoom to a scale where all features are visible.</td>
</tr>
<tr>
<td></td>
<td>The features have been filtered out.</td>
<td>Check the Status bar to see if a filter is active. If the filter icon is visible, open the <em>Filter By</em> form where you can disable or change the criteria for filters (see page 56).</td>
</tr>
<tr>
<td></td>
<td>The features have been deleted.</td>
<td>Deleted features are never shown in the <strong>Map</strong> section. In the <strong>Update Features</strong> screen (see page 51), highlight a deleted feature (a feature with a line through it), tap <strong>Options</strong>, and then select <strong>Undelete</strong>.</td>
</tr>
<tr>
<td>Problem</td>
<td>Possible cause</td>
<td>Solution</td>
</tr>
<tr>
<td>--------------------------------------------------------------</td>
<td>--------------------------------------------------------------------------------</td>
<td>-------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>The coordinates displayed by the TerraSync software seem to be incorrect.</td>
<td>You have selected the wrong coordinate system or zone.</td>
<td>In the Coordinate System form, select the correct coordinate system and zone (see page 151).</td>
</tr>
<tr>
<td>You have selected the wrong coordinate units.</td>
<td></td>
<td>In the Coordinate System form, select the coordinate system, then select the correct coordinate units (see page 151).</td>
</tr>
<tr>
<td>You are using the Latitude/Longitude coordinate system and have selected the wrong datum.</td>
<td></td>
<td>In the System field on the Coordinate System form (see page 151), select Latitude/Longitude and specify the correct datum.</td>
</tr>
<tr>
<td>You are using the UTM coordinate system and have selected the wrong UTM zone or datum.</td>
<td></td>
<td>In the System field on the Coordinate System form (see page 151), select UTM, then specify the correct zone and datum. The traditional UTM datum for the U.S.A. is NAD-27.</td>
</tr>
<tr>
<td>You have defined a custom coordinate system, datum and/or zone incorrectly in the Coordinate System Manager utility in the GPS Pathfinder Office software.</td>
<td></td>
<td>Check the definition of the coordinate system, datum and/or zone carefully.</td>
</tr>
<tr>
<td>You cannot select some coordinate system datums, zones, or ellipsoids.</td>
<td>You transferred a single coordinate system to the TerraSync software, or a coordinate system export file that did not include all the coordinate systems you want. When you transfer coordinate systems to TerraSync, the transferred data overwrites the existing data, so you must make sure that you transfer all the coordinate systems you require.</td>
<td>Create a coordinate system export file that contains all the coordinate systems that you want to use, and transfer this file to TerraSync.</td>
</tr>
<tr>
<td>The required coordinate system files have been deleted from the field computer.</td>
<td></td>
<td>Transfer the files from the GPS Pathfinder Office software again.</td>
</tr>
<tr>
<td>The target icon is not at the location of the feature you selected as the navigation target.</td>
<td>You re-recorded the GPS position of the feature, or digitized its position. The navigation target remains at the old position of the feature.</td>
<td>Reselect the feature as the navigation target.</td>
</tr>
<tr>
<td>The message The system time of this device does not match GPS time appears.</td>
<td>The selected time zone of the field computer is incorrect.</td>
<td>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.</td>
</tr>
</tbody>
</table>
Position accuracy

This section lists possible causes of, and solutions to, problems with the accuracy of GPS positions.

<table>
<thead>
<tr>
<th>Problem</th>
<th>Possible cause</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>The accuracy of recorded GPS positions is not as good as expected.</td>
<td>You did not record sufficient positions to achieve the required accuracy.</td>
<td>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.</td>
</tr>
<tr>
<td>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.</td>
<td></td>
<td>In the GPS Settings form (see page 130), lower the maximum PDOP or HDOP value to make sure that the TerraSync software only logs accurate positions.</td>
</tr>
<tr>
<td>The minimum SNR or elevation value was too low. If the receiver uses satellites with a low SNR or elevation, this may have a detrimental effect on the accuracy of positions calculated by the receiver.</td>
<td></td>
<td>In the GPS Settings form (see page 130), raise the minimum SNR and/or elevation value to make sure that the receiver uses satellites with a strong signal.</td>
</tr>
<tr>
<td>You are operating in an area of high multipath.</td>
<td></td>
<td>Move to an area with better GPS coverage and use offsets. Apply velocity filtering: • Set the Velocity Filter field (see page 133) on the GPS Settings form to Auto to apply velocity filtering to positions as they are recorded. If at least one valid real-time correction source is selected in the Real-time Settings form (see page 138), 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 126) 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.</td>
</tr>
<tr>
<td>No configured real-time source is available, so the TerraSync software is using uncorrected positions.</td>
<td></td>
<td>Move to an area with better GPS coverage and use offsets. Apply velocity filtering: • Set the Velocity Filter field (see page 133) on the GPS Settings form to Auto to apply velocity filtering to positions as they are recorded. If at least one valid real-time correction source is selected in the Real-time Settings form (see page 138), 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 126) 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.</td>
</tr>
<tr>
<td>Problem</td>
<td>Possible cause</td>
<td>Solution</td>
</tr>
<tr>
<td>------------------------------------------------------------------------</td>
<td>-------------------------------------------------------------------------------</td>
<td>--------------------------------------------------------------------------</td>
</tr>
<tr>
<td>You are unable to differentially correct GPS positions (either in real time or in postprocessing).</td>
<td>The TerraSync software used satellites that were not visible to the base station.</td>
<td>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. 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.</td>
</tr>
<tr>
<td>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.</td>
<td>Wait until the receiver has collected a new almanac before you log data.</td>
<td>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.</td>
</tr>
</tbody>
</table>
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 differential correction sources such as virtual reference station (VRS) networks, and relays corrections from the source that you select. An NTRIP server is an example of a broadcast server.

**C/A code**
See code phase.

**carrier phase**
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 pseudo-random number code generated by the TerraSync software and the pseudorandom number code coming in from the satellite. The code phase data is used to quickly compute the distance to a satellite and therefore calculate your position.

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 191.

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 191.
**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.

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**field computer**  
In the TerraSync software documentation, a field computer is any computer that has the TerraSync software installed. The computer must be either a PC running a supported Windows desktop operating system (for example, a laptop or notebook computer running Tablet PC software), or 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 191.

---

**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.

---

**HAE**  
See **Height Above Ellipsoid**.

**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 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 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 is the difference between magnetic north and true north. Declination is expressed as an angle and differs between locations.

A bearing that is relative to magnetic north uses the north magnetic pole as its north reference.

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.

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.

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 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.

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.

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.

(Networked Transport of RTCM via Internet Protocol)

NTRIP enables the streaming of DGPS or RTK correction data via the Internet. Data is usually received using a modem and/or a cellphone. An NTRIP server is a type of broadcast server, and can be accessed by a number of users at the same time.

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.
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 2.60 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**

**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 **pseudo-random number**.
### Glossary

#### pseudo-random number (PRN)
The pseudo-random number is the code of 0s and 1s transmitted by GPS satellites, which appears to be random “noise”, but is actually a complex pattern that can be exactly reproduced.

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 (RTK)
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, TerraSync 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 noise of the signal. The typical SNR of a satellite at 30° elevation is between 47 and 50 dBHz. The quality of a GPS position is degraded if the SNR of one or more satellites in the constellation falls below 39 dBHz.

The TerraSync software lets you set a minimum SNR value. This value is used to determine whether the signal strength of a satellite is sufficient for that satellite to be used by the GPS receiver. If the SNR of a satellite is below the configured minimum SNR, that satellite is not used to compute positions.

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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, TerraSync 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, go 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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