Legal Notices

For a complete list of all relevant legal notices regarding this product, please refer to the TerraSync Software Getting Started Guide.

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This product is covered by the following patent: 6,377,891.

Release Notice

This is the March 2007 release (Revision A) of the TerraSync Software Reference Manual. It applies to version 3.00 of the TerraSync software.
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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](http://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

**TerraSync Software Help**

The TerraSync Software Help is a screen-by-screen reference that tells you what each control on the screen does.

The 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 device that is running Microsoft Windows Mobile® software, tap 📖 and then select Help.

  If you tap 📖 and then select Help when the TerraSync software is not running, the main Help Contents topic appears. Select TerraSync to open the Contents topic of the TerraSync Software 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 Trimble reseller.

Technical support

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

- FAQs
- support notes detailing the latest support issues
- documentation
- the latest files available for download

Windows error reporting

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

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

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

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

In this chapter:

- Getting help
- Windows operation
- Windows Mobile software operation
- Starting and exiting the TerraSync software
- Section structure
- The TerraSync software display
- Status bar
- Interacting with the TerraSync software

This section contains detailed information about the TerraSync software user interface and data entry methods.
Getting help

The TerraSync Software Help describes the fields and commands for each screen. For detailed information about using the TerraSync software that is not provided in the Help or in this document, refer to the TerraSync Software Reference Manual.

To access the TerraSync software context-sensitive help from:

- a Windows Mobile-based device, tap \AppHelp\ and then select Help.
  
  If you tap \AppHelp\ and then select Help on the device 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 PC, press F1. Alternatively, hold down the Alt key on the keyboard and then press H.

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

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

Windows operation

You can install the TerraSync software on a desktop, laptop, or Tablet PC instead of on a Windows Mobile-based device.

This manual describes the TerraSync software as it appears on a portrait orientation handheld with a 240 × 320 pixel screen. On a PC, some software items are displayed differently. The main difference is that on a larger screen the TerraSync software display is arranged in panes, so you can view up to three sections at the same time (see Panes, page 43). For more information, refer to the TerraSync Software Reference Manual.

Except where specified, any information in this manual that relates to the operation of the TerraSync software on a Windows Mobile-based device also applies to its operation on a PC.
Windows Mobile software operation

This manual assumes that you are reasonably familiar with the Microsoft Windows Mobile software. If you have used a Windows operating system such as Microsoft Windows 2000 or Windows XP, you will know how to use most Windows Mobile software features. For help on using this software, select Help from the Start menu on the Windows Mobile-based device.

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

- Adjusting the screen contrast, page 15
- Working with other applications, page 15
- On-screen keyboards, page 16
- Device Lock utility, page 17

Adjusting the screen contrast

You can change the screen contrast on any Windows Mobile-based device, to adjust to indoor or outdoor operation. Many devices have settings software and a hardware control for adjusting the contrast in bright or dim light. For information on changing device settings, or on locating and using hardware controls, refer to the documentation for the device.

Some devices, such as the GeoExplorer series handheld, have a frontlight or backlight instead of contrast control. For information on changing the lighting level, refer to the documentation for the device.

Working with other applications

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

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

1. On the Windows Mobile taskbar, tap **Start**.
2. Select **Settings / System / Memory**.
3. Select the **Running Programs** tab.
4. Highlight the task you want, then do one of the following:
   - To shut down the task, tap **Stop**.
   - To switch to the selected task, tap **Activate**.
5. Tap **OK** to close the **Running Programs** dialog.

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

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

### On-screen keyboards

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

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

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

You can install different on-screen keyboards on the device and switch between them as required. All of these keyboards are available when you use the TerraSync software. For example, you may want to use a character recognition keyboard to quickly enter a long note, an alphabetic keyboard to enter a filename, and the Trimble numeric keyboard (see page 17) to enter numeric data such as the height of a feature or a distance.
If the device has on-screen keyboards installed, the TerraSync software automatically displays the appropriate keyboard when you select a field that accepts data entry, and hides the keyboard when you select a control that does not accept keyboard input.

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

To change the selected keyboard:

1. Tap the arrow on the right end of the on-screen keyboard button.
   
   A list of installed keyboards pops up. The currently selected keyboard is indicated by a bullet or check mark.

2. Tap the name of the keyboard required.
   
   The pop-up list closes automatically.

**Trimble numeric keyboard**

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

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

**Note** – The Trimble numeric keyboard is only available on Windows Mobile-based devices that use on-screen keyboards, such as a Pocket PC.

**Device Lock utility**

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

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

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

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

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

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

Starting and exiting the TerraSync software

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

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

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

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

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

- Use any of the methods described above for starting the TerraSync software.
- On a Windows Mobile-based device, tap and then tap the TerraSync icon on the recently-used programs list.
- On a Windows PC, tap the TerraSync icon in the system tray in the taskbar.
Section structure

The TerraSync software is arranged in five sections:

<table>
<thead>
<tr>
<th>Section</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Map</td>
<td>View features, background files, and the GPS trail graphically.</td>
</tr>
</tbody>
</table>
| Data    | Work with data files:  
  - create a new data file or open an existing data file  
  - collect new features or maintain existing features  
  - move, copy, delete, or rename data and background files |
| Navigation | Navigate to features using the Direction Dial and Close-up screen.  
Create and edit waypoints. |
| Status  | View information about:  
  - the satellites the TerraSync software is tracking, their relative positions in the sky, and your current position  
  - the GPS receiver and real-time correction source  
  - the TerraSync software version and trademark information |
| Setup   | Configure the TerraSync software. |

The TerraSync software display

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

The status bar appears at the top of the TerraSync software screen and provides basic status information about the connected GPS receiver. For information about how to connect to a GPS receiver, see

![Status bar icons](image)

The status bar is always visible, but the icons displayed depend on the current status of the system. Table 2.1 shows the icons that can appear.

Table 2.1 Status bar: Icons

<table>
<thead>
<tr>
<th>Icon</th>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
</table>
| ![Battery icon](image) | Battery icon        | The left half of this icon indicates the charge level of the GPS receiver battery, if one is connected. If the connected receiver does not provide battery status information to TerraSync, the left half of the battery icon is empty.  
  - The right half indicates the charge level of the field computer battery. When the battery of the GPS receiver or field computer is fully charged, the corresponding half of the battery icon appears green. The level of green drops as the corresponding battery charge level drops.  
  - When the power level is low, the corresponding half of the battery is yellow.  
  - When the power level is critical, the corresponding half of the icon is red and the icon flashes.  
  If the GPS receiver is powered by the field computer (for example a GPS Pathfinder XC receiver) or is integrated with the field computer (for example a GeoExplorer series handheld), both halves of the battery icon show the same level and indicate the battery status of the field computer. |
| ![Satellite icon](image) | Satellite icon      | Shows whether the geometry of the satellites is good or bad, as configured in the GPS settings area of the software. The satellite icon flashes when the geometry of the satellites (their PDOP or HDOP) is poor.  
  The number below the icon indicates how many satellites are being used to compute GPS positions. The number flashes when not enough satellites are available. You need at least four satellites to compute GPS positions. |
| ![Current Estimated Accuracy (CEA)](image) | (This is the number above the satellite icon.) Shows the estimated horizontal accuracy of the current GPS position, in meters. The value shown depends on several factors, including satellite geometry and the type of GPS receiver that is connected.  
  **Note** – Choosing GPS settings that emphasize productivity over precision (settings on the left side of the GPS slider) can cause the CEA to decrease rather than increase. This is because the satellite geometry has been improved by including more satellites in the calculation of the GPS position. |
When you are logging positions using measurements from an RTK base station, the satellite icon changes to show the horizontal precision estimate for the current position. The estimate is displayed in centimeters or inches, depending on the distance units configured in the Units form.

If the TerraSync software connects to the receiver but cannot find a GPS antenna, the antenna icon appears instead of the satellite icon. This icon flashes to warn you that there is a problem.

If no icon appears in this position, no GPS receiver is connected.

If the real-time signal is lost, the current real-time icon flashes. If no icon is visible, the TerraSync software is using autonomous (uncorrected) GPS to calculate its position.

Indicates that a filter has been applied to the open data file. When this icon is not displayed, no filter has been set up. For more information, refer to the TerraSync Software Reference Manual.

Shows that the TerraSync software is logging a feature with H-Star carrier accuracy. The number at the bottom of the icon indicates the number of positions logged. The number above the icon is the carrier time (see below).

Table 2.1 Status bar: Icons (continued)

<table>
<thead>
<tr>
<th>Icon</th>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.0cm</td>
<td>Satellite icon (RTK)</td>
<td>When you are logging positions using measurements from an RTK base station, the satellite icon changes to show the horizontal precision estimate for the current position. The estimate is displayed in centimeters or inches, depending on the distance units configured in the Units form.</td>
</tr>
<tr>
<td>Connect icon</td>
<td>Connect icon</td>
<td>When the TerraSync software is trying to connect to a receiver, the connect icon appears instead of the satellite icon. If the TerraSync software cannot connect to the GPS receiver, the connect icon flashes.</td>
</tr>
<tr>
<td>Antenna icon</td>
<td>Antenna icon</td>
<td>If the TerraSync software connects to the receiver but cannot find a GPS antenna, the antenna icon appears instead of the satellite icon. This icon flashes to warn you that there is a problem. If no icon appears in this position, no GPS receiver is connected.</td>
</tr>
<tr>
<td>Real-time external icon</td>
<td>Real-time external icon</td>
<td>Shows that the TerraSync software is receiving real-time corrections from an external source, such as a radio.</td>
</tr>
<tr>
<td>Integrated RTK radio icon</td>
<td>Integrated RTK radio icon</td>
<td>Shows that the TerraSync software is receiving RTK corrections through the GPS receiver’s integrated radio.</td>
</tr>
<tr>
<td>External RTK icon</td>
<td>External RTK icon</td>
<td>Shows that the TerraSync software is receiving RTK corrections through an external radio.</td>
</tr>
<tr>
<td>Real-time VRS icon</td>
<td>Real-time VRS icon</td>
<td>Shows that the TerraSync software is receiving real-time DGPS corrections from a VRS server.</td>
</tr>
<tr>
<td>RTK VRS icon</td>
<td>RTK VRS icon</td>
<td>Shows that the TerraSync software is receiving RTK corrections from a VRS server.</td>
</tr>
<tr>
<td>Real-time beacon icon</td>
<td>Real-time beacon icon</td>
<td>Shows that the TerraSync software is receiving real-time corrections from an external beacon receiver such as a GeoBeacon receiver.</td>
</tr>
<tr>
<td>Real-time satellite icon</td>
<td>Real-time satellite icon</td>
<td>Shows that the TerraSync software is receiving real-time corrections from a satellite differential service.</td>
</tr>
<tr>
<td>Real-time SBAS icon</td>
<td>Real-time SBAS icon</td>
<td>Shows that the TerraSync software is receiving real-time corrections from an SBAS satellite.</td>
</tr>
</tbody>
</table>

Note – If the real-time signal is lost, the current real-time icon flashes. If no icon is visible, the TerraSync software is using autonomous (uncorrected) GPS to calculate its position.
Table 2.1  Status bar: Icons (continued)

<table>
<thead>
<tr>
<th>Icon</th>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Carrier time" /></td>
<td>Carrier time</td>
<td>Shows that the TerraSync software is logging carrier phase measurement data. The number indicates the time, in minutes and seconds, for the current block of carrier data. If a feature is open, the carrier time is displayed above the logging icon.</td>
</tr>
<tr>
<td><img src="image" alt="PPA indicator" /></td>
<td>PPA indicator</td>
<td>Shows the predicted postprocessed accuracy (PPA) of the current GPS position, in the configured distance unit. The PPA only appears if the connected GPS receiver is H-Star capable, and H-Star logging is set to Auto in the Logging Settings form. If a feature is open, the PPA is displayed above the logging icon.</td>
</tr>
<tr>
<td><img src="image" alt="Logging static icon" /></td>
<td>Logging static icon</td>
<td>Shows that the TerraSync software is logging a point feature or vertex in <strong>static mode</strong>, which is available only when the TerraSync software is receiving RTK corrections. In static mode, only the GPS position with the best precision estimate is logged. All other positions are discarded. The number to the right of the icon indicates whether a position has been logged. If the required precision has not been achieved, the number is 0 and no position is logged. If a position with the required precision has been logged, the number is 1. If a position with a better precision is received, it replaces the previously logged position.</td>
</tr>
<tr>
<td><img src="image" alt="Logging vertex icon" /></td>
<td>Logging vertex icon</td>
<td>Shows that the TerraSync software is logging GPS position information for an averaged vertex. The number to the right of the icon indicates the number of positions logged for this vertex.</td>
</tr>
<tr>
<td><img src="image" alt="Base logging icon" /></td>
<td>Base logging icon</td>
<td>Shows that the TerraSync software is logging positions to a base data file, or that is generating correction messages.</td>
</tr>
<tr>
<td><img src="image" alt="Digitizing icon" /></td>
<td>Digitizing icon</td>
<td>Shows that the TerraSync software is in Digitize mode and GPS logging is paused, so tapping the map will result in a digitized position being recorded for the open feature. The number to the right of the icon indicates the number of digitized positions logged for this feature.</td>
</tr>
<tr>
<td><img src="image" alt="Pause icon" /></td>
<td>Pause icon</td>
<td>When logging is paused, the pause icon flashes.</td>
</tr>
<tr>
<td><img src="image" alt="Memory icon" /></td>
<td>Memory icon</td>
<td>When storage space is low, the memory icon appears. If memory gets low while you are logging positions, the memory icon flashes alternately with the logging icon. If you are not logging, the memory icon appears alone and flashes. <strong>Note</strong> – <strong>When no icon appears in this position, memory space is sufficient, and the TerraSync software is not logging position data.</strong></td>
</tr>
</tbody>
</table>
Table 2.2 shows the status bar icons and the tooltips that describe them.

<table>
<thead>
<tr>
<th>Icon</th>
<th>Behavior</th>
<th>Tooltip</th>
</tr>
</thead>
<tbody>
<tr>
<td>![Solid GPS icon]</td>
<td>GPS is calculating positions</td>
<td></td>
</tr>
<tr>
<td>![Flashing]</td>
<td>Poor satellite geometry (PDOP) or Poor satellite geometry (HDOP)</td>
<td></td>
</tr>
<tr>
<td>![Flashing satellite count icon]</td>
<td>Too few satellites</td>
<td></td>
</tr>
<tr>
<td>![Animated]</td>
<td>Attempting to connect to GPS receiver</td>
<td></td>
</tr>
<tr>
<td>![Flashing]</td>
<td>No GPS detected. Check cables and batteries.</td>
<td></td>
</tr>
<tr>
<td>![Flashing]</td>
<td>Antenna is not connected to GPS receiver</td>
<td></td>
</tr>
<tr>
<td>![Solid]</td>
<td>Applying real-time corrections from external source</td>
<td></td>
</tr>
<tr>
<td>![Flashing]</td>
<td>Waiting for real-time corrections</td>
<td></td>
</tr>
<tr>
<td>![Solid]</td>
<td>Applying real-time corrections from VRS</td>
<td></td>
</tr>
<tr>
<td>![Flashing]</td>
<td>Waiting for real-time corrections</td>
<td></td>
</tr>
<tr>
<td>![Solid]</td>
<td>Applying RTK corrections from an external RTK source</td>
<td></td>
</tr>
<tr>
<td>![Flashing]</td>
<td>Waiting for RTK corrections</td>
<td></td>
</tr>
<tr>
<td>![Solid]</td>
<td>Applying RTK corrections from a VRS</td>
<td></td>
</tr>
<tr>
<td>![Flashing]</td>
<td>Waiting for RTK corrections</td>
<td></td>
</tr>
<tr>
<td>![Solid]</td>
<td>Applying real-time corrections from the external beacon receiver</td>
<td></td>
</tr>
<tr>
<td>![Flashing]</td>
<td>Waiting for real-time corrections</td>
<td></td>
</tr>
<tr>
<td>![Solid]</td>
<td>Applying real-time corrections from the receiver’s integrated beacon differential receiver</td>
<td></td>
</tr>
<tr>
<td>![Flashing]</td>
<td>Waiting for real-time corrections</td>
<td></td>
</tr>
<tr>
<td>![Solid]</td>
<td>Applying real-time corrections from the receiver’s integrated satellite differential receiver</td>
<td></td>
</tr>
<tr>
<td>![Flashing]</td>
<td>Waiting for real-time corrections</td>
<td></td>
</tr>
<tr>
<td>![Solid]</td>
<td>Applying real-time corrections from the receiver’s integrated SBAS differential receiver</td>
<td></td>
</tr>
<tr>
<td>![Flashing]</td>
<td>Waiting for real-time corrections</td>
<td></td>
</tr>
<tr>
<td>![Solid]</td>
<td>Applying RTK corrections from the receiver’s integrated RTK radio</td>
<td></td>
</tr>
<tr>
<td>![Flashing]</td>
<td>Waiting for RTK corrections</td>
<td></td>
</tr>
</tbody>
</table>

Note – The message that appears depends on whether a maximum PDOP or HDOP value is configured.
Table 2.2 Status bar: Tooltips (continued)

<table>
<thead>
<tr>
<th>Icon</th>
<th>Behavior</th>
<th>Tooltip</th>
</tr>
</thead>
</table>
| ![Solid] | GPS receiver battery is good (75%)  
Field computer battery is good (75%) | |
| ![Solid] | GPS receiver battery is low (25%)  
Field computer battery is low (25%) | |
| ![Flashing] | GPS receiver battery is critical (10%)  
Field computer battery is critical (10%) | |

**Note** – The battery icons and tooltips in this table show both batteries at the same level of charge. However, each half of the battery icon can appear in green, yellow, or red, independently of the color and level of the other half.

<table>
<thead>
<tr>
<th>Icon</th>
<th>Behavior</th>
<th>Tooltip</th>
</tr>
</thead>
<tbody>
<tr>
<td>![Solid]</td>
<td>Filter is applied</td>
<td></td>
</tr>
<tr>
<td>![Animated pen, and number increments]</td>
<td>Positions are being logged</td>
<td></td>
</tr>
<tr>
<td>![Flashing pen]</td>
<td>GPS is not available</td>
<td></td>
</tr>
<tr>
<td>![Animated pen and number increments]</td>
<td>H-Star data is being logged</td>
<td></td>
</tr>
<tr>
<td>![Flashing pen]</td>
<td>H-Star data is not being logged</td>
<td></td>
</tr>
<tr>
<td>![Animated pen and number increments]</td>
<td>Carrier data is being logged</td>
<td></td>
</tr>
<tr>
<td>![Flashing pen]</td>
<td>Carrier data is not being logged</td>
<td></td>
</tr>
<tr>
<td>![Animated circle decreases in size]</td>
<td>Vertex capture in progress</td>
<td></td>
</tr>
<tr>
<td>![Solid]</td>
<td>Ready to digitize</td>
<td></td>
</tr>
<tr>
<td>![Flashing]</td>
<td>Position logging is paused</td>
<td></td>
</tr>
<tr>
<td>![Flashing]</td>
<td>Memory is full</td>
<td></td>
</tr>
</tbody>
</table>

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

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

The following topics describe the different types of displays:

- Screens, page 25
- Graphical screens, page 26
- Forms, page 26

The TerraSync software screens also have the following features:

- Lists, page 27
- Buttons, page 28
- Data entry fields, page 32
- Auto-incrementing attributes, page 35
- Pop-up messages, page 36
- Sound, page 37
- Color, page 40

For more ways to interact with the software if the field computer has a keyboard, see Keyboard shortcuts, page 30.

**Screens**

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

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

Examples of screens are:

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

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

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

**Forms**

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

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

To edit a field, select it. There are several ways to enter data into a form, depending on the keyboard options the field computer has, and the type of data stored in the field. See also *Data entry fields*, page 32.

To move to the next field on a form, do one of the following:
- Tap the field you want to move to.
- Tap *Enter* on the on-screen keyboard. Tap *Enter* repeatedly to move through all fields on the form.
• Press **Tab** on the physical keyboard. Press **Tab** repeatedly to move through all fields on the form.

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

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

**Lists**

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

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

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

![Choose Feature List](image)

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

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

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

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

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

List buttons and menu buttons are special buttons. They can be identified by the drop-down arrow at the right end of the button. When you tap one of these buttons, a drop-down list of commands appears. See also **List buttons, page 28**, and **Menu buttons, page 29**.

List buttons

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

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

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

The following list buttons appear in the TerraSync software:

- Section button
- Mini Section button (appears when the software is arranged in panes. Panes are used when the TerraSync software is running on a field computer that has a screen size of 640 × 240 pixels or larger.)
- Subsection button
- Map Tools button in the Map section
- Status Mode button in the Status section
Note – List buttons differ from menu buttons (such as Options buttons) in their appearance, behavior, and function. See also Menu buttons, page 29.

Menu buttons

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

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

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

The following menu buttons appear in the TerraSync software:

- Any Options button
- The Layers button in the Map section
- The Edit button in the Edit dictionary form in the Data section (see the TerraSync Software Reference Manual)

Note – Menu buttons differ from list buttons (such as the Section list button) in their appearance, behavior, and function. See also List buttons, page 28.
Keyboard shortcuts

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

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

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

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

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

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

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

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

If the screen size of the field computer is 640 × 240 pixels or larger, the screen is arranged in panes. Local shortcuts work only for the primary pane (the pane in the top left of the screen).
This table lists the global shortcuts in the TerraSync software:

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

This table lists the local shortcuts in the TerraSync software:

<table>
<thead>
<tr>
<th>Action</th>
<th>Section</th>
<th>Keyboard shortcut</th>
</tr>
</thead>
<tbody>
<tr>
<td>Select a command on an open list</td>
<td>All sections</td>
<td>Underlined letter</td>
</tr>
<tr>
<td>Open the Options list for the current screen</td>
<td>All sections</td>
<td>Alt+O</td>
</tr>
<tr>
<td>Open the Layers list</td>
<td>Map</td>
<td>Alt+A</td>
</tr>
<tr>
<td>Zoom in</td>
<td>Map</td>
<td>Alt+Z</td>
</tr>
<tr>
<td>Zoom out</td>
<td>Map</td>
<td>Alt+Y</td>
</tr>
<tr>
<td>Zoom extents</td>
<td>Map</td>
<td>Alt+X</td>
</tr>
<tr>
<td>Move up</td>
<td>Map</td>
<td>Alt+up arrow key; Alt+8</td>
</tr>
<tr>
<td>Move down</td>
<td>Map</td>
<td>Alt+down arrow key; Alt+2</td>
</tr>
<tr>
<td>Move left</td>
<td>Map</td>
<td>Alt+left arrow key; Alt+4</td>
</tr>
<tr>
<td>Move right</td>
<td>Map</td>
<td>Alt+right arrow key; Alt+6</td>
</tr>
<tr>
<td>Open Existing File subsection</td>
<td>Data</td>
<td>Alt+X</td>
</tr>
<tr>
<td>Open File Manager subsection</td>
<td>Data</td>
<td>Alt+G</td>
</tr>
</tbody>
</table>
The method you use to enter data in a field on a form depends on the type of field you are entering data into, and on the availability of keyboards.

The following field types can appear:

- Text fields (see page 33)
- Numeric fields (see page 33)
- Menu fields (see page 33)
- Time fields (see page 33)
- Date fields (see page 34)
- Filename fields (see page 34)

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

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

If you use an on-screen keyboard to enter values, the TerraSync software automatically moves the focus to the next field on the form. To move through the fields on a form, repeatedly tap Enter on the on-screen keyboard. If the field computer has a physical keyboard, press the Tab key to move through the fields. When you reach the end of the form, the focus moves to the first field on the form. See On-screen keyboards, page 16.

### Data Entry Fields

<table>
<thead>
<tr>
<th>Action</th>
<th>Section</th>
<th>Keyboard shortcut</th>
</tr>
</thead>
<tbody>
<tr>
<td>Open Satellite Info subsection</td>
<td>Status</td>
<td>Alt+F</td>
</tr>
<tr>
<td>Open Receiver subsection</td>
<td>Status</td>
<td>Alt+V</td>
</tr>
<tr>
<td>Open Real-time subsection</td>
<td>Status</td>
<td>Alt+A</td>
</tr>
<tr>
<td>Open Plan subsection</td>
<td>Status</td>
<td>Alt+P</td>
</tr>
<tr>
<td>Open Sensor subsection</td>
<td>Status</td>
<td>Alt+R</td>
</tr>
<tr>
<td>Open Comms subsection</td>
<td>Status</td>
<td>Alt+O</td>
</tr>
<tr>
<td>Open UTC Time subsection</td>
<td>Status</td>
<td>Alt+I</td>
</tr>
<tr>
<td>Open About subsection</td>
<td>Status</td>
<td>Alt+B</td>
</tr>
</tbody>
</table>

---

### Action Section Keyboard shortcut

- Open Satellite Info subsection: Status, Alt+F
- Open Receiver subsection: Status, Alt+V
- Open Real-time subsection: Status, Alt+A
- Open Plan subsection: Status, Alt+P
- Open Sensor subsection: Status, Alt+R
- Open Comms subsection: Status, Alt+O
- Open UTC Time subsection: Status, Alt+I
- Open About subsection: Status, Alt+B
Text fields

To enter a value in a text field, use an on-screen keyboard or the physical keyboard. If you are using a field computer with on-screen keyboards, a keyboard pops up automatically when you select a text field. The keyboard that pops up is the one that was selected when you started the TerraSync software. See On-screen keyboards, page 16.

Numeric fields

To enter a value in a numeric field, use an on-screen or physical keyboard. If the field computer uses on-screen keyboards, the Trimble numeric keyboard (see page 17) pops up when you select a numeric field.

Tip – Any text or numeric field can be defined as an auto-incrementing attribute. See also Auto-incrementing attributes, page 35.

Menu fields

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

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

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

Time fields

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

To enter the current time, tap the arrow at the right of the field and select Now from the drop-down list.
In the data dictionary, you can specify that a time attribute is automatically set to the current time when the feature is created, when the feature is updated, or both.

**Date fields**

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

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

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

**Filename fields**

A filename field lets you attach an existing file to a feature.

The TerraSync software does not record attached files. Use other software or hardware, such as a digital camera or sound recorder, to create and save files before you attach them to features.

Enter a filename manually using the physical keyboard, or select the filename from the drop-down list for the filename field.

The drop-down list shows files in the current working folder. To change the working folder, tap the Browse button to the right of the filename field. In the pop-up window that appears, navigate to the folder you need.

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

To view the currently selected file, tap the Preview button beside the attribute field. The file is opened in the default program associated with its file type.

Once you attach a file to a filename attribute in a feature and save the feature, the selected file is moved to the TerraSync software data folder and assigned a unique name. If you open the feature for review later, the actual filename is not displayed, because the file has been renamed. Instead, a message based on the file type appears. For example, if you attached the file Elm024.jpg to a feature, the text “Attached JPG File” appears in the attribute field.
When you transfer the data file to the office computer using the Trimble Data Transfer utility, any attached files are transferred with the data file, and are stored with the transferred data file. This link is also maintained when you export the data file to a GIS. For more information, refer to the Data Transfer Utility Help.

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

Auto-incrementing attributes

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

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

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

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

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

- the feature is the first of its type to be created in this file and no default value is specified
- the last value for the attribute was blank
- the last value was the maximum value in the range and the sequence is incrementing
- the last value was the minimum value in the range and the sequence is decrementing
To make an attribute auto-incrementing, you must set an increment value in the data dictionary. You can do this in the Data Dictionary Editor utility in the GPS Pathfinder Office software, or data dictionary editor in the Data section. For more information on making an attribute auto-incrementing, refer to the Data Dictionary Editor Help.

**Pop-up messages**

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

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

**Toolips**

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

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

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

If you tap an icon in the status bar (see page 20), a tooltip appears over it. The tooltip contains information about the current state of the system function the icon represents. For example, if you tap the Filter icon (see page 21) when a filter is in use, a tooltip appears, showing the message Filter is applied.

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

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

The TerraSync software uses sound to indicate special conditions or events. Often these conditions are accompanied by a change in a status icon. For example, when the battery on the GPS receiver gets low, the battery icon in the status bar (see page 20) flashes, and the Low GPS battery (see page 38) sound is played.

Note – Battery-related events do not sound if you are using a GPS Pathfinder XB receiver, because the TerraSync software does not monitor the battery status of this receiver.
The events and conditions that can occur fall into three categories:

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

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

<table>
<thead>
<tr>
<th>Event</th>
<th>Sound category</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Feature stored</td>
<td>Success</td>
<td>The feature has been successfully stored.</td>
</tr>
<tr>
<td>GPS connected</td>
<td>Success</td>
<td>The TerraSync software has successfully connected to the GPS receiver and is receiving position information.</td>
</tr>
<tr>
<td>GPS OK</td>
<td>Success</td>
<td>The GPS quality has increased to the levels you have specified, and the TerraSync software is logging positions again.</td>
</tr>
<tr>
<td>Minimum positions stored</td>
<td>Success</td>
<td>The TerraSync software has logged the minimum number of positions for the current feature. You can now safely close this feature and begin logging another feature.</td>
</tr>
<tr>
<td>Navigation proximity alarm</td>
<td>Success</td>
<td>The navigation target is within the close-up range you have specified, and the Direction Dial screen changes to the Close-up screen.</td>
</tr>
<tr>
<td>Position logged</td>
<td>Success</td>
<td>The TerraSync software has successfully logged a GPS position.</td>
</tr>
<tr>
<td>Position snapped</td>
<td>Success</td>
<td>The digitized position has been snapped to a nearby existing position.</td>
</tr>
<tr>
<td>Real time OK</td>
<td>Success</td>
<td>The connection to the specified source of real-time differential correction has been regained.</td>
</tr>
<tr>
<td>Carrier lock acquired</td>
<td>Success</td>
<td>Carrier lock has been acquired. The TerraSync software has started logging carrier or H-Star data.</td>
</tr>
<tr>
<td>General error</td>
<td>System</td>
<td>An error has occurred. An error is indicated by the sound the field computer uses for the Critical Stop event.</td>
</tr>
<tr>
<td>Question</td>
<td>System</td>
<td>The TerraSync software requires some information or a decision from you. The question appears in a message box and is indicated by the sound the field computer uses for the Question event.</td>
</tr>
<tr>
<td>Dead GPS battery</td>
<td>Warning</td>
<td>The battery in use by the GPS receiver is dead. The TerraSync software continues to operate but no position information is received until the battery is replaced.</td>
</tr>
<tr>
<td>Low GPS battery</td>
<td>Warning</td>
<td>This sound plays repeatedly and the battery icon in the status bar flashes when the battery in use by the GPS receiver is running low and needs to be replaced.</td>
</tr>
</tbody>
</table>
Customizing sounds

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

To enable or disable all sounds as a group:

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

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

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

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

- Battery icon (see page 20)
- Map layer colors

### Map layer colors

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

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

<table>
<thead>
<tr>
<th>Event</th>
<th>Sound file</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carrier lock acquired</td>
<td>LockOpened.wav</td>
</tr>
<tr>
<td>Carrier lock lost</td>
<td>LockLost.wav</td>
</tr>
<tr>
<td>Minimum positions stored</td>
<td>StoredMoreThanMinimumPositions.wav</td>
</tr>
<tr>
<td>Navigation proximity alarm</td>
<td>CloseUpChange.wav</td>
</tr>
<tr>
<td>Too Few Satellites</td>
<td>TooFewSatellites.wav</td>
</tr>
<tr>
<td>Question</td>
<td>The file that the field computer uses for the Question event. By default, this is Question.wav. Use the Volume and Sounds system setting to replace the sound for this event.</td>
</tr>
<tr>
<td>General error</td>
<td>The file that the field computer uses for the Critical Stop event. By default, this is Critical.wav. Use the Volume and Sounds system setting to replace the sound for this event.</td>
</tr>
</tbody>
</table>
Software Structure

In this chapter:
- Introduction
- Sections
- Panes
- Section structure
- Section structure lists

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

The TerraSync software is arranged in the following five sections:

- Map section
- Data section
- Navigation section
- Status section
- Setup section

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

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

**Tip** – You can also use shortcuts to move between sections. See Keyboard shortcuts, page 30.

**Sections**

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

- **Data** section
  
  The Data section provides forms for entering information about features.

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

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

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

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

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

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

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

• **Setup** section

The Setup section provides forms for configuring the TerraSync software.

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

• **Status** section

The Status section contains information screens.

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

## Panes

If you use the TerraSync software on a field computer that has a screen size of 640 × 240 pixels or larger, the screen is arranged in panes. Each pane displays a section of the software.

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

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

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

To change the section that is displayed in the primary pane, tap the Section list button and select a section from the list. If the section is already displayed in a secondary pane, the two sections switch position.
To change the section that is displayed in a secondary pane, tap the Mini Section list button that appears in the top left corner of the pane. Then select a section from the list.

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

**Section structure**

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

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

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

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

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

### Map section

<table>
<thead>
<tr>
<th>Map Tools</th>
<th>Select</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Zoom In</td>
</tr>
<tr>
<td></td>
<td>Zoom Out</td>
</tr>
<tr>
<td></td>
<td>Pan</td>
</tr>
<tr>
<td></td>
<td>Digitize</td>
</tr>
<tr>
<td></td>
<td>Measure</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Options</th>
<th>Zoom Extents</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Auto Pan to GPS Position</td>
</tr>
<tr>
<td></td>
<td>Auto Pan to Selection</td>
</tr>
<tr>
<td></td>
<td>Filter</td>
</tr>
<tr>
<td></td>
<td>Update Selected Feature</td>
</tr>
<tr>
<td></td>
<td>Delete Selected Feature</td>
</tr>
<tr>
<td></td>
<td>Set Nav Start</td>
</tr>
<tr>
<td></td>
<td>Set Nav Target</td>
</tr>
<tr>
<td></td>
<td>Clear Nav Targets</td>
</tr>
<tr>
<td></td>
<td>Cross-Track Light Bar</td>
</tr>
<tr>
<td></td>
<td>Enter Coordinates</td>
</tr>
<tr>
<td></td>
<td>Refresh</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Layers</th>
<th>Filtered Features</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Unfiltered Features</td>
</tr>
<tr>
<td></td>
<td>Waypoints</td>
</tr>
<tr>
<td></td>
<td>Background</td>
</tr>
<tr>
<td></td>
<td>Between Feature GPS</td>
</tr>
<tr>
<td></td>
<td>GPS Trail</td>
</tr>
<tr>
<td></td>
<td>Background Files</td>
</tr>
<tr>
<td></td>
<td>Layer Formatting</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Undo</th>
<th>End Measurement</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Create/End Feature</td>
</tr>
<tr>
<td></td>
<td>Log/Pause/Resume</td>
</tr>
</tbody>
</table>
## Data section

<table>
<thead>
<tr>
<th>New File</th>
<th>Create</th>
</tr>
</thead>
<tbody>
<tr>
<td>Existing File</td>
<td>Open</td>
</tr>
<tr>
<td>Update Features</td>
<td>Update Features Form</td>
</tr>
<tr>
<td>Options</td>
<td>Show Filtered Features</td>
</tr>
<tr>
<td></td>
<td>Show Unfiltered Features</td>
</tr>
<tr>
<td></td>
<td>Filter</td>
</tr>
<tr>
<td></td>
<td>Delete</td>
</tr>
<tr>
<td></td>
<td>Undelete</td>
</tr>
<tr>
<td></td>
<td>Set Nav Start</td>
</tr>
<tr>
<td></td>
<td>Set Nav Target</td>
</tr>
<tr>
<td></td>
<td>Clear Nav Targets</td>
</tr>
<tr>
<td></td>
<td>Logging Interval</td>
</tr>
<tr>
<td></td>
<td>Continue</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Attribute Entry Form</th>
<th>Options</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Offset</td>
</tr>
<tr>
<td></td>
<td>New Vertex</td>
</tr>
<tr>
<td></td>
<td>Logging Interval</td>
</tr>
<tr>
<td></td>
<td>Nest</td>
</tr>
<tr>
<td></td>
<td>Segment Line</td>
</tr>
<tr>
<td></td>
<td>Log</td>
</tr>
<tr>
<td></td>
<td>Pause</td>
</tr>
<tr>
<td></td>
<td>Resume</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Collect Features</th>
<th>Collect Features Form</th>
</tr>
</thead>
<tbody>
<tr>
<td>Options</td>
<td>Logging Interval</td>
</tr>
<tr>
<td></td>
<td>Repeat</td>
</tr>
<tr>
<td></td>
<td>Log Now</td>
</tr>
<tr>
<td></td>
<td>Log Later</td>
</tr>
<tr>
<td></td>
<td>Continue</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Attribute Entry Form</th>
<th>Options</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Offset</td>
</tr>
<tr>
<td></td>
<td>New Vertex</td>
</tr>
<tr>
<td></td>
<td>Logging Interval</td>
</tr>
<tr>
<td></td>
<td>Nest</td>
</tr>
<tr>
<td></td>
<td>Segment Line</td>
</tr>
<tr>
<td></td>
<td>Log</td>
</tr>
<tr>
<td></td>
<td>Pause</td>
</tr>
<tr>
<td></td>
<td>Resume</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Log/Pause/Resume</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>File Manager Options</td>
<td>Navigation section</td>
</tr>
<tr>
<td>----------------------</td>
<td>--------------------</td>
</tr>
<tr>
<td>Delete</td>
<td><strong>Navigate</strong></td>
</tr>
<tr>
<td>Copy to</td>
<td>Options</td>
</tr>
<tr>
<td>Rename</td>
<td>New Waypoint</td>
</tr>
<tr>
<td>Move to</td>
<td>File List</td>
</tr>
<tr>
<td>Send via E-mail</td>
<td>New Waypoint Form</td>
</tr>
<tr>
<td>Receive via E-mail</td>
<td>Open</td>
</tr>
<tr>
<td>Edit embedded dictionary</td>
<td>Options</td>
</tr>
<tr>
<td>New dictionary</td>
<td>Set Nav Start</td>
</tr>
<tr>
<td>Read dictionary from data</td>
<td>New Waypoint Form</td>
</tr>
<tr>
<td>Write data from shape</td>
<td>Create From</td>
</tr>
<tr>
<td>Extract new data from file</td>
<td>GPS</td>
</tr>
<tr>
<td></td>
<td>Map Point</td>
</tr>
<tr>
<td></td>
<td>Selected Point</td>
</tr>
<tr>
<td></td>
<td>Feature</td>
</tr>
<tr>
<td></td>
<td>Selected Vertex</td>
</tr>
<tr>
<td></td>
<td>Selected Waypoint</td>
</tr>
<tr>
<td></td>
<td>Edit</td>
</tr>
<tr>
<td></td>
<td>Waypoint Form</td>
</tr>
</tbody>
</table>
Status section

Skyplot

Satellite Information

Receiver

Real-time
  Real-time Summary screen
  External Source Status screen
  External Beacon Status screen
  Integrated Beacon Status screen
  Integrated Satellite Status screen
  Integrated SBAS Status screen
  Integrated RTK Radio Status screen

Plan

Sensor
  Sensor 1
  Sensor 2

Comms

UTC Time

About
  System Report

Setup section

Options
  Connect to GPS
  Disconnect from GPS
  Reset GPS receiver
  Activate Integrated Satellite
  Connect to External Source
  Disconnect from External Source

Ext Source

GPS

Reload

Change

Lock

Logging Settings

GPS Settings

Real-time settings

Coordinate System

Units

External Sensors
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 62.
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 51)
- Options (see page 53)
- Tools (see page 54)
- Layers (see page 55)

Table 4.1 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 54.</td>
</tr>
<tr>
<td><img src="image" alt="Options" /></td>
<td>Opens the option list for the map. See page 53.</td>
</tr>
<tr>
<td><img src="image" alt="Layers" /></td>
<td>Opens the layer option list for the map. See Map layers, page 55.</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 64.</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 64.</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 64.</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 69.

Pause Pauses GPS position logging for the current feature. See Controlling logging from the Map section, page 69.

End Measurement Ends the current measurement. See Measuring, page 66.

<table>
<thead>
<tr>
<th>Item</th>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<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 cross-track line, which is the shortest path between the navigation start and target. See Lightbar, page 130.</td>
<td></td>
</tr>
<tr>
<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>
<td></td>
</tr>
<tr>
<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>
<td></td>
</tr>
<tr>
<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>
<td></td>
</tr>
<tr>
<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>
<td></td>
</tr>
<tr>
<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 Position information, page 52.</td>
<td></td>
</tr>
<tr>
<td>Waypoint</td>
<td>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. Tap a waypoint to display a tooltip showing information about the position. See Position information, page 52.</td>
<td></td>
</tr>
<tr>
<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>
<td></td>
</tr>
<tr>
<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>
<td></td>
</tr>
<tr>
<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>
<td></td>
</tr>
</tbody>
</table>
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.

<table>
<thead>
<tr>
<th>Item</th>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Features</td>
<td></td>
<td>Features that have been logged in the current data file.</td>
</tr>
<tr>
<td></td>
<td>Between feature</td>
<td>A trail of small crosses that show all GPS positions logged but not associated with a feature.</td>
</tr>
<tr>
<td>GPS</td>
<td>Position</td>
<td>A tooltip showing the coordinates of the current map cursor location.</td>
</tr>
<tr>
<td></td>
<td>information</td>
<td>If the selected location is a waypoint, the waypoint name and number also appear. 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>
</tr>
<tr>
<td>Digitized position</td>
<td></td>
<td>The last point that you digitized for the open feature.</td>
</tr>
<tr>
<td>Measured point</td>
<td></td>
<td>The last point that you measured.</td>
</tr>
<tr>
<td>Measurement</td>
<td></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>
</tr>
<tr>
<td>Command bar</td>
<td></td>
<td>A toolbar containing zooming and panning controls:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Pan half the map width to the left</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Pan half the map height upwards</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Pan half the map height downwards</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Pan half the map width to the right</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Zoom in</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Zoom out</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Zoom to extents to show all positions in all visible layers</td>
</tr>
<tr>
<td>Scale</td>
<td></td>
<td>The scale at which the map is drawn. As you zoom in or out, the scale changes accordingly.</td>
</tr>
</tbody>
</table>
## Table 4.3 Map section: Options

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Zoom Extents</strong></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>
<tr>
<td><strong>Auto Pan to GPS Position</strong></td>
<td>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. <strong>Note</strong> – <strong>You can select either Auto Pan to GPS Position or Auto Pan to Selection, but not both.</strong> To clear Auto Pan to GPS Position, select it again, or select Auto Pan to Selection.</td>
</tr>
<tr>
<td><strong>Auto Pan to Selection</strong></td>
<td>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. <strong>Note</strong> – <strong>You can select either Auto Pan to Selection or Auto Pan to GPS Position, but not both.</strong> To clear Auto Pan to Selection, select it again, or select Auto Pan to GPS Position.</td>
</tr>
<tr>
<td><strong>Filter</strong></td>
<td>Opens the <strong>Filter By</strong> form in the Data section, where you can set or change filtering criteria (see page 99).</td>
</tr>
<tr>
<td><strong>Update Selected Feature</strong></td>
<td>Opens the Data section and displays the <strong>Attribute Entry</strong> form for the currently selected feature, where you can update the attributes or position of the feature (see page 82). When you save the changes to the feature and close the attribute entry form, you are returned to the Map section. <strong>Note</strong> – <strong>You can also open a feature for update by double-tapping it on the map.</strong></td>
</tr>
<tr>
<td><strong>Delete Selected Feature</strong></td>
<td>Deletes the currently selected feature. This is the same as the Delete option in the Update Features screen in the Data section (see page 96). <strong>Note</strong> – <strong>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 94).</strong></td>
</tr>
<tr>
<td><strong>Set Nav Start</strong></td>
<td>Defines the position of the navigation start. See Setting and clearing the navigation start and target, page 67.</td>
</tr>
<tr>
<td><strong>Set Nav Target</strong></td>
<td>Defines the position of the navigation target. See Setting and clearing the navigation start and target, page 67.</td>
</tr>
<tr>
<td><strong>Clear Nav Targets</strong></td>
<td>Clears the current navigation start and target. You do not have to select either the start or target before clearing them.</td>
</tr>
<tr>
<td><strong>Cross-Track Light Bar</strong></td>
<td>Hides or displays the navigation lightbar at the top of the Map screen. By default, the lightbar is hidden. See Lightbar, page 130.</td>
</tr>
<tr>
<td><strong>Enter Coordinates</strong></td>
<td>Opens the <strong>Enter Coordinates</strong> form, where you can record a position for the open feature by entering its coordinates manually. See Creating manual positions, page 66. <strong>Note</strong> – <strong>To enter coordinates manually, you must be in Digitize mode with a feature open.</strong></td>
</tr>
<tr>
<td><strong>Refresh</strong></td>
<td>Clears the map display and then redraws it.</td>
</tr>
</tbody>
</table>
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 52). 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, map points, and waypoints, page 62.</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 63.</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 63.</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 62.</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 64.</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 66.</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>
<tbody>
<tr>
<td>Filtered Features</td>
<td>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. <strong>Note</strong> – You can set or clear filters in the Map section or in the Data section (see page 71).</td>
</tr>
<tr>
<td>Unfiltered Features</td>
<td>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. <strong>Note</strong> – 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.</td>
</tr>
<tr>
<td>Waypoints</td>
<td>Hides or displays waypoints on the map (see page 51).</td>
</tr>
<tr>
<td>Background</td>
<td>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.</td>
</tr>
<tr>
<td>Between Feature GPS</td>
<td>Hides or displays Between feature GPS positions on the map (see page 52).</td>
</tr>
<tr>
<td>GPS Trail</td>
<td>Hides or displays the GPS trail (see page 51).</td>
</tr>
<tr>
<td>Background Files</td>
<td>Opens the Background Files 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 56). This option is not available in the TerraSync Standard edition software. You can only open background files using the TerraSync Professional edition software.</td>
</tr>
<tr>
<td>Layer Formatting</td>
<td>Opens the Layer Formatting form, where you can change the colors and line thicknesses used for the layers in the map (see page 59).</td>
</tr>
</tbody>
</table>
Background Files form

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

Use the Background Files 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 Files 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 (.bkg) 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 (.cor, .ssf, or .imp) 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 (.bkg) file for data collection or update, and features in a background file cannot be selected, updated, or deleted.

The vector formats that the TerraSync software supports are the TerraSync software data file format (.cor, .ssf, or .imp) and ArcView Shapefiles (.shp).

You can also transfer raster files such as aerial photographs to the TerraSync software as background (.bkg) files. The supported formats are bitmap (.bmp), ECW (.ecw), JPEG (.jpg), JPEG2000 (.jp2, .j2c), MrSID (.sid), and TIFF (.tif). If the image file is any format except an .ecw or an .sid file, the 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.

Including these files is optional if you are using an .ecw or an .sid image file.

**Multiple background files**

If you are using the TerraSync Professional edition software, you can display more than one file as background layers for your current map.

**Note – You can only display multiple files if each file is located in the same folder and uses the configured coordinate system.**
When displaying multiple background files, the layers are not transparent; files layered beneath other layers are obscured by the layers above. If the uppermost layer contains a white background, the layer directly underneath shows through, except when hidden by features on the uppermost layer.

Background files are layered in the following order:

- Raster image layers are displayed first.
- Shapefile layers are displayed over raster image layers.
- Trimble data file and background (.bkg) layers are displayed over Shapefile layers.

**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 4.4 Background File Form: Fields

<table>
<thead>
<tr>
<th>Field</th>
<th>Default</th>
<th>Description</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location</td>
<td>Default</td>
<td>The location of the files to be listed in the Files field. This field contains an entry for each storage location on the device. There is also an option called Default, which represents the TerraSync documents folder, and an option called Internet, which allows you to download background images from a Web map server.</td>
<td></td>
</tr>
<tr>
<td>Show Data Files</td>
<td>None</td>
<td>Select the check box to show Trimble data files (.ssf, .cor, or .imp files) in the list of background files.</td>
<td></td>
</tr>
<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>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Data A Trimble data file (a .ssf, .cor, or .imp file)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Background A Trimble data file transferred as a background (.bkg) file</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Shapefile ArcView Shapefiles (.shp)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• BMP A bitmap (.bmp) file</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• ECW An .ecw file</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• JPEG A .jpg file</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• JPEG2000 A .jp2 or a .j2c file</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• MrSID An .sid file</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• TIFF A .tif file</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Note</strong> – Data files appear only if you have selected the Show Data Files check box.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• To display a background file, select the check box next to the file name.</td>
<td></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>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• ArcIMS A map server that uses the ArcIMS protocol</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Open GIS A map server that conforms to the Open GIS standard</td>
<td></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. This field only appears if Internet is selected in the Location field.</td>
<td></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. If you want to connect to an Open GIS server, leave this field blank. Open GIS servers do not provide services. This field only appears if Internet is selected in the Location field.</td>
<td></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 55).

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 4.5  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 Filtered Features layer (see page 55).</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.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>This field only appears if the Color Source field is set to Layer Color</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(see page 59).</td>
</tr>
</tbody>
</table>
Table 4.5  Layer Formatting form: Fields (continued)

<table>
<thead>
<tr>
<th>Field</th>
<th>Default</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unfiltered Features</td>
<td>(none)</td>
<td>Sets the display options for the Unfiltered Features layer (see page 55).</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.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>This field only appears if the Color Source field is set to Layer Color (see page 59).</td>
</tr>
<tr>
<td>Waypoints</td>
<td>(none)</td>
<td>Sets the display options for the Waypoints layer (see page 55).</td>
</tr>
<tr>
<td>Color</td>
<td>Black</td>
<td>The color for waypoints (see page 51).</td>
</tr>
<tr>
<td>Vector Background</td>
<td>(none)</td>
<td>Sets the display options for the Background layer (see page 55).</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Note</strong> – This field is not available in the TerraSync Standard edition software.</td>
</tr>
<tr>
<td>Color Source</td>
<td>Data dictionary</td>
<td>Specifies whether to display features from a file that is open in the background using the layer color or the color specified in the data dictionary.</td>
</tr>
<tr>
<td>Color</td>
<td>Dark Magenta</td>
<td>The color for background features if the background file contains feature information. This field only appears if the Color Source field is set to Layer Color (see page 59).</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Note</strong> – This field is not available in the TerraSync Standard edition software.</td>
</tr>
<tr>
<td>Between Feature GPS</td>
<td>(none)</td>
<td>Sets the display options for the Between Feature GPS layer (see page 55).</td>
</tr>
<tr>
<td>Color</td>
<td>Dark Cyan</td>
<td>The color for Between feature GPS positions (see page 52).</td>
</tr>
<tr>
<td>GPS trail</td>
<td>(none)</td>
<td>Sets the display options for the GPS Trail layer (see page 55).</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Note</strong> – In addition to the GPS trail, the following items appear in the color assigned to the GPS Trail layer:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Current position (see page 51)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Map point (see page 51)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Bearing to go arrow (see page 51)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Line segments between digitized positions for the current feature</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Line segments between measured points</td>
</tr>
<tr>
<td></td>
<td></td>
<td>However, when the GPS Trail layer is hidden, these map items remain visible.</td>
</tr>
<tr>
<td>Color</td>
<td>Dark Red</td>
<td>The color for the GPS trail (see page 51).</td>
</tr>
<tr>
<td>Navigation</td>
<td>(none)</td>
<td>Sets display options for the Navigation layer.</td>
</tr>
<tr>
<td>Color</td>
<td>Blue</td>
<td>The color for the Navigation start and Navigation target (see page 51).</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 54). 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 66.

<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 202). <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. 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 202).</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 202).</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 202).</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 202). 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 202). The altitude of the manual position. The altitude is expressed as a Height Above Ellipsoid or Mean Sea Level, depending on the option configured in the Coordinate System form (see page 202), 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, map points, and waypoints

When a feature is selected in the Data section (see page 71), 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 94) 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, a waypoint, or anywhere else on the screen. The feature remains selected (highlighted) until you tap another feature.

Waypoints are displayed on the map with the symbol 🗺️.

When you select a map point that is not a feature (see page 51), 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 54) 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 52) 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 53), 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 53), 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 54) 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 52) 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 54) 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 53). 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 55).

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 177)

When you close a feature using the End Feature button, you are returned to the section that you opened the feature from. If you used the Create Feature button, you are returned to the Map section. Otherwise, you are returned to the Data section.

Tip – To create digitized positions from the map, you need an open feature. Use the Create Feature button to open a new feature without switching to the Data section. See Digitizing positions, page 64.

Note – Waypoints cannot be created from the map. To create waypoints, use the Waypoints subsection of the Navigation section (see page 136).

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 64.

2. Make sure that GPS logging is paused.

**Tip** – Use the Log Later option to prevent GPS logging from starting automatically when you start a new feature (see page 80).

3. Select the Digitize tool (see page 54). 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 when shown 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 54), 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 only GPS positions or a single manual or digitized position.

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

- A feature is open.
- GPS logging is paused.
- The Digitize tool (see page 54) is active.

For more information, see Digitizing positions, page 64.

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 61).
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 54). 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 130), 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 waypoint
- 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, a waypoint, or from a feature, select the map point, waypoint, 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 the selected waypoint, select the waypoint. The waypoint is identified by the waypoint number (for example, **18 Waypoint**).
To set the start to a location on the selected feature, select one of the feature options. The feature options are identified by the feature number and feature type (for example, 173 Road - Start is the feature option for the start point of the Road feature that has ID number 173).

The start icon 📍 appears over the selected map point, waypoint, feature, or position.

Tip – A start icon also appears beside the selected feature in the Update Features screen (see page 94).

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 130), 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 waypoint
- 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, a waypoint, or to a feature, select the map point, waypoint, 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 the selected waypoint, select the waypoint. The waypoint is identified by the waypoint number (for example, 18 Waypoint).
   - 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 102). 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, waypoint, feature, or position. If a navigation start is also defined, the start and target are joined by a line that shows the most direct navigation path.

Tip – A target icon also appears beside the selected feature in the Update Features screen (see page 94).

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 84.
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.

**Data Section**

**In this chapter:**
- New File screen
- Collect Features screen
- Existing Files screen
- Update Features screen
- File Manager
- Data Dictionary Editor
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 79)
- a base file, the Base Station Setup wizard appears (see page 74)

Tip – Once you have logged features to the new file, you can switch to the Update Features screen (see page 94) to edit the features you have collected so far.

Table 5.1 New File screen: Fields

<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>Rover</td>
<td>The new file will contain feature, attribute, and position information.</td>
</tr>
<tr>
<td>Base</td>
<td>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>Note – You can change the prefix character for rover files in the Logging Settings form in the Setup section (see page 176).</td>
</tr>
<tr>
<td></td>
<td>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.</td>
</tr>
</tbody>
</table>
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 179) 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 93).

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 179). If you change either value, it is also changed in the Logging Settings form.

Table 5.2 Confirm Antenna Height form: Fields

<table>
<thead>
<tr>
<th>Field</th>
<th>Default</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Height</td>
<td>The current value set in the Height field of the Antenna Settings 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>Measure To</td>
<td>The current value set in the Measure To field of the Antenna Settings 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 defaults to Bottom of antenna mount.</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 72) 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 239.

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

- Antenna Settings step, page 74
- Logging and GPS Settings step, page 75
- Real-Time Output step, page 75
- Reference Position step, page 78

**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 5.3 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 <em>Antenna Settings form</em>, page 178.</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 <em>Antenna Settings form</em>, page 178.</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 <em>Antenna Settings form</em>, page 178.</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>
<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. If the GPS receiver is a survey receiver, this field shows N/A.</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 5.5  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 broadcast. The options are:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Off: Do not output differential corrections. If this option is selected, 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 configure the receiver port, tap the Setup button beside this field. The Receiver Port Settings form appears (see page 195).</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- R8 Internal Radio: Output corrections on the receiver's internal transmit radio. This option is only available if the receiver is an R8. To configure the radio, tap the Setup button beside this field. The R8 Internal Radio Settings form appears (see page 78).</td>
</tr>
<tr>
<td>Station ID</td>
<td>1</td>
<td>The ID number that the base station will use to identify itself to rovers. Enter a station ID number between 0 and 1023.</td>
</tr>
<tr>
<td>Real-time Protocol</td>
<td>RTK/DGPS RTCM 2.1</td>
<td>The message format to be used. Select an option from the drop-down list. The protocol that you choose depends on the message formats supported or required by rovers:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- 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.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- 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.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>This field only appears for a survey GPS receiver. For other receivers, the RTCM 2.1 message format is used.</td>
</tr>
<tr>
<td>Message Interval</td>
<td>1s</td>
<td>The interval, in seconds, at which correction messages are output. Select an option from the drop-down list or type the time interval.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>If the connected receiver is a survey receiver, this field is read-only. These receivers output messages at a 1-second interval.</td>
</tr>
</tbody>
</table>

⚠️ **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 195).
**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.

<table>
<thead>
<tr>
<th>Button</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Channel</td>
<td>The channel on which the R8 receiver’s internal radio will transmit corrections.</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).

<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 <em>Here</em> 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 <em>Here</em> 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 <em>Here</em> 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 75).</td>
</tr>
<tr>
<td>OK</td>
<td>Closes the Base Station Setup wizard and begins logging base data. The <em>Collect Base Data</em> screen appears (see page 81).</td>
</tr>
<tr>
<td>Cancel</td>
<td>Cancels the Base Station Setup wizard and returns to the <em>New File</em> screen (see page 72).</td>
</tr>
</tbody>
</table>
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 72), or the Existing File screen to open an existing data file (see page 93).

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 5.8  Reference Position step: Fields

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Latitude</td>
<td>The latitude of the reference position. Select an option from the drop-down list. This field only appears if the current coordinate system is Lat/Long. The value entered is displayed in the units specified in the Coordinate System form (see page 202). Note – To indicate a Southern hemisphere latitude or Western hemisphere longitude, you must include the hemisphere letter (S or W) or a minus sign (–). The hemisphere letter or plus sign is optional for Northern or Eastern hemisphere positions. Tip – The symbols for degrees (°), minutes (‘), and seconds (&quot;) can be omitted or replaced with a space, but you must include the decimal point (.).</td>
</tr>
<tr>
<td>Longitude</td>
<td>This field only appears if the current coordinate system is Lat/Long. The longitude of the reference position. The formats you can use are as for the Latitude field.</td>
</tr>
<tr>
<td>North</td>
<td>This field only appears if the current coordinate system uses North/East. The northing of the reference position, in the coordinate units specified in the Coordinate System form (see page 202).</td>
</tr>
<tr>
<td>East</td>
<td>This field only appears if the current coordinate system uses North/East. The easting of the reference position, in the coordinate units specified in the Coordinate System form (see page 202).</td>
</tr>
<tr>
<td>Altitude</td>
<td>The altitude of the reference position. The altitude is expressed as a Height Above Ellipsoid or Mean Sea Level, depending on the option configured in the Coordinate System form (see page 202), and is in the altitude units specified in this form.</td>
</tr>
</tbody>
</table>

Table 5.9  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 82). Tip – The Map screen also has a Create Feature button (see page 50).</td>
</tr>
</tbody>
</table>
### Table 5.10 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 5.11 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 <em>Logging Interval</em> form where you can configure the logging interval for all features of the selected type in the open data file (see page 91).</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 <em>Repeat</em> 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 220.</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>
<tr>
<td>Trigger &lt;sensor name&gt;</td>
<td>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. <strong>Note</strong> – This option only appears if the sensor is configured to provide data when requested. <em>To do this, open the Sensor Properties form (see page 206) and set the Receive Mode field to Requested, and set the Request Intervals field for the feature type to Trigger.</em> <strong>Note</strong> – This option does not appear in the TerraSync Standard edition software.</td>
</tr>
<tr>
<td>Continue</td>
<td>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 <em>Continue feature form</em>. 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 211.</td>
</tr>
</tbody>
</table>
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 72).

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>Table 5.12</th>
<th>Collect Base Data screen: Button</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Button</strong></td>
<td><strong>Description</strong></td>
</tr>
<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 72).</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Table 5.13</th>
<th>Collect Base Data form screen: Fields</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Field</strong></td>
<td><strong>Description</strong></td>
</tr>
<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. <strong>Note</strong> – 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.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Table 5.14</th>
<th>Collect Base Data form screen: Options</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Option</strong></td>
<td><strong>Description</strong></td>
</tr>
<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 82).</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 81).

Alternatively, tap the Setup button in the Skyplot section (see page 144) or the Satellite Information section (see page 149).

*Note – If this form is already open, the Logging Settings and GPS Settings buttons in the Setup section are unavailable (see page 171).*

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 75).

**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 79).

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 96.

Table 5.15  Attribute entry form: Buttons

<table>
<thead>
<tr>
<th>Button</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>![OK]</td>
<td>Closes and saves the current feature and returns to the Collect Features screen (see page 79).</td>
</tr>
<tr>
<td>![Cancel]</td>
<td>Returns to the Collect Features screen (see page 79) without saving the current feature.</td>
</tr>
<tr>
<td>![Log]</td>
<td>Starts logging GPS positions.</td>
</tr>
<tr>
<td>![Pause]</td>
<td>Suspends logging of GPS positions. See Pausing and resuming logging, page 84.</td>
</tr>
<tr>
<td>![Resume]</td>
<td>Starts logging GPS positions again after you have paused logging. See Pausing and resuming logging, page 84.</td>
</tr>
<tr>
<td>![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 5.16  Attribute entry form: Fields

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>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>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 5.17  Attribute entry form: Options

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
</table>
| Offset | 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 85). If a point feature is open, select the type of offset for the point feature from the pullout menu. The Offset form for the selected option opens. For more information see:  
  - Distance-Bearing Offset form, page 86  
  - Distance-Distance Offset form, page 87  
  - Triple Distance Offset form, page 88  
  - Bearing-Bearing Offset form, page 88  
  - Triple Bearing Offset form, page 89 |
| New Vertex | Opens the Vertex form where you can record an averaged vertex for the selected line or area feature (see page 90). |
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 49).
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 219.

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

Table 5.18 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 204).</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 204).</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 204).</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 204).</td>
</tr>
</tbody>
</table>
Distance-Bearing Offset form

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

To display the Distance-Bearing Offset form, from the attribute entry form for the point feature, select the Distance-Bearing option (see page 82).

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 5.19  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 204).</td>
</tr>
<tr>
<td>Horizontal</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 204).</td>
</tr>
<tr>
<td>Vertical</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 204).</td>
</tr>
<tr>
<td>Slope</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/Inclination (see page 204).</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/Inclination (see page 204).</td>
</tr>
</tbody>
</table>
**Distance-Distance Offset form**

Use the *Distance-Distance Offset* form to specify a distance-bearing offset for a point feature.

To display the *Distance-Distance Offset* form, from the attribute entry form for the point feature, select the *Distance-Distance* option (see page 82).

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 217.

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 212.

<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 <strong>OK</strong> 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>

**Table 5.20  Distance-Distance offset form: Buttons**

<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:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Not started You have not yet collected any positions, because logging was paused when you opened the form.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Logging The TerraSync software is logging positions for this reference position.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Paused Logging of positions is paused.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Collected The position has been collected.</td>
</tr>
<tr>
<td>Distance</td>
<td>(none)</td>
<td>The distance from the reference position to the feature. Depending on the current Offset Format set in the <em>Units</em> form (see page 204), the fields below this heading are either Horizontal distance and Vertical distance (see page 85), or Slope distance and Inclination (see page 85). The fields are repeated for each reference position.</td>
</tr>
<tr>
<td>Direction</td>
<td>(none)</td>
<td>The direction of the feature relative to the path between the reference positions. The options are left and right.</td>
</tr>
</tbody>
</table>
**Triple Distance Offset form**

Use the *Triple Distance Offset* form to specify a triple-distance offset for a point feature.

To display the *Triple Distance Offset* form, from the attribute entry form for the point feature, select the *Triple Distance* option (see page 82).

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 217.

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 212.

The *Triple Distance Offset* form contains the same controls as the *Distance-Distance Offset* form (see page 87), except that the repeated fields appear three times (for the three reference positions A, B, and C), and the *Direction* field is usually read-only because the software calculates it automatically.

**Bearing-Bearing Offset form**

Use the *Bearing-Bearing Offset* form to specify a bearing-bearing offset for a point feature.

To display the *Bearing-Bearing Offset* form, from the attribute entry form for the point feature, select the *Bearing-Bearing* option (see page 82).

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 218.

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 212.

**Table 5.22  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 5.23  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 87).</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 204).</td>
</tr>
</tbody>
</table>

**Triple Bearing Offset form**

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

To display the **Triple Bearing Offset** form, from the attribute entry form for the point feature, select the **Triple Bearing** option (see page 82).

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 218.

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 212.
The Triple Bearing Offset form contains the same buttons and fields as the Bearing-Bearing Offset form (see page 88), 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 82).

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 221.

**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 80). 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 .throw, 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 3.1. The number beside the icon is 1 if a position has been logged, or 0 if no positions with the required precision have been received yet.
4. Remain stationary at your current location, and enter or edit attribute values if necessary.
5. When you have recorded enough positions for this vertex, tap OK. The Vertex form closes, and you are returned to the attribute entry form.
Tip – In RTK mode, you can finish logging the vertex at any time, provided the number beside the logging icon is 1.

Logging Interval form

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 176).

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

- Collect Features screen (see page 79)
- Attribute entry form for a new feature (see page 82)
- Update Features screen (see page 94)
- Attribute entry form for an existing feature (see page 96)

<table>
<thead>
<tr>
<th>Field</th>
<th>Default</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Logging style</td>
<td>Time</td>
<td>The unit of measurement for the logging interval. The options are:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Time</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Distance</td>
</tr>
<tr>
<td></td>
<td></td>
<td>This field is only available for line and area features. If the selected feature is a point, this field displays Time and the logging style cannot be edited.</td>
</tr>
<tr>
<td>Logging interval</td>
<td>5 s</td>
<td>The time or distance between recording GPS positions. Enter the interval in the units specified in the Logging style field.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Note – When the logging interval is small, the TerraSync software records more positions for the feature. More storage space is required.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>If you do not want to log positions, select Off. No GPS data is recorded for this feature.</td>
</tr>
<tr>
<td>Accuracy</td>
<td>Code</td>
<td>This field specifies whether to log the usual code phase data from the GPS receiver, or to log more detailed but more accurate carrier phase data.</td>
</tr>
</tbody>
</table>
Continue Feature form

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 79).

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 82), and logging of GPS positions to this feature resumes. See Continuing line and area features, page 211.

Table 5.25 Continue Feature form: Buttons

<table>
<thead>
<tr>
<th>Button</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cancel</td>
<td>Cancels the continuation of the feature and returns to the Collect Features screen (see page 79)</td>
</tr>
<tr>
<td>Continue</td>
<td>Opens the attribute entry form for the selected feature. Use this form to continue logging positions to the selected feature.</td>
</tr>
</tbody>
</table>

Table 5.26 Continue Feature 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 list of features that you can 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></td>
<td>• Name The name of the feature and its type, shown by the line or area icon to the left of the feature name.</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 verify that the correct feature is selected from the list.</td>
</tr>
</tbody>
</table>
**Existing Files screen**

Use the *Existing Files* 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 94).

**Tip** – You can also switch to the *Collect Features* screen to add new features to the file (see page 79). 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 5.27 Existing Files screen: Fields

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Location</strong></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><strong>List of files</strong></td>
<td>A list of all the data files that are available for update. The list contains the following columns:</td>
</tr>
<tr>
<td>Name</td>
<td>The name of the data file.</td>
</tr>
<tr>
<td>Time</td>
<td>The date and time when the file was created or was last updated.</td>
</tr>
<tr>
<td>Size</td>
<td>The size of the file.</td>
</tr>
<tr>
<td>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.</td>
<td></td>
</tr>
<tr>
<td>To open a file, highlight it in this list and then tap <strong>Open</strong>. The <em>Update Features</em> screen appears (see page 94).</td>
<td></td>
</tr>
<tr>
<td><strong>Features</strong></td>
<td>The number of features in the selected file.</td>
</tr>
<tr>
<td><strong>Positions</strong></td>
<td>The number of position records in the selected file.</td>
</tr>
</tbody>
</table>
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 93), or the New File screen to open a new data file (see page 72).

*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>
<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 5.29  Update Features screen: Fields

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>File</strong></td>
<td>The filename of the open file. This field is read-only.</td>
</tr>
<tr>
<td><strong>Choose Feature list</strong></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 97) 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>
<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. Possible values are:</td>
</tr>
<tr>
<td>• &lt;carrier time&gt;</td>
<td>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>• Continuing</td>
<td>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>• Insufficient</td>
<td>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 5.30 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 in the Filter column. When filtered features are displayed, this option has a check mark 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 beside it.</td>
</tr>
<tr>
<td>Filter</td>
<td>Opens the Filter By form where you can set or clear filtering conditions (see page 99).</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 . 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>
<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. <strong>Note</strong> – You can also set the navigation start and target in the Map section.</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 91).</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 211.</td>
</tr>
</tbody>
</table>

### Attribute entry form for existing features

Use this form to update the attributes or position data of an existing feature. To update a feature, highlight the feature in the Choose Feature list in the Existing File screen and tap **Begin** (see page 93). Alternatively, double-tap the feature in the Map section.

For information about the controls on this form, see **Attribute entry form, page 82.**

**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 98.**
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 94). 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 84.

**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 94) 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>☑</td>
<td>Imported</td>
<td>The feature has been transferred from the postprocessing software but has not been updated yet.</td>
</tr>
<tr>
<td>☑</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 98)
- Digitizing positions (see page 64)
- Adding or changing offsets in an offset form (see Offsets, page 212)

*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 (✔️) appears beside it in the Choose Feature list (see page 80).

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 80) 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 177) is configured to require confirmation, or the feature is a line or area, a message box appears, asking you to select a logging option:

   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.

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Update feature</td>
<td>Records new positions for this feature, replacing all positions.</td>
</tr>
<tr>
<td>Continue feature</td>
<td>Continues the feature, appending the new positions to the existing positions. See Continuing line and area features, page 211. This option is not available for point features.</td>
</tr>
</tbody>
</table>

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 94). 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 64) 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 100.

**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 94).

<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></td>
<td>• New</td>
</tr>
<tr>
<td></td>
<td>• Imported</td>
</tr>
<tr>
<td></td>
<td>• Updated</td>
</tr>
<tr>
<td></td>
<td>For each field, choose one of the following options:</td>
</tr>
<tr>
<td></td>
<td>• Unfiltered</td>
</tr>
<tr>
<td></td>
<td>• Filtered</td>
</tr>
<tr>
<td></td>
<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>
</tr>
<tr>
<td><strong>Deleted Status</strong></td>
<td>Select this check box to filter by deletion status. If this check box is selected, the following fields appear below it:</td>
</tr>
<tr>
<td></td>
<td>• Deleted</td>
</tr>
<tr>
<td></td>
<td>• Undeleted</td>
</tr>
<tr>
<td></td>
<td>For each field, choose one of the following options:</td>
</tr>
<tr>
<td></td>
<td>• Unfiltered</td>
</tr>
<tr>
<td></td>
<td>• Filtered</td>
</tr>
<tr>
<td></td>
<td>If this check box is cleared, the <em>Deleted</em> and <em>Undeleted</em> fields do not appear, and the filter does not consider deletion status.</td>
</tr>
</tbody>
</table>
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 94) or in the Map section (see page 49) tap Options and select Filter. The Filter By form (see page 99) 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.

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Features</td>
<td>Select this check box to filter by feature types or their attributes. If this check box is selected, a field for each type of feature in the data dictionary appears below it. Use these fields to specify feature filtering conditions. Each feature type field provides the following options: • Unfiltered Do not filter by this feature type. • All Filtered Filter all features of this type. • Filter By Select features of this type to filter by, using attribute values. When you select this option, the Attribute, Test, and Value fields appear below it. Use these three fields to select the attribute values for this feature to filter by.</td>
</tr>
<tr>
<td>Attribute</td>
<td>This field only appears if the Filter By option is selected in the Features field. The attribute from the feature to filter by. Each attribute of the feature is listed here.</td>
</tr>
<tr>
<td>Test</td>
<td>This field only appears if the Filter By option is selected in the Features field. The comparison to perform on the attribute selected above. The options listed depend on the attribute type: • Menu Equal To, Not Equal To • Text or filename Containing, Not Containing • Date, time, or numeric Equal To, Not Equal To, Less Than, Greater Than</td>
</tr>
<tr>
<td>Value</td>
<td>This field only appears if the Filter By option is selected in the Features field. The attribute value to filter by. If there is a list of options, select an attribute value from the list. Otherwise, enter the value to filter by.</td>
</tr>
</tbody>
</table>
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 94) 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 96) 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 55.

**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 94), 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 105).

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 5.35  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  <strong>SSF</strong> files (.cor, .imp, .phs, or .ssf files) containing feature and attribute information.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Base files  <strong>SSF</strong> 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 <strong>vector</strong> (.cor, .imp, .phs, .ssf) or <strong>raster</strong> (.bmp, .ecw, .jpg, .jp2, .j2c, .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></td>
<td></td>
<td>• Waypoint files  Waypoint (.wpt) files containing name and location information for geographical points.</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 <strong>Choose File</strong> 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 <strong>Choose File Type</strong> list. If the Base files option is selected, this field shows the value Base.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>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 <strong>Choose File Type</strong> list.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>The number of position records in the selected file.</td>
</tr>
<tr>
<td>Waypoints</td>
<td>(no default)</td>
<td>This field does not appear unless the Waypoint files option is selected in the <strong>Choose File Type</strong> list.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>The number of waypoints in the selected file.</td>
</tr>
</tbody>
</table>
### Table 5.35 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 5.36 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 106).</td>
</tr>
<tr>
<td>Receive via E-mail</td>
<td>Opens the Receive via E-mail form (see page 107).</td>
</tr>
</tbody>
</table>
| Edit dictionary | Opens the Edit Dictionary form (see page 113). 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 113).                                      |
| Read dictionary from data | Opens the Read Dictionary from Data form (see page 108).                                                                                |
| Read data from Shape | Opens the Read from Shape form (see page 109). 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 103) 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 Windows Mobile-based 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 5.37 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. If you have sent</td>
</tr>
<tr>
<td></td>
<td>files from the TerraSync software before, this field defaults to the last e-</td>
</tr>
<tr>
<td></td>
<td>mail address used.</td>
</tr>
<tr>
<td>Subject Prefix</td>
<td>A subject line for the e-mail. If you have sent files from the TerraSync</td>
</tr>
<tr>
<td></td>
<td>software before, this field defaults to the last subject line used.</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 103) 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 5.38  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>This field only appears if the field computer is a Windows Mobile-based device. 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.</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 103) 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 104).
Read from Shape form

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 202.

To open the Read data from Shape form, in the File Manager screen (see page 103) 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 5.39  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 103).</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 103). The new file appears in the List of files.

### Table 5.40  Read from Shape form: Fields

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Create &lt;file type&gt; file</td>
<td>The name of the new file. The TerraSync software automatically generates a default filename for the new data, data dictionary, or background file, using the same naming convention as in the <strong>File Name</strong> field in the <strong>New File</strong> screen (see page 72). You can edit this default name, or enter an entirely different name. Filenames must follow the naming rules for Windows, but you should not specify an extension.</td>
</tr>
<tr>
<td>From Shape file(s) in</td>
<td>The folder where the source Shapefiles are stored.</td>
</tr>
<tr>
<td>In coordinate system</td>
<td>The current coordinate system. Use this field to check that the coordinate system to be used by the new file is correct.</td>
</tr>
<tr>
<td></td>
<td><strong>Note</strong> – When you create a data or background file, the current coordinate system <strong>must</strong> match the coordinate system in the input Shapefiles. Use the Coordinate System form in the Setup section (see page 202) to change the coordinate system if necessary. When you create a data dictionary file, the coordinate system does not matter.</td>
</tr>
<tr>
<td>Include</td>
<td>A list of the Shapefiles in the selected folder. To include features in a Shapefile in the converted file, select the check box beside the name of the Shapefile.</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 103) 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>
<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 202) to change the coordinate system if necessary.</td>
</tr>
<tr>
<td>Zone</td>
<td>The currently selected coordinate system zone. This field does not appear if the selected coordinate system has no zones.</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 103) 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 5.42  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 113
- Edit dictionary form, page 113
- Edit Feature form, page 116
- New Attribute Type form, page 120
- Edit Attribute form, page 121
- Edit Attribute Value form, page 123
- Settings for All Features form, page 124

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 103) 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</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 103) 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 5.44 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>
</tbody>
</table>
| Properties                    | The properties of the selected feature or attribute. The information shown depends on the type of feature or attribute selected. If a feature is selected, the following fields appear:  

- Min Positions (for point features), Offset (for line and area features)  
- Logging Interval  
- Label 1  
- Label 2  

If an attribute is selected, the following fields appear:  

- Attribute type, Default, Format  
- Max length, Min, Max  
- Generate, Auto-increment  
- Creation, Update

Note – Only the fields that are relevant to the attribute type appear. For example, the Format field appears only for date and time attributes.
Table 5.45  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 116). 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 121). 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 116). 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 121). 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 5.46  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 124).</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 5.47 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 5.48  Default Settings tab, Edit Feature form: Buttons

<table>
<thead>
<tr>
<th>Button</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<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 124).</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 5.49  Default Settings tab, Edit Feature form: Fields

<table>
<thead>
<tr>
<th>Field</th>
<th>Default</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Logging interval</td>
<td>Time</td>
<td>The default logging style. The options are:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Time Log a new position when a certain time has elapsed since logging the last position for this feature.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Distance Log a new position when you have moved a certain distance from the last position logged for this feature.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Off Do not log GPS positions for this feature.</td>
</tr>
<tr>
<td>Time</td>
<td>5 seconds</td>
<td>The time between positions and the unit of measure (seconds or minutes), when Time is selected as the logging interval.</td>
</tr>
<tr>
<td>Distance</td>
<td>5 meters</td>
<td>This field only appears if the feature is a line or area. The distance between positions and the unit of measure (meters or feet), when Distance is selected as the logging interval.</td>
</tr>
<tr>
<td>Minimum Positions</td>
<td>1</td>
<td>This field only appears if the feature is a point feature. The minimum number of positions to log.</td>
</tr>
<tr>
<td>Accuracy</td>
<td>Code</td>
<td>This field specifies whether to log the usual code phase data from the GPS receiver, or to log more detailed but more accurate carrier phase data.</td>
</tr>
<tr>
<td>Direction</td>
<td>Left</td>
<td>The default direction to the feature, relative to your path of travel. The options are left and right.</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 49), 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 5.50 Symbol tab, Edit Feature form: Buttons

<table>
<thead>
<tr>
<th>Button</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Default</td>
<td>Resets the symbol properties to the defaults. The default point symbol is a cross over a small round point X (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>
**Line Style tab**

*Note – This tab only appears if the selected feature is a line or area feature.*

Use the Line Style tab of the Edit Feature form to specify the appearance of the line used to represent this feature in the Map section and Update Features list.

**Tip –** In the Map section (see page 49), 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>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 Windows Mobile-based device, this field is read-only.</td>
</tr>
</tbody>
</table>

**Table 5.52**  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 5.53**  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>
</tbody>
</table>

*Note – Thicker lines take longer for the software to draw. Use thin lines to maximize the drawing speed of the Map screen.*
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 121), where you can give the attribute a name and set its properties.

<table>
<thead>
<tr>
<th>Table 5.53</th>
<th>Line Style tab, Edit Feature form: Fields (continued)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Field</td>
<td>Description</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>
</tbody>
</table>

**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.

<table>
<thead>
<tr>
<th>Table 5.54</th>
<th>New Attribute Type form: Attribute types</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attribute type</td>
<td>Description</td>
</tr>
<tr>
<td>Menu</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>Numeric</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>Text</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>Date</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>Time</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>File Name</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>Separator</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 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 5.55  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 Edit Attribute Value form (see page 123). Use this form to add new attribute values.</td>
</tr>
<tr>
<td>Edit</td>
<td>Opens the Edit Attribute Value form (see page 123). 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 5.56  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 On Creation 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</td>
<td>(none)</td>
<td>This field only appears if the attribute type is Menu. The list of values</td>
</tr>
<tr>
<td>Values</td>
<td></td>
<td>for a menu attribute. Use the <strong>New</strong> and <strong>Edit</strong> buttons to add or edit</td>
</tr>
<tr>
<td></td>
<td></td>
<td>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</td>
</tr>
<tr>
<td></td>
<td></td>
<td>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</td>
</tr>
<tr>
<td></td>
<td></td>
<td>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</td>
</tr>
<tr>
<td></td>
<td></td>
<td>for a numeric attribute.</td>
</tr>
<tr>
<td>Auto-Incrementing</td>
<td>No Increment</td>
<td>This field only appears if the attribute type is Numeric or Text. This</td>
</tr>
<tr>
<td></td>
<td></td>
<td>field specifies whether the default value for the attribute is supplied by</td>
</tr>
<tr>
<td></td>
<td></td>
<td>automatically incrementing (or decrementing) the value of the last attribute</td>
</tr>
<tr>
<td></td>
<td></td>
<td>of this type that was entered. The options are:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• No Increment No auto-incremented default value is supplied.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Increment An auto-incremented default value is supplied.</td>
</tr>
<tr>
<td>Step Value</td>
<td>+1</td>
<td>This field only appears if the attribute type is Numeric or Text. The</td>
</tr>
<tr>
<td></td>
<td></td>
<td>amount by which the attribute value increments or decrements.</td>
</tr>
<tr>
<td>Length</td>
<td>30</td>
<td>This field only appears if the attribute type is Text. The maximum length</td>
</tr>
<tr>
<td></td>
<td></td>
<td>for a text attribute. The length can be any integer from 1 to 100.</td>
</tr>
<tr>
<td>Default</td>
<td>(none)</td>
<td>A default value for the attribute.</td>
</tr>
<tr>
<td>Auto Generate on</td>
<td>Selected</td>
<td>This field specifies whether the attribute is automatically filled in with</td>
</tr>
<tr>
<td>Creation</td>
<td></td>
<td>the current date or time when the feature is created. This field only</td>
</tr>
<tr>
<td></td>
<td></td>
<td>appears if the attribute type is Date or Time.</td>
</tr>
<tr>
<td>Auto Generate on Update</td>
<td>Not</td>
<td>This field specifies whether the attribute is automatically filled in with</td>
</tr>
<tr>
<td></td>
<td>selected</td>
<td>the current date or time when the feature is opened for update. This field</td>
</tr>
<tr>
<td></td>
<td></td>
<td>only appears if the attribute type is Date or Time.</td>
</tr>
<tr>
<td>Format</td>
<td>Year-</td>
<td>This field only appears if the attribute type is Date or Time. The display</td>
</tr>
<tr>
<td></td>
<td>Month-</td>
<td>format of the attribute.</td>
</tr>
<tr>
<td></td>
<td>Day (for</td>
<td>If the attribute type is Date, the options are:</td>
</tr>
<tr>
<td></td>
<td>Date</td>
<td>• Day - Month - Year</td>
</tr>
<tr>
<td></td>
<td>attributes)</td>
<td>• Month - Day - Year</td>
</tr>
<tr>
<td></td>
<td>or 24</td>
<td>• Year - Month - Day</td>
</tr>
<tr>
<td></td>
<td>Hour (for</td>
<td>If the attribute type is Time, the options are:</td>
</tr>
<tr>
<td></td>
<td>Time</td>
<td>• 24 Hour</td>
</tr>
<tr>
<td></td>
<td>attributes)</td>
<td>• 12 Hour</td>
</tr>
</tbody>
</table>
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 121).

Table 5.57  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. If you opened this form by tapping Add in the Edit Attribute form (see page 121), this button is labeled Add. Tap Add to keep the form open and add another value to the list. If you opened this form by tapping Edit in the Edit Attribute form (see page 121), this button is labeled OK. Tap OK to close the form.</td>
</tr>
<tr>
<td>Cancel/Close</td>
<td>Closes this form. If you have made changes in this form but have not yet tapped Add or OK, this button is labeled Cancel. If you use it to close the form, a message appears asking you to confirm that you want to close the form without saving any changes. Tap Yes to continue. If you have saved changes by tapping Add, this button is labeled Close.</td>
</tr>
</tbody>
</table>

Table 5.58  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 117), 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:
- Navigate
- Waypoints

Use the Navigation section to:
- make sure that you follow a direct course to a target location
- revisit features that you have previously mapped
- create and edit waypoints
- view information such as your current heading or the distance from your current position to the target
Navigate

Use the Navigate subsection to navigate to selected targets. To display the Navigate subsection, tap the arrow on the Subsection button below the Section button and then select Navigate.

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 subsection, the default screen displayed is the Direction Dial graphical screen.

![Direction Dial graphical screen]

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

The Direction Dial graphical screen provides a simple dial which shows all the information you need to get to the target. It is 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 subsection. Select a target from the Waypoints subsection (see page 137), the Data section (see page 94), or the Map section (see page 68).

Table 6.1 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 Map Point appears.</td>
</tr>
<tr>
<td></td>
<td>• If you have selected a waypoint, the waypoint number and the text Waypoint appear.</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>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 135), you must navigate to the start before you can navigate to the target. While you are navigating to the start, the Nav Start field appears instead of the Target field. Once you have navigated within close-up range of the start, the Nav Start field is replaced by the Target field and you can start navigating to the target.</td>
</tr>
<tr>
<td></td>
<td>• Like the Target field, the Nav Start field identifies the navigation start:</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 selected a waypoint, the waypoint number and the text Waypoint appear.</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 130).</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 shows the direction you should travel in order to take the shortest path between the current GPS position and the target.</td>
</tr>
<tr>
<td>Message line</td>
<td>The message line displays messages relating to navigation (see page 134).</td>
</tr>
<tr>
<td>Information fields</td>
<td>The information fields at the bottom of the screen provide navigational information (see page 132).</td>
</tr>
</tbody>
</table>

Using the Direction Dial

To activate navigation, use the Data section (see page 94) or the Map section (see page 68) 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 132). 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 you have specified a target and started moving, 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 134.

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 130). This path is called the cross-track line. If you are not within the configured range of the navigation start (see page 135), 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 130), the navigation proximity alarm sounds, and the Close-up graphical screen replaces the Direction Dial screen:
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 130), 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 132) that depend on the heading are automatically locked as well. See Heading locked, page 134.

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

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

Table 6.2 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 selected a waypoint, the waypoint number and the text Waypoint appear.</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 130).</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 134).</td>
</tr>
<tr>
<td>Information fields</td>
<td>The information fields at the bottom of the screen provide navigational information (see Information fields, page 132).</td>
</tr>
</tbody>
</table>
**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 135).

**Close-up style**

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

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

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

**Lightbar**

The navigation lightbar appears at the top of the *Direction Dial* and *Close-up* screens, as well as in the Map section (see page 49). 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 71) or the Map section (see page 49).

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 135). 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 135). 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 any 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 126) and on the *Close-up* screen (see page 128).

*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 204) 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 134). If you are stationary or are not moving fast enough for the software to calculate a heading, these fields show the value ?, and the message line prompts you to start moving.*
### Table 6.3 Navigation section: Information fields

<table>
<thead>
<tr>
<th>Field</th>
<th>Label</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Distance</td>
<td>Label: 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>Label: 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>Label: 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>Label: 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>Label: 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>Label: 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>Label: 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>Label: 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>Label: 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>Label: 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. 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.</td>
</tr>
</tbody>
</table>
Message line

The message line appears above the information fields (see page 132). It displays important messages relevant to navigation. The following messages may appear:

Table 6.4 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 Start moving. The direction dial arrow and any information fields affected freeze. To unlock the heading, start moving faster than the cutoff velocity of 0.35 meters/second (1.26 kilometers/hour, or 0.78 miles/hour). Note – The heading is always locked when the Close-up screen is visible.</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 Start moving 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 49), the Data section (see page 71), or from the Waypoint List screen (see page 137).</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>
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 6.5 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>
Waypoints

Use the Waypoints subsection to create or open a waypoints file and to create or edit waypoints.

To display the Waypoints subsection, tap the arrow on the Subsection button below the Section button and then select Waypoints. The Waypoint Files screen appears. If there are no waypoint files, the New Waypoint File form appears (see page 137).

Waypoint Files screen

Use the Waypoint Files screen to open an existing waypoint file.

To open the Waypoint Files screen, tap the arrow on the Subsection button below the Section button and then select Waypoints.

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

Select an existing waypoint file from the list of files and then tap Open to open this file and begin reviewing existing waypoints in the Waypoint List screen (see page 137).

If there are no existing waypoint files, the New Waypoint File form appears (see page 137).

Tip – You can also use the New Waypoint form to add new waypoints to the file (see page 139).

Table 6.6 Waypoint Files 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 waypoint 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 waypoint files that are available for update. The list contains the following columns:  
  • Name The name of the waypoint file.  
  • Time The date and time when the file was created or was last updated.  
  • Size The size of the file.  
  You can drag each column heading to resize the column, or tap a column heading to sort by that column. If the list is already sorted by the column you tap, the sort order reverses.  
  To open a file, highlight it in this list and then tap Open. The Waypoint List screen appears (see page 137). |
| Waypoints | The number of waypoints in the selected file. |
**New Waypoint File form**

Use the New Waypoint File form to create a new waypoint file for the name and location of geographical points.

To open the New Waypoint File form, tap **New** in the Waypoint Files screen. The New Waypoint File form appears.

Select a location and enter a filename, and then tap **OK** to create a new file. The Waypoint List screen appears.

💡 **Tip** – To edit the waypoints you have collected so far, use the Waypoint List screen (see page 137).

<table>
<thead>
<tr>
<th>Table 6.7 New Waypoint File form: Fields</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Field</strong></td>
</tr>
<tr>
<td>Location</td>
</tr>
</tbody>
</table>
| File Name    | The name of the new file. When you open this section, the TerraSync software automatically generates a filename for the new waypoint file, using the date and time from the field computer’s clock. It uses the formula WMMDDHHX, where:  
  - **W** is the Filename Prefix.  
  - **MM** is the current month,  
  - **DD** is the current day of the month,  
  - **HH** is the current hour of the day,  
  - **X** increments within this hour, starting at **A** for the first file in that hour, then **B** for the second file, and so on.  
  
**Note** – You can change the prefix character for waypoint files in the Logging Settings form in the Setup section (see page 176).  

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.

**Waypoint List screen**

Use the Waypoint List screen to review and maintain waypoints that have already been collected. You can update name and location information.

To open the Waypoint List screen, open a new or existing waypoint file. To open a waypoint file, tap the arrow on the Subsection button below the Section button and then select **Waypoints**. Tap **New** to open a new file, or select a file from the list of waypoint files and then tap **Open** to open the file.

The Waypoint List screen lists all the waypoints in the open waypoint file.
To update the name or location of a waypoint, do one of the following:

- in the list of waypoints, tap and hold the waypoint you want to edit.
- select the waypoint in the list, tap the **Options** button and then tap **Edit**.

The **Edit Waypoint** form appears (see page 142).

**Table 6.8**  
**Waypoint List screen: Fields**

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Choose</td>
<td>The list of waypoints for review or update.</td>
</tr>
<tr>
<td>Waypoint list</td>
<td>The list contains the following columns:</td>
</tr>
<tr>
<td>#</td>
<td>The waypoint number. This number is not stored in the .wpt file, but is</td>
</tr>
<tr>
<td></td>
<td>dynamically assigned according to the order of waypoints in the file.</td>
</tr>
<tr>
<td>Name</td>
<td>The name of the waypoint.</td>
</tr>
<tr>
<td>Distance</td>
<td>The distance from the waypoint to the current GPS position.</td>
</tr>
</tbody>
</table>

**Table 6.9**  
**Waypoint List screen: Options**

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Set Nav Start</td>
<td>This option is only available if you have selected a waypoint from the list.</td>
</tr>
<tr>
<td></td>
<td>Sets the currently selected waypoint as the navigation start point.</td>
</tr>
<tr>
<td></td>
<td>When you set the start, the waypoint icon beside the selected waypoint is</td>
</tr>
<tr>
<td></td>
<td>replaced by the start icon . If there was already a navigation start</td>
</tr>
<tr>
<td></td>
<td>selected, the icon of that waypoint or feature changes from the start icon</td>
</tr>
<tr>
<td></td>
<td>back to its usual waypoint or feature icon.</td>
</tr>
<tr>
<td>Set Nav Target</td>
<td>This option is only available if you have selected a waypoint from the list.</td>
</tr>
<tr>
<td></td>
<td>Sets the currently selected waypoint as the navigation target.</td>
</tr>
<tr>
<td></td>
<td>When you set the target, the waypoint icon beside the selected waypoint is</td>
</tr>
<tr>
<td></td>
<td>replaced by the target icon . If there was already a navigation target</td>
</tr>
<tr>
<td></td>
<td>selected, the icon of that waypoint or feature changes from the target</td>
</tr>
<tr>
<td></td>
<td>icon back to its usual waypoint or feature icon.</td>
</tr>
<tr>
<td></td>
<td><strong>Note</strong> – You can also set the navigation start and target in the Map</td>
</tr>
<tr>
<td></td>
<td>section (see page 67).</td>
</tr>
<tr>
<td>Delete</td>
<td>This option is only available if you have selected a waypoint from the list.</td>
</tr>
<tr>
<td></td>
<td>Flags the selected waypoint as deleted, so that it does not appear on the</td>
</tr>
<tr>
<td></td>
<td>map. A deleted waypoint is indicated by a horizontal line through it.</td>
</tr>
<tr>
<td></td>
<td>Deleted waypoints can be undeleted in the TerraSync software or in the</td>
</tr>
<tr>
<td></td>
<td>postprocessing software.</td>
</tr>
<tr>
<td>Undelete</td>
<td>This option is only available if you have selected a deleted waypoint from</td>
</tr>
<tr>
<td></td>
<td>the list.</td>
</tr>
<tr>
<td></td>
<td>Undeletes the selected waypoint. The line through the waypoint is removed.</td>
</tr>
<tr>
<td>Edit</td>
<td>This option is only available if you have selected a waypoint from the list.</td>
</tr>
<tr>
<td></td>
<td>Opens the selected waypoint for editing.</td>
</tr>
<tr>
<td>New</td>
<td>Create a new waypoint.</td>
</tr>
<tr>
<td>Close</td>
<td>Close the open waypoint file and return to the Waypoint Files screen.</td>
</tr>
</tbody>
</table>
New Waypoint form

Note – The New Waypoint form is only available when a waypoint file is open. Use the New Waypoint File form to create a new waypoint file (see page 137) or the Waypoint Files screen to open an existing waypoint file (see page 136).

Use the New Waypoint form to create a new waypoint.

To open the New Waypoint screen, tap the Options button in the Waypoint List screen and then select New. The New Waypoint screen appears.

Enter the coordinates of the waypoint yourself, or use the Create From option to automatically fill out the coordinate fields using the location of a selected point.

Note – Waypoints can only be entered using the current coordinate system, but are always stored as WGS-84.

When you have finished entering information for the waypoint, tap OK. The waypoint is created and the Waypoint List screen reappears (see page 137).

To return to the Waypoint List screen without saving the waypoint, tap Cancel.

Using the Create From option

You can create a waypoint using the position of any of the following items:

- the current GPS position
- 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 selected waypoint

To create a waypoint using the coordinates of another item:

1. Do one of the following:
   - To create a waypoint from the current GPS position, connect to GPS.
   - To create a waypoint from a map point, a feature, or another waypoint, select the map point, feature, or waypoint in the Map section (see page 62).
     Alternatively, select the feature from the Update Features screen in the Data section (see page 94), or select the waypoint from the Waypoint List screen (see page 137).

2. Tap the Create From button and then select the item that you want to use the coordinates from. Do one of the following:
   - To use the coordinates of the current GPS position, select GPS.
– To use the coordinates of the selected map point, select **Map Point**.

– To use the coordinates of 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).

– To use the coordinates of the selected waypoint, select **Waypoint**.

The values in the location fields in the **New Waypoint** screen are updated with the location information for the selected point.

3. If required, edit the location values.

4. To specify a distance-bearing offset for the waypoint from the item you selected as the reference position, fill out the **Bearing** field and then the **Horizontal Distance** and **Vertical Distance** fields or the **Slope Distance** and **Inclination** fields.

---

Table 6.10  New Waypoint form: Fields

<table>
<thead>
<tr>
<th>Field</th>
<th>Default</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td></td>
<td>The name of the waypoint. You can enter up to 20 characters, including spaces and underscores, but you cannot use punctuation.</td>
</tr>
</tbody>
</table>
| Latitude   |         | The latitude of the waypoint. The value entered is displayed in the units specified in the **Coordinate System** form (see page 202).  
**Note** – To indicate a Southern hemisphere latitude or Western hemisphere longitude, you must include the hemisphere letter (S or W) or a minus sign (–). The hemisphere letter or plus sign is optional for Northern or Eastern hemisphere positions. |
| Longitude  |         | The longitude of the waypoint. The formats you can use are as for the **Latitude** field. |
| North      |         | The northing of the waypoint, in the coordinate units specified in the **Coordinate System** form (see page 202). |
| East       |         | The easting of the waypoint, in the coordinate units specified in the **Coordinate System** form (see page 202). |
| Altitude   |         | The altitude of the waypoint. The altitude is expressed as a **Height Above Ellipsoid** or **Mean Sea Level**, depending on the option configured in the **Coordinate System** form (see page 202), and is in the altitude units specified in this form. |
| Bearing    | 0.00°   | The bearing, in the selected angle units, from the reference position to the waypoint you are creating. For example, if you are facing North and the waypoint 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 204). |
Horizontal distance 0.00 m This field only appears if the Offset Format field in the Units form is set to Horizontal/Vertical (see page 204). The two-dimensional distance to the waypoint. The horizontal distance ignores any difference in height between the reference position and the waypoint.

Vertical distance 0.00 m This field only appears if the Offset Format field in the Units form is set to Horizontal/Vertical (see page 204). The vertical distance between the reference position and the waypoint.

Slope distance 0.00 m This field only appears if the Offset Format field in the Units form is set to Slope distance (see page 204). The distance from the reference position to the waypoint, including any difference in height.

Inclination 0.00° This field only appears if the Offset Format field in the Units form is set to Slope distance (see page 204). The angle of inclination between the reference position and the waypoint.

<table>
<thead>
<tr>
<th>Field</th>
<th>Default</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Horizontal distance</td>
<td>0.00 m</td>
<td>This field only appears if the Offset Format field in the Units form is set to Horizontal/Vertical (see page 204). The two-dimensional distance to the waypoint. The horizontal distance ignores any difference in height between the reference position and the waypoint.</td>
</tr>
<tr>
<td>Vertical distance</td>
<td>0.00 m</td>
<td>This field only appears if the Offset Format field in the Units form is set to Horizontal/Vertical (see page 204). The vertical distance between the reference position and the waypoint.</td>
</tr>
<tr>
<td>Slope distance</td>
<td>0.00 m</td>
<td>This field only appears if the Offset Format field in the Units form is set to Slope distance (see page 204). The distance from the reference position to the waypoint, including any difference in height.</td>
</tr>
<tr>
<td>Inclination</td>
<td>0.00°</td>
<td>This field only appears if the Offset Format field in the Units form is set to Slope distance (see page 204). The angle of inclination between the reference position and the waypoint.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Create From</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>GPS</td>
<td>This option is not available if you are not connected to GPS. Use the current GPS position for the location of the waypoint.</td>
</tr>
<tr>
<td>Map Point</td>
<td>This option is not available if you have not selected a point on the map. Use the selected map point for the location of the waypoint.</td>
</tr>
</tbody>
</table>
| Feature     | This option is not available if you have not selected a feature from the map or in the Data section. The options available depend on the type of feature selected. The options are:  
  - Point Use the selected point feature for the location of the waypoint.  
  - Line Use the vertex, start, middle, or end of the line feature for the location of the waypoint.  
  - Area Use the vertex, start, centroid, or end of the area feature for the location of the waypoint.  
| Waypoint    | This option is not available if you have not selected a waypoint from the map or in the Waypoints List screen. Use the selected waypoint for the location of the new waypoint. |
Edit Waypoint form

Use the Edit Waypoint form to edit the name and location information of an existing waypoint. To update a feature, select the waypoint in the Waypoint List screen and tap Options and then select Edit.

When you have finished editing the waypoint, tap OK. The updated information is stored and the Waypoint List screen reappears (see page 137).

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

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>The name of the waypoint. You can enter up to 20 characters, including spaces and underscores, but you cannot use punctuation.</td>
</tr>
<tr>
<td>Latitude</td>
<td>This field only appears if the current coordinate system is Lat/Long. The latitude of the waypoint. The value entered is displayed in the units specified in the Coordinate System form (see page 202). <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>Tip</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>This field only appears if the current coordinate system is Lat/Long. The longitude of the waypoint. The formats you can use are as for the Latitude field.</td>
</tr>
<tr>
<td>North</td>
<td>This field only appears if the current coordinate system uses North/East. The northing of the reference position, in the coordinate units specified in the Coordinate System form (see page 202).</td>
</tr>
<tr>
<td>East</td>
<td>This field only appears if the current coordinate system uses North/East. The easting of the reference position, in the coordinate units specified in the Coordinate System form (see page 202).</td>
</tr>
<tr>
<td>Altitude</td>
<td>The altitude of the reference 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 202), and is in the altitude units specified in this form.</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.
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 144)
- SNR graph (see page 146)
- Satellite geometry indicator (see page 146)
- Information fields (see page 147)
- Message line (see page 147)
- GPS settings area (see page 148)

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 253.
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 183). 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 146.
**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 7.2 Skyplot screen: Information fields

<table>
<thead>
<tr>
<th>Display</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>GPS position</td>
<td>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 202). Note – Positions viewed on the screen are not saved. To save them, open a data file and start a feature.</td>
</tr>
<tr>
<td>PDOP</td>
<td>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 182), 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 148), or tap the Setup button to open the GPS Settings form (see page 180).</td>
</tr>
<tr>
<td>HDOP</td>
<td>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 182), 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 180).</td>
</tr>
</tbody>
</table>

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 149).

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 7.3 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 147). 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 180.

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 180). 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 180). 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 7.4 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 183) 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 <strong>UH</strong> 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 183) 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 204).</td>
</tr>
</tbody>
</table>
As in the Skyplot screen, the following appear at the bottom of the Satellite Information screen:

- Information fields (see page 150)
- Message line (see page 147)
- GPS settings area (see page 148)

**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>
<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 147).</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 147).</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 7.6 Receiver screen: Fields

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>GPS</td>
<td>The current status of the GPS receiver connection. The options are:</td>
</tr>
<tr>
<td></td>
<td>• Connected The TerraSync software is connected to the GPS receiver.</td>
</tr>
<tr>
<td></td>
<td>• Attempting to connect to GPS The TerraSync software is trying to connect to the receiver. If this message appears, no other fields appear.</td>
</tr>
<tr>
<td></td>
<td>• GPS is disconnected The receiver has been disconnected from the TerraSync software. If this message appears, no other fields appear.</td>
</tr>
<tr>
<td></td>
<td>• No GPS detected. Check cables, batteries etc The TerraSync software has failed to detect the receiver, because it is not connected to the port specified in the GPS Settings form (see page 180), or has no power. If this message appears, no other fields appear.</td>
</tr>
<tr>
<td>Antenna</td>
<td>The current status of the antenna connection. The options are:</td>
</tr>
<tr>
<td></td>
<td>• Connected The TerraSync software is connected to a GPS receiver, and the receiver is connected to a GPS antenna.</td>
</tr>
<tr>
<td></td>
<td>• Not connected No antenna is connected. The antenna icon also appears in the Status bar.</td>
</tr>
<tr>
<td>Position status</td>
<td>An indicator of the GPS status. The options are:</td>
</tr>
<tr>
<td></td>
<td>• Calculating positions The receiver is computing GPS position fixes. The current satellite constellation is therefore acceptable.</td>
</tr>
<tr>
<td></td>
<td>• Poor satellite geometry 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></td>
<td>• Too few satellites The GPS receiver has acquired satellites, has not acquired enough satellites to compute a position.</td>
</tr>
<tr>
<td></td>
<td>• Unavailable No position is available. For example, there may be no antenna connected to the receiver.</td>
</tr>
<tr>
<td>Carrier time</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>Almanac</td>
<td>The date of the almanac.</td>
</tr>
<tr>
<td>Battery</td>
<td>The current level of charge in the GPS receiver battery. This value appears as a percentage.</td>
</tr>
<tr>
<td></td>
<td><strong>Note</strong> – 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.</td>
</tr>
<tr>
<td>Receiver type</td>
<td>The name of the receiver model currently connected to the field computer.</td>
</tr>
<tr>
<td></td>
<td><strong>Note</strong> – The TerraSync software shows the internal name supplied by the receiver, which may not exactly match the name you use for the receiver.</td>
</tr>
</tbody>
</table>
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 155)
- *External Beacon* status screen (see page 156)
- *Integrated Beacon* status screen (see page 158)
- *Integrated Satellite* status screen (see page 159)
- *Integrated SBAS* status screen (see page 161)
- *Integrated RTK Radio* status screen (see page 162)

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.
**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 188).

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 7.7 through Table 7.11 on pages 153 to 155.

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 188).

<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 <em>External Source</em> status field (see Table 7.7). When the GPS receiver is using an external beacon receiver for real-time corrections, the external beacon icon $(\text{\textcircled{\text{\textcolor{red}{E}}}})$ 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 7.8  Real-time Summary screen: Integrated Beacon fields

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
</table>
| Integrated Beacon| The status of the Integrated Beacon real-time correction source. The options are the same as for the External Source status field (see Table 7.7), with the addition of this option:  
|                  | Not supported  The connected GPS receiver does not support real-time differential corrections from this source.  
|                  | 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. |
| Frequency        | The current beacon frequency being tracked or locked on to.                                                                                 |
| State            | The real-time operating status of the integrated beacon receiver.                                                                           |
| SNR              | The signal-to-noise ratio of the signal that is being monitored.                                                                           |

## Table 7.9  Real-time Summary screen: Integrated Satellite fields

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
</table>
| Integrated Satellite| 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 7.8).  
|                  | 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. |
| Service Provider | The name of the satellite differential service provider that the satellite in use belongs to.                                                  |
| Frequency        | The current satellite frequency being tracked or locked on to.                                                                               |
| State            | The real-time operating status of the integrated satellite receiver.                                                                           |
| SNR              | The signal-to-noise ratio of the satellite signal that is being monitored.                                                                    |

## Table 7.10  Real-time Summary screen: SBAS fields

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
</table>
| Integrated SBAS  | 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 7.8).  
|                  | 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. |
| SNR              | The signal-to-noise ratio of the SBAS satellite signal that is being monitored.                                                               |
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 188) 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 156) 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 152). Then tap the arrow on the Summary list button below the status bar, and from the drop-down list select External.
Table 7.12  External Source status screen: Fields

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>External Source</td>
<td>The status of the external real-time correction source. The options are:</td>
</tr>
<tr>
<td></td>
<td>• In use  The external real-time correction source 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 status of the external source is being monitored and the TerraSync software will switch to the external source if it becomes available and it is the highest-ranked available source.</td>
</tr>
<tr>
<td></td>
<td>• Not in use The external real-time correction source is set up but is not currently being used for real-time differential corrections.</td>
</tr>
<tr>
<td>Correction Type</td>
<td>This field only appears if the external source is a virtual reference station (VRS).</td>
</tr>
<tr>
<td></td>
<td>The type of VRS correction being received. The options are:</td>
</tr>
<tr>
<td></td>
<td>• Network The VRS is providing a network solution, using corrections from more than one base station to calculate the position of the virtual reference station.</td>
</tr>
<tr>
<td></td>
<td>• Single Station The VRS is operating in raw mode, and is using only one base station to provide RTCM corrections.</td>
</tr>
<tr>
<td>Connection Up-time</td>
<td>This field only appears if the external source is a VRS.</td>
</tr>
<tr>
<td></td>
<td>The duration, in hours, minutes, and seconds, of the current VRS connection.</td>
</tr>
<tr>
<td>Data Received</td>
<td>This field only appears if the external source is a VRS.</td>
</tr>
<tr>
<td></td>
<td>The amount of data, in megabytes, kilobytes, or bytes as appropriate, that has been sent and received since the connection was established.</td>
</tr>
<tr>
<td>Last correction</td>
<td>The time, in seconds, since the last correction message from this source was received.</td>
</tr>
</tbody>
</table>

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 155) 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 152). Then tap the arrow on the Summary list button below the status bar, and from the drop-down list select Ext. Beacon
Table 7.13  External Beacon status screen: Fields

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Field</td>
<td>Description</td>
</tr>
<tr>
<td>External Beacon</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>Frequency</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>State</td>
<td>The operating state of the external 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 signal the external beacon receiver is monitoring.</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>Beacon mode</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>Filter applied</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>External beacon battery level</td>
<td>The remaining battery power of the external beacon receiver, as a percentage.</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 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 152). Then tap the arrow on the Summary list button below the status bar, and from the drop-down list select Beacon.

Table 7.14 Integrated Beacon status screen: Fields

<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></td>
<td>• In use A beacon 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 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></td>
<td>• Not in use A beacon 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 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 152). 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</td>
</tr>
<tr>
<td></td>
<td>used to correct positions in real time.</td>
</tr>
<tr>
<td></td>
<td>• Waiting A lower-ranked choice is currently being used to correct</td>
</tr>
<tr>
<td></td>
<td>positions in real time. The satellite status is being</td>
</tr>
<tr>
<td></td>
<td>monitored and the TerraSync software will switch to the</td>
</tr>
<tr>
<td></td>
<td>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</td>
</tr>
<tr>
<td></td>
<td>but is not currently being used for real-time differential</td>
</tr>
<tr>
<td></td>
<td>corrections.</td>
</tr>
<tr>
<td></td>
<td>• Not supported The connected GPS receiver does not support corrections</td>
</tr>
<tr>
<td></td>
<td>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</td>
</tr>
<tr>
<td></td>
<td>from the drop-down list.</td>
</tr>
<tr>
<td>SNR</td>
<td>The signal-to-noise ratio, in decibels, of the selected satellite signal.</td>
</tr>
<tr>
<td></td>
<td>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</td>
</tr>
<tr>
<td></td>
<td>was received by the GPS receiver.</td>
</tr>
<tr>
<td>Real-time Service</td>
<td>A heading used to group together fields that contain information about the</td>
</tr>
<tr>
<td>Information</td>
<td>satellite differential service subscription.</td>
</tr>
<tr>
<td>User access</td>
<td>Specifies whether the selected satellite differential service has been</td>
</tr>
<tr>
<td></td>
<td>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</td>
</tr>
<tr>
<td></td>
<td>receiver has not yet determined the activation status.</td>
</tr>
</tbody>
</table>
### Table 7.15  Integrated Satellite status screen: Fields (continued)

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Decoder state</strong></td>
<td>The current status of the satellite activation. The options are:</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Initializing</td>
<td>The real-time correction decoder is initializing.</td>
</tr>
<tr>
<td>Receiving corrections</td>
<td>The decoder is providing corrections.</td>
</tr>
<tr>
<td>No recent data</td>
<td>Real-time correction data has not been received from the decoder in the last 10 seconds.</td>
</tr>
<tr>
<td>Decoder unavailable</td>
<td>The decoder is not available or is not operating correctly.</td>
</tr>
<tr>
<td>Decoder reset</td>
<td>A reset has been detected in the decoder.</td>
</tr>
<tr>
<td>Invalid link</td>
<td>The decoder is using a satellite link that is not valid for the subscription.</td>
</tr>
<tr>
<td>Invalid region</td>
<td>The decoder is being used in a region that is not covered by the current subscription.</td>
</tr>
<tr>
<td>Update required</td>
<td>The decoder requires an update from the master station before corrections can be provided.</td>
</tr>
<tr>
<td>No offshore</td>
<td>The decoder is being used in a marine area but the current subscription does not provide for offshore operation.</td>
</tr>
<tr>
<td><strong>Expiration</strong></td>
<td>The date on which the satellite differential service subscription expires, or the time remaining until the subscription expires.</td>
</tr>
<tr>
<td><strong>Diagnostic Information</strong></td>
<td>A heading used to group together fields that contain information for troubleshooting the satellite differential service.</td>
</tr>
<tr>
<td><strong>Quality figure</strong></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><strong>Decoder version</strong></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 152). Then tap the arrow on the Summary list button below the status bar, and from the drop-down list select SBAS.

Table 7.16  Integrated SBAS status screen: Fields

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Integrated SBAS</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>SNR</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>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>Satellites corrected</td>
<td><strong>Note</strong> – This field only appears if the connected GPS receiver is a GPS Pathfinder XB or XC receiver.</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 152). Then tap the arrow on the Summary list button below the status bar, and from the drop-down list select *RTK Radio*.

### Table 7.17  Integrated RTK Radio status screen: Fields

<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 166.

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

The Plan screen includes:
- Planning skyplot (see page 164)
- Message line (see page 165)
- DOP graph (see page 165)
- Buttons, see below

Table 7.18 Plan screen: Buttons

<table>
<thead>
<tr>
<th>Button</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Play</td>
<td>Tap <strong>Play</strong> to begin playback of a session, or to resume playback after pausing. When the session is playing, the button changes to the <strong>Pause</strong> button. Tap the <strong>Pause</strong> button to temporarily pause playback. At the end of playback, the button changes to the <strong>Home</strong> button. Tap the <strong>Home</strong> button to return to the beginning of the session, ready for playback again.</td>
</tr>
<tr>
<td>Now</td>
<td>Tap <strong>Now</strong> 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 165) 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 180).</td>
</tr>
</tbody>
</table>
Planning skyplot

The planning skyplot is similar to the skyplot shown in the Skyplot screen (see page 144). 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 144).

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 165).

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 7.19 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, an orbit trail plots where the satellite has been in this session. The trail is a solid line in the same color that is used to represent the satellite.</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](image)

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 164) 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 180) 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 165) 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.

Tip – By using the trajectories from the Show Orbits list, it is possible to see any areas in the sky that may not have satellites during the work period. You can use this information to better orient the receiver so that observable satellites are not blocked by objects or your own body.
Sensor


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

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 7.21 Sensor screen: 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 206).</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>
<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 7.23 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>
Setup Section

In this chapter:

- Setup screen
- Configuration files
- Logging Settings form
- GPS Settings
- Real-time Settings form
- Coordinate System
- Units
- External Sensors

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 form, page 176
- GPS Settings, page 180
- Real-time Settings form, page 188
- Coordinate System, page 202
- Units, page 204
- External Sensors, page 205

Table 8.24 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 8.26).</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 8.26).</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 175). 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 176). 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 176).</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 180).</td>
</tr>
<tr>
<td>Real-time Settings</td>
<td>Opens the Real-time Settings form (see page 188).</td>
</tr>
<tr>
<td>Coordinate System</td>
<td>Opens the Coordinate System form (see page 202).</td>
</tr>
<tr>
<td>Units</td>
<td>Opens the Units form (see page 204).</td>
</tr>
<tr>
<td>External Sensors</td>
<td>Opens the External Sensors form (see page 205).</td>
</tr>
</tbody>
</table>
Configuration files

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 175) 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 176), 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 173) 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 8.27 Choose Configuration form: Buttons

<table>
<thead>
<tr>
<th>Button</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Load</td>
<td>Loads the settings in the selected configuration file.</td>
</tr>
<tr>
<td>Cancel</td>
<td>Returns to the Setup screen without changing the current configuration.</td>
</tr>
</tbody>
</table>

Table 8.28 Choose Configuration form: Fields

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>List of files</td>
<td>A list of all of the configuration files loaded in the TerraSync software. To load a configuration file, select it from this list and then tap <strong>Load</strong>.</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 253.

Table 8.29 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 form

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 8.30 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.</td>
</tr>
</tbody>
</table>
Log H-Star Data

- 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 178).

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.

Waypoint Filename Prefix

- W: The prefix to be included at the beginning of the default name of each new waypoint file. The prefix may be any alphanumeric string between 1 and 30 characters long.

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 8.30 Logging Settings form: Fields (continued)

<table>
<thead>
<tr>
<th>Field</th>
<th>Default</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interval</td>
<td>Off</td>
<td>The logging interval for the between feature positions: If you selected Distance from the Style list, enter the number of meters between logging positions, or select an existing value from the list. If you selected Time from the Style list, enter the number of seconds between logging positions, or select an existing value from the list. Select Off to turn off between feature logging.</td>
</tr>
<tr>
<td>Style</td>
<td>Time</td>
<td>This field only appears if a data file is open. It is repeated for each feature type in the file. The method of measurement for the specified feature type. The options are as for Style above. <strong>Note – If the feature is a point feature, this field is set to Time and cannot be changed.</strong></td>
</tr>
<tr>
<td>Interval</td>
<td>Off</td>
<td>This field only appears if a data file is open. It is repeated for each feature type in the file. The logging interval for the specified feature type. The options are as for Interval above.</td>
</tr>
<tr>
<td>Accuracy</td>
<td>Code</td>
<td>This field only appears if a data file is open. It is repeated for each feature type in the file. Specifies whether to log the usual code phase data from the GPS receiver, or to log more detailed but more accurate carrier phase data.</td>
</tr>
</tbody>
</table>

**Antenna Settings form**

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 176).
Table 8.31  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 73) 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 73) 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. 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 it is the receiver can only connect to an internal antenna, this field automatically shows the correct part number. 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 144), or at the bottom of the Satellite Information screen (see page 149).

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 8.34 on page 182.

**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 8.32:

<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 8.33:

<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 8.34  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 182).</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 182).</td>
</tr>
<tr>
<td></td>
<td></td>
<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>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Note</strong> – When using a GPS Pathfinder XB or XC receiver, the DOP Type is set to PDOP.</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. A low PDOP value indicates that the visible satellites are widely separated in the sky, which gives better position information. When the PDOP value rises above the maximum value, the GPS receiver stops logging GPS positions. Specify a lower maximum PDOP to collect fewer, more precise positions. Specify a higher maximum PDOP to collect more, less precise positions.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Note</strong> – When using a GPS Pathfinder XB or XC receiver, the Max PDOP is set to 99.</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. Use a maximum HDOP value when vertical precision is not particularly important, and productivity would be decreased by excluding positions with a high vertical component in the PDOP value (for example, if you are collecting data under canopy). This field does not appear in Slider mode. In Slider mode, you can only change the maximum PDOP. To set a maximum HDOP, use Custom mode.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Note</strong> – 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>
</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.
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 8.34 GPS Settings form: Fields (continued)

<table>
<thead>
<tr>
<th>Field</th>
<th>Default</th>
<th>Description</th>
</tr>
</thead>
</table>
| Receiver Power Output  | Auto    | *Note – Enabling power output can damage some field computers. Trimble recommends that you always select the Auto option unless you require power to another external device and have protected the field computer from power that is supplied by the GPS receiver.* 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:
- **Auto** Corresponds to the On option for a survey receiver; corresponds to Off for all supported Mapping and GIS receivers.
- **On** Enable power output (Pro XRS receivers only).
- **Off** Disable power output. |
| NMEA Output            | Off     | 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 185). *Note – The TerraSync software does not support NMEA output from Recon GPS CF Card or GPS Pathfinder XB and XC receivers.* |
| RTK Precisions         | 5 cm, 5 cm, 10 cm, 15 cm | 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 187). |
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 184), 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 184).
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 8.35  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>
<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:
– External Source Settings form, page 192
– Integrated Beacon Settings form, page 199
– Integrated Satellite Settings form, page 199
– Integrated SBAS Settings form, page 200
– RTK Radio Settings form, page 201

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

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 8.37 on page 190.

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 8.37 summarizes the valid combinations of real-time correction sources.

Table 8.37  Real-time Settings form: Valid real-time correction choices

<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>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 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>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></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>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></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>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>
<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 8.38 describes the fields available in the *Real-time Settings* form.

### Table 8.38  Real-time Settings form: Fields

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

*Choice 2*  Use Uncorrected GPS  
This field does not appear if you selected Use Uncorrected GPS in the Choice 1 field.  
The source of real-time corrections to use when the first choice is not available.  
The options are as for the Choice 1 field except that External Source is not available, and the following additional option is available:  
• Wait for Real-time  
  Suspend logging until a real-time correction source becomes available. |

*Choice 3*  Use Uncorrected GPS  
This field does not appear if you selected Use Uncorrected GPS in the Choice 2 field.  
The source of real-time corrections to use when the first and second choices are not available. The options are:  
• Use Uncorrected GPS  
• Wait for Real-time  
• Integrated SBAS |

*Choice 4*  Use Uncorrected GPS  
This field does not appear if you selected Use Uncorrected GPS in the Choice 3 field.  
The source of real-time corrections to use when none of the other preferred real-time correction sources are available. The options are:  
• Use Uncorrected GPS  
• Wait for Real-time
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 232.

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.

You can connect the application to an external real-time correction source using a variety of connection methods.

VRS and single base stations deliver real-time corrections using the same methods (Internet, direct dial, or serial port connections). For example, you can use a broadcast (NTRIP) server to relay single base corrections over the Internet in the same way that a VRS relays corrections using a VRS server. In addition, you can also connect to a single base station using a receiver port connection.
Table 8.39 indicates which connection method to use when connecting to an external real-time differential correction source.

Table 8.39  External DGPS source connection methods

<table>
<thead>
<tr>
<th>Use a...</th>
<th>if you have all of the following:</th>
</tr>
</thead>
</table>
| Internet connection      | • an Internet connection, for example using a cellphone or a wireless LAN (Local Area Network)  
                          | • access to a base station or VRS server that outputs RTCM correction messages to the Internet |
| Direct dial connection   | • a cellphone and modem, or a cellular modem  
                          | • direct dial access to a base station or VRS server |
| serial port connection   | • an external device that receives RTCM messages, for example a GeoBeacon receiver or a data radio  
                          | • access to a single base station or VRS server that outputs RTCM messages |
| receiver port connection | • a Trimble GPS receiver that does not support a serial port connection  
                          | • access to a single base station that outputs RTCM, CMR™, or CMR+™ correction messages  
                          | • an external device that receives RTCM, CMR, or CMR+ correction messages |

Table 8.40 describes the fields in the External Source Settings form.

Table 8.40  External Source Settings form: Fields

<table>
<thead>
<tr>
<th>Field</th>
<th>Default</th>
<th>Description</th>
</tr>
</thead>
</table>
| Type                         | Single Base | The type of source. The options are:  
                          |         |    • Single Base Corrections are sent by a single base station.  
                          |         |    • VRS Corrections are sent by a virtual reference station (VRS) server, which uses corrections from several base stations to compute corrections for a virtual base station at your location. |
| Connection Method            | Serial Port | How TerraSync connects to the external correction source. The options are:  
                          |         |    • 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. |
|                              |         |    • Direct Dial The TerraSync software communicates with a VRS server using a dial-up modem connection. |
|                              |         |    • Serial Port RTCM corrections are received by a data radio, such as an external beacon receiver or TRIMTALK™ radio, connected to a serial port on the field computer. |
|                              |         |    • Receiver Port Corrections are received by a data radio that is connected to the GPS receiver. This option is only available if the Type field 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 195) appears. |
### Table 8.40  External Source Settings form: Fields (continued)

<table>
<thead>
<tr>
<th>Field</th>
<th>Default</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Address</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>Port</td>
<td>COM1</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>(Serial Port)</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 195), and configure the serial port settings.</td>
</tr>
<tr>
<td></td>
<td>or 80</td>
<td>• Internet: specifies the port on the VRS server to connect to.</td>
</tr>
<tr>
<td>Modem Type</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>
<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 197) 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>
<tr>
<td>Connection</td>
<td>Auto</td>
<td>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:</td>
</tr>
<tr>
<td>Control</td>
<td></td>
<td>• Auto: The TerraSync software automatically establishes a connection when it is needed, and re-connects if an existing connection is lost.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• 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 171).</td>
</tr>
</tbody>
</table>
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 192), 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 75).

### Table 8.41 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>
</tbody>
</table>
Table 8.41  Receiver Port Settings form: Fields (continued)

<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>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>
<tr>
<td>Parity</td>
<td>None</td>
<td>This field is read-only unless you select Custom in the Port Configuration field. The parity setting used when the GPS receiver and external source communicate. Select an option from the drop-down list.</td>
</tr>
</tbody>
</table>

**Serial Port Settings form**

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 192).
**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 8.42 Serial Port Settings form: Fields**

<table>
<thead>
<tr>
<th>Field</th>
<th>Default</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Port</td>
<td>Custom</td>
<td>The communication settings for the port. There is an option for each communication 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>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>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>
<tr>
<td>Parity</td>
<td>None</td>
<td>This field is read-only unless you select Custom in the Port Configuration field. The parity setting used when the GPS receiver and external source communicate. Select an option from the drop-down list.</td>
</tr>
</tbody>
</table>

**Select Server form**

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 192):

- 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 8.43  Select Server form: Fields

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Server</td>
<td>The identification code of the VRS server.</td>
</tr>
<tr>
<td>Name</td>
<td>A description of the VRS server.</td>
</tr>
<tr>
<td>Country</td>
<td>The three-letter code for the country where the VRS server is located.</td>
</tr>
<tr>
<td>Carrier</td>
<td>This field specifies whether the VRS data stream includes carrier phase data.</td>
</tr>
<tr>
<td>Format</td>
<td>The format of the data stream, such as RTCM, raw data, or CMR.</td>
</tr>
<tr>
<td></td>
<td><strong>Note</strong> – Currently, TerraSync does not support VRS data in CMR format.</td>
</tr>
<tr>
<td>Details</td>
<td>Details of the message format, such as the RTCM message types generated.</td>
</tr>
<tr>
<td>Network</td>
<td>The network or VRS service provider.</td>
</tr>
<tr>
<td>Generator</td>
<td>The hardware or software used to generate the data stream.</td>
</tr>
<tr>
<td>Solution</td>
<td>This field specifies whether the data stream is generated from a single base station (Single Base) or a network of base stations (Network Solution).</td>
</tr>
<tr>
<td>Fee</td>
<td>This field specifies whether there is a charge for use of the correction data.</td>
</tr>
<tr>
<td>Rate</td>
<td>The bit rate of the data stream, in bits per second.</td>
</tr>
<tr>
<td>Misc</td>
<td>Miscellaneous notes about the VRS server.</td>
</tr>
</tbody>
</table>
**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>
<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 <em>Frequency</em> field.</td>
</tr>
<tr>
<td>Frequency</td>
<td>283.5 kHz</td>
<td>The frequency used when you select Manual in the <em>Mode</em> 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.
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.

<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 Name field.</td>
</tr>
<tr>
<td>Data Rate</td>
<td>600</td>
<td>The data rate used when you select Custom in the Name field. Select an option from the drop-down list.</td>
</tr>
</tbody>
</table>
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 192) to configure communication between the external data radio and the receiver.

### Table 8.46 Integrated SBAS Settings form: Fields

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tracking Mode</td>
<td>Specify the tracking mode. The options are:</td>
</tr>
<tr>
<td></td>
<td>• Auto The receiver tracks or locks on to the most powerful satellite signal. The receiver uses its longitude to determine which SBAS system to track:</td>
</tr>
<tr>
<td></td>
<td>• Wide Area Augmentation System (WAAS) satellites between 40° W and 180° W</td>
</tr>
<tr>
<td></td>
<td>• European Geostationary Navigation Overlay Service (EGNOS) satellites between 30° W and 60° E</td>
</tr>
<tr>
<td></td>
<td>• MTSAT Satellite-based Augmentation System (MSAS) satellites between 120° E and 165° E</td>
</tr>
<tr>
<td></td>
<td>• Custom If you are using a GeoExplorer 2005 series handheld or a GPS Pathfinder Pro series (ProXH or ProXT) receiver, you can select the Custom option to specify the satellites you want the receiver to track or to ignore.</td>
</tr>
<tr>
<td>State</td>
<td>In custom mode, select specific SBAS satellites and then select the following options:</td>
</tr>
<tr>
<td></td>
<td>• Disabled The satellite is disabled.</td>
</tr>
<tr>
<td></td>
<td>• Enabled, Heed Health The real-time source is only used if the information is flagged as healthy by the SBAS provider.</td>
</tr>
<tr>
<td></td>
<td>• Enabled, Override Health The real-time information is used irrespective of the health flag in the signal. An unhealthy signal will still be tracked and used.</td>
</tr>
</tbody>
</table>

**RTK Radio Settings form**

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 192) 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 8.48 Coordinate System form: Fields

<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></td>
<td>• Coordinate system and zone A coordinate system and a zone within that system.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Site A named site. Each site is associated with a coordinate system and zone that you cannot change.</td>
</tr>
<tr>
<td>Site</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>
<tr>
<td>Field</td>
<td>Default</td>
<td>Description</td>
</tr>
<tr>
<td>-----------------------</td>
<td>---------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<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>Note – 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 204).</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>
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 8.49  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. <strong>Note</strong> – 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 203).</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 <strong>magnetic declination</strong>, 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>
<thead>
<tr>
<th>Table 8.50</th>
<th>External Sensors form: Buttons</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Button</strong></td>
<td><strong>Description</strong></td>
</tr>
<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>
<thead>
<tr>
<th>Table 8.51</th>
<th>External Sensors form: Fields</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Field</strong></td>
<td><strong>Default</strong></td>
</tr>
<tr>
<td>Check box</td>
<td>(cleared)</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.

### Table 8.52 Sensor Properties: Fields

<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. The options are 7 or 8.</td>
</tr>
<tr>
<td></td>
<td>(external sensor)</td>
<td>or 4800 (laser)</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>
### Max Bytes
- **Limits the length of each message to a specific number of bytes.** This value includes the prefix and suffix strings, if they are defined. You cannot enter a value in this field that is less than the combined length of the prefix and suffix strings.
- If you do not want to specify a maximum number of bytes, leave this field blank. **Do not enter 0.**
- The maximum value for the Max Bytes field is 242. This is the maximum length for UNINTERPRETED_SENSOR_DATA SSF records.

### Time Out
- **0.10s**
- 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.

### Receive Mode
- **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 80) 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 208.

### 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 80) 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.
**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>
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<td>\08</td>
<td>bs</td>
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<td>\09</td>
<td>tab</td>
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<td>\0a</td>
<td>lf</td>
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<tr>
<td>\0b</td>
<td>vt</td>
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<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>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Code</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<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>

**Note** – You can store sensor data in a text or numeric attribute. However, if you use a numeric attribute, any data that cannot be interpreted as a number or that is not in the 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.
Advanced Data Collection

In this chapter:

- Advanced datalogging options
- High-accuracy data collection
- Using corrections from a VRS system
- Setting up a base station
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 79) 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 79) 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 176) 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.

You can continue any line or area feature, not just the last one collected, provided you have not used the Continue option for any other features since collecting that line or area feature.

Once you continue a feature, you cannot continue any line or area features collected between the two segments of that feature. These features are now nested within the continued feature. Any features you collected before the continued feature are also unavailable for continuation.

New features that you collect after the continued segment will be available for continuation, because you have not continued any other feature since they were collected. If you replace the positions of an existing feature with new GPS or digitized positions, the Continue option treats the feature as a new feature, so it can be continued.

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

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**.

**Nesting point features**

The Nest option enables you to collect point features at the same time as you collect a line or area feature, without having to first end and then continue the line or area feature you are collecting.

**Note** – Only point features can be nested. To collect a line or area feature while you are collecting another, you must use the Continue option. For more information, see **Continuing line and area features, page 211**.

To nest a point feature:

1. Start logging the line or area feature.
2. Tap **Pause** to pause logging.
3. Tap **Options**. From the option list, select **Nest** and from the pullout list select the type of point feature you want to collect. The attribute entry form appears and if **Log Now** is selected logging starts. Alternatively, tap **Log** to start logging.
4. When you have recorded attributes for the feature and logged sufficient GPS positions, tap **OK** to close the point feature.
5. The attribute entry form for the line or area feature you were logging reappears. Tap **Resume** to continue logging.

**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.

![Diagram showing offset point feature](image)

**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 214.

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.

![Diagram showing line and area features with offsets](image)

**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 220.
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 219.
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 217)
- Triple distance offset (see page 217)
- Bearing-bearing offset (see page 218)
- Triple bearing offset (see page 218)

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 215.

**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 219.
   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.

**Triple bearing offset**

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

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

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

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

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

Before storing an offset from a laser rangefinder, the TerraSync software subtracts the antenna height from the measurement (see page 177). 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 205.

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 205.

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 219.
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 79), 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 82), 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 272) 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 82), 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 85).
• 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 210.

**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 270) 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** using a receiver that has H-Star™ technology. These receivers are the GPS Pathfinder ProXH receiver and the GeoExplorer GeoXH handheld.

• You can log **postprocessable carrier phase data** using a GPS receiver that logs carrier phase data. These receivers are:
  – GPS Pathfinder Pro XR receiver
  – GPS Pathfinder Pro XRS receiver
  – GPS Pathfinder ProXT receiver
  – GPS Pathfinder Pocket receiver
  – GeoExplorer GeoXT handheld

• You can use a survey receiver to receive **real-time kinematic (RTK) measurements** from an RTK base station. For more information, see Real-time kinematic (RTK) data collection, page 229.

**H-Star versus carrier phase data logging**

Collecting H-Star data and carrier phase data are similar in the following ways:

• both types of data produce high-accuracy results

• good satellite signals are required
you must achieve lock before collected positions will have the required accuracy
as long as lock is maintained, subsequent positions achieve high accuracy with minimal occupation times

However, there are also important differences between H-Star and carrier phase data logging:

- H-Star data logging is based on a decreasing Predicted Postprocessed Accuracy (PPA) indicator, but carrier phase logging is based on an increasing lock time.
- H-Star data logging reaches subfoot accuracy within two minutes of acquiring lock, but the accuracy achieved with carrier phase logging depends on the elapsed time since lock was acquired. For more information, see Improved accuracy, page 223.

H-Star technology enables you to collect high-accuracy subfoot data quickly. However, you can achieve higher accuracy by collecting carrier data with a receiver that has H-Star technology (a ProXH or GeoXH) and then postprocessing it as standard carrier data instead of H-Star data, providing the data meets carrier data collection requirements. For example, if you have maintained carrier lock for 45 minutes with a ProXH receiver, you can achieve the same centimeter-level accuracy after postprocessing as you would with 45 minutes of carrier data from a ProXT receiver. When used as a carrier-capable receiver, a receiver that has H-Star technology has the same capabilities and limitations as the corresponding carrier-capable receiver (for example, a ProXH will perform like a ProXT, and a GeoXH will perform like a GeoXT).

**Improved accuracy**

During conventional GPS data collection, the GPS Pathfinder Tools SDK application logs independent GPS positions. If enough satellites are visible and the PDOP is low, it continues to log reliable positions.

During GPS data collection where the GPS Pathfinder Tools SDK application logs data using a receiver with H-Star technology, the application's Predicted Postprocessed Accuracy (PPA) indicator shows the accuracy likely to be achieved once the H-Star data is postprocessed. H-Star processing is designed to reach subfoot accuracy with no more than two minutes of continuous data. If lock on satellites is maintained, subsequent positions need only minimal occupation times.

H-Star processing corrects the collected GPS data using data from a group of base stations. The collected GPS positions are corrected using data from each base station in the group, and then the results are averaged to produce a single corrected position for each original position. The averaging calculation gives more weight to base stations that are closer to where the original GPS positions were collected and cancels out bias errors, so the positions generated during H-Star postprocessing are more accurate than positions corrected against a single base station.

By logging H-Star data, you can achieve accuracies of 30 centimeters (1 ft) or better after H-Star processing. Static GPS positions (collected when the receiver is stationary) logged using an external dual-frequency (L1/L2) antenna can achieve accuracy of 20 cm (8 in) or better after H-Star processing.
Note – Accuracy estimates for dynamic/streaming GPS positions may be larger than 20 cm (dual-frequency) or 30 cm (single frequency).

During GPS data collection where the GPS Pathfinder Tools SDK application logs carrier phase data, measurements are collected from each individual satellite. Carrier phase processing corrects the collected GPS positions using the data from individual satellites, so the positions generated during postprocessing are more accurate than positions logged in the field.

By logging carrier phase data, you can achieve accuracies of better than 50 cm after carrier phase postprocessing. The following table is a general guide to accuracies that can be obtained with carrier phase data collection.

<table>
<thead>
<tr>
<th>Time since acquiring lock</th>
<th>Accuracy</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 minutes</td>
<td>30cm +5ppm</td>
</tr>
<tr>
<td>10 minutes</td>
<td>20cm +5ppm</td>
</tr>
<tr>
<td>20 minutes</td>
<td>10cm +5ppm</td>
</tr>
<tr>
<td>45 minutes</td>
<td>1cm +5ppm</td>
</tr>
</tbody>
</table>

The relationship between time and accuracy

The accuracy of positions generated during postprocessing depends on a combination of the number of satellites used, the distance between the base station and the roving receiver, and the length of time for which data is recorded from those satellites. When collecting H-Star data, the PPA indicates when enough time has elapsed to provide the level of accuracy shown. Collecting data for longer generally gives more accurate positions. To achieve accuracies of 50 cm or better when logging carrier phase data, 5 minutes of continuous carrier phase data is required.
Assuming that enough satellites are available, Figure 9.1 shows the relationship between the time taken to collect high-accuracy data and the accuracy of the positions generated during postprocessing.

**Collecting sufficient high-accuracy data**

Certain criteria must be met in order to achieve the levels of accuracy described above. This section describes what you need to do when collecting data to achieve high accuracy features.

**Planning**

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.

**Number of satellites**

To provide sufficient data to achieve the required accuracy, make sure that you maintain lock on the minimum number of satellites. When logging static GPS positions (that is, when the GPS receiver is stationary, as when you log a point feature), you must maintain lock on at least four satellites. When logging dynamic or streaming GPS positions (that is, when the GPS receiver is moving, as when you log a line or area feature), you must maintain lock on at least five satellites.

When collecting **H-Star data**, you must also maintain a PDOP of 6 or less.

‘Loss of lock’ occurs when the number of available satellites drops below four when logging static GPS positions, or below five when logging streaming GPS positions. Loss of lock can also occur during H-Star data collection if the PDOP rises above 6. If you minimize the number of times that loss of lock occurs during the session, you greatly increase the accuracy of the postprocessed results.

**Ensuring accuracy when collecting H-Star data**

As you log a feature using H-Star technology, the **Predicted Postprocessed Accuracy** (PPA) value for the feature is displayed in the status bar. The PPA is a prediction of the accuracy that could be achieved after H-Star processing, and it applies to all positions logged since you acquired lock on the required number of satellites. The PPA has a 68% confidence level, which means that 68% of the time the postprocessed position will be within the PPA value shown when the position was collected.

The value of the PPA is inversely related to the length of time that you have continuously collected H-Star data. The longer the duration of lock, the better the accuracy, which is indicated by a decreasing PPA value. All positions achieve the same level of accuracy for the duration that lock was maintained.

When the PPA value reaches the accuracy you require for the feature, you can stop logging.
**Note** – *The TerraSync software does not prevent you from closing a feature before the required accuracy is achieved, or before the lock period is complete.*

For example, to collect a point feature with an estimated accuracy of 20 cm, you must maintain lock on at least 4 satellites with a PDOP of 6 or less until the PPA indicator shows 20 cm. Providing features collected during the session were logged while lock was maintained on the required number of satellites, with a PDOP of 6 or less, and you postprocess against three or more good quality base stations within 200 km, differentially correcting the GPS data using H-Star processing results in features that have accuracy values equal to the PPA indicated when they were collected.

**Note** – *If you lose lock while collecting a feature, the PPA value increases, and you must reacquire satellites and remain at the feature until the PPA value decreases to the required accuracy.*

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** – *Do not move to another feature before the required PPA value is reached unless you are unlikely to lose lock on the required number of satellites. If you lose lock while collecting a series of features, you will need to re-collect all of the features to obtain features with the required accuracy.*

---

**Collecting useful 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. As soon as four or more satellites are available, a **counter** starts. When enough time has elapsed for the GPS positions to obtain the accuracy you require (see Table 9.53, page 224), all of the carrier phase data recorded during that period can be used during postprocessing.

Useful data is not stored as one continuous stream, 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. If you lose lock, disconnect the GPS receiver, or close the SSF file, the block ends. The data collected until then may not provide the required accuracy during postprocessing. If you are still connected to the receiver the counter is automatically reset to zero. If lock is regained, a new block begins and the counter restarts.

The TerraSync software continues to create blocks of data throughout the file. These blocks together constitute the measurement data for the entire session.
Figure 9.2 shows how the TerraSync software creates distinct blocks of carrier phase data for static GPS observations as the number of satellites changes.

In the figure above, the counter begins at time zero and stops at 35 minutes when lock is lost (B). This creates the first block of carrier phase data. This first block contains sufficient useful data. It should produce positions that meet the accuracy you require.

Between B and C, the required minimum number of satellites is not met. The counter does not start, and the carrier phase data collected during this period is not used.

When four satellites are again available (C), the TerraSync software creates a new block and the counter begins to measure again from time zero. In this example, this happens 38 minutes after the start of the session. Lock is lost at 55 minutes (D)—after 17 minutes worth of data has been collected. This block contains sufficient useful data.

**Figure 9.2** Blocks of carrier phase data for static GPS observations, relative to satellite lock

<table>
<thead>
<tr>
<th>Time in minutes</th>
<th>Number of SVs</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>8</td>
</tr>
<tr>
<td>10</td>
<td>7</td>
</tr>
<tr>
<td>15</td>
<td>6</td>
</tr>
<tr>
<td>20</td>
<td>5</td>
</tr>
<tr>
<td>25</td>
<td>4</td>
</tr>
<tr>
<td>30</td>
<td>3</td>
</tr>
<tr>
<td>35</td>
<td>2</td>
</tr>
<tr>
<td>40</td>
<td>1</td>
</tr>
<tr>
<td>45</td>
<td></td>
</tr>
<tr>
<td>50</td>
<td></td>
</tr>
<tr>
<td>55</td>
<td></td>
</tr>
</tbody>
</table>

A = 4 or more satellites – useful carrier phase data
B = lock is lost – unusable carrier phase data
C = lock is regained (4 or more satellites) – useful carrier phase data
D = lock is again lost – unusable carrier phase data
When you start a new feature that is set to carrier accuracy, the carrier logging icon appears in the Status bar, and the satellite icon shows the carrier time.

**Note –** When you open an existing file with carrier features, the TerraSync software does not automatically log background carrier data. Carrier logging only begins when you start logging positions to the file. These may be not-in-feature positions, position records for a new feature, or updated positions for an existing feature.

The carrier time is 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.

**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.

**Note –** If your GPS receiver is not H-Star capable, the Auto setting corresponds to No. Select No if you have a GPS receiver that is H-Star capable but you do not want to log H-Star data.

4. Tap OK to close this form and confirm the changes you have made.
Configuring feature types to use carrier phase data

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 103).

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.

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 239.*

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 232.
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 232). 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.
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 roving receivers with corrections that are more accurate than corrections from a single base station.

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 roving receiver’s position. It then sends interpolated RTCM correction messages back to the roving receiver.

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 roving receiver.

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 roving receiver.

Unlike other real-time DGPS correction sources, using corrections from a VRS requires two-way communication between the VRS server and the roving receiver. The roving receiver must send its position to the server, so that the server can calculate corrections for that position, and select the closest base station if necessary. Because the VRS server generates a unique virtual reference station for each roving receiver, it must send separate corrections to each roving receiver.

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**

The two-way connection between the roving receiver and the VRS server can be achieved using one of the following methods:

- Internet connection method (see below)
- Direct dial connection method (see page 236)
- Serial port connection method (see page 238)

**Internet connection method**

You can use an existing Internet connection on the field computer to connect to a single base station or a VRS server.

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.
Access to the VRS server may be controlled using a **broadcast server**, for example a computer running Networked Transport of RTCM via Internet Protocol (NTRIP) software. A broadcast server manages authentication and password control for a base station or VRS servers and allows you to select the type of corrections you want to receive. The broadcast server relays the corrections from the selected base station or VRS server to your application.

You can connect to the Internet in a number of ways, including:

- connecting over a phone or adaptor that has Bluetooth® wireless technology. For more information, refer to the manufacturer’s instructions for the Bluetooth-enabled device.
- connecting over a wireless LAN (an 802.11b connection).
- 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 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.

These components may be connected by cable, or by a wireless technology such as a Bluetooth or infrared wireless link.

**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.
3. Tap **Real-time Settings**. The *Real-time Settings* form appears.

4. In the *Choice 1* field, select External Source.

5. Configure the external source:
   a. Tap the Setup button beside the *Choice 1* field. The *External Source Settings* form 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.
   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 base station or VRS server directly. These devices may be connected to the field computer by cable, or using Bluetooth wireless technology. For more information about establishing a Bluetooth wireless link, refer to the manufacturer’s instructions for the Bluetooth-enabled device.

Unlike the Internet connection method, a direct dial connection is configured, established, and terminated from within the TerraSync software.

**Authentication**

If the call is authenticated using Caller ID, you will need to inform the VRS provider of the cellphone number that you are using. Otherwise, you may need to configure the modem to use a terminal window after dialling.

**Before you begin**

For a direct dial connection, you need the following information from the VRS provider:

- The dial-up telephone number of the VRS server
- Your VRS username and password, if the VRS provider requires you to enter these details when you connect to the server

**Configuration**

To configure the TerraSync software to establish a direct dial connection to a VRS source:

1. Install any software or drivers for the modem.
2. Start the TerraSync software and open the Setup section.
3. Tap **Real-time Settings**. The **Real-time Settings** form appears.

4. In the **Choice 1** field, select External Source.

5. Configure the external source:
   a. Tap the Setup button beside the **Choice 1** field. The **External Source Settings** form 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.

The hardware components may be connected by cable, or using Bluetooth wireless technology. You can connect two Bluetooth-enabled devices using a Bluetooth serial port profile, or you can use a Bluetooth-serial adaptor to connect any of these devices using a Bluetooth wireless link. For more information, refer to the manufacturer’s instructions for the Bluetooth-enabled device.

**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.

### 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 240).

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 241).
**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 72) and start a new base data file. Then step through the Base Station Setup wizard (see page 74).

**Generating real-time corrections**

The following receivers can output real-time corrections:

- GPS Pathfinder Pro XRS receiver
- All supported survey receivers

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

Survey receivers can output **DGPS** corrections in the RTCM correction messages message format. These corrections can be used by any rover that can use RTCM corrections from an external source, such as a GPS Pathfinder receiver or a GeoExplorer series handheld.

In addition to DGPS corrections in RTCM format, survey receivers can also output **RTK** corrections, in RTCM, **CMR**, or **CMR+** format. RTK corrections can only be used by RTK-capable rover systems, such as a survey receiver connected to a field computer running version 2.40 or later of the TerraSync software.

The correction types and message format that you choose depend on the capabilities of the roving receivers that will use the corrections.

**WARNING –** Enabling power output can damage some field devices. Trimble recommends that you always select the Auto option unless you require power to the data radio and have protected the field device from power supplied by the GPS receiver. See [Outputting power from the GPS receiver, page 184](#).
To output real-time corrections:

1. Open the New File screen (see page 72) and start a new base data file.
2. Step through the Base Station Setup wizard. In the Real-Time Output step (see page 75), 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 72) and start a new base data file.
3. Step through the Base Station Setup wizard. In the Real-Time Output step (see page 75), 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.
It is useful to have some understanding of coordinate systems and datums before collecting GPS data.

The GPS receiver computes positions in terms of the WGS-84 coordinate system and stores them as latitude, longitude and height above ellipsoid (LLH) values. However, you may want to work with positions in terms of a different coordinate system.

The TerraSync software transforms GPS positions from the WGS-84 coordinate system to the selected coordinate system. This lets you enter and display coordinates using the coordinate system that best suits you and the location you are working in.

This chapter introduces coordinate systems and related concepts, and describes how to configure the coordinate system using the TerraSync software.
Modelling the earth’s surface

Because it is difficult to represent the earth’s surface on a flat, rectangular map, mathematical formulas are used to project the earth’s surface onto maps. These mathematical formulas are called geoids and ellipsoids. Frameworks called datums and coordinate systems help to further define how the earth is projected onto a particular map.

Geoids and ellipsoids

A geoid is an imaginary three-dimensional surface representing mean sea level (MSL) if it was projected to extend through the continents. While we might assume that mean sea level remains constant over the surface of the globe, in fact it does not. Rather, mean sea level varies from place to place due to variations in local gravitational forces, which are in turn caused by local variations in the size, shape, and density of geological features. This means that, unlike an ellipsoid or datum, which has a symmetrical surface, the geoid undulates perpendicular to the force of gravity.

Using a geoid, we can describe a feature of the earth in terms of the earth’s actual terrain as well as by measuring gravity. For example, if we say that Mount Everest is 8848 meters above mean sea level, then the vertical location of the feature on the surface of the earth has been identified by measuring gravity and comparing to mean sea level gravity. Unfortunately, a geoid is an extremely complex surface, and is not always suitable for modelling the surface of the earth. However, over limited areas and depending on the accuracy required, a simple ellipsoidal model of the earth’s gravity fits quite well.

An ellipsoid is a three-dimensional surface shaped like a squashed sphere, which approximately models the shape of the earth.
An ellipsoid treats the earth as a smooth, featureless sphere, and approximates the shape of the earth at sea level without regard to land masses. The size and shape of the best fitted ellipsoid, as well as its location relative to the center of mass of the earth, differs from place to place. As a result, many local ellipsoids have been created to fit the geoid in different parts of the world.

Figure 10.5 provides a representation of these different models for the earth’s surface.

A datum transformation and a projection are then used to transform coordinates from this local ellipsoid to the flat-earth model used in maps and in the GIS.

**Coordinate systems and datums**

A *datum* specifies the ellipsoid used to represent the earth, and the point on the surface of the earth that is used as the origin of the datum. Various datums have been established that best suit particular regions. For example, maps in the United States
are often based on the North American Datum of 1927 or 1983 (NAD-27, NAD-83). The only global datum is WGS-84, which is based on the GRS-80 ellipsoid. All GPS coordinates are based on the WGS-84 datum surface.

A coordinate system is a three-dimensional reference frame used to describe the location of objects within a spatial reference system (a datum). There are two types of global coordinate systems:

- Angular coordinates (for example, Latitude and Longitude)
- Cartesian (rectangular) coordinates (for example, Universal Transverse Mercator)

In the Latitude and Longitude coordinate system, position coordinates are based on an angular distance from a known reference point (the Prime Meridian) located at Greenwich. Coordinates are expressed in degrees, minutes, and seconds. Angular coordinates are unprojected as they are perfectly suited to the spherical surface of the earth. Latitude and Longitude is the predominant coordinate system used for nautical and aeronautical navigation.

For most land-based GPS applications, and particularly for GIS data collection applications, latitudes and longitudes are much less convenient. Typically, a GIS represents the coordinates of geographic features in a locality of interest using a rectangular grid (running North and East), and presumes that the earth is locally flat. In a GIS, the spherical coordinates of latitude, longitude and height are translated into planar coordinates of northing, easting, and elevation. Coordinates are expressed in the unit of measurement defined for the coordinate system, for example meters.

Worldwide there are a number of standard grid coordinate systems defined. The US State Plane grids are an example of this kind of grid coordinate system.
Transforming and projecting collected GPS positions

Collected GPS positions are always stored in the SSF file using the WGS-84 datum. To send the positions to a GIS as North, East coordinates, the GPS latitudes and longitudes need to be processed in a number of ways. The remainder of this section describes the steps that are required to perform this processing.

First, the collected GPS positions must be transformed from latitudes, longitudes, and altitudes on the WGS-84 datum into latitudes, longitudes, and altitudes on the local datum. This operation is called a datum transformation.

Once the coordinates are expressed as latitudes and longitudes on the local datum, they must then be projected into North and East values on a flat grid, using an operation called a map projection.

Note – Data files are stored using the currently configured coordinate system. If you change coordinate systems, the coordinates of the current data file are recalculated, which may take some time.

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

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

Finally, if altitudes are to be stored by the GIS, they need to be transformed from heights above the GRS-80 ellipsoid to heights above some other reference level. The most common reference level is the geoid, more commonly referred to as mean sea level. The GPS Pathfinder Office software contains a geoid separation model which enables it to transform altitudes relative to GRS-80 into heights relative to mean sea level.

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

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

**Coordinate systems available in the TerraSync software**

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

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

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

**Using the Coordinate System Manager utility**

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

To use the Coordinate System Manager utility:

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

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

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 249*).
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 250).
- You can use the Coordinate System Manager utility to create a coordinate system export file that contains a number of coordinate systems, zones, datums and sites, and then transfer this file to the TerraSync software (see below).

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

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

Transferring a coordinate system export file

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

To transfer a coordinate system export file:

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

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

6. Click *Transfer*.

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

The selected coordinate system export file and any associated files are transferred to the field computer, replacing any coordinate systems stored in the TerraSync software.

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

### Transferring a single coordinate system

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

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

To transfer a coordinate system:

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

2. Select the *Send* tab.

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

4. 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 202*.
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.
CHAPTER 11

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 Windows Mobile-based device.</td>
<td>The 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 device out of the cradle and then replace it. Unplug the data cable of the 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 173), 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. Change the selected port in the Laser port field on the Logging Settings form (see page 176).</td>
</tr>
<tr>
<td></td>
<td>An ActiveSync technology partnership with another Windows Mobile-based device is interfering with connection to the device.</td>
<td>In ActiveSync technology, delete any partnerships with other Windows Mobile-based devices. Use a guest relationship, not a partnership.</td>
</tr>
<tr>
<td>Data transfer is slow.</td>
<td>The Windows Mobile-based 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 Windows Mobile-based device.</td>
<td>The 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>
### Field computer

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</td>
<td>The TerraSync software cannot connect to your ISP because it does not have your</td>
<td>In the settings for the e-mail service that you are using, specify the login details for</td>
</tr>
<tr>
<td>within the TerraSync software.</td>
<td>account login details.</td>
<td>connecting to your ISP.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Configure the e-mail service that you are using to download the entire message and any</td>
</tr>
<tr>
<td></td>
<td></td>
<td>attachments, not just the message header.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Use the Trimble Data Transfer utility to transfer files to or from the TerraSync software.</td>
</tr>
<tr>
<td>You cannot send or receive data files by e-mail from</td>
<td>The data files attached to e-mails are not being downloaded from the mail server.</td>
<td></td>
</tr>
<tr>
<td>within the TerraSync software.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The field computer does not support e-mail.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Problem</th>
<th>Possible cause</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>The field computer does not turn on, or turns off</td>
<td>The field computer’s batteries are dead.</td>
<td>Replace or recharge the field computer batteries.</td>
</tr>
<tr>
<td>immediately after being turned on.</td>
<td></td>
<td>Connect to an external power source.</td>
</tr>
<tr>
<td></td>
<td>Not enough memory on the Windows Mobile-based device is allocated to</td>
<td>Adjust the memory allocation. For more information, refer to the documentation for the</td>
</tr>
<tr>
<td>The message Not enough memory appears.</td>
<td>programs, because too much is allocated for storage.</td>
<td>device.</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 page 15.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A file attached to a filename field does not open or</td>
<td>The file has been recorded in a special file format that is used only on a</td>
<td>In the software that you use to record or create the file, change the settings to record</td>
</tr>
<tr>
<td>play on a desktop computer.</td>
<td>Windows Mobile-based device, or on a specific brand of Windows Mobile-based</td>
<td>files in a format that can be read on a desktop computer.</td>
</tr>
<tr>
<td></td>
<td>device. For example, there are a number of ways of encoding WAV (.wav) audio</td>
<td></td>
</tr>
<tr>
<td></td>
<td>files that are specific to one brand of device.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></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</td>
<td>Open the file in the TerraSync software. The software automatically repairs and rebuilds the</td>
</tr>
<tr>
<td></td>
<td>was logging data.</td>
<td>file.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Note</strong> – 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>
## 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>Connect to an external power source.</td>
<td></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 149) 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. <strong>Note – GPS does not work indoors.</strong></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 171), 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.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>In the GPS Settings form (see page 180), check that the minimum elevation value is not too high.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>In the GPS Settings form (see page 180), 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.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>In the GPS Settings form (see page 180), 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 188), 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 being used.</td>
<td>In the Real-time section (see page 152), check the status of your preferred correction source. If necessary, change the configuration in the <em>Real-time Settings</em> form (see page 188), or wait until this source is available again.</td>
</tr>
<tr>
<td></td>
<td>The correction source you expected is not set up as the preferred source.</td>
<td>In the <em>Real-time Settings</em> form (see page 188), select your preferred real-time correction source in the <em>Choice 1</em> field.</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 188), 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></td>
<td>You have set the mode or frequency incorrectly.</td>
<td>In the <em>Real-time Settings</em> form (see page 188), select appropriate options in the <em>Mode</em> and <em>Frequency</em> fields.</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 188), 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></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></td>
<td>You have entered the incorrect provider, satellite, and/or frequency.</td>
<td>In the <em>Real-time Settings</em> form (see page 188), select appropriate options in the <em>Service Provider</em>, <em>Name</em>, and <em>Frequency</em> fields.</td>
</tr>
<tr>
<td></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 199), 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>
### Troubleshooting

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>The real-time differential correction link does not appear to work.</td>
<td>The telemetry link has been incorrectly installed, powered, cabled or configured.</td>
<td>Install the telemetry link as specified by the supplier. Consult the supplier if necessary.</td>
</tr>
<tr>
<td>You have set the station ID incorrectly.</td>
<td>In the Real-time Settings form (see page 188), check that you have set the Station ID field correctly.</td>
<td></td>
</tr>
<tr>
<td>You have configured the real-time settings incorrectly.</td>
<td>In the Real-time Settings form (see page 188), check that the settings under the External Source heading match the telemetry link and the transmitted RTCM data stream.</td>
<td></td>
</tr>
<tr>
<td>You cannot update a feature, add new features, or open a data file.</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>The file is already open in the background of the Map section.</td>
<td></td>
<td>Set the map background file to None.</td>
</tr>
<tr>
<td>Position updates are not allowed.</td>
<td>Set the Allow Position Update field (see page 177) on the Logging Settings form to Yes or Confirm.</td>
<td></td>
</tr>
<tr>
<td>You cannot change settings or use some menu items.</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>You cannot unlock a configuration file.</td>
<td>You have forgotten the password for the configuration file.</td>
<td>Use the manager’s password, TrimbleTerraSync.</td>
</tr>
<tr>
<td>Automatically generated time attributes are incorrect.</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>File dates are incorrect.</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>

### 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>You cannot update a feature, add new features, or open a data file.</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>The file is already open in the background of the Map section.</td>
<td></td>
<td>Set the map background file to None.</td>
</tr>
<tr>
<td>Position updates are not allowed.</td>
<td>Set the Allow Position Update field (see page 177) on the Logging Settings form to Yes or Confirm.</td>
<td></td>
</tr>
<tr>
<td>You cannot change settings or use some menu items.</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>You cannot unlock a configuration file.</td>
<td>You have forgotten the password for the configuration file.</td>
<td>Use the manager’s password, TrimbleTerraSync.</td>
</tr>
<tr>
<td>Automatically generated time attributes are incorrect.</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>File dates are incorrect.</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>Problem</td>
<td>Possible cause</td>
<td>Solution</td>
</tr>
<tr>
<td>---------</td>
<td>---------------</td>
<td>----------</td>
</tr>
<tr>
<td>Some or all features are missing from the Update Features screen or the Map section.</td>
<td>There is no data file open.</td>
<td>Use the New File form to create a new file (see page 72), or the Existing File screen (see page 93) to open an existing file.</td>
</tr>
<tr>
<td></td>
<td>There are no features in the file to display.</td>
<td>Open the Collect Features screen to collect some features (see page 79).</td>
</tr>
<tr>
<td></td>
<td>The layer in the Map section that the features belong to has been turned off, or the group in the Data section that the features belong to has been hidden.</td>
<td>In the Map section, tap Layers and select Filtered Features, or Unfiltered Features, to display the appropriate layer (see page 55).</td>
</tr>
<tr>
<td></td>
<td>The background file in the Map 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 Background File form to check that the map is set to display this file (see page 56). Then tap Layers and make sure that the Background 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 Map screen.</td>
<td>Use the Pan map tool (see page 54) or the Pan button on the Command bar (see page 52) to pan the display to the appropriate area. Use the Zoom Extents mode (see page 53) or the Zoom Extents button on the Command bar (see page 52) 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 ( \text{Filter} ) is visible, open the Filter By form where you can disable or change the criteria for filters (see page 99).</td>
</tr>
<tr>
<td></td>
<td>The features have been deleted.</td>
<td>Deleted features are never shown in the Map section. In the Update Features screen (see page 94), highlight a deleted feature (a feature with a line through it), tap Options, and then select Undelete.</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 202).</td>
</tr>
<tr>
<td></td>
<td>You have selected the wrong coordinate units.</td>
<td>In the Coordinate System form, select the coordinate system, then select the correct coordinate units (see page 202).</td>
</tr>
<tr>
<td></td>
<td>You are using the Latitude/Longitude coordinate system and have selected the wrong datum.</td>
<td>In the System field on the Coordinate System form (see page 202), select Latitude/Longitude and specify the correct datum.</td>
</tr>
<tr>
<td></td>
<td>You are using the UTM coordinate system and have selected the wrong UTM zone or datum.</td>
<td>In the System field on the Coordinate System form (see page 202), 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></td>
<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>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></td>
<td>The required coordinate system files have been deleted from the field computer.</td>
<td>Transfer the files from the GPS Pathfinder Office software again.</td>
</tr>
<tr>
<td></td>
<td>To restore default coordinate systems, re-install the TerraSync software.</td>
<td></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.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>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 180), 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 180), 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:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Set the Velocity Filter field (see page 183) 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 188), and the last Choice field is set to Wait for Real-time, then only real-time positions are filtered.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• If you intend to postprocess the data, set the Log Velocity Data field (see page 176) 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>In the last Choice field on the Real-time Settings form (see page 188), select Wait for Real-time, to use differentially corrected positions only.</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. 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>
<td></td>
</tr>
</tbody>
</table>
This section explains some of the terms used in this manual.

almanac
An almanac is data transmitted by a GPS satellite, which includes orbit information on all the satellites, clock corrections, and atmospheric delay parameters. The almanac is stored on the field computer. It is used to facilitate rapid acquisition of GPS signals when you turn on the TerraSync software, or when you have lost track of satellites and are trying to regain GPS signals.

attribute
An attribute is information about a geographic feature in a GIS or database, usually stored in a table and linked to the feature by a unique identifier. Every identifiable feature has attributes. One common attribute of all mapped features is geographic position. Other attributes depend on the type of feature. For example, attributes of a road might include its name, surface type, and number of lanes. Each attribute has a range of possible values, called a domain. The value selected is called the attribute value.

attribute value
An attribute is the particular value for a feature, chosen from the domain of an attribute. For example, for a road feature, surface type is an attribute; bitumen, gravel, and concrete are domains; and gravel is an attribute value.

base station
Also called a reference station. A base station is a GPS antenna and receiver positioned on a known location specifically to collect data for differential correction. Base data needs to be collected at the same time as you collect data on a rover unit. A base station can be a permanent station that collects base data for provision to multiple users, or a rover unit that you locate on known coordinates for the duration of the datalogging session.

baud rate
A baud is a unit used to measure the speed of electronic code transmissions, generally one bit per second. The higher the baud rate, the faster the transfer of data. However, both the input and output device must be configured to the same baud rate for data to be successfully transferred.

bearing
A bearing is the direction from one point to another, usually measured clockwise from north. In the TerraSync software, the bearing indicates the direction from your current position to the target.

broadcast server
A broadcast server is an Internet server that manages authentication and password control for differential correction sources such as virtual reference station (VRS) networks, and relays corrections from the source that you select. An NTRIP server is an example of a broadcast server.

C/A code
See code phase.

carrier phase
Carrier phase is the time taken for the L1 or L2 carrier signal generated by the satellite to reach the GPS receiver. Measuring the number of carrier waves between the satellite and receiver is a very accurate method of calculating the distance between them.

Cartesian coordinates
The Cartesian coordinate system is a system of coordinates that defines the location of a point in space in terms of its perpendicular distance from each of a set of mutually perpendicular axes. The X direction is 0° latitude (the Greenwich meridian) and the Y direction is 90° east longitude.

centroid
The calculated center of an area feature.
CMR (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 correction messages, but is not supported by all non-Trimble receivers.

Coarse Acquisition code
(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.

code phase
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.

coordinate system
A set of transformations that allow GPS positions (in the WGS-84 ellipsoid) to be transformed to projection coordinates with elevations above the geoid. Essentially, a coordinate system consists of a datum transformation, a geoid model allocation, and a projection definition.

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.

For more information, see Modelling the earth's surface, page 244.

datum transformation
A datum transformation defines the method and parameters that are used to transform the coordinates of a point defined in one datum to coordinates in a different datum. Trimble software supports several methods of datum transformation including Seven-Parameter, Three-Parameter (also referred to as Molodensky), and grid-based transformations. Typically, you use datum transformations to convert data collected in terms of the WGS-84 datum using GPS methods onto datums used for mapping purposes in individual regions and countries.

decoration
See magnetic declination.

dGDS
See real-time differential GPS.
**Glossary**

**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. For more information, see **Modelling the earth's surface**, page 244.

**feature** A feature is a physical object or event that has a location in the real world, which you want to collect position and/or descriptive information (attributes) about. Features can be classified as points, lines, or areas. For example, a road sign is a point feature, a road is a line feature, and a park is an area feature.

Features are defined in a **data dictionary**.

**field computer** In the TerraSync software documentation, a field computer is any portable computer such as a handheld device, a laptop, or a Tablet PC running the TerraSync software. See also **Windows Mobile-based device**.

**geoid** A geoid is an imaginary three-dimensional surface representing **Mean Sea Level** (MSL) if it was projected to extend through the continents. Unlike an **ellipsoid** or **datum**, which have a symmetrical surface, the geoid undulates perpendicular to the force of gravity.

For more information, see **Modelling the earth's surface**, page 244.

**geoid height** (Also known as geoid separation and geoidal undulation.)

The geoid height is the distance of the geoid (MSL) above or below the reference ellipsoid.
A geoid model is a mathematical representation of the geoid for a specific area, or for the whole earth.

The great-circle distance is the shortest distance between two points on the surface of a sphere.

A guest connection lets a Windows Mobile-based device exchange and share information with a desktop computer. You need a guest connection or a partnership to transfer data between the TerraSync software on the device and the GPS Pathfinder Office software on the desktop computer.

When you connect as a guest, you can:

• move or copy files between the two computers
• back up files on the Windows Mobile-based device
• install or uninstall programs on the Windows Mobile-based 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 Windows Mobile-based device is disconnected from the desktop computer, any settings for the guest connection are lost. The next time you connect the device to the desktop computer, you must set the guest connection again.

For more information, refer to the ActiveSync Help.

See Height Above Ellipsoid.

See Horizontal Dilution of Precision.

The heading is the direction you are facing or traveling, usually measured clockwise from north.

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.

The line at which the earth and sky seem to meet.

Dilution of Precision 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.

Dilution of Precision 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).
### Glossary

**H-Star technology**

H-Star technology is a Trimble-patented technology allowing the collection of high accuracy GPS data. A GPS receiver that has H-Star technology logs L1 data or, if used with an external dual-frequency antenna, logs **L1** and **L2** data. H-Star postprocessing uses base data from multiple base stations to obtain better postprocessed accuracy for the collected data.

**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**

Ionospheric noise is the effect that the ionosphere has on GPS signals. The ionosphere is the band of charged particles 100 to 200 kilometers (60 to 125 miles approximately) above the surface of the earth.

**ITRF**

See [International Terrestrial Reference Frame](#).

**L1**

The primary L-band carrier used by GPS satellites to transmit satellite data. The frequency is 1575.42 MHz. It is modulated by C/A code, P-code, or Y-code, and a 50bps navigation message.

**L2**

The secondary L-band carrier used by GPS satellites to transmit satellite data. The frequency is 1227.6 MHz. It is modulated by P-code or Y-code, and a 50bps navigation message.

**Laser rangefinder**

An instrument that uses a laser beam to accurately measure the distance to a target. Some rangefinders also measure the **bearing** to the target. Use a laser rangefinder to measure offsets when you are unable to record positions at the exact location of the feature.

**Latitude**

Latitude is an angular measurement made from the center of the earth to north or south of the equator. It comprises the north/south component of the latitude/longitude coordinate system, which is used in GPS data collection. Traditionally, north is considered positive, and south is considered negative.

**Local datum**

The datum chosen for use in a particular region. Positions on a local datum are commonly called local geodetic coordinates. Coordinates are traditionally given in terms of the local datum. When you survey using the satellite-based Global Positioning System (GPS), however, the coordinates you collect are based on the World Geodetic System 1984. These coordinates are given in terms of the WGS-84 datum. Before you can use WGS-84 coordinates with coordinates measured in terms of the local datum, you must perform a datum transformation.

**Local ellipsoid**

The ellipsoid specified by a coordinate system. The WGS-84 coordinates are first transformed onto this ellipsoid, then converted to grid coordinates.

**Lock**

To track sufficient satellites for logging carrier phase or H-Star data. 'Loss of lock' occurs when the number of available satellites drops below four when logging a **static GPS position**, or below five when logging a **streaming GPS position**. Loss of lock can also occur during H-Star data collection if the PDOP rises above 6.
longitude  Longitude is an angular measurement made from the center of the earth to the east or west of the Greenwich meridian (London, England). It comprises the east/west component of the latitude/longitude coordinate system, which is used in GPS data collection. Traditionally, east is considered positive, and west is considered negative.

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

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

Mean Sea Level  (MSL) Mean Sea Level is a method of altitude reference. Altitudes expressed in relation to MSL actually give a height above the geoid.

It is important to use the same geoid when comparing altitudes in MSL.

MSAS  (MTSAT Satellite-Based Augmentation System) MSAS is a satellite-based augmentation system (SBAS) that provides a free-to-air differential correction service for GPS. MSAS is the Japanese equivalent of WAAS, which is available in the United States.

MSL  See Mean Sea Level.

MTSAT Satellite-Based Augmentation System  See MSAS.

multipath  Multipath is interference that occurs when GPS signals arrive at the receiver having traveled different paths. For example, this may happen if some signals are reflected off a building before reaching the receiver. If a signal takes a longer path it will show a larger distance to the satellite and therefore decrease position accuracy.

NAD-27  North American Datum of 1927. A horizontal datum employing the Clarke 1866 ellipsoid. Height values of this era are expressed in NGVD (National Geodetic Vertical Datum) of 1929.

NAD-83  North American Datum of 1983. A horizontal datum employing the GRS-80 ellipsoid. The original realization of NAD-83 was almost identical to WGS-84. The current realization NAD-83 (CORS96) differs from WGS-84 by up to a meter.

NMEA  Initial letters of National Marine Electronics Association.

NMEA 0183 defines the standard for interfacing marine electronic navigational devices. This standard defines a number of strings referred to as NMEA sentences that contain navigational details such as positions. Most Trimble GPS receivers can output positions as NMEA sentences.

NTRIP  (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.

office computer  An office computer is any computer running Trimble postprocessing software. Usually the office computer is a desktop computer located in the office, but if you are running your data collection software on a laptop or Tablet PC then the office computer may actually be the same computer as the field computer.
parity A digital message is composed of 0's and 1's. Parity is a form of error checking that sums the 0's and 1's of the digital message. A parity error results when one of the bits is changed so that the parity calculated at message reception is not the same as it was at message transmission. Options for parity checking include even, odd, and none.

Typically you should have the same parity setting on the Windows Mobile-based device as on the external device you are communicating with.

partnership A partnership lets a Windows Mobile-based device exchange and share information with a desktop computer. You need a partnership or a guest connection to transfer data between the TerraSync software on the device and the GPS Pathfinder Office software on the desktop computer.

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 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, running Microsoft Windows Mobile software, that is small enough to fit in your hand or pocket.

Position Dilution of Precision (PDOP) Dilution of Precision (DOP) is a measure of the quality of GPS positions, based on the geometry of the satellites used to compute the positions. When satellites are widely spaced relative to each other, the DOP value is lower, and position accuracy is greater. When satellites are close together in the sky, the DOP is higher and GPS positions may contain a greater level of error.

PDOP is a DOP value that indicates the accuracy of three-dimensional measurements. Other DOP values include VDOP (vertical DOP) and HDOP (Horizontal DOP).

The TerraSync software lets you specify either a maximum HDOP value or a maximum PDOP. It uses this maximum value as an upper bound on DOP values. You can configure the desired level of accuracy, and make sure that the positions logged are of a certain quality. When the DOP exceeds this maximum, the TerraSync software stops computing GPS positions.

Using a maximum PDOP value is ideal for situations where both vertical and horizontal precision are important.

postprocessing Postprocessing is the processing of satellite data after it has been collected in order to eliminate error. This involves using PC software to compare data from the rover to data collected at the base station.

Because the base station is on a known location, any errors can be determined and removed from the rover data.
**Glossary**

**PRN**
See pseudo-random number.

**projection**
A mapping of a set of coordinates from a datum to a plane; or a set of mathematical rules for performing such a translation. Projections are used to create flat maps that represent the surface of the earth or parts of it.

**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**
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 correction messages**
RTCM are the initial letters of the Radio Technical Commission for Maritime Services. This is a commission established to define a differential data link for the real-time differential correction of roving GPS receivers. There are two types of RTCM differential correction message. All Trimble GPS receivers use the version 2.1 or later RTCM protocol.

**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.
<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>signal-to-noise ratio (SNR)</td>
<td>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.</td>
</tr>
<tr>
<td>site</td>
<td>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.</td>
</tr>
<tr>
<td>SNR</td>
<td>See signal-to-noise ratio.</td>
</tr>
<tr>
<td>SSF</td>
<td>(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. 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.</td>
</tr>
<tr>
<td>static GPS position</td>
<td>A static GPS position is a GPS position logged when the GPS receiver is stationary, as when logging a point feature or an averaged vertex in a line or area feature.</td>
</tr>
<tr>
<td>static mode</td>
<td>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.</td>
</tr>
<tr>
<td>streaming GPS position</td>
<td>(Also known as dynamic GPS positions.) Streaming GPS positions are GPS positions logged when the GPS receiver is moving. When you are moving along a line feature, or around the perimeter of a polygon feature, you log streaming GPS positions. Your application logs a new vertex for every GPS position received from the GPS receiver.</td>
</tr>
<tr>
<td>synchronize</td>
<td>Synchronization is the process where ActiveSync technology compares information on a Windows Mobile-based 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 and the Data Transfer Utility Help.</td>
</tr>
<tr>
<td>tracking</td>
<td>The process of receiving and recognizing signals from a satellite.</td>
</tr>
<tr>
<td>true north</td>
<td>A bearing that is relative to true north uses the north celestial pole as its north reference.</td>
</tr>
</tbody>
</table>
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 roving receivers that are more accurate than corrections from a single base station.
Unlike other real-time correction sources, using corrections from a VRS requires two-way communication between the VRS server and the roving receiver. The roving receiver must send its position to the server, so that the server can calculate corrections for that position, and select the closest base station if necessary. The VRS server generates a unique virtual reference station for each roving receiver that connects to it.

WAAS  (Wide Area Augmentation System)
WAAS is a satellite based augmentation system (SBAS) that provides a free-to-air differential correction service for GPS. WAAS was established by the Federal Aviation Administration (FAA). Its coverage area includes the continental United States and outlying parts of Canada and Mexico.

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.

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.

Windows Mobile-based device  A small handheld device running Microsoft Windows Mobile software. A Windows Mobile-based device usually has a small screen, and limited memory and storage space.
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