QUICK REFERENCE GUIDE

Trimble® GPS Controller software

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Version 2.11
Revision A
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Trimble

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This is the April 2007 release (Revision A) of the *Trimble GPS Controller Software Quick Reference Guide*. It applies to version 2.11 of the GPS Controller software.

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

Contents

CHAPTER

1

Introduction

In this chapter:

The *Trimble GPS Controller Software Quick Reference Guide* describes how to use the Trimble® GPS Controller software.

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/gps) for an interactive look at Trimble and GPS.

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

What is the GPS Controller software?

GPS Controller is software that enables you to:

- configure a range of Trimble GPS receivers and real-time differential correction settings
- view status information about the receiver, satellites, and real-time correction sources
- view satellite prediction information in the field to help you plan your data collection session

The GPS Controller software duplicates the GPS configuration, status, and planning features of the Trimble TerraSync™ software and the Trimble GPScorrect™ extension for ESRI ArcPad software. If you have either of these applications installed, you do not need to install or use the GPS Controller software.

The GPS Controller software enables you to control a range of Trimble GPS receivers:

- GeoExplorer® series handhelds with integrated GPS receiver:
  - GeoXH™ handheld
  - GeoXM™ handheld
  - GeoXT™ handheld
- Juno™ ST handheld
- GPS Pathfinder Pro series receivers:
  - ProXT™ receiver
  - ProXH™ receiver
- GPS Pathfinder Pro XRS receiver
- GPS Pathfinder XB receiver
- GPS Pathfinder XC receiver
- Recon® GPS CF Card receiver

Related information

Online Help

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

The online help is context-sensitive. If you access the help while the GPS Controller software is running, it opens at the topic that corresponds to the current software screen.

To access context-sensitive help from within the GPS Controller software:

- when using an office computer, press **F1**
- when using a Pocket PC, tap  and select **Help**
- when using a Handheld PC, tap  and select **Help**

Additional information

If you have a problem and cannot find the information you need in the product documentation, go to the Trimble technical support website (www.trimble.com/support.shtml). This site contains additional support documentation and information such as software patches, utilities, service bulletins, and FAQs.

Consider a Trimble training course to help you use your GPS system to its full potential. For more information, go to www.trimble.com/training.shtml.

Release Notes

You can access the latest GPS Controller software Release Notes from the GPS Controller support page at www.trimble.com.

Technical assistance

If you cannot find the information you need, you can purchase Priority Support by going to www.trimble.com/mgis_rqst_home.asp. If you already have Priority Support, you can also use this link to request support from your Trimble Dealer.

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 GPS Controller software technical support page www.trimble.com 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 GPS Controller 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 GPS Controller software.

Your comments

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

CHAPTER

2

Software Installation

In this chapter:

This chapter describes how to install version 2.11 of the GPS Controller software onto a Windows Mobile powered device or a Windows PC.

To install the GPS Controller software, you must:

1. Make sure your field or office computer meets the minimum platform requirements for successful operation of the GPS Controller software.
2. Install the software using the *GPS Controller Software CD* or download from the Trimble website.

System requirements

Field computer specifications

Version 2.11 of the GPS Controller software runs on handheld devices running any of the following Microsoft operating systems:

- Windows Mobile® version 5.0 software
- Windows Mobile 2003 software
- Windows CE version 5.0
- Windows CE .NET (version 4.2 or later)

Version 2.11 of the GPS Controller software runs on computers running any of the following Microsoft operating systems, including 64-bit variants:

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

For detailed specifications, go to the Trimble website at www.trimble.com/support.

Required software

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

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

For more information, see Installing the GPS Controller software on a Windows Mobile-based device, page 13.

Installing the GPS Controller software

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

- Installing the GPS Controller software on a Windows Mobile-based device, page 13
- Installing the GPS Controller software on a Windows PC, page 21

Installing the GPS Controller software on a Windows Mobile-based device

This section describes how to install the GPS Controller software on a supported Windows Mobile powered device.

The installation procedure comprises the following steps:

1. Step 1: Install Microsoft connection management software onto the computer, page 14
2. Step 2: Connect the device to a computer, page 15
3. Step 3: Back up any GPS Controller software data files, page 18
4. Step 4: Uninstall any previous versions of GPS Controller software, page 19
5. Step 5: Check that you have enough space on the device, page 19
6. Step 6: Install the GPS Controller software on the device, page 21

More information about each step is provided below.

Step 1: Install Microsoft connection management software onto the computer

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

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

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

Installing the Windows Mobile Device Center

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

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

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

Installing ActiveSync technology

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

Step 2: Connect the device to a computer

1. Make sure that the device and the computer are switched on.
2. Connect the device to the office computer using either a USB cable connection or Bluetooth® wireless technology.

   For more information on connecting the device to a computer, refer to the documentation for the Windows Mobile powered device.

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

3. If the office computer is running:

- Windows Vista:

   a. If the *Autoplay* window appears, close the window.

   b. The *Windows Mobile Device Center* window displays the message Connected:

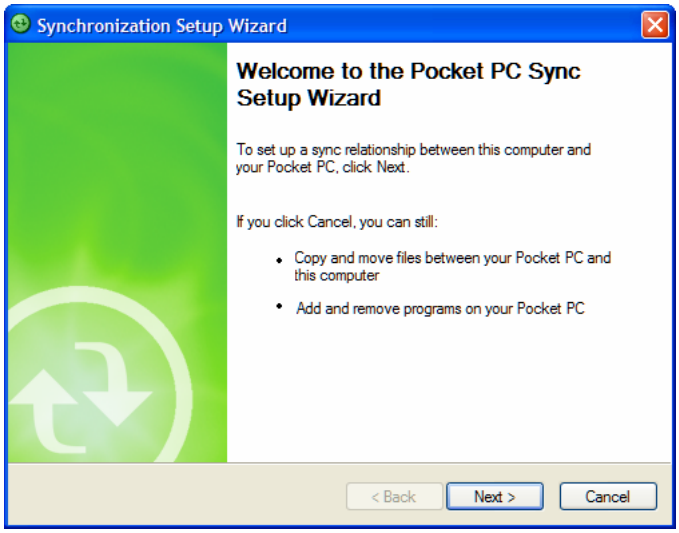
   c. Click *Connect without setting up your device*.

   d. Use the Windows Mobile Device Center to back up data files and uninstall any previous versions of the software (see Step 3, Step 3: Back up any GPS Controller software data files, page 18 and Step 4, Step 6: Install the GPS Controller software on the device, page 21).

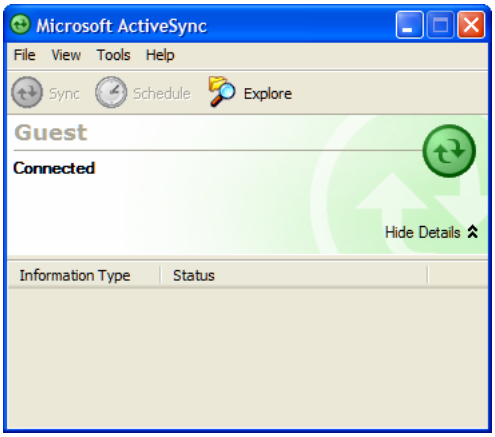
   For more information, refer to the *Windows Mobile Device Center Help*.

- Windows XP or 2000:

  a. If the *Synchronization Setup Wizard* appears, click **Cancel** to close the wizard:



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



  c. Use ActiveSync technology to back up data files and uninstall any previous versions of the software (see Step 3 Step 3: Back up any GPS Controller software data files, page 18 and Step 4 Step 4: Uninstall any previous versions of GPS Controller software, page 19 below).

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

Step 3: Back up any GPS Controller software data files

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

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

Step 4: Uninstall any previous versions of GPS Controller software

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

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

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

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

Note – *When installing software onto a device running Windows Mobile 5.0 software, you cannot install to RAM. The default installation location is always an internal non-volatile location.*

Before you install the GPS Controller software, make sure that you have enough free space on the device. The GPS Controller software requires at least 4 MB of free space. If you are installing it to a secondary internal storage location, such as the GeoExplorer 2003 series handheld's Disk, the GPS Controller software requires at least 2MB of free space in that location, plus 2 MB of RAM.

Note – *The installation program cannot determine how much memory is available in the non-volatile storage location. You must ensure that there is 2 MB available* ***before*** *you begin the installation.*

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

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

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

Step 6: Install the GPS Controller software on the device

1. Before you begin, make sure that:
   - the GPS Controller software is not running on the device.
   - you have closed all applications on the device.
2. Insert the *GPS Contoller Software CD* in the CD drive of the office computer.

   Alternatively, you can download the software from the Trimble website. Go to www.trimble.com/support. Click *Downloads* and then click *v2.11 GPS Controller Software for Windows CE.*

Installing the GPS Controller software on a Windows PC

This section describes how to install the GPS Controller software on a Windows PC, such as a laptop or a Tablet PC.

The installation procedure comprises the following steps:

- Step 1: Back up any GPS Controller software data files, page 18
- Step 2: Uninstall any previous versions of GPS Controller software, page 18
- Step 3: Install the GPS Controller software on the field computer, page 18

More information about each step is provided below.

Step 1: Back up any GPS Controller software data files

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

Step 2: Uninstall any previous versions of GPS Controller software

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

Step 3: Install the GPS Controller software on the field computer

1. Before you begin, make sure that:
   - the GPS Controller software is not running on the computer.
   - you have closed all open windows programs on the PC.

2. Insert the *GPS Contoller Software CD* in the CD drive of the office computer.

   Alternatively, you can download the software from the Trimble website. Go to www.trimble.com/support. Click *Downloads* and then click *v2.11 GPS Controller for Windows 2000/XP/Vista Software.*

Connecting to a GPS receiver

You can connect the GPS receiver to a port on the field computer. using one of the options described in Table 2.1.

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

Table 2.1 GPS receiver connection methods

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

Powered connections

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

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

Connecting to external real-time correction devices

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

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

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

CHAPTER

3

Configuring the Receiver

In this chapter:

This chapter provides step-by-step instructions for key tasks when configuring the GPS receiver, getting real-time differential corrections, and planning your data collection session using the GPS Controller software.

Configuring the GPS receiver

You can configure a GPS receiver in either Slider mode or Custom mode.

Note – *If you are using a Juno ST handheld, or 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 the GPS receiver in Slider mode

1. Open the Skyplot section (see page 34) or the Satellite Info section (see page 38).
2. In the Setup area, drag the slider control to the left to collect a greater number of less precise positions, or to the right to collect fewer, more precise positions.

Configuring the GPS receiver in Custom mode

1. Open the Skyplot section (see page 34) or the Satellite Info section (see page 38).
2. In the Setup area, tap the Setup button  .

   The *GPS Settings* form appears.
3. Clear the slider check box. The remaining fields in the form become available.
4. Specify appropriate values for the *Max PDOP*, *Min SNR*, and *Min Elevation* fields.
5. If you will be working in an area of high multipath, select Auto from the *Velocity Filter* field to smooth "spikes" in GPS positions.

   If you will be working in a good GPS environment, select Off.
6. If the output of NMEA messages is required, select On from the drop-down list.
7. Tap **OK** to confirm your changes and return to the Skyplot section or Satellite Info section.

For more information about the settings in this form, see GPS Settings form, page 52.

Resetting the GPS receiver to its factory default settings

A reset clears the receiver memory, deletes the almanac and any configuration data, and returns the receiver to its default state.

Note – *If the GPS receiver does not operate as expected after it has been connected to another field computer or another data collection application, reset the receiver. This clears any settings that may prevent it from working properly with the GPS Controller software.*

To reset the GPS receiver to the factory default settings:

1. Open the Setup section (see page 51).
2. Tap the **Options** button and select *Reset GPS receiver*.

3. A message asks you to confirm that you want to reset the receiver. Tap **OK**.

Configuring a real-time correction source

The *Choice* fields in the *Real-time Settings* form (see page 57) let you select up to three 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.

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:

Source	Description
External Source	Use corrections from an external correction source (for example a radio or an external beacon receiver).
Integrated Beacon	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.
Integrated Satellite	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.
Integrated SBAS	Use corrections from a Satellite Based Augmentation System (SBAS) using the GPS receiver's integrated SBAS receiver.
Use Uncorrected GPS	Log autonomous GPS positions without applying real-time corrections.
Wait for Real-time	Suspend logging until a real-time correction source becomes available.

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 60
   - Integrated Beacon Settings form, page 65
   - Integrated Satellite Settings form, page 65
   - Integrated SBAS Settings form, page 66

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 4.24 on page 58.
5. If the *Real-Time Age Limit* field appears, select a maximum age at which a correction message will be used.
6. Click **OK**.

Verify the status information in the *Real-time Summary* screen (see page 40) to confirm that you are receiving real-time corrections.

Planning your data collection session

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

1. Use the Setup section (see page 51) to configure GPS settings to your data collection requirements.

   Any changes you make are reflected in the planning skyplot and PDOP graph in the Plan section. For example, if you decrease the minimum elevation, the red circle on the planning skyplot gets larger.
2. If required, tap **Options** and then 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.
3. If required, tap the Report button to create a GPS planning report for the session.

Do one of the following:

- 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 under the **Pause** button. Tap the **Pause** button at any time to pause playback.
- Tap the **Now** button to set the skyplot to show the current time.
- Drag the slider on the DOP graph (see page 50) to fast forward to a time of interest, or use the backward  or forward  button to move in increments of ten minutes. The skyplot changes to show the constellation for the time indicated by the slider position.

4. To zoom in on a particular time, use the **Pause** button, slider, or backward or forward buttons to stop playback at the time of interest. Tap **Options** and then 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.*

CHAPTER

4

Forms and Controls

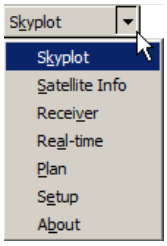
In this chapter:

This chapter describes the user interface of the GPS Controller software, and provides reference information about its forms and controls.

Common elements

Section list button

To access the sections of the GPS Controller software, tap the Section list button and then select the required section from the drop-down list.



Status bar

The status bar appears at the top of all GPS Controller software screens. It is always visible, and the icons that are displayed reflect the current status of the system and provide basic information about the status of the GPS receiver.

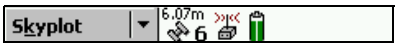


Table 4.1 Status bar: Icons

Icon	Name	Description
	Satellite icon	Shows whether the geometry of the satellites is good or bad, as configured in the GPS settings area (see GPS settings area, page 37). The satellite icon flashes when the geometry of the satellites (their PDOP) 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. The number above the satellite icon shows the Current Estimated Accuracy (CEA) in meters.
	Current Estimated Accuracy (CEA)	(This is the number above the satellite icon.) Shows the estimated accuracy of the current GPS position, in meters.
	Real-time icon	Shows that the GPS receiver is receiving real-time corrections from an external source, such as a radio.
	External beacon icon	Shows that the GPS receiver is receiving real-time corrections from an external beacon receiver, such as a GeoBeacon™ receiver.
	Integrated beacon icon	Shows that the GPS receiver's integrated beacon receiver is receiving real-time corrections from a radio-beacon.
	Integrated satellite icon	Shows that the GPS receiver's integrated satellite receiver is receiving real-time corrections from a satellite differential service.

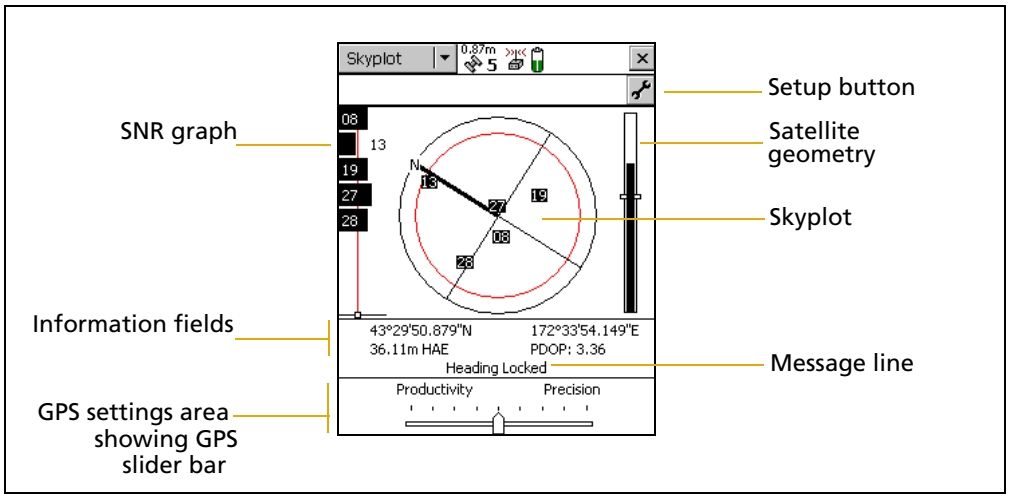
Table 4.1 Status bar: Icons (continued)

Icon	Name	Description
	Integrated SBAS icon	Shows that the GPS receiver is receiving real-time corrections from a Satellite-Based Augmentation System (SBAS). SBAS implementations include: • WAAS (Wide Area Augmentation System), covering the United States and Canada • EGNOS (European Geostationary Navigation Overlay System), covering Europe • MSAS (MTSAT augmentation system), covering the Asia-Pacific region
Note – *If the real-time signal is lost, the current real-time icon flashes. If no icon is visible, the GPS receiver is using autonomous (uncorrected) GPS to calculate its position.*		
	External antenna icon	This icon indicates that an optional external antenna is connected.
	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 the GPS Controller software, 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.

Skyplot section

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

To access the Skyplot section when another section is visible, tap the arrow on the Section button next to the status bar and from the drop-down list select *Skyplot*.



The Skyplot section includes the following items:

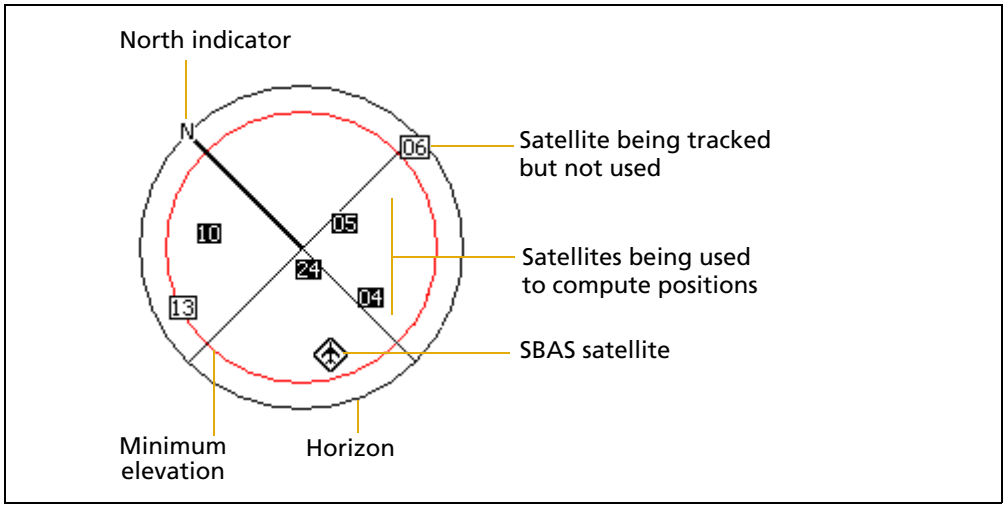
- Skyplot (see page 34)
- SNR graph (see page 36)
- Satellite geometry indicator (see page 36)
- Information fields (see page 37)
- Message line (see page 37)
- GPS Settings area (see page 37)

The Skyplot section also has a Setup button in the GPS settings area at the bottom of the screen (see page 37).

Skyplot

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

Tip – If no positions are computed, look for obstructions that might be blocking satellite signals. Move away from any possible obstructions.



Numbered boxes represent the satellites currently available to the GPS receiver.

- Satellites shown as filled black boxes are currently being used by the GPS receiver 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 54). When the minimum elevation value is changed, the inner circle of the skyplot changes diameter accordingly.

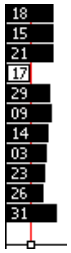
- If the minimum elevation is increased, the inner circle gets smaller and only those satellites higher in the sky are used to compute GPS positions.
- If the minimum elevation is decreased, the inner circle gets larger, and satellites closer to the horizon are included when GPS positions are computed.

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 36.

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 graph shows the configured minimum SNR value.

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

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.

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 to 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 section, a tooltip appears. The tooltip provides detailed information about the item that you tapped.

Table 4.2 Tooltips

Skyplot section item	Tooltip
Bar on SNR graph	Satellite pseudo-random number (PRN) and SNR value(s)
White box on indicator below SNR graph	Configured minimum SNR value
Geometry indicator	Current PDOP value
Horizontal bar on geometry indicator	Configured maximum PDOP value
Satellite on skyplot	Satellite PRN, SNR value(s), elevation, and bearing
Inner circle on skyplot	Configured minimum elevation value

Information fields

Information fields show the current GPS position and settings.

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

Table 4.3 Skyplot section: Information fields

Field	Description
GPS position	The current GPS position is displayed in terms of the Latitude/Longitude coordinate system.
PDOP	The Position Dilution of Precision (PDOP) is a numeric value that represents the satellite geometry. If the PDOP rises above the value set in the Maximum PDOP field, the GPS receiver stops outputting positions. To set the maximum PDOP value, use the GPS slider in the Setup area, or tap the Setup button  .

Message line

The message line is displayed midway down the Skyplot section, 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 38).*

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.

GPS settings area

The GPS settings area appears at the bottom of the Skyplot section and the Satellite Information section (see page 38). It shows the current GPS settings. The GPS settings area has two modes: Slider and Custom.

Note – *If you are using a Juno ST handheld, or 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 Setup area displays the ***GPS slider bar***. The position of the slider control 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 control position is the most productive setting at which the precision specifications of the specific GPS receiver are met.

When the slider control is on the left, the GPS receiver is optimized for productivity. The receiver calculates positions in more environments, but they may be less precise. When the slider control is on the right, the GPS receiver is optimized for precision. You may get fewer positions, but they will be more precise. The default control position is in the middle of the bar.

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 (see page 52). Any changes made to the one GPS slider bar is reflected in the other.

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 near the top of the screen to open the *GPS Settings* form (see page 52). Then clear the *Slider* check box.

Satellite Information section

Use the Satellite Information (Sat Info) section to view information about satellites in text form.

To display the Satellite Information section, tap the arrow on the Section button next to the status bar and from the drop-down list select *Sat Info*.

Table 4.4 Satellite Info section: Columns

Column	Description	
Use indicator	Filled circle (●)	Satellite is being used to calculate positions.
	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).
	No circle	Satellite is available, but is not being tracked by the GPS Controller software (for example, if the satellite's signal is blocked by a tall building).
PRN	The pseudo-random number of each satellite. A satellite is identified by its unique PRN.	
SRN	The current signal-to-noise ratio of each satellite. A satellite that is below the configured minimum SNR is not used to compute positions. ***Note –*** *If a satellite is marked as "unhealthy" by the GPS Control segment, the characters U/H appear in the SNR column for that satellite.*	
Elev	The current elevation above the horizon of each satellite. A satellite that is below the configured minimum elevation is not used to compute positions. The arrow beside the elevation value (▲ or ▼) indicates whether the satellite is rising or setting.	
Br(T)	The current bearing to each satellite. This bearing is shown relative to true north.	

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

- Information fields (see page 37)
- Message line (see page 37)
- GPS Settings area (see page 37)

Receiver section

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

To display the Receiver section, tap the arrow on the Section button next to the status bar and from the drop-down list select *Receiver*.

Table 4.5 describes the fields that appear in the Receiver section.

Table 4.5 Receiver section: Fields

Field	Description
GPS	The current status of the GPS receiver connection. The options are: • Connected — The software is connected to the GPS receiver. • Attempting to connect to GPS — The software is trying to connect to the receiver. If this message appears, no other fields appear. • GPS is disconnected — The receiver has been disconnected from the software. If this message appears, no other fields appear. • No GPS detected. Check cables, batteries etc — The software has failed to detect the receiver, because it is not connected to the port specified in the *GPS Settings* form (see page 52), or has no power. If this message appears, no other fields appear.
Antenna	The current status of the antenna connection. The options are: • Connected — The software is connected to a GPS receiver and the receiver is connected to a GPS antenna.The antenna icon also appears in the status bar. • Not connected — No antenna is connected.
Position status	An indicator of the GPS status. The options are: • Calculating positions — The receiver is computing GPS position fixes. The current satellite constellation is therefore acceptable. • Poor satellite geometry — The current PDOP value is greater than the maximum value, so the GPS receiver is not computing GPS positions. • Too few satellites — The GPS receiver has acquired satellites, but has not acquired enough satellites to compute a position. • Unavailable — No position is available. For example, there may be no antenna connected to the receiver.
Almanac	The date of the almanac.
Battery	The current level of charge in the GPS receiver battery. This value appears as a percentage. ***Note –*** *If the connected receiver is integrated with or powered by the field computer, the field computer's battery level appears in this field. If the receiver does not report any battery status, this field is not displayed.*

Table 4.5 Receiver section: Fields (continued)

Field	Description
Receiver type	The name of the receiver model currently connected to the field computer. ***Note –*** *The GPS Controller software shows the internal name supplied by the receiver, which may not exactly match the name you use for the receiver.*
Navigation version	The version number of the navigation firmware that is installed in the connected GPS receiver.
Signal processor version	The version number of the signal processing firmware that is installed in the connected GPS receiver.
OmniSTAR ID	This field only appears if the connected receiver supports real-time corrections from a satellite differential service. The activation code for the OmniSTAR satellite differential service. You need this code when contacting your OmniSTAR provider for activation.

Real-time section

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 arrow on the Section button next to the status bar and from the drop-down list select *Real-time*.

By default, the Real-time Summary screen appears (see page 40). Depending on the real-time correction sources that you have set up, the following detailed status screens may be available:

- *External Source* status screen (see page 43)
- *External Beacon* status screen (see page 43)
- *Integrated Beacon* status screen (see page 45)
- *Integrated Satellite* status screen (see page 46)
- *Integrated SBAS* status screen (see page 48)

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

Real-time Summary screen

The *Real-time Summary* screen contains a heading and summary information for each real-time correction source you have set up. The heading shows the type of correction source. The order of the correction sources matches the order of the choices you have made in the Setup section using the *Real-time Settings* form (see page 57).

The real-time source that is currently being used for real-time differential corrections has an icon beside its name. The icon is the same as the icon that appears in the status bar.

If no icon is shown, the GPS receiver is either waiting for real-time corrections to resume, or is logging uncorrected positions. If real-time corrections are not available, the real-time icon in the status bar flashes (see page 32).

For more information about the summary information provided for each real-time correction source in the *Real-time Summary* screen, see Table 4.6 through Table 4.10 below.

For full status information on any 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 57).

Table 4.6 Real-time Summary screen: External Source summary fields

Field	Description
External Source	The status of the External Source real-time correction source. The options are: • In use — This source is currently being used for real-time corrections. • Waiting — This source is configured but a lower-ranked choice is currently in use. The status of the source is being monitored and the GPS receiver will switch to this source if it becomes available and it is the highest-ranked available source. • (none) — This source is configured but is not being monitored or used. When the GPS receiver is using External Source for real-time corrections, the real-time external source icon  appears to the left of this field.

Table 4.7 Real-time Summary screen: External Beacon summary fields

Field	Description
External Beacon	The status of the External Beacon real-time correction source. The options are the same as the options for the *External Source* status field (see Table 4.6). When the GPS receiver is using an external beacon for real-time corrections, the external beacon icon  appears to the left of the field name.
Frequency	The current beacon frequency being tracked or locked on to by the external beacon receiver.
State	The real-time operating status of the external beacon receiver.
SNR	The signal-to-noise ratio of the beacon signal that is being monitored.

Table 4.8 Real-time Summary screen: Integrated Beacon summary fields

Field	Description
Integrated Beacon	The status of the Integrated Beacon real-time correction source. The options are the same as the options for the *External Source* status field (see Table 4.6), 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 the field name.
Frequency	The current beacon frequency being tracked or locked on to.
State	The real-time operating status of the beacon.
SNR	The signal-to-noise ratio of the signal that is being monitored.

Table 4.9 Real-time Summary screen: Integrated Satellite summary fields

Field	Description
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 4.8). When the GPS receiver is using an integrated satellite receiver for real-time corrections, the integrated satellite icon appears to the left of the field name.
Service Provider	The name of the satellite differential service provider that the satellite in use belongs to.
Frequency	The current satellite frequency being tracked or locked on to.
State	The real-time operating status of the satellite.
SNR	The signal-to-noise ratio of the signal that is being monitored.

Table 4.10 Real-time Summary screen: Integrated SBAS summary fields

Field	Description
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 4.8). When the GPS receiver is using an integrated SBAS receiver for real-time corrections, the integrated SBAS icon appears to the left of the field name.
SNR	The signal-to-noise ratio of the SBAS satellite signal being monitored.

External Source status screen

Note – *If you have configured an external beacon as the external source, the External Beacon status screen (see below) 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, tap the Summary list button Summary in the Real-time section and then select *External Source*.

Table 4.11 describes the fields that appear in the *External Source status* screen.

Table 4.11 External Source status screen: Fields

Field	Description
External Source	The status of the external real-time correction source. The options are: • In use — The external real-time correction source is currently being used to correct positions in real time. • Waiting — A lower-ranked choice is currently being used to correct positions in real time. The status of the external source is being monitored and the GPS receiver will switch to the external source if it becomes available and it is the highest-ranked available source. • Not in use — The external real-time source is set up but is not currently being used for real-time differential corrections.
Correction Type	Defaults to single station. The external real-time station is operating in raw mode, and is using the base station to provide RTCM corrections.
Correction Up-time	The duration, in hours, minutes, and seconds, of the current external source connection.
Data Received	The amount of data, in megabytes, kilobytes, or bytes, that has been sent and received since the connection was established.
Last correction	The time, in seconds, since the last correction message from this source was received by the GPS receiver.

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 above) 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, tap the arrow on the Section button next to the status bar and from the drop-down list select *Real-time* to open the Real-time section. Then tap the arrow on the Summary list button below the status bar, Summary and from the drop-down list select *Ext. Beacon*.

Table 4.12 External Beacon status screen: Fields

Field	Description
External Beacon	The status of the external beacon receiver. The options are: • In use — The external beacon receiver is currently being used to correct positions in real time. • Waiting — A lower-ranked choice is currently being used to correct positions in real time. The status of the external beacon receiver is being monitored and the GPS receiver will switch to the external beacon receiver if it becomes available and it is the highest-ranked available source. • Not in use — The external beacon receiver is set up but is not currently being used for real-time corrections.
Frequency	The current beacon frequency being tracked or locked on to by the external beacon receiver. ***Note –*** *Use the configuration software provided with the beacon to set the external beacon frequency.*
State	The operating state of the external beacon receiver. The options are: • Search • Track • Lock • Idle • On • Off
SNR	The signal-to-noise ratio, in decibels, of the beacon signal the external beacon receiver is monitoring.
Last correction	The time, in seconds, since the last correction message from this source was received by the GPS receiver.
Beacon mode	The mode the external beacon receiver is operating in. The options are: • Best — The external beacon receiver tracks the best frequency available and automatically switches frequency if a better signal is available. • Fixed — The external beacon receiver tracks only the frequency you specify in the beacon receiver configuration software.
Filter applied	Indicates whether a filter has been applied to the list of frequencies the external beacon receiver can track.
External beacon battery level	The remaining battery power of the external beacon receiver, as a percentage.
Diagnostic information	A heading used to group together fields that contain information for troubleshooting the beacon service.
Error rate	The RTCM Word Error Rate, which shows the proportion of RTCM words that have parity errors. The error rate should be 0.1 or less.
Input level	The intensity level of the electro-magnetic field. This value should be between 10 and 100 dBuV/M.

Table 4.12 External Beacon status screen: Fields (continued)

Field	Description
Data rate	The data modulation rate from the beacon.
Health	The health of the beacon signal. The options are: • Healthy • Unhealthy • Not tracked

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, tap the arrow on the Section button next to the status bar and from the drop-down list select *Real-time* to open the Real-time section. Then tap the arrow on the Summary list button 

below the status bar, and from the drop-down list select *Beacon*.

Table 4.13 Integrated Beacon status screen: Fields

Field	Description
Integrated Beacon	The status of this real-time correction source. The possible values are: • In use — A beacon is currently being used to correct positions in real time. • Waiting — A lower-ranked choice is currently being used to correct positions in real time. The status of the beacon is being monitored and the GPS receiver will switch to the beacon if it becomes available and it is the highest-ranked available source. • Not in use — A beacon real-time correction source is set up but is not currently being used for real-time corrections. • Not supported — The connected GPS receiver does not support real-time differential corrections from a beacon.
Frequency	The current beacon frequency being tracked or locked on to.
State	The operating state of the integrated beacon receiver. The options are: • Search • Track • Lock • Idle • On • Off
SNR	The signal-to-noise ratio, in decibels, of the beacon signal being tracked. An SNR above 6.0 dB indicates that the signal is usable.
Last correction	The time, in seconds, since the last correction message from this source was received by the GPS receiver.
Diagnostic information	A heading used to group together fields that contain information for troubleshooting the beacon service.
Error rate	The RTCM Word Error Rate, which shows the proportion of RTCM words that have parity errors. The error rate should be 0.1 or less.

Table 4.13 Integrated Beacon status screen: Fields (continued)

Field	Description
Input level	The intensity level of the electro-magnetic field. This value should be between 10 and 100 dBuV/M.
Data rate	The data modulation rate of the beacon.
Health	The health of the beacon signal. The options are: • Healthy • Unhealthy • Not tracked

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, tap the arrow on the Section button next to the status bar and from the drop-down list select *Real-time* to open the Real-time section. Then tap the arrow on the Summary list button 

below the status bar, and from the drop-down list select *Satellite*.

Table 4.14 Integrated Satellite status screen: Fields

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

Table 4.14 Integrated Satellite status screen: Fields (continued)

Field	Description	
Real-time Service Information	A heading used to group together fields that contain information about the satellite differential service subscription.	
User access	Specifies whether the selected satellite differential service has been enabled for the GPS receiver. The options are:	
	• Enabled	The service is enabled.
	• Disabled	The activation has expired.
	• Unknown	The service has not yet been activated on this receiver, or the receiver has not yet determined the activation status.
Decoder state	The current status of the satellite activation. The options are:	
	• Initializing	The real-time decoder is initializing.
	• Receiving corrections	The decoder is providing corrections.
	• No recent data	Real-time correction data has not been received from the decoder in the last 10 seconds.
	• Decoder unavailable	The decoder is not available or is not operating correctly.
	• Decoder reset	A reset has been detected in the decoder.
	• Invalid link	The decoder is using a satellite link that is not valid for the subscription.
	• Invalid region	The decoder is being used in a region that is not covered by the current subscription.
	• Update required	The decoder requires an update from the master station before corrections can be provided.
	• No offshore	The decoder is being used in a marine area but the current subscription does not provide for offshore operation.
Expiration	The date on which the satellite differential service subscription expires, or the time remaining until the subscription expires.	
Diagnostic Information	A heading used to group together fields that contain information for troubleshooting the satellite differential service.	
Quality figure	The percentage of error-free data received from the satellite in the last data block. This value should be 90% or higher.	
Decoder version	The version number of the satellite decoder in the GPS receiver.	

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, tap the arrow on the Section button next to the status bar and from the drop-down list select *Real-time* to open the Real-time section. Then tap the arrow on the Summary list button 

below the status bar, and from the drop-down list select *SBAS*.

Table 4.15 Integrated SBAS status screen: Fields

Field	Description	
Integrated SBAS	The status of this real-time correction source. The possible values are:	
	• In use	The SBAS real-time correction source is currently being used to correct positions in real time.
	• Waiting	A lower-ranked choice is currently being used to correct positions in real time. The status of the SBAS is being monitored and the GPS receiver will switch to the SBAS source if it becomes available and it is the highest-ranked available source.
	• Not in use	The SBAS real-time correction source is set up but is not currently being used for real-time corrections.
	• Not supported	The connected GPS receiver does not support corrections from an SBAS satellite.
SNR	The signal-to-noise ratio, in decibels, of the SBAS satellite being monitored. An SNR of above 3.0 dBHz indicates that the signal is usable.	
Last correction	The time, in seconds, since the last correction message from this source was received by the GPS receiver.	
Satellites corrected	***Note –*** *This field only appears if the connected GPS receiver is a GPS Pathfinder XB receiver (Juno ST handheld supports WAAS only at this time).* 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 GPS Controller software treats the current GPS position as SBAS-corrected. Otherwise, the GPS Controller software treats the position as an autonomous position, and the Integrated SBAS icon in the status bar flashes. 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.	

Plan section

The Plan section enables you to plan your next 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 your data collection session, page 28.

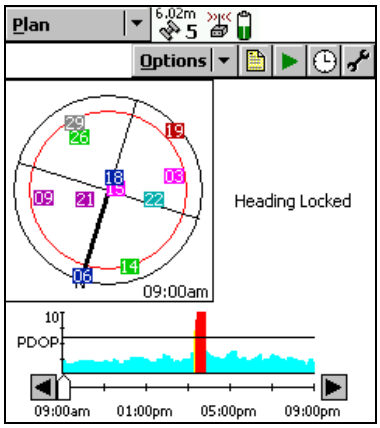
To display the Plan section, tap the arrow on the Section button next to the status bar and from the drop-down list select *Plan*.

The Plan section includes:

- Planning skyplot (see page 49)
- DOP graph (see page 50)
- Message line (see page 50)

For information about how to preview a data collection session, see Previewing a data collection session, page 50.

Planning skyplot



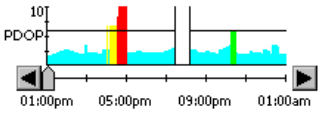
The planning skyplot is similar to the skyplot shown in the Skyplot section. The outer black circle represents the horizon, while the inner red circle represents the minimum elevation that you have set. Each satellite that is in view is represented by a box containing the pseudo-random number (PRN) of the satellite. Each satellite is colored for easy identification.

Note – *Unlike the skyplot in the Skyplot section, the planning skyplot shows* ***all*** *visible satellites, even if they are below the configured minimum elevation or their current SNR value is too low. To check which satellites are currently being tracked, use the skyplot in the Skyplot section (see page 34).*

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 50).

When you open the Plan section, the orientation of the planning skyplot matches the current heading shown on the skyplot in the Skyplot section. 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.

DOP graph



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

The slider control shows the period that is selected in the Hours list (see page 51) of the Plan section. To view the skyplot for a specific time, drag the slider control across the graph, or tap the left or right arrow button. As the position of the slider control changes, the skyplot and time are updated to match the selected time.

Table 4.16 DOP graph values

Bar appearance	PDOP
Cyan	< 4
Green	4 to 6
Yellow	6 to 8
Red	> 8
Blank with black left and right borders	Not enough satellites are available to compute a position.

Message line

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

Previewing a data collection session

Use the buttons and options provided in the Plan section to preview a data collection session.

Table 4.17 Plan section: Buttons

Button		Description
	Play	Tap **Play** to begin playback of a session, or to resume playback after pausing. When the session is playing, the button changes to the **Pause** button. Tap the **Pause** button to temporarily pause playback. At the end of playback, the button changes to the **Home** button. Tap the **Home** button to return to the beginning of the session, ready for playback again.
	Now	Tap **Now** to set the session to the current time. The time shown on the skyplot and the position of the slider control on the DOP graph (see page 50) change to match the current time.

Table 4.17 Plan section: Buttons (continued)

Button		Description
	Report	Tap the Report button to create an HTML file in the My Documents folder that contains details of the current planning session.
	Setup	Tap the Setup button  and then tap **GPS Settings** to open the *GPS Settings* form (see page 52).

Table 4.18 Plan section: Options

Option	Description	
Show Orbits	Select the type of orbit information to display on the skyplot. The options are:	
	• Off	Do not show any orbit information.
	• Trails	Show an orbit trail for each satellite. During session playback, 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.
	• 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.
Hours	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.	

Setup section

Use the *Setup* section to perform common setup tasks, and to access the following forms:

- *GPS Settings* form (see page 52)
- *Real-time Settings* form (see page 57)

To open the Setup section, tap the arrow on the Section button next to the status bar and from the drop-down list select *Setup*. The *Setup* screen appears.

Table 4.19 Setup screen: Options

Option	Description
Connect to GPS	Establishes a connection to a GPS receiver. If the GPS receiver is already connected, this command is not available. When you connect to the GPS receiver, the settings from the software are sent to the GPS receiver to configure its operation. ***Note –*** *You can also tap the* **GPS** *button to connect to GPS.*
Disconnect from GPS	Disconnects the software from the GPS receiver. If the GPS receiver is already disconnected, this command is not available.

Table 4.19 Setup screen: Options

Option	Description
Reset GPS receiver	Resets the GPS receiver to its default settings. See Resetting the GPS receiver to its factory default settings, page 26.
Activate Integrated Satellite	This option is only available if a satellite differential service has been set up as a real-time correction choice, and you are connected to a receiver that supports this service. Allows you to enter an activation code to enable your subscription to a satellite differential service.
Connect to External Source	Establishes a connection to a configured external real-time correction source. If the receiver is already connected, this option is not available.
Disconnect from External Source	Disconnects the GPS receiver from an external real-time correction source. If the receiver is already disconnected, this option is not available.

Table 4.20 Setup screen: Buttons

Button	Description
GPS	To connect to or disconnect from a GPS receiver, tap **GPS**.
GPS Settings	Opens the *GPS Settings* form, see page 49.
Real-time Settings	Opens the *Real-time Settings* form, see page 57.

GPS Settings form

Use the *GPS Settings* form to control the precision you require for GPS positions.

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

- In the Setup section, tap **GPS Settings**.
- In the Skyplot section (see page 34) or the Satellite Info section (see page 38), tap  .

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

Note – *If you are using a Juno ST handheld, or 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 all fields below the GPS slider bar become read-only. The values in these fields change as the slider control position 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 is the same as the slider in the Setup area of the Skyplot and Satellite Info sections. If you change the slider control position in the GPS Settings form, it changes the control position in the other screens.*

For information about the fields in the *GPS Settings* form, see Table 4.22 on page 54.

Minimum SNR values for GPS slider bar positions

Version 2.00 and later of the GPS Controller software stores and displays SNR values as Carrier-to-Noise ratio (C/No) values, measured in decibel-Hertz (dBHz). Previously, signal-to-noise ratio (SNR) values were displayed as Amplitude Measurement Unit (AMU) values. Typical SNR values for most supported Trimble Mapping and GIS receivers are 33 through 43 dBHz. Typical SNR values for the Recon GPS CF Card receiver range from 14 through 26 dBHz. The Juno ST handheld, and 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, 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 4.21:

Table 4.21 GPS slider: SNR values

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

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 4.22 GPS Settings: Fields

Field	Default	Description
DOP Type	PDOP	PDOP (Position Dilution of Precision) is a measure of the precision of three-dimensional measurements.
Max PDOP	6.0	The maximum PDOP value. 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. ***Note –*** *When using a Juno ST handheld, or a GPS Pathfinder XB or XC receiver, the Max PDOP is set to 99.*
Min SNR	39	The minimum L1 signal-to-noise ratio (SNR) value. The SNR is a measure of the quality of the signal from a satellite. Signals with a low SNR can be of poor quality. When the SNR of a satellite falls below the minimum SNR value, the GPS receiver stops using that satellite to calculate the GPS position. ***Note –*** *When using a Juno ST handheld, or a GPS Pathfinder XB or XC receiver, the Min SNR is set to 12.*
Min Elevation	15°	The minimum elevation. Signals from satellites that have a low elevation from the horizon can be of poor quality. The GPS receiver does not use any satellite that is below the minimum elevation value to calculate the GPS position. ***Note –*** *The minimum elevation that you specify in this field applies to code phase data only. To ensure that you collect high quality H-Star carrier phase data, the minimum elevation during H-Star data collection is always 15°.* ***Note –*** *When using a Juno ST handheld, or a GPS Pathfinder XB or XC receiver, the Min Elevation is set to 5°.*

Table 4.22 GPS Settings: Fields (continued)

Field	Default	Description
Velocity Filter	Off	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 to real-time positions. If at least one valid real-time correction source is selected in the Choice fields, and the last *Choice* field is set to Wait for Real-time, only real-time GPS posiitons are filtered. Otherwise, all positions are filtered. • Off — Do not apply velocity filtering in good GPS conditions. ***Note –*** *Trimble recommends that you do **not** use velocity filtering in good GPS conditions.* ***Note –*** *When using a Juno ST handheld, or 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.*
Receiver Power Output	Auto	This field only appears if the *Connection Method* field in the *External Source Settings* form is set to Receiver Port (see page 61). ***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.* This field specifies whether the connected receiver outputs power. If the connected GPS receiver is a GPS Pathfinder Pro XRS receiver, you can use this field to enable power output for an external device such as a DGPS radio. See Outputting power from the GPS receiver (Pro XRS only) below. The options are: • Auto — 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	Enable or disable the output of NMEA messages. To configure the NMEA output settings, tap the Setup button to open the *NMEA Output Settings* form (see page 56).

Outputting power from the GPS receiver (Pro XRS only)

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

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.

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, the GPS Controller 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 52).
2. Connect the field computer to the GPS receiver using a ***non-powered*** connection. 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 configure the NMEA output.

To open the *NMEA Output Settings* form, tap  next to the *NMEA* field in the *GPS Settings* form (see page 52).

Table 4.23 NMEA Output Settings form: Fields

Field	Default	Description
Output interval	5s	The rate at which NMEA messages are generated. You may select one of the options (Off, 1 s, 5 s) or enter a number.
Receiver Port (Primary)	Port 1	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.
Receiver Port (Secondary)	None	The GPS Controller 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.
Data bits	8	The number of data bits used when the GPS receiver and external device communicate.
Stop bits	1	The number of stop bits used when the GPS receiver and external device communicate.
Parity	None	The parity setting used when the GPS receiver and external device communicate.
General	(none)	Select the required output formats to generate messages of a specific type. See Appendix A, NMEA Messages.

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  .

The GPS Controller 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 software switches to the next choice. Whenever the GPS Controller software acquires a higher priority real-time source, it switches back to this source. For example, the software will not use your third choice if your first choice is available.

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

Valid combinations of real-time correction sources

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 GPS Controller software manages this for you by hiding invalid options or Choice fields depending on your previous choices. For example, with a GPS Pathfinder Pro XRS receiver, you cannot use Integrated Satellite if you have already selected Integrated Beacon for a higher choice. When you select Integrated Beacon in the *Choice 2* field, Integrated Satellite is removed from the options for the *Choice 3* field.

The software also ensures that you do not select choices that are not valid for the connected GPS receiver. For example, if the connected receiver is a GeoExplorer series handheld, only the External Source, Integrated SBAS, and Use Uncorrected GPS options are available in the *Choice 1* field. If you then select Integrated SBAS in the *Choice 1* field, the only options available in the *Choice 2* field are Use Uncorrected GPS and Wait for Real-time.

If you have configured an invalid real-time combination before connecting the GPS receiver, a warning message appears when you connect to GPS, telling you to check your real-time settings. When you open the *Real-time Settings* form, the only changes you can make to your real-time settings are those that are compatible with the connected receiver.

Table 4.24 summarizes the valid combinations of real-time correction sources.

Table 4.24 Real-time Settings form: Valid real-time correction choices

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

Table 4.25 descibes the fields in the *Real-time Settings* form:

Table 4.25 Real-time Settings form: Fields

Field	Default	Description

Choice 1	Use Uncorrected GPS	Your preferred source of real-time corrections. The options are:
		• External Source — Use an external correction source such as a data radio or GeoBeacon receiver.
		• Integrated Beacon — Use corrections from an integrated beacon receiver (Pro XRS receivers only).
		• Integrated Satellite — Use corrections from an integrated satellite receiver (Pro XRS receivers only).
		• Integrated SBAS — 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 XB receiver
		  • GPS Pathfinder ProXT and ProXH receivers
		  • Juno ST handheld (WAAS only)
		• 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 that you want to use when your first choice is not available. The options are as for the *Choice 1* field except that External Source is not available, and the following additional option is available: • Wait for Real-time — Suspend logging until a real-time correction source becomes available.
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 that you want to use when your first and second choices are not available. The options are: • Use Uncorrected GPS • Wait for Real-time • Integrated SBAS

Table 4.25 Real-time Settings form: Fields (continued)

Field	Default	Description
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 that you want to use when none of your other preferred real-time correction sources are available. The options are: • Use Uncorrected GPS • Wait for Real-time
Real-time Age Limit	50 seconds	The maximum age at which a correction message will be used. The age of a message is the time that has elapsed since it was received. Select an option from the drop-down list. ***Note –*** *This field does not appear if you are using a Juno ST handheld, or a GPS Pathfinder XB or XC receiver. For these receivers, the real-time age limit is set to 18 seconds.* ***Note –*** *If you are using a GPS Pathfinder Pro XRS receiver with firmware earlier than version 1.50 installed, the maximum age limit is 1 minute.*

External Source Settings form

Use the *External Source Settings* form to configure settings specific to an external real-time source, such as a GeoBeacon receiver.

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.

To open the *External Source Settings* form, tap  next to the *Choice 1* field in the *Real-time Settings* form. Use this form to configure the external correction source.

Table 4.26 External Source Settings form: Fields

Field	Default	Description
Connection Method	Serial Port	Select the connection method. The options are: • Internet — GPS Controller communicates with a correction source over a TCP/IP connection, for example using a GSM or GPRS cellphone. The connection must be configured and made outside the GPS Controller software. • Direct Dial — GPS Controller communicates with a correction source 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 64) appears.
Type	Single base	Read-only.
Address	(blank)	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, ntrip.seaview.gov) of the broadcast server that is supplying the corrections. A broadcast server (for example, an NTRIP server) manages authentication and password control for differential correction sources and relays corrections from the source that you select to the GPS receiver.
Port	COM1 (Serial Port) or 80 (Internet)	This field only appears if the *Connection Method* field is set to Serial Port or Internet. When the *Connection Method* field is set to: • 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 63), and configure the serial port settings. • Internet: specifies the port on the server that the GPS receiver is to connect to.
Modem Type	(blank)	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 server.
Phone Number	(blank)	The telephone number of the server.

Table 4.26 External Source Settings form: Fields (continued)

Field	Default	Description
Connection Control	Auto	This field only appears if the *Connection Method* field is set to Internet or Direct Dial. Specifies how communication with the server is controlled. The options are: • Auto — The software automatically establishes a connection when it is needed, and reconnects if an existing connection is lost. • Manual — You must manually connect to the external source whenever you want to use real-time external source corrections. To connect or disconnect, tap the Ext Source button in the main screen of the Setup section (see page 51).
Real-time Protocol	RTCM	The type of real-time correction messages the external source is transmitting. This is RTCM (Radio Technical Commission for Maritime Services), a standard format for transmitting differential GPS corrections from a base station to roving GPS receivers.
Station ID	Any	Select the reference station you want to use to compute real-time corrections from. Select Any to use any available station, or enter a station ID number between 0 and 1023.

Connection Properties form

Use the *Connection Properties* form to set up connection properties for the modem you are using when you connect to the external correction source using a direct dial connection.

To open the *Connection Properties* form, tap the Setup button  next to the *Modem type* field in the *External Source Settings* form.

Table 4.27 Modem connection properties

Field	Description
Baud Rate	The baud rate that the GPS receiver and modem communicate at.
Data Bits	The number of data bits used when the modem and the GPS receiver communicate.
Parity	The parity setting when the GPS receiver and the modem communicate.
Stop Bits	The number of stop bits used when the modem and the GPS receiver communicate.
Flow Control	The method used to control the communication. The options are hardware, software, or none.
Dialing Options	Select the appropriate dialing option.
Call Options	Select the appropriate call option

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  next to the *Port* field in the *External Source Settings* form.

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

Table 4.28 Serial Port Settings form: Fields

Field	Default	Description
Port Configuration	Custom	The communication settings for the selected port. There is an option for each communications protocol (NMEA, RTCM, and TSIP) and 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 device's current settings. If this is the case, or if the device you want to use is not listed, select the Custom option. The following fields become available and you can select customized port settings.
Baud Rate	9600	This field is read-only unless you select Custom in the *Port Configuration* field. The baud rate that the field device and external source communicate at.
Data Bits	8	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 the field computer communicate.
Stop Bits	1	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 the field computer communicate.
Parity	None	This field is read-only unless you select Custom in the *Port Configuration* field. The parity setting when the field computer and the external source communicate.

Note – *The settings in this form must match the settings used by the field computer. For information on communication settings, refer to the documentation provided with the field computer.*

Receiver Port Settings form

Use the *Receiver Port Settings* form to configure communication settings when an external correction source is connected to a port on the receiver.

To open the *Receiver Port Settings* form, tap  next to the *Connection* field in the *External Source Settings* form.

Table 4.29 Receiver Port Settings form: Fields

Field	Default	Description
Receiver Port	Port 1	The port on the GPS receiver that the external device is connected to.
Port Configuration	Custom	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 device's current settings. If this is the case, or if the device you want to use is not listed, select the Custom option. The remaining fields become available and you can select customized port settings. If the external device allows you to configure port settings, the preset values may not match the current settings on 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.
Baud Rate	9600	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.
Data Bits	8	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.
Stop Bits	1	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.
Parity	None	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.

Integrated Beacon Settings form

Use the *Integrated Beacon Settings* form to configure settings that are specific to an integrated beacon real-time correction 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 4.30 Integrated Beacon Settings form: Fields

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

Integrated Satellite Settings form

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

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

Table 4.31 Integrated Satellite Settings form: Fields

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

Integrated SBAS Settings form

Use this 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 4.32 Integrated SBAS Settings form: Fields

Field	Description	
Tracking Mode	Specify the tracking mode. The options are:	
	• Auto	The receiver tracks or locks on to the most powerful satellite signal. The receiver uses its longitude to determine which SBAS system to track: • Wide Area Augmentation System (WAAS) satellites are tracked in the Continental United States including Alaska, and in the southern parts of Canada • European Geostationary Navigation Overlay Service (EGNOS) satellites are tracked in Europe • MTSAT Satellite-based Augmentation System (MSAS) satellites are tracked in Japan
	• 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.
State	In custom mode, select specific SBAS satellites and then select the following options:	
	• Disabled	The satellite is disabled.
	• Enabled, Heed Health	The real-time source is only used if the information is flagged as healthy by the SBAS provider.
	• 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.

About section

The About section displays version and copyright information about the GPS Controller software.

APPENDIX

A

NMEA Messages

In this appendix:

The NMEA standard, developed by the National Marine Electronics Association, defines a format for communicating data collected or computed by the GPS receiver to external devices. You can use the GPS Controller software to configure a supported GPS receiver to output NMEA messages. This appendix describes the NMEA messages that can be configured from the GPS Controller software.

All NMEA messages conform to the NMEA-0183 Version 2.0 format. All begin with $ and end with a carriage return and a line feed. Data fields follow comma (,) delimiters and are variable in length. Null fields still follow a comma delimiter but contain no information.

The optional checksum field is the last field in a message and follows the asterisk (*) delimiter. The checksum is the 8-bit *exclusive* OR of all characters in the message, including the commas, between but not including the $ and asterisk delimiters. The hexadecimal result is converted to two ASCII characters (0–9, A–F). The most significant character appears first.

For an example of an NMEA message, see Common message elements, page 68.

Supported NMEA messages

The supported messages are:

Message	Description
GGA	Time-, position-, and fix-related data
GLL	Position fix, time of position fix, and status
GSA	GPS receiver operating mode, SVs used for navigation and DOP values
GSV	Number of visible SVs, PRN numbers, elevation, azimuth, and SNR values
RMC	Recommended minimum specific GPS/TRANSIT data
VTG	Actual track made good and speed over ground
ZDA	UTC day, month, year, and local time zone offset.

Common message elements

Each message consists of:

- A message ID consisting of *$GP* followed by the message type. For example, the message ID of the ALM message is *$GPALM*
- A comma
- A number of comma-separated fields, which depend on the message type
- An asterisk
- A checksum

Here is an example of a simple message with six fields plus the message ID and checksum:

$GPZDA,004405.25,30,09,1994,00,00*6B

Latitude and longitude

Latitude is represented as *ddmm.mmmm* and longitude is represented as *dddmm.mmmm*, where:

- *dd* or *ddd* is degrees
- *mm.mmmm* is minutes and decimal fractions of minutes

Direction

Direction—north, south, east, or west—is represented by a single character: *N*, *S*, *E*, or *W*.

Time

Time values are presented in Universal Time Coordinated (UTC) and are represented as *hhmmss*, where:

- *hh* is hours, from 00 to 23
- *mm* is minutes
- *ss* is seconds

Messages

The following NMEA-0183 messages can be produced.

GGA: Time-, Position-, and Fix-Related Data

$GPGGA,004407.00,3723.477595,N,12202.251222,W,2,07,1.2,19.1,M,-25.7,M,3,0003*55

The fields include:

- UTC of position fix
- Latitude
- Direction of latitude (N or S)
- Longitude
- Direction of longitude (E or W)
- GPS quality indicator:
  - 0 = fix not valid
  - 1 = GPS fix
  - 2 = Differential GPS fix
- Number of SVs in use, 00 to 12
- Antenna height, MSL reference
- *M* is fixed text indicating that altitude is measured in meters
- Geoid separation
- *M* is fixed text indicating that geoid separation is measured in meters
- Age of differential GPS data record, Type 1 or Type 9, null when DGPS not used
- Reference station ID, 0000 to 1023, null when *any reference station ID* is selected and no corrections have been received

GLL: Position Fix, Time of Position Fix, and Status

$GPGLL,3723.477595,N,12202.251222,W,004407.00,A*1E

The fields include:

- Latitude
- Direction of latitude (N or S)
- Longitude
- Direction of longitude, (E or W)
- UTC of position
- Status: Fixed text A, indicates that data is valid

GSA: GPS Receiver Operating Mode, SVs used for Navigation, and DOP Values

$GPGSA,A,3,25,15,01,14,29,21,20,,,,,,1.9,1.2,1.5*30

The fields include:

- Fix Mode:
  - M = Manual, forced to operate in 2D or 3D
  - A = Automatic, 3D/2D
- Fix Status:
  - 1 = Fix not available
  - 2 = 2D
  - 3 = 3D
- Fields 3 to 14 = PRNs of SVs used in position fix (null for unused fields)
- Field 15 = PDOP
- Field 17 = VDOP

GSV: Number of Visible SVs, PRN Numbers, Elevation, Azimuth, and SNR Values

$GPGSV,2,1,08,01,32,054,47,14,33,308,45,15,61,261,
52,20,07,054,41*7F

The fields include:

- Total number of messages of this type in this cycle
- Message number
- Total number of visible satellites
- SV PRN number

- Elevation in degrees, 90
- Azimuth, degrees from true north, 000
- SNR (C/N_0) 00 to 99 dB, null when not tracking
- 8 to 11 = Information about second SV, same format as fields 4 to 7
- 12 to 15 = Information about third SV, same format as fields 4 to 7
- 16 to 19 = Information about fourth SV, same format as fields 4 to 7

RMC: Recommended Minimum Specific GPS/TRANSIT Data

$GPRMC,004407.00,A,3723.477595,N,12202.251222,W,1.2,7.4,071196,2.0,E*hh

The fields include:

- UTC of position
- Status: Fixed text A, indicates that data is valid
- Latitude
- Direction of latitude (N or S)
- Longitude
- Direction of longitude (E or W)
- Speed over ground in knots
- Track made good in degrees True
- UT date
- Magnetic variation degrees (Easterly var. subtracts from true course)
- E or W
- Checksum

VTG: Actual Track Made Good and Speed Over Ground

$GPVTG,7.4,T,,,000.1,N,000.1,K*2E

The fields include:

- Track made good
- Fixed text T indicates that track made good is relative to true north
- Fields 3 and 4 are null, not used
- Speed over ground in knots
- Fixed text N indicates that speed over ground is in knots
- Speed over ground in kilometers per hour (km/h)
- Fixed text K indicates that speed over ground is in km/h

ZDA: UTC Day, Month, Year, and Local Time Zone Offset

$GPZDA,004405.25,30,09,1994,00,00*6B

The fields include:

- Time, in UTC
- Day, 01 to 31
- Month, 01 to 12
- Year
- Local time zone offset from GMT, 00 to 23
- Local time zone offset from GMT in minutes

Together, fields 5 and 6 yield the total offset. For example, if field 5 is –5 and field 6 is –15, local time is 5 hours and 15 minutes earlier than GMT.

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