Stratus Help Contents

Basic Survey Steps with Stratus

The Stratus system is used to calculate the precise vector(s) between two or more points by simultaneously recording GPS observations at each end of the baseline.

The following steps take you through a basic survey quick start that briefly introduces the hardware and software components in the Stratus system:

P:\RELEAS~1\HELPFI~1\STRATU~1\NATIVE~1\STRATU~1\home.gif

Plan your Survey

Planning your survey is a very important step towards receiving quality data. Before heading out to survey, you should follow these steps to ensure that you are surveying an area with minimum obstructions at the appropriate time.

In the field

1. Visit the survey site prior to the survey time to see if there are any obstructions on the site.

   ✉ **Note:** It is important that the survey site provides clear visibility of the sky in as many directions as possible (in other words, that it is relatively free from obstructions). Minimally, you should be able to track four satellites for static survey and five for kinematic.

2. Use your GPS field book to record any obstructions, and their degree of elevation, for entry later in the *Planning* software.
3. Determine where your survey points might be for an idea of the expected baseline lengths.

At the office

5. Launch the *Planning* software. For detailed instructions on using this software, refer to your *Planning Reference Manual*.
6. Make sure the *Planning* software has a recent almanac (no more than 30 days old). See the *Planning Reference Manual*.
7. Enter your obstructions into the *Planning* software. *Planning* will use the almanac to look at the obstructions in relation to where the satellites are positioned in the sky. From this analysis, Planning will report and illustrate the most opportune time to survey.
8. Decide on the type of survey: static or kinematic. Static surveys require longer periods of occupation to

provide centimeter level results (20 - 60 minutes). It is not necessary to interact with the Stratus receiver to collect static data. Kinematic surveys require short occupations (seconds -5 minutes) but with a moderate reduction in accuracy.

9. Determine the occupation time required at each survey point by analyzing the satellite position, obstructions present, baseline lengths, and the type of survey. For information on occupation times, see your *Stratus Operations Manual.*

P:\RELEAS~1\HELPFI~1\STRATU~1\NATIVE~1\STRATU~1\home.gif

Conserve Controller Power and Memory

Allocating memory

You can specify how much of the memory available on your data collector you want to be used to run programs such as Stratus controller or to use for data storage.

To provide more space on the controller for your survey information, allocate more memory for storage. Experiment with the memory allocation to find a setting that is suitable for your needs.

To access memory settings, select **Start** | **Settings** | **System** from the ***Explorer*** menu and choose the **<Memory>** icon. Adjust the slider bar as necessary to allocate memory.

Conserving battery power

There are several steps you can take to ensure that you get the most surveying time out of your data collector in the field. Use your Windows CE Help to walkthrough the following energy saving suggestions.

- Make sure that your data collector is fully charged before proceeding to the field.
- Turn off the backlight unless it is absolutely necessary, or if available, set the backlight to power down automatically when the data collector is idle.
- Consider removing CompactFlash™ or other memory cards if you have their option but do not need their services.
- If possible, set your data collector to automatically sleep when it is idle. This will not interfere with Stratus controller surveying processes. The software will pick up where it left off when you use your data collector.

P:\RELEAS~1\HELPFI~1\STRATU~1\NATIVE~1\STRATU~1\home.gif

Collect Data

Once you have setup your survey, you will be ready to collect data. The Stratus receiver is a versatile GPS device that enables you to collect data in two ways: *with receiver only* and *with receiver and handheld controller*.

Receiver only

Without a handheld, you can only collect static data. Follow the steps in Static Survey Workflow - Without a Controller, for instructions on collecting data with the receiver.

Receiver with controller

Using a handheld, you can collect both static and kinematic survey data. The controller interacts with the receiver via infrared (IR) communications.

Follow these steps to use the handheld with the receiver to collect data:

1. Create a new survey job (see Create a New Job).

2. Review the GPS status (see GPS Status).

3. Perform survey: If you are performing a static survey, follow the steps in Static Survey Workflow - With a Controller. If you are performing a kinematic survey, follow the steps in Kinematic Survey Workflow.

4. Transfer observation information from the controller to the receiver.

P:\RELEAS~1\HELPFI~1\STRATU~1\NATIVE~1\STRATU~1\home.gif

Post-Process your Survey

When you finish surveying in the field, you need to transfer your raw data into a post-processing software (such as Sokkia's *Spectrum Survey*) to determine your unknown coordinates.

Transfer data into Spectrum Survey

The following steps will help your transfer data from your receiver to Spectrum Survey:

1. Turn on your receiver and PC.

2. Attach the serial cable to the receiver and to the PC (usually COM1 port). See your *Stratus Operations Manual* for information on the Power/Communications Port.

3. Launch *Spectrum Survey* on your PC and start a new project.

4. On the Project Startup dialog box, select Download, or if that dialog box does not appear, select **File** | **Send/Receive** from the *Spectrum Survey* main menu. The ***Download/ Upload*** dialog box will display.

5. Choose **Stratus Receiver** from the ***Device type*** drop down list, or double-click the **<Stratus>** icon.

6. Click <**Settings**> to make sure that communication settings are correct. A 115,200 baud rate is suggested.

7. Click <**OK**> to accept settings and return to the ***Download/ Upload*** dialog box.

8. Click <**Connect**> to establish communication with the receiver.

9. In the ***Local Machine*** window, select the path on your PC to save your files.

10. Select the data files you wish to transfer from the receiver list in the ***Device*** window and click the <<-> button. The data files will be copied from the receiver to the designated directory.

✉ **Note**: If communication between the receiver and the PC is interrupted during transfer, you must reconnect to the receiver and start the process again.

11. Select <**Disconnect**> at the bottom of the ***Device*** window after the files have been copied.

12. Repeat steps 3 - 11 until all data has been transferred from your Stratus receivers to your PC.

✉ **Note:** In the case of a kinematic survey, you will also need to download files from the handheld controller. The process is the same as downloading from the receiver, except that you would choose **Stratus Handheld** from the ***Device Type*** window.

13. To import these files into your Spectrum Survey project, select **File | Data File Manager** from Spectrum Survey's main menu. The ***Data File Manager*** dialog box will appear.

14. Click **<Import>** to open the ***Import Observations and Ephemeris*** dialog box.

15. If your files are not displayed in this dialog box, use the **Look In** drop down list to navigate to the directory where you saved your stratus files.

16. Select your files and click **<Open>** to import them into the ***Data File Manager*** dialog box.

17. Click **<OK>** to import the files into your project.

✉ **Note:** Complete instructions for using Spectrum Survey are found in the *Spectrum Survey Reference Manual*.

18. Use Spectrum Survey to process your survey baselines.

P:\RELEAS~1\HELPFI~1\STRATU~1\NATIVE~1\STRATU~1\home.gif

Create a New Job

The Stratus controller records your survey information in survey jobs. Each job consists of one or more observation files which can either be static or kinematic data.

Observation settings can be edited, updated, and applied to the receiver at any time during a session until the observation ends.

✉ **Note:** During a static or kinematic survey, the data you collect is placed into observations on the receiver. The settings for these observations can be modified with the controller, and then saved on your controller in a job file. If you prefer to keep each observation setting in an individual file, you must set that up in your receiver setup.

For more information:

Create a Static Job

Create a Kinematic Job

P:\RELEAS~1\HELPFI~1\STRATU~1\NATIVE~1\STRATU~1\home.gif

Setup your Static/Base Receivers

When the survey time arrives, perform the following steps to setup your survey system in the field.

1. Firmly mount the receiver on a fixed height tripod (or on a traditional tripod with a tribrach and adapter).
2. Position the tripod and receiver over a known point.
3. Orient your antenna (see below).
4. Level the tripod.
5. Measure the antenna height (see Measure Antenna Height).
6. Turn on the receiver to complete the setup. Upon acquisition of satellites, the receiver will begin to collect data.

Orient your antenna

The orientation marker (a small triangle), is located on the top of the Stratus receiver, at the antenna measuring point above the battery compartment. Use this marker to orient your antenna with respect to the North.

✉ **Note:** It is recommended that Stratus receivers used together should be oriented in the same direction.

P:\RELEAS~1\HELPFI~1\STRATU~1\NATIVE~1\STRATU~1\home.gif

Receiver Information

Main Menu | Receiver Setup

Throughout the data collection process, you may need to view or change certain receiver configuration settings to meet the needs of your particular project.

Use the ***Receiver Setup*** dialog box to modify observation file and receiver settings, or to turn off or reset the receiver.

On this dialog box are three tabs:

Observation Tab

Receiver Tab

Reset Tab

Use these tabs to:

- change or apply observation settings that control how data is collected
- verify receiver information and status
- reset the receiver to its factory default settings
- shut off the receiver with the controller

When you are finished entering information into these tabbed pages, tap **<OK>** to return to the ***Main Menu***.

P:\RELEAS~1\HELPFI~1\STRATU~1\NATIVE~1\STRATU~1\home.gif

Observation Tab

Use the ***Observation*** tab to create or change general receiver observation settings.

The fields on this tab are analogous to the fields on the Static Survey dialog box.

The ***Observation*** tab also displays several buttons. When finished entering data, tap:

<Start>

To begin a new observation. The controller will synchronize with the receiver to start recording epochs.

<OK>

If you do not want to keep these settings.

<Set>

To apply the settings to the current receiver observation file. The controller will synchronize with the receiver to transfer the current receiver settings.

✉ **Note:** When you tap **<Start>** or **<Set>**, the ***Synchronize*** dialog box will display instructions to apply settings to the receiver via the IR port or serial cable, depending on your port selection. See Modify Unit Settings. Observations started on the ***Observation*** tab are stopped on the ***Receiver*** tab.

P:\RELEAS~1\HELPFI~1\STRATU~1\NATIVE~1\STRATU~1\home.gif

Reset or Turn Off the Receiver

To reset your receiver settings, or turn off the receiver, tap on the ***Reset*** tab in the ***Receiver Setup*** dialog box.

This tab has two buttons:

<Power Off>

Tap this button to turn off the receiver. To manually turn off your receiver, see your *Stratus Operations Manual*.

<Reset>

Tap this button to return the receiver to its factory default settings. The receiver will beep and the middle three LEDs of each status indicator will blink for two seconds.

✉ **Note:** Your observation files will not be deleted when you reset the receiver.

P:\RELEAS~1\HELPFI~1\STRATU~1\NATIVE~1\STRATU~1\home.gif

Numeric Keypad

The **<Numeric Keypad>** button is located next to fields that require numeric input. The keypad enables you to enter positive and negative numbers into the field.

The keypad is opened by tapping the keypad icon.

When you click this icon, a numeric entry dialog box will appear.

✉ **Note:** Alternatively, you can use the keyboard to enter numeric data in a field.

The numeric entry dialog box contains an edit field to display your data, number buttons, and buttons to correct or clear your data.

The Numeric Keypad dialog box includes the following keys:

Bksp

Backspace in the information field.

Clear

Clear the information field.

Cancel

Exit the Numeric Keypad without saving information in it.

OK

Click this button to return to the previous dialog box. The number you entered in the numeric entry dialog box will appear in the field associated with the keypad button that you selected.

P:\RELEAS~1\HELPFI~1\STRATU~1\NATIVE~1\STRATU~1\home.gif

Controller Main Menu

When you open the Stratus Controller software on your Windows® CE device the ***Main Menu*** dialog box appears. Use the Main Menu to navigate throughout the software. You will find the following options available on the Main Menu dialog box:

Static Survey

If you tap this button you can create, modify, view, and save a static survey in the ***Static Survey*** dialog box.

Kinematic Survey

If you tap this button you can create, modify, view, and save a kinematic survey in the ***Kinematic Job*** dialog box.

GPS Status

In the ***GPS Status*** dialog boxes you can view your satellite conditions and synchronize with your satellites.

Receiver Setup

In the ***Receiver Setup*** dialog boxes you can review receiver information, change observation settings, and reset the receiver settings to the company default settings.

About

Click this button to view technical information about the software including version and ID number.

Receiver Files

The ***Receiver Files*** dialog box displays a list of GPS data files available in the receiver's internal memory. In this dialog box you can update files or delete them.

Files on Controller

The ***Files on Controller*** dialog box displays the four file types that the Stratus software creates for you to use. You can access files that you have already created to edit or delete them.

Controller Setup

In the ***Controller Setup*** dialog box you can adjust your unit settings.

P:\RELEAS~1\HELPFI~1\STRATU~1\NATIVE~1\STRATU~1\home.gif

Synchronize with the Receiver

Communication between the controller and receiver takes place when settings are applied, status information is updated, or site information is entered. Information on the controller can quickly be transferred to the receiver, and vice versa, using the infrared (IR) port.

Because information is not constantly flowing between the controller and the receiver, continuous IR communication is unnecessary. Whenever you make changes on the data collector that require the receiver to be updated or synchronized, the controller will display the ***Synchronize*** dialog box.

For synchronization to work, ensure that the controller is at maximum 1m (3ft.) away from the receiver, but optimally 30-61cm (1-2ft.) away. Also make sure that the controller's IR port is pointing at the receiver's IR port.

During synchronization, the ***Synchronize*** dialog box will display messages, both on the screen and audibly, to guide you through the process.

If you decide to use the receiver with the controller to configure and initiate data collection, a communication link will be established between the receiver and controller during synchronization. Once established, the handheld will control the behavior of the receiver.

✉ **Note:** Although the controller transfers most settings to the receiver, it is unable to transfer personal notes. You will have to transfer these files directly from the controller to your PC. For instructions, see your *PDA reference manual*.

P:\RELEAS~1\HELPFI~1\STRATU~1\NATIVE~1\STRATU~1\home.gif

End an Observation

At the bottom of an observation's Receiver tab is a button labeled **<Stop>**. Once an observation begins, you must tap **<Stop>** to end the observation. The ***End Observation*** dialog box will open.

Select one of the four available buttons:

End Observation on Receiver

If you are finished with the current observation, but you would like to begin another, tap this button.

The controller will synchronize with the receiver to close the observation, and when successful, you will be returned to the appropriate *Observation* or *Setup* dialog box.

End and Shutdown Receiver

This is the suggested method. If you are finished with the current observation, and you want to shut down the receiver, tap this button.

The controller will synchronize with the receiver to close the observation, the receiver will turn off, and you will be returned to the appropriate *Observation* or *Setup* dialog box.

***End without Linking**

If you would like to end the current observation without linking to the receiver, tap this button. In this case, you will need to shut down the receiver(s) manually.

Return

If you accidently tapped the <**Stop**> button on the ***Receiver*** tab, tap this button to return to the previous dialog box.

✉ *This will not appear if you are exiting through the ***Receiver Setup*** dialog box.

P:\RELEAS~1\HELPFI~1\STRATU~1\NATIVE~1\STRATU~1\home.gif

Add Static Observation

Main Menu | Static Survey | Add

Once you have created or opened an existing job, you can create new static observations, or review existing observations.

Tap **<Add>** on the ***Static Survey*** dialog box to open the ***Add Static Observation*** dialog box.

Populate the ***Add Static Observation*** dialog box with the information for your survey.

The following fields are available:

Point ID

Record a meaningful survey point ID in this field. Use the keyboard at the bottom of the dialog box, or select an ID from the drop-down list (if applicable).

Ant. Height

Tap **<Keypad>** to enter the height of your antenna (see Measure Antenna Height).

Ant. Method

This field determines how you are going to measure the vertical offset of the receiver itself. Select one of three antenna measurement methods: **Slant**, **Vertical**, and **True Vertical**. For more information see Measure Antenna Height.

Desc

Type in this field any descriptions about the static job, or select a predefined description from the drop-down list. For more information on defining descriptions, see Load Descriptions.

Rec. Interval (sec)

Enter the rate at which you want to store the raw observations to the receiver (this should match all of your other receivers). Tap **<Keypad>** to set the number of seconds the receiver will wait between each reading (for more information see Static and Base Setup).

Elev. Mask (deg)

Tap **<Keypad>** to set the number of degrees from the horizon that the receiver will disregard satellite information.

<Start>

Transfer observation settings to the receiver and begin collecting data for a new file in the receiver.

<Set>

Save updated information to the currently active file on the receiver.

<Cancel>

Tap to exit the ***Add Static Observation*** dialog box without synchronizing with the receiver or saving changes.

When you finish entering your information, aim the controller at the receiver and tap **<Start>** to open the ***Synchronize*** dialog box. Your data and commands will be transferred to the receiver. You could also tap **<Set>** to use the existing file.

✉ **Note:** When you tap **<Start>** or **<Set>**, you will be asked to supply the antenna height if you have not done so already.

✉ **Note:** If the receiver is already recording an observation that has been set by a controller, you may be prompted to *confirm new observation*. Respond **<OK>**.

When the synchronization is complete (after all data is transferred) the ***Static Observation*** dialog box will appear displaying three tabs:

- **Receiver**
- **Observation**
- **Note**

When you are finished with the information on the tabs, tap **<OK>** to close the ***Static Observation*** dialog box and return to the ***Static Survey*** dialog box.

You can now **<Add>** further observations to the survey job.

✉ **Note:** For every static observation you create by **<add>**, you need to synchronize to your receiver(s).

When you are finished adding observations, you can exit this dialog box by tapping **<OK>**. The ***End Survey*** dialog box will appear. For an explanation of the choices see End a Survey Job.

For more information:

Receiver Tab

Observation Tab

Note Tab

P:\RELEAS~1\HELPFI~1\STRATU~1\NATIVE~1\STRATU~1\home.gif

Working with Files on Controller

Main Menu | Files on Controller

In the ***Files on Controller*** dialog box, accessed by tapping **<Files on Controller>** from the ***Main Menu***, you can do the following:

View jobs on receiver

Open existing observations

End existing observations

Delete jobs

View Jobs on Receiver

To access job files that you have previously created, tap **<Files on Controller>** from the ***Main Menu***. The ***Files on Controller*** dialog box will open and display, by default, all the files located on your controller that can be opened by the Stratus software.

If you want to narrow which files are displayed in this dialog box, use the **Type** drop down list to change the

display from **All Files** to one of the following:

- Static Job Files (*.sta)
- Kinematic Job Files (*.kin)
- Receiver Files (*.str)
- Description Libraries (*.txt)

Open Existing Observation

It is possible to set the receiver to collect data for an observation even while the ***Static Observation*** or ***Kinematic Job*** dialog boxes are closed. In such a case, you may want data to be collected over a long period of time before you **<Stop>** the data collection.

To access an observation file that is currently recording on the receiver, tap the **<Files on Controller>** icon, located on the ***Main Menu*** to open the ***Files on Controller*** dialog box.

Tap to select the file that contains your observation, and tap **<Open>** to open the ***Static Survey*** dialog box.

✉ **Note:** Although the following explains how to open an existing static observation, the instructions are the same for opening an existing kinematic observation.

The observation is displayed in the main window of the ***Static Survey*** dialog box. The **Stop** column displays the number of epochs that have been collected since the **Start** time indicated.

End Existing Observation

If you have enough data collected, and you want to end the observation, follow these steps:

1. Tap on the observation file to automatically open the ***Static Observation*** dialog box.
2. On the ***Receiver*** tab, tap **<Stop>**.
3. The End Observation dialog box will automatically appear.
4. When the observation ends, you will be returned to the ***Static Survey*** dialog box. Notice that the information under the **Stop** column now displays the time that the observation was stopped.
5. To close this dialog box, tap **<OK>**. The End Survey dialog box will automatically appear.
6. Use the ***End Survey*** dialog box to continue to collect observations.

Delete Job

To delete a job(s) from your controller, tap **<Files on Controller>** from the ***Main Menu*** to open the ***Files on Controller*** dialog box.

The main window on this dialog box displays all the jobs that are currently on your controller.

As well, the following buttons are displayed:

<Delete>

To delete a job, select it from the list of files and tap this button.

<Select All>

To delete all the files on the controller at once, tap this button to select all the files, then tap **<Delete>**.

<Open>

If you are unsure if you want to delete a particular job, and it was created on the controller (*.kin or *.sta file), you can open the job to look at it before deleting it. Tap the file to select it, then tap **<Open>** to view the job.

P:\RELEAS~1\HELPFI~1\STRATU~1\NATIVE~1\STRATU~1\home.gif

Glossary

Almanac

An almanac is a data file that contains the approximate orbit information of all satellites. This information takes around 20 - 60 minutes to transfer from a GPS satellite to a GPS receiver. When the GPS receiver receives the information, rapid satellite signal acquisition becomes possible. The acquisition time on receiver start-up is significantly faster when aided by a current almanac. The approximate orbital data is used to preset the receiver with the approximate position and carrier Doppler frequency (the frequency shift caused by the rate of change in range to the moving satellites) of each satellite.

Almanac age

Almanac age represents the number of days that have passed since the almanac file was received. It is recommended you use a recent almanac, usually no more than 60 days old.

Antenna height

The antenna height is the distance between the position of the observed point and the phase center of the GPS antenna.

Antenna measuring points

The antenna measuring points are located around the circumference of the receiver. Use them to measure the height of the antenna from the ground.

Antenna slots

Four raised squares located around the circumference of the top of the receiver. Use these slots to hold the Height Measurement Ring in place.

Assumed known point

A point whose coordinates are to be considered "known" for the purpose of calculating relative positions in a survey.

Azimuth

The angle (in a clockwise direction) between the north and the location of the satellite.

Baseline

The three-dimensional vector distance between a pair of stations for which simultaneous GPS data has been collected and processed with differential techniques. The most accurate GPS result.

Base receiver

A receiver in a kinematic survey that serves as the known point (or assumed known point) on a baseline. This receiver provides control for the survey network.

Base station

In differential positioning, a base station is the end of the baseline that is assumed known and its position fixed.

Differential positioning

Determines the relative coordinates using two or more receivers that are simultaneously tracking the same satellites. Dynamic differential positioning is a real-time calibration technique achieved by sending corrections to the roving user from one or more reference stations. Static differential GPS involves determining baseline vectors between pairs of receivers.

Dilution of precision (DOP)

The geometry of the visible satellites is an important factor in achieving high quality results. The geometry changes with time due to the relative motion of the satellites. An accuracy measure for the geometry is the Dilution of Precision (DOP) factor.

DOP is a description of the effect of satellite geometry on position and time computations. Values that are considered to be 'good' are small, approximately 3. Values greater than 7 are considered poor. Thus, a small DOP is associated with widely separated satellites. Standard DOP terms for GPS include:

• GDOP (Geometric Dilution of Precision) is a composite measure reflecting the effects of satellite geometry on position and time computations.

• PDOP (Position Dilution of Precision) reflects the effects of satellite geometry on position computation.

• HDOP (Horizontal Dilution of Precision) reflects the effects of satellite geometry on the horizontal component of the position computation.

• VDOP (Vertical Dilution of Precision) reflects the effects of satellite geometry on the vertical component of the position computation.

• TDOP (Time Dilution of Precision) reflects the effects of satellite geometry on the time computation.

Elevation mask angle

An adjustable feature of GPS receivers that specifies a satellite must be at least a specified number of degrees above the horizon before the signals from the satellite are to be used. Satellites directly overhead have a 90º elevation. Satellites at low elevation angles (five degrees or less) have lower signal strengths and are prone to loss of lock thus causing noisy solutions.

Ephemeris

A list of (accurate) positions or locations of a celestial object as a function of time broadcast by a satellite. Available as *interruption ephemeris* or as post-processed *precise ephemeris*. This positional data is used for subsequent calculations.

Epoch

Time stamp for a measurement interval or data frequency, Example: 15 seconds or 30 seconds. See also *recording interval*.

Firmware

The firmware is the electronic heart of a receiver where coded instructions relating to receiver function and

data processing algorithms are stored for operation.

GDOP

See *Dilution of Precision*.

Global Positioning System (GPS)

GPS is a passive, satellite-based navigation system operated by the Department of Defense. Its primary mission is to provide passive global positioning/navigation for land-, sea- and air-based operations. GPS consists of the following:

- space segment (up to 24 NAVSTAR satellites in 6 different orbits)
- control segment (5 monitor stations, 1 master control station and 3 upload stations)
- user segment (GPS receivers)

NAVSTAR satellites carry extremely accurate atomic clocks and broadcast coherent simultaneous signals.

GPS time

GPS time is an atomic time system that is related to International Atomic Time in the following manner:

International Atomic Time (IAT) = GPS + 19.000 sec.

HDOP

See *Dilution of Precision*.

Height measurement ring

A ring used to measure the correct distance between the Stratus receiver's antenna and the ground. The ring rests on the top of the receiver's antenna, in between the antenna slots. On it's outer rim are four measuring points you can place the tip of your tape measure.

When using a HI tape measure, place the Height Measurement Ring on the receiver right side-up. Hook it's clip on an antenna measuring point on the side of the measurement ring with writing on it.

When using a generic tape measure, place the Height Measurement Ring on the receiver upside-down. Hook it's clip on an antenna measuring point on the side of the measurement ring without writing on it.

HI

Height of Instrument. See also *antenna height*.

HI tape measure

A tape measure with a modified tape that takes into account the length of the tape body and point.

Kinematic survey (stop-and-go)

Kinematic surveys require occupations as short as a few seconds, but with a moderate reduction in accuracy. During kinematic surveys, a Stratus base station records control data over a known point while one or more rovers takes brief GPS readings at each unknown position.

GPS data is collected while rovers are stationary or in motion. The data is later processed. Each point where the rover position is fixed yields an accurate measurement. Because many points may be quickly surveyed,

kinematic surveying allows for high productivity and is useful for surveys that require a large number of points over a local region (topographic, as-built surveys). Kinematic surveying requires a Stratus Controller.

Note: Kinematic surveys typically require initialization time.

Known point

A known point is a point whose coordinates have been determined to the required accuracy.

L1

L1 is the primary L-band signal radiated by each NAVSTAR satellite at 1575.42 MHz. The L1 signals modulated with the C/A and P codes, and with the NAV message.

Multipath

Multipath is the reception of a satellite signal both along a direct path and along one or more reflected paths. The reflected signals are caused by reflecting surfaces near the GPS antenna. The multipath signal results in an incorrect pseudorange measurement. The classical example of multipath is the ghosting that appears on television when an airplane passes overhead.

Observation

An observation occurs when you record (GPS) data at a site. An example usage of the term would be, 'The observation at point 0001 lasted 1 hour'. Observation is usually interchangeable with the term occupation.

Obstruction

An obstruction is a physical feature that blocks the satellite direct line of site from the point of observation. GPS signals are very weak. They can be blocked from reaching the GPS antenna by objects between the antenna and the satellites. Classic examples of obstructions are trees and buildings.

Occupation

See *observation*.

Orientation marker

A small triangle located on one of the antenna measuring points (located on the top of the receiver). Use this marker to orient your antenna with respect to the North.

Phase center

The phase center of a GPS antenna is the physical location on the antenna where the raw GPS signals are observed. This is the physical location where the computed position will be determined. GPS antennas are manufactured to place the phase center as closely as possible to the physical center of the antenna housing. To determine the position of a survey marker on the ground, the GPS antenna (and thus the phase center) is centered over the marker and the HI is measured to the survey marker for use during processing.

Point ID

the point ID is an alphanumeric identifier for a survey point. Each survey point must have a unique site ID. Otherwise, the processing software will have problems determining which point certain observations belong to. You can enter up to 16 digits in this field

Position dilution of precision (PDOP)

See *Dilution of Precision*.

Post-processing

The reduction and processing of GPS data after the data was actually collected in the field. Post processing is usually accomplished on a computer in an office environment where appropriate software is employed to achieve optimum position solutions.

PPM

Part Per Million

PRN number

Pseudo-Random Noise number used to identify each satellite.

Pseudorange

A measure of the apparent propagation time from the satellite to the receiver antenna expressed as a distance. Pseudorange is obtained by multiplying the apparent signal-propagation time by the speed of light. Pseudorange differs from the actual range by the amount that the satellite and user clocks are offset by propagation delays and other errors.

The apparent propagation time is determined from the time shift required to align (correlate) a replica of the GPS code generated in the receiver with the received GPS code. The time shift is the difference between the time of signal reception (measured in the receiver time frame) and the time of emission (measured in the satellite time frame).

Raw data

Raw data is GPS data which has not been processed or differentially corrected.

Recording interval

This is the time interval between the recording of GPS raw data to the GPS receiver memory. For example, a recording interval of 10 seconds indicates GPS raw data will be stored to the GPS receiver memory once every 10 seconds. See also *epoch*.

Rover

The GPS receiver that moves from point to point during a kinematics GPS survey.

Session

A session is a group of simultaneously collected GPS raw data. For example, if four GPS receivers collected data simultaneously on four points, the entire data set is considered a session. Within a session, GPS vectors can be computed between all points.

Site

This is the location or survey point where GPS data is collected.

Site ID

See *point ID*.

Slant height

This is the distance from the survey marker to the edge of the antenna ground plane. Using the slant height and radius of the GPS antenna, the true vertical height or HI of the antenna can be determined. The HI is used in the processing to determine the location of the survey marker on the ground.

Static surveying

Static surveys are often performed as control surveys or boundary surveys. During static surveys, two or more Stratus receivers are placed at the ends of the baselines being measured and each receiver collects data for a session (15-60 minutes depending on baseline length). This process is repeated for a number of lines yielding a set of connected baselines that form a survey network. Static surveys require longer periods of occupation to provide centimeter level results. It is not necessary to interact with the Stratus receiver to collect static data.

Stop-and-Go Survey

See ***Kinematic***

SV

Space Vehicle or Satellites Visible.

Task bar, Explorer

The task bar is a thin bar at the top of the Windows CE dialog box. On the task bar, you can access the ***Start*** menu, time of day, and other features.

TDOP

See *Dilution of Precision*.

True vertical height

The exact distance from the survey marker to the phase center of the antenna. No offsets apply.

VDOP

See *Dilution of Precision*.

Vector

The spatial line described by 3-D components between two points. In GPS surveying, a vector is the product of processing raw data collected on two points simultaneously.

Vertical height

When measuring the antenna height, the distance from the survey marker to the bottom of the antenna/receiver. The vertical offset added to the vertical height will equal the true vertical height.

P:\RELEAS~1\HELPFI~1\STRATU~1\NATIVE~1\STRATU~1\home.gif

Last Sync

Main Menu | GPS Status | Last Sync tab

On the ***GPS Status*** dialog box, tap the ***Last Sync*** tab to view the time and date that your handheld controller last synchronized with a receiver.

Synchronizing updates the controller with the receiver's GPS status information and timing. For more information, see Synchronize.

The following information is available to you:

Satellites Tracked

Number of satellites within the receivers range.

PDOP

This field description is analogous to the same field on the Sky Plot tab.

HDOP

This field description is analogous to the same field on the Sky Plot tab.

VDOP

Vertical Dilution of Precision represents the vertical geometry of the current satellite locations. Values considered 'good' are small (3 or less); values greater than 7 are considered poor.

PRN

The Pseudo Random Noise identifies the number associated with each satellite.

Azimuth

This field description is analogous to the same field on the Sky Plot tab.

Elevation

Angular distance of a satellite above the horizon.

Last Sync

Lists the time and date that the current receiver was last synchronized with the Stratus controller.

<Link>

This field description is analogous to the same field on the Sky Plot tab.

✉ **Note:** Satellites shown with asterisks after PRN, azimuth, and elevation are visible, but not tracked.

P:\RELEAS~1\HELPFI~1\STRATU~1\NATIVE~1\STRATU~1\home.gif

Satellites

Main Menu | GPS Status | Satellites tab

On the ***GPS Status*** dialog box, tap the ***Satellites*** tab. A graph is displayed that shows how many satellites are available and the PDOP level for your survey.

You should plan your survey to maximize the satellite number available, and minimize the PDOP level.

The graph is setup as follows:

Vertical Axis

Shows the number of satellites and PDOP values. The line at seven indicates a suggested PDOP limit.

Horizontal Axis

Shows the time of day. By default, the time displayed is the current hour with a range of 12 hours. Both ends can be adjusted to a maximum range of 24 hours, with 12 hours before and after the current hour.

The following information is available for you:

Satellite & PDOP Value

Calculates the number of satellites available and the corresponding PDOP value.

Begin Time

Click these arrows to set from which hour you want to view satellite information.

Almanac Age

This field description is analogous to the same field on the Sky Plot tab.

<Link>

This field description is analogous to the same field on the Sky Plot tab.

Satellites Available

Displays the number of satellites your receiver is tracking. Minimally, you want to track at least five satellites.

Min/Max No.

This indicator line divides the graph. Ideally, **Satellites Available** should be shown graphed above this line, and **PDOP** should be shown graphed below this line.

PDOP Bar

This field description is analogous to the **PDOP** field on the Sky Plot tab.

End Time

Click these arrows to set until which hour you want to view satellite information.

P:\RELEAS~1\HELPFI~1\STRATU~1\NATIVE~1\STRATU~1\home.gif

End a Survey Job

You typically end a survey job when you have collected as many observations as you need for your job. To

end a survey job, tap **<OK>** in the Static Survey or Kinematic Job dialog boxes. The ***End Survey*** dialog box will appear

Select one of the four available buttons:

<End Job and Exit>

Tap this button to end your current job, but keep your receiver turned on for the next job. You can also end a job and exit (without synchronizing) by turning off the receiver using its power button.

<End Job, Shutdown Receiver and Exit>

Tap this button to end your job and shutdown any receivers that the controller show are currently operating.

✉ **Note:** Stratus will tell you what receiver(s) to shut down by indicating with the unit's serial number(s).

<Exit without Ending Job>

If your receiver is collecting observation data, but you would like to leave the ***Static Job*** or ***Kinematic Job*** dialog box without stopping the observation, tap this button. The ***Main Menu*** will open for you to browse the controller.

<Return to Survey>

If you accidently tapped **<OK>** in the ***Static Survey*** or ***Kinematic Survey*** dialog box, tap this button to return to the previous dialog box.

P:\RELEAS~1\HELPFI~1\STRATU~1\NATIVE~1\STRATU~1\home.gif

Technical Support

When contacting customer support, have available:

- serial number
- firmware version number
- concise description of the problem

Technical support for this product is purchased it. You also may contact one of available from the distributor where you the Sokkia subsidiaries listed here.

Africa

Sokkia RSA Pty. Ltd.

Centurion, 0046

P.O. Box 7998

Republic of South Africa

Phone +27-12-663-7999

Fax +27-12-663-7998

sokrsa@mweb.co.za

Web www.sokkia.com/Worldwide

Asia

Sokkia Singapore Pte. Ltd.

401 Commonwealth Drive

#06-01 Haw Par Technocentre

Singapore 149598

Phone +65-479-3966

Fax +65-479-4966

sales@sokkia.com.sg

Web www.sokkia.com/Worldwide

Australia

Sokkia Pty. Ltd.

Rydalmere Metro Centre

Unit 29,38-46 South Street

Rydalmere NSW 2116

Australia

Phone +61-2-9638-0055

Fax +61-2-9638-3933

Web www.sokkia.com.au

Canada

Sokkia Corp.

1050 Stacey Court

Mississauga, Ontario

L4W 2X8

Phone +1-905-238-5810

Fax +1-905-238-9383

Web www.sokkia.com

Central & South America

Sokkia Central & South America

1200 N.W. 78 Avenue, #109

Miami, FL, USA 33126

Phone +1-305-599-4701

Fax +1-305-599-4703

sokcsa@worldnet.att.net

Europe

Sokkia B.V.

Businesspark De Vaart

Damsluisweg 1, 1332 EA Almere

P.O. Box 1292, 1300 BG Almere

The Netherlands

Phone +31-36-53-22-880

Fax +31-36-53-26-241

Web www.sokkia.nl

New Zealand

Sokkia New Zealand

20 Constellation Drive

Mairangi Bay, C.P.O. Box 4464,

Auckland 10

New Zealand

Phone +64-9-479-3064

Fax +64-9-479-3066

Web www.sokkia.com.au

U.K.

Sokkia Ltd.

Datum House, Electra Way

Crewe Business Park

Crewe, Cheshire, CW1 6ZT

United Kingdom

Phone +44-1270-25-05-11

Fax +44-1270-25-05-33

Web www.sokkia.co.uk

USA

Sokkia Corporation

16900 W 118th Terrace

P.O Box 726

Olathe, KS 66061

Phone +1-913-492-4900

Fax +1-913-492-0188

Web www.sokkia.com

P:\RELEAS~1\HELPFI~1\STRATU~1\NATIVE~1\STRATU~1\home.gif

Controller Setup

Main Menu | Controller Setup

The controller software enables you to customize Stratus for your local region and project requirements. To access these settings, tap <**Controller Setup**> on the ***Main Menu*** to open the ***Controller Setup*** dialog box.

You can choose settings in the following fields:

Distance Unit

Select whether distances will be displayed in **Feet** or **Meters**.

Time Reference

Select whether survey time will be referenced according to **GPS** or **Local** time (current time).

Port

Choose whether the controller will communicate with the PC using an **IrDA** or **Serial** port.

Tap <**Ok**> in the upper right-hand corner of the dialog box to apply your unit settings.

P:\RELEAS~1\HELPFI~1\STRATU~1\NATIVE~1\STRATU~1\home.gif

GPS Status

Main Menu | GPS Status

Throughout the course of your GPS survey, make certain that GPS satellite conditions are acceptable for collecting usable data. It is common to check the GPS status immediately prior to each static or kinematic survey observation.

✉ **Note:** Although monitoring GPS status can help ensure good survey results, careful survey planning is essential. See Pre-Survey for more information.

To monitor GPS satellite conditions, tap <**GPS Status**> on the ***Main Menu***, or from within the ***Kinematic*** or ***Static*** dialog boxes, tap <**Status**>.

The ***GPS Status*** dialog box will appear displaying three tabs:

- Sky Plot
- Satellites
- Last Sync

P:\RELEAS~1\HELPFI~1\STRATU~1\NATIVE~1\STRATU~1\home.gif

View/Delete Files from Receiver

Main Menu | Receiver Files

The following information explains how to use your controller to view and delete files from the Stratus receiver.

View Files

To access a list of files that are currently stored on your receiver, tap **<Receiver Files>** from the ***Main Menu***. The ***Receiver Files*** dialog box will open enabling you to view the current files on your receiver, or delete them all to free up space on your receiver.

✉ **Note:** For the list of files to appear, please ensure that both the receiver and the controller are powered up and running. If you have not synchronized with the receiver, you must click **<Link>** to obtain the list of files.

When the ***Receiver Files*** dialog box is updated, you can view the details of each file by tapping on it to select it. The right side of the dialog box will update to display the properties for the selected file.

The fields on this dialog box are analogous to those found on the Add Static Observation dialog box.

The *Receiver Files* dialog box displays several buttons:

<Link>

To make sure that the list of files on the controller accurately reflects the files on the receiver, you should synchronize the two devices.

To synchronize, aim the controller at the receiver and tap the **<Link>** button. The controller will synchronize with the receiver, and the receiver files will appear in the dialog box.

<Select All>

Tap this button to automatically select every file displayed in the dialog box.

✉ **Note:** After you tap **<Select All>**, the button will change to read **<Desel. All>**. Now when you tap this button, all files will automatically be deselected. This button automatically toggles between **<Select All>** and **<Desel. All>**.

<Copy>

Tap this button to copy the selected file(s) from the receiver to the controller.

Performing the copy enables you to copy any needed files to your controller before deleting them off the receiver to make space. Files that have not been copied from the receiver are identified by an asterisk (*****) symbol next to the file name.

Delete Files

<Delete All>

To delete all files from the receiver, aim the controller at the receiver and tap **<Delete All>**. The Synchronization dialog box will open.

Once the controller has synchronized with the receiver, the files will be deleted.

✉ **Note:** During deletion, the middle three memory gauge LEDs will illuminate.

Besides the above method, there are two other methods you can use to delete files from your receiver:

- Manually delete files from the receiver (see Power/Memory settings in your *Stratus Operations Manual*).
- Delete files from the receiver with Spectrum Survey (see your *Spectrum Survey Reference Manual*).

P:\RELEAS~1\HELPFI~1\STRATU~1\NATIVE~1\STRATU~1\home.gif

Measure Antenna Height

The antenna height is also known as Height of Instrument (HI).

✉ **Note:** Accurately measuring and recording the antenna height is critical. Failure to accurately measure the height of the antenna from the initial known location will result in a three-dimensional error in position.

To measure the HI, perform the following steps:

1. Slip the *Height Measurement Ring* over the antenna slots on the top of the receiver. The ring should fit

snugly.

2. Choose a method for measuring the HI:
    - Slant height
    - Vertical height
    - True vertical height
3. Use an antenna measuring point on the top of the *Height Measurement Ring* to measure the distance between the antenna and the ground.
4. Record your measurements into your field book or Stratus controller.

✉ **Note:** If you are using the controller, it is mandatory to record your instrument height in the appropriate fields.

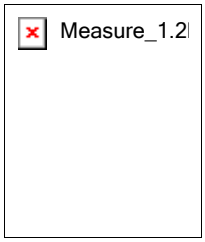
Slant height

Typically, the slant height measuring method is used when:

- **Using a tripod during static surveys**
- **Establishing a base station**

To measure slant height, follow these steps:

1. Mount the measuring ring on the top of the receiver.
2. Use a tape measure to equate the distance from the antenna (top of receiver) to the survey mark on the ground.



3. Record the slant height using one of the following:
    - **Field book**
    - **Controller**

Record slant height in field book

If you are not using the handheld controller, it is recommended that you record the slant height in your *GPS Economy Field Book* (included with each receiver).

Perform the following steps to find your antenna's slant height:

1. Measure the slant height (SH) and record the receiver's Radius (R).
2. Find the vertical height of your antenna.

✉ Note: Spectrum Survey will compute the height of your antenna automatically once you enter the measurement method and slant height into the software. For more information, refer to your Spectrum Survey Reference Manual.

Record slant height in controller

If you are using the Stratus controller, you will only need to record the slant height of the receiver.

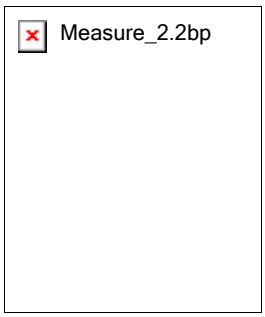
Perform the following steps to record slant height using the controller:

1. On the controller, open the Stratus software.
2. Tap **<Static Survey>** or **<Kinematic Survey>** from the Main Menu. The ***Static Survey*** or ***Kinematic Job*** dialog box opens.
3. Create a new, or select an existing observation.
4. In the **Ant. Method** drop down list, select **Slant**.
5. In the **Ant. Height** field, type in your slant height measurement.

✉ Note: You do not have to enter the radius measurement into your controller. Spectrum Survey will automatically compute the true vertical height of your antenna.

Vertical and true vertical height

Typically, if you are surveying using a graduated range pole or fixed height tripod, you would use the vertical or true vertical height measuring methods.



Record the vertical height using one of the following:

- **Field book**
- **Controller**

Record the true vertical height using one of the following:

- **Field book**
- **Controller**

Record vertical height in field book

If you are not using the handheld controller, it is recommended that you record the vertical height of the range pole or tripod in your *GPS Economy Field Book* (included with each receiver).

Record vertical height in controller

If you are using the Stratus controller, you will only need to record the vertical height of the receiver.

The method for recording vertical height is analogous to static height with the exception that you choose **Vertical** from the **Ant. Method** drop down list.

✉ Note: You do not have to enter the vertical offset into your controller. Spectrum Survey will automatically compute the true vertical height of your antenna.

Record true vertical height in field book

If you are not using the handheld controller, it is recommended that you record the true vertical height in your *GPS Economy Field Book* (included with each receiver).

Perform these steps to record the true vertical height:

1. Record the height of the range pole or tripod.
2. Add the vertical offset to it (Vertical Height + Vertical Offset).

> ✉ Note: If Spectrum Survey encounters a survey point designated as true vertical, the value will be assumed correct and no additional calculations will be made.

Record true vertical height in controller

If you are using the Stratus controller, you will only need to record the true vertical height of the receiver.

The method for recording true vertical height is analogous to static height with the exception that you choose **True Vertical** from the **Ant. Method** drop down list.

P:\RELEAS~1\HELPFI~1\STRATU~1\NATIVE~1\STRATU~1\home.gif

Setup your Rover Receivers

A typical rover setup consists of an adjustable pole, Stratus receiver, and a controller, setup over an unknown point.

To setup the receiver for a kinematic survey, follow these steps:

1. Mount the receiver on top of the pole.
2. Attach the controller to the handheld bracket.
3. (Optional) If the system is to remain standing, attach a tripod to the pole.
4. Measure the height of your receiver from the ground (see Measure Antenna Height).
5. Turn on the receiver and controller. Upon acquisition of satellites, the receiver will begin collecting data.
6. Setup survey jobs on the controller.

P:\RELEAS~1\HELPFI~1\STRATU~1\NATIVE~1\STRATU~1\home.gif

Static Survey Workflow

Without a Controller

Basically, a static survey consists of turning on your receiver to collect data at a site, then when finished,

turning off the receiver. Follow this procedure for every site until you have collected all the required data.

✉ **Note:** Each time you turn on the receiver, a new *.str file is created. The antenna/site information must be recorded in a manual GPS logbook.

Static Survey - In the Field Without a Controller

To collect data in a basic static survey, you must do the following:

1. Setup a Stratus receiver over one survey point (endpoint) of your baseline. To setup your receiver, see Setup your Static/Base Receivers.

✉ **Note:** During the static survey process, one of your survey points should be either a known or assumed known point to provide control for the survey network.

2. Orient your receiver.
3. Measure the antenna height (see Measure Antenna Height).
4. Record the antenna height in your GPS logbook.
5. Turn on the receiver. It will initialize in approximately 60 seconds.

✉ **Note:** If this is the first time you are using the Stratus receiver since purchased, or if it is first being used after a full reset was performed on the receiver, then initialization may take up to 10 minutes.

6. After initialization, Stratus automatically opens a new data file with a default name and begins tracking satellites.

✉ **Note:** Only common data is processed. Use care when setting up multiple receivers to ensure that they collect data during the same time period.

7. A **Satellites Visible Tracking** LED should be yellow to confirm that the receiver is tracking a sufficient number of satellites. A **Memory** LED should flash as data is recorded to memory. For more information on these LEDs, see your *Stratus Operations Manual*.
8. Record the point ID and description in your GPS field book.
9. Record GPS data to your receiver for 20 to 60 minutes (the amount of time is dependent on your baseline length and recording interval).
10. Turn off the receiver when you are satisfied that enough GPS data has been collected over the point for optimal accuracy, using the **Occupation Time** gauge as a guide (see see your *Stratus Operations Manual* for information on gauges). The current data file will automatically save and close.
11. Move one or more receivers to a new point. Keep at least one receiver on a known or previously measured point.
12. Repeat steps 2 - 11 until all desired vectors have been observed.

Static Survey - In the Office Without a Controller

13. Transfer raw GPS data from the receiver to the PC
14. Process and adjust GPS data to obtain the point coordinates of the baseline in Spectrum Survey. Refer to your *Spectrum Survey Reference Manual* for more information.

✉ **Note:** When you data is imported into Spectrum Survey, you should see the vector combinations. If you do not, then select **Tools | Define Combinations**, lower the minimum overlap value, and select **<OK>**. On some shorter occupations, this may be necessary.

P:\RELEAS~1\HELPFI~1\STRATU~1\NATIVE~1\STRATU~1\home.gif

Static Survey Workflow

With a Controller

The following steps guide you through taking a static survey with the use of the handheld controller.

Static Survey - In the Field With a Controller

1. Perform steps 1 to 7 of Static Survey Workflow (No Controller).
2. Turn on your controller and select **Start | Stratus** from the Windows CE task bar. The controller will display the controller ***Main Menu*** screen.
3. Monitor the receiver LEDs. When you have a minimum of four satellites tracking (the second bottom LED of the **Satellites Visible Tracking** gauge is illuminated), you are ready to collect data. For more information, see your *Stratus Operations Manual*.
4. Obtain a new almanac.
5. In the ***GPS Status*** dialog box, use the **Sky Plot** to help determine the optimal GPS survey conditions.
6. Tap **<OK>** to exit the ***GPS Status*** dialog box.
7. Tap **<Static Survey>** to start a new job.
8. Tap **<Add>** to open the ***Add Static Observation*** dialog box and fill in information about your survey.
9. When finished, tap **<Start>** to begin your static observation.
10. Occupy the point until your **Occupation Time** gauge LED is illuminated for your given baseline length (2, 5, 10, 15 or 20km) between the base and rover. For more information, see your *Stratus Operations Manual*.
11. Select ***Receiver*** and tap **<Stop>** to end the observation.
12. The ***Synchronizing*** dialog box will display. Your information is transferred to the receiver. An audible message will inform you when synchronization is complete.
13. Move your receiver(s) to new points. Keep at least one receiver on a known or previously measured point.

    ✉ **Note:** To add other static observations, repeat steps 8 to 13.

14. To end your survey job, tap **<OK>** to close the ***Survey*** dialog box. The ***End Survey*** dialog box will open.
15. Select how you want to end your job from the list of options on the ***End Survey*** dialog box.

Static Survey - In the Office With a Controller

16. Transfer raw GPS data from the receiver and the controller (*.sta) to the PC.
17. Process and adjust GPS data to obtain the point coordinates of the baseline in Spectrum Survey. Refer to your *Spectrum Survey Reference Manual* for more information.

✉ **Note:** When you data is imported into Spectrum Survey, you should see the vector combinations. If you do not, then select **Tools | Define Combinations**, lower the minimum overlap value, and select **<OK>**. On some shorter occupations, this may be necessary.

P:\RELEAS~1\HELPFI~1\STRATU~1\NATIVE~1\STRATU~1\home.gif

Kinematic Survey Workflow

The following steps guide you through taking a kinematic survey.

Kinematic Survey - In the Field

1. Perform steps 1 to 6 of Static Survey Workflow (With Controller). These steps describe how to setup a Stratus receiver, as a base, over a known survey point (endpoint) of your baseline.

   ✉ **Note:** During the kinematic survey process, one survey point should be a known or an assumed known point. This point will provide control for the survey network.

2. Tap **<Kinematic Survey>** to start a new survey job.

Kinematic Survey - Base Setup

3. To setup the base receiver, tap **Base | New Base** in the ***Kinematic Job*** dialog box.
4. After synchronization with the base, tap **<OK>** in the upper right-hand corner of the screen.

Kinematic Survey - Rover Setup

5. Turn on the rover receiver.
6. To setup the rover receiver, tap **Rover | New Rover** in the ***Kinematic Job*** dialog box.
7. Fill in the fields on the ***Rover Setup*** dialog box.
8. Tap **<Start>** and synchronize with the receiver. This will create a new file on the receiver.

   ✉ **Note:** If you use **<Set>**, then it will use the existing file already logging on the receiver. No new file will be created.

9. Tap **<OK>**.

Kinematic Survey - Collect Data

✉ **Note:** There must be a base receiver collecting data for the rover data to process. Do not stop the base observation until the kinematic survey is complete.

10. Position the rover over your first survey point (In this example, it is assumed that the coordinate is not known. If you do want to setup over a known control point, see Take Reading).

✉ **Note:** If you set your rover on an unknown point, initialization may take an estimated 30 minutes, depending on the length of your baseline. See your *Stratus Operations Manual*.

11. Tap **<Read>** to open the ***Take Reading*** dialog box and start your first kinematic site.

12. Because your first reading needs to be a kinematic initialization site, tap the **Init. Type** check box and select **Static OBS**. This checkbox may already read **Static OBS**, if so, then leave this check box selected.
13. If you are satisfied with the **Point ID** and **Antenna Height**, tap **<Read>** to begin initialization.
14. Allow the receiver to initialize until the LED illuminated on the **Occupation Time** gauge correctly identifies the distance of your baseline. See your *Stratus Operations Manual*.

✉ **Note:** Neither the **Auto Epoch** or **Auto Seconds** applies on an initialization site (static obs). To stop the observation, you must manually select the **<Stop>** button.

15. Tap **<Stop>** to end the initialization.
16. The remainder of your readings will be kinematic, so deselect the **Static OBS** check box.
17. Move your rover to a survey point (For Example, a fire hydrant or curb).
18. Tap **<Read>** to start this observation. Your rover will collect data for a few seconds to a few minutes depending on your reading settings.
19. Wait until the Epoch counter reaches its completion, and then select **<Save>** to store the existing **Point ID** information.
20. Continue steps 17 to 19 for all kinematic observations.

✉ **Note:** You can manually stop an observation at any time by tapping **<Stop>**. The observation is automatically stored in the database.

Kinematic Survey - End Survey

21. When your survey is complete, tap **<OK>** on your ***Kinematic Observation*** dialog box. The ***Kinematic Survey*** dialog box will open.
22. If you are ready to end your job, tap <**Ok**>. The ***End Survey*** dialog box will appear.
23. Choose an option in the ***End Survey*** dialog box.
24. Go to your base receiver and from the ***Kinematic Job*** dialog box, tap on the observation type that is tagged **Base**.
25. Select the ***Receiver*** tab and tap **<Stop>**.
26. Choose an option in the ***End Survey*** dialog box.
27. Turn off the receivers. The current data file will automatically save and close.

Kinematic Survey - In the Office

28. Follow the steps in Static Survey Workflow - Without a Controller.

P:\RELEAS~1\HELPFI~1\STRATU~1\NATIVE~1\STRATU~1\home.gif

Survey Workflows

You can perform both static and kinematic surveys with your Stratus system.

These survey workflows are provided to help you quickly navigate through each survey type.

For a brief overview of the basic Stratus survey steps, see Basic Survey Steps.

The Stratus system can collect survey information these ways:

Static Survey Workflow - Without a Controller

Static Survey Workflow - With a Controller

Kinematic Survey Workflow

P:\RELEAS~1\HELPFI~1\STRATU~1\NATIVE~1\STRATU~1\home.gif

Create a Static Job

Main Menu | Static Survey

To create a new static survey job, tap <**Static Survey**> on the ***Main Menu*** to open the ***Static Survey*** dialog box.

A default job name, (For Example, **ClarkesSurvey-341a.sta**), will display in the **Static Job** field. This name consists of the following:

Owner's name	Day	Unique character	File Extension
ClarkesSurvey	341	a	sta

Owner's name

Determined by what is set in the ***Owner Information*** dialog box, accessed by selecting **Start |Settings** from the controller's ***Explorer*** menu, then tapping the ***Personal*** tab.

Day

Displayed as the GPS three-digit day of the year.

Unique Character

This incremental character is used to differentiate multiple jobs during the same day.

File Extension

This identifies the file type associated with the job. A static job has the file extension *.sta.

Available on the Static Survey dialog box are several buttons:

<Status>

Tap to open the ***GPS Status*** dialog box to receive information about the status of satellites currently being tracked by your receiver. For more information see View GPS Status.

<Note>

Tap to open the ***Note*** dialog box. Use the keyboard to type any information you want about your job.

<Add>

Tap to add observations to your new job. You will be required to synchronize to the receiver for each observation. For more information see Static Observations.

<OK>

If at this time you do not want to add observations, tap **<OK>** to close the dialog box. The ***End Survey*** dialog box will appear. For more information see End a Survey Job.

P:\RELEAS~1\HELPFI~1\STRATU~1\NATIVE~1\STRATU~1\home.gif

Create a Kinematic Job

Main Menu | Kinematic Survey

To create a new kinematic survey job, tap <**Kinematic Survey**> on the ***Main Menu*** to open the ***Kinematic Job*** dialog box.

The **Job** field on this dialog box is analogous to the **Static Job** field found on the ***Static Survey*** dialog box (see Create a Static Job).

✉ **Note:** One exception is that the file extension for a kinematic file is ***.kin**.

The Kinematic Job dialog box displays several buttons:

<OK>, <Status>, **<Note>**

These buttons are analogous to the buttons on the ***Static Job*** dialog box. See Create a Static Job.

<Read>

Tap this button to take a kinematic reading. Read requires you to have synchronized with the rover receiver (**Rover | New Rover**) before the reading will take place.

When your base and rover receivers are setup and logging data, you can evaluate the information your receivers are logging. This is called *taking a reading*.

- Take Reading

<Base>

Tap this button to open the ***Base Setup*** dialog box.

<Rover>

Tap this button to open the ***Rover Setup*** dialog box.

A kinematic survey requires two receiver configurations: **base** and **rover**. You must create new observations for each of these receiver configurations:

- Base Receiver
- Rover Receiver

✉ **Note:** When you are synchronizing your controller with the receiver, if another observation is currently logging, the controller will prompt you with the warning message *"Receiver is already recording. Do you want to start a new observation?"* At this point, you can decide to start a new observation, or you can choose **<No>** and return to the previous screen.

When you finish working in the ***Kinematic Job*** dialog box, tap **<OK>**. The ***End Survey*** dialog box will appear. For information on the choices on this dialog box, see End a Survey Job.

P:\RELEAS~1\HELPFI~1\STRATU~1\NATIVE~1\STRATU~1\home.gif

Take Reading

Main Menu | Kinematic Survey | Read

After you setup your rover and base station, you are ready to take a reading. To access the ***Take Reading*** dialog box, tap **<Read>** from the ***Kinematic Job*** dialog box. You will have access to three tabs:

- Observation tab
- Receiver tab
- Note tab

When you are finished entering information into these tabbed pages, tap **<OK>** to return to the ***Kinematic Job*** dialog box.

P:\RELEAS~1\HELPFI~1\STRATU~1\NATIVE~1\STRATU~1\home.gif

Sky Plot

Main Menu | GPS Status | Sky Plot tab

On the ***GPS Status*** dialog box, tap the ***Sky Plot*** tab. A chart will appear that displays the location of the satellites in your range, the elevation mask, and geographic coordinates. The chart is setup as follows:

- The position of your receiver's antenna is at the center of the target.
- The degrees of elevation are represented by the concentric circles around the antenna position.
- The satellite numbers are displayed on the chart based on their actual location in the sky.

The Sky Plot displays the following information:

Time Bar/Dial

Move the dial on the time bar to see where your satellites will be at different times of the day.

Almanac Age

Represents the number of days that have passed since the almanac file was received. Use a recent almanac that is no older than 30 days.

Elevation Mask

The satellite's elevation from the horizon.

Satellite Location

The satellites will appear as circled numbers on the sky plot.

PDOP

The Positional Dilution of Precision displays the effect of satellite geometry on 3-D position and time computations. Values considered to be 'good' are small (less than 3). Values greater than 7 are considered poor.

HDOP

The Horizontal Dilution of Precision represents the horizontal geometry of the current satellite locations. Values considered 'good' are small (3 or less); values greater than 7 are considered poor.

Azimuth

The angle (in a clockwise direction) between the north and the location of the satellite.

<Now>

This button snaps the dial on the time bar over the present time.

Horizon

Represents degrees above the horizon. To determine a satellites elevation from the horizon, compare its position on the chart in relation to these lines

<Link>

Tap this button to refresh the controller's satellite and site information.

P:\RELEAS~1\HELPFI~1\STRATU~1\NATIVE~1\STRATU~1\home.gif

Base Setup

Main Menu | Kinematic Survey | Base

With the ***Kinematic Job*** dialog box open, tap **<Base> | New Base** to open the ***Base Setup*** dialog box. This dialog box is used to setup your base receiver information with your controller. On this dialog box are three tabs:

- Observation tab
- Receiver tab
- Note tab

When you are finished entering information into these tabbed pages, tap **<OK>** to return to the ***Kinematic Job*** dialog box.

P:\RELEAS~1\HELPFI~1\STRATU~1\NATIVE~1\STRATU~1\home.gif

Rover Setup

Main Menu | Kinematic Survey | Rover

With the ***Kinematic Job*** dialog box open, tap **<Rover> | New Rover**. The ***Rover Setup*** dialog box opens.

The ***Rover Setup*** dialog box is used to record rover setup information on your controller. On this dialog box are two tabs:

- Observation tab
- Receiver tab

When you are finished entering information into these tabbed pages, tap **<OK>** to return to the ***Kinematic Job*** dialog box.

✉ **Note:** You can have many base receivers, but only one rover receiver at a time for collecting observations. If you try to setup a second rover, the software will warn you that there can only be one rover. You will have the option to stop the current rover receiver and replace it with another.

P:\RELEAS~1\HELPFI~1\STRATU~1\NATIVE~1\STRATU~1\home.gif

Allocate Memory

You can specify how much of the memory available on your data collector you want to be used to run programs such as Stratus controller or to use for data storage.

To provide more space on the controller for your survey information, allocate more memory for storage. Experiment with the memory allocation to find a setting that is suitable for your needs.

To access memory settings, select **Start** | **Settings** | **System** from the ***Explorer*** menu and choose the **<Memory>** icon. Adjust the slider bar as necessary to allocate memory.

P:\RELEAS~1\HELPFI~1\STRATU~1\NATIVE~1\STRATU~1\home.gif

Conserve Battery Power

There are several steps you can take to ensure that you get the most surveying time out of your data collector in the field. Use your Windows CE Help to walkthrough the following energy saving suggestions.

- Make sure that your data collector is fully charged before proceeding to the field.
- Turn off the backlight unless it is absolutely necessary, or if available, set the backlight to power down automatically when the data collector is idle.
- Consider removing CompactFlash™ or other memory cards if you have their option but do not need their services.
- If possible, set your data collector to automatically sleep when it is idle. This will not interfere with Stratus controller surveying processes. The software will pick up where it left off when you use your data collector.

P:\RELEAS~1\HELPFI~1\STRATU~1\NATIVE~1\STRATU~1\home.gif

Controller Configuration

Adjusting memory and battery power settings on your controller can optimize its performance in the field.

✉ **Note:** Also, please refer to your handheld controller's materials for additional settings.

Allocate Memory

Conserve Battery Power

P:\RELEAS~1\HELPFI~1\STRATU~1\NATIVE~1\STRATU~1\home.gif

Observation Tab

Main Menu | Kinematic Survey | Base | Observation

In the ***Observation*** tab, you can modify base observation information.

The fields on this tab are analogous to those found on the Add Static Observation dialog box, with the addition of the following:

Known Point

If this receiver is being placed over a known point, select this checkbox.

✉ **Note:** For kinematic surveys, it is wise to setup the base over a known point so that later that coordinate may be keyed into Spectrum Survey and held "fixed". For more information, consult the *Spectrum Survey Reference Manual*.

Rec. Interval

Ensure your recording interval is the same as what will be used on your kinematic rover receiver. Generally, with kinematic work you would want to go with a lower recording interval (For Example, two seconds).

At the bottom of the ***Base Setup*** dialog box is **<Start>** and **<Set>**. When you finish entering information on the ***Observation*** tab, tap **<Start>** to begin synchronization with the Stratus receiver. Tap <**Set**> to apply the settings to the current receiver observation file.

✉ **Note:** If you have more than one base station, it is recommended that you use the same recording interval(10). If the recording intervals do not match, the results will be less accurate, and a warning box will appear when you tap **<Start>** or **<Set>**.

P:\RELEAS~1\HELPFI~1\STRATU~1\NATIVE~1\STRATU~1\home.gif

Observation Tab

In the ***Observation*** tab, you can modify rover observation information.

The fields on this tab are analogous to those found on the Add Static Observation dialog box, with the addition of the following fields:

Rec. Interval

Make sure that the recording interval is the same as what was used on your base receiver. See Base Setup.

End Reading

End the reading automatically or manually. Select **Auto Epochs**, **Auto Seconds**, or **Manually** from the drop down list.

End Method	Description
Auto Epochs - default	Counts out the value you have for reading duration in terms of epochs recorded. Reading will end once epoch count has been reached.
Auto Seconds	Counts out the value you have for reading duration in terms of actual seconds. Reading will end once time has been reached.
Manually	Forces you to manually stop each reading. The reading will begin and end when you tap <Stop/Start>*.

* Note: The <Stop/Start> button will read <Stop> while the observation is in progress. Otherwise, it will read <Start>.

Reading Duration

Select the number of epochs or seconds the reading will record. This field will appear dimmed if **Manually** was selected in the **End Reading** field.

P:\RELEAS~1\HELPFI~1\STRATU~1\NATIVE~1\STRATU~1\home.gif

Observation Tab

In the ***Observation*** tab of the ***Take Reading*** dialog box, you can modify information about a specific reading observation. It is from this tab that you start and stop kinematic readings for initializing the receiver and collecting kinematic observations.

The fields on this tab are analogous to those on the ***Add Static Observation*** dialog box (see Static Observations), with the addition of the following fields:

Known Pt. Type

If this receiver is being placed over a known point, you can note that in the software. Select this checkbox to access a drop-down list of choices: **New Known**, **Known**, **Revisit Known**, and **<See Note>**. The name of this checkbox changes to the name you select from this list. When no point type has been selected, this checkbox will read **Known Pt. Type**.

Start

Lists the time the most recent reading began.

Epochs/Seconds

Lists the estimated number of recording intervals that have occurred in the file. The intervals are either recorded in epochs or seconds, depending on what was chosen in End Reading.

Stop

Lists the time the most recent reading ended.

<Status>

This button is analogous to the button on the Static Job dialog box.

Init. Type

This checkbox, when tapped, will display a drop-down list of observation types: **Static Obs**, **Known Coord**, **Known Vector**, **Re-Initialize**, and **<See Note>**. The name of this checkbox changes to the name you select from this list. When no observation type has been selected, this checkbox will read **Init. Type**.

Select **Re-Initialize** if you are visiting a spot where you previously initialized the receiver.

For the other choices in the Init. Type list, see the following sections:

- Initializing over an unknown point
- Initializing over a known point
- Initializing over a known vector

<Read> or **<Stop>** or **<Save>**

Tap this button to take an automatic or manual kinematic reading.

See the following sections for an explanation of automatic and manual kinematic readings:

- Automatically stop reading
- Manually stop reading

Initializing over an unknown point

Setting up your rover over an unknown point can mean that you will have to initialize the receiver for approximately 20-60 minutes (depending on the baseline length).

Follow these steps for an unknown point:

1. Select the **Static Obs.** option for the **Init. Type** check box.
2. Tap **<Read>**.
3. Initialize over the point until the **Occupation Time** gauge LEDs display that enough data has been collected to accurately determine your position. Refer to your *Stratus Operations Manual* for more information.
4. Tap **<Stop>**.

Initializing over a known point

When you setup your rover over a known point, you can dramatically decrease the amount of time required to initialize the receiver.

Follow these steps for a known point:

1. Select the **Known Coordinate** option for the **Init. Type** check box.
2. Tap **<Read>**.
3. Initialize for approximately the time that you set for reading durations.

✉ **Note:** The reading duration is set in the End Reading field for the rover setup.

4. Tap **<Stop>**.
5. The known coordinates will not automatically initialize on the handheld. To complete the initialization, the data must be transferred into *Spectrum Survey*.
6. Open the point in Spectrum Survey's ***Point Editor.***
7. Select the **Use as a reference coordinate** check box.
8. Type in the correct (known) coordinates.
9. Click **<OK>** to save the information.

✉ **Note:** Spectrum Survey will use the point as a known point and adjust all other coordinates off that point. For detailed information, refer to your *Spectrum Survey Reference Manual*.

Initializing over a known vector

When you setup your rover over a known vector, you can dramatically decrease the amount of time required to initialize the receiver.

Follow these steps for a known vector:

1. Select the **Known Vector** option for the **Init. Type** check box.
2. Tap **<Read>**.
3. Initialize for approximately the time that you set for reading durations.

✉ **Note:** The reading duration is set in the End Reading field for the rover setup.

4. Tap **<Stop>**.

5. The known coordinates will not automatically initialize on the handheld. To complete the initialization, the data must be transferred into *Spectrum Survey*.
6. Open the point in Spectrum Survey's ***Vector Editor***.
7. On the **Processing** tab, select the **Fix vector for GPS initialization** check box.
8. Type in the correct coordinates.
9. Click **<OK>** to save the information.

Automatically Stop Reading

For readings to automatically stop, the End Reading field must be set to **Auto Seconds** or **Auto Epochs**.

Before you can collect kinematic data, you must first initialize the receiver. See Initializing over an unknown point or Initializing over a known point for instructions.

After initialization, and once you are over the point you want to survey, follow these steps:

1. Tap **<Read>**. The controller will collect information until it reaches the number set in the **Reading Duration** field. Then the button will automatically change to **<Save>**.
2. Tap **<Save>** to store the observation in the database. The button will now say **<Read>**.
3. Move to your next survey point and repeat these steps until you complete the survey.

✉ **Note:** At any time before the duration time occurs, you can tap **<Stop>** to end the observation. Should this happen, the observation will automatically be saved in the database.

Manually stop observations

For readings to continue until you decide to stop them, the End Reading field must be set to **Manually**.

Before you can collect kinematic data, you must first initialize the receiver. See Initializing over an unknown point or Initializing over a known point for instructions.

After initialization, and once you are over the point you want to survey, follow these steps:

1. Tap **<Read>**. The controller will collect information until you tap **<Stop>**.
2. Move to your next survey point and repeat these steps until you complete the survey.

P:\RELEAS~1\HELPFI~1\STRATU~1\NATIVE~1\STRATU~1\home.gif

Observation Tab - Static Observations

The ***Observation*** tab enables you to view or modify survey information.

The fields on this dialog box are analogous to those found on the Add Static Observation dialog box.

P:\RELEAS~1\HELPFI~1\STRATU~1\NATIVE~1\STRATU~1\home.gif

Receiver Tab

The ***Receiver*** tab displays important information about your receiver, and it can be used to stop the current observation.

✉ **Note:** When taking a reading, if you stop the reading, you will be required to setup a new rover before you can continue the kinematic survey.

✉ **Note:** For kinematic survey, information will not populate on this tab until you enter information on the ***Observation*** tab and synchronize with the receiver.

The following information is displayed:

Stratus S/N

Displays the serial number of the Stratus receiver.

Firmware

Displays the controller's current firmware.

Total Memory

The amount of memory available on your receiver.

Memory Remaining

Displays the estimated time (hours and minutes) you have left to fill the receiver's memory.

Battery Remaining

Displays the approximate time in hours and minutes of battery power remaining at the current data collection rate.

✉ **Note:** The memory and battery remaining are only shown if the file is recording.

File Name

Lists the observation file name.

File Size

Displays the estimated size of the file on the receiver. The file size is only shown if the file is complete (stopped).

Start

Displays the start time of the observation.

Epochs

Lists the estimated number of epochs (recording intervals) that have occurred in the file. If an observation is

currently recording, this field will continue to update.

Stop

Displays the survey stop time. If the receiver is still recording, this field will display **Recording**.

Last Sync

Lists the time and date that the current receiver was last synchronized with the Stratus controller.

<Stop>

Tap this button to access the End Observation dialog box where you can exit the observation. If you open an existing observation that is not currently logging data, this button will become inactive.

<Link>

Tap this button to synchronize with the receiver and update the information displayed in the ***Receiver*** tab.

P:\RELEAS~1\HELPFI~1\STRATU~1\NATIVE~1\STRATU~1\home.gif

Notes

On the ***Note*** tab or ***Note*** dialog box you can enter miscellaneous information about your current observation.

When ***Note*** is opened, an alphanumeric keyboard should appear automatically in the bottom portion of the dialog box. If the keyboard does not appear, tap the **<Keyboard>** icon to make it open.

✉ **Note:** The alphanumeric keyboard will automatically pop up when you open a new dialog box. The keyboard may be hiding vital buttons and information fields behind it. To collapse the keyboard, press the keyboard icon on the bottom frame of the dialog box.

P:\RELEAS~1\HELPFI~1\STRATU~1\NATIVE~1\STRATU~1\home.gif

Load Descriptions

Pre-defined descriptions can be created on your handheld controller with any generic word processing software, then loaded into your Stratus software.

To load descriptions into the Stratus software, you must alter the text in your controller's **description.txt** file, either by editing the existing file, or overwriting the file with one you created on your PC. The following explains both options.

Altering descriptions on the controller

To alter descriptions in the **description.txt** file already residing on the controller, perform these steps:

1. From the controller's start menu, tap **Start | File Explorer** to open the ***File Explorer*** dialog box.

2. At the top of the ***File Explorer*** dialog box is a drop down list. Tap on it to select **My Device**.
3. Tap on the **Program Files** folder. The ***Program Files*** dialog box will appear.
4. Tap on the **Sokkia Stratus** folder to open the ***Sokkia Stratus*** dialog box.
5. Tap on the **description.txt** file. It will open in the ***Pocket Word*** program, or a similar text editor.
6. The **description.txt** file contains, on each line, some predefined descriptions. Scroll down to the end of this file and type your descriptions at the bottom of the description list.

Altering descriptions on the PC

To create descriptions in a **description.txt** file on your PC, then overwrite the current **description.txt** file on the controller, perform these steps:

1. Open a text editor (such as *Notepad*) on your PC.
2. (Optional) If you want to edit the current **description.txt** file, transfer it from the controller to your PC, then open it with the text editor. To transfer data from your controller to the PC, see Transfer data into Spectrum Survey.
3. Make changes to the file.
4. Save your changes to the document, and transfer the revised file to your controller.
5. You must separate each description with a carriage return in the text file for the description to appear correctly in the ***Desc*** field**.**

P:\RELEAS~1\HELPFI~1\STRATU~1\NATIVE~1\STRATU~1\home.gif

Keyboard

The keyboard, opened by tapping the keyboard icon at the bottom of the Stratus desktop, is used to type information into text fields in the Stratus software.

The layout of the keyboard changes depending on whether you have the **<CAP>** key selected.

✉ **Note:** The keyboard, if displayed, will hide information on the bottom portion of the dialog box. To hide it, tap the keypad icon at the bottom of the dialog box.

P:\RELEAS~1\HELPFI~1\STRATU~1\NATIVE~1\STRATU~1\home.gif

Descriptions

Type in the **Description** field any descriptions about the static job, or select a predefined description from the drop-down list.

For more information on defining descriptions, see Load Descriptions.

P:\RELEAS~1\HELPFI~1\STRATU~1\NATIVE~1\STRATU~1\home.gif
