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Home Screen

The Home Screen allows you to create customized menus with your frequently used functions.

You can navigate to the Home Screen from any menu in Survey Pro by tapping on the home icon at the upper left corner of the screen. If you are on the Home Screen you can return to the main menu by tapping the menu icon at the upper left corner of the screen. If you are currently on a sub menu screen, you can return to the main menu by tapping on the menu up icon at the upper right corner of the screen.

You can tap and hold on any Survey Pro sub menu item to add it to the home screen. When you tap and hold on a menu item, select **Add to Home** to place this menu item on your home screen. When you do so, the home screen will appear in the edit mode, and the following icons appear on the home screen positions:

- **Open square:** Tap at this location to place the new menu item in an unused position on the home screen. When the home screen is in edit mode, you can change pages to access a different page to place the item on.
- **Closed square:** Tap at this location to place the new menu item in an already occupied position on the home screen. The existing menu item at this location will be moved down.

You can tap and hold on the home screen to bring up a context menu to customize the placement of items and pages of the home screen. The menu allows you to:

- **Move Item:** Places the home screen in edit mode, and you can move items to a different location, including to a different page of the home screen.
- **Remove Item:** Removes the selected menu item from the home screen.
- **Insert Page Before:** Adds a new home screen page before the current page. You can have a maximum of four pages on your home screen.
- **Insert Page After:** Adds a new home screen page after the current page. You can have a maximum of four pages on your home screen.
- **Remove Page:** Removes the current page from the home screen. If the current page has items on it, you will be prompted before you can remove it. You can not remove the last page of the home screen.


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Main Menu

The Main Menu is the starting point where all the other screens described in this manual are accessed.




The area at the bottom of the screen is called the *command bar*. The small buttons in the command bar are used as follows:

Map View

Opens a Map View of the current job can be displayed by tapping the  button.

Spectra Precision Central

The Spectra Precision Central icon shows the state of your current connection:

- Not signed in 
- Signed in and connected 
- Signed in but there are connection issues 

Tapping the Central icon will open the Central information and sign in screen.

Surveying Mode







The instrument icon indicates which collection mode the software is running in. There are three possible surveying modes:

- Optical
- RTK GNSS
- Leveling

Tapping this icon will open a list of options to do any of the following:


- Switch to another instrument mode.
- Select a different instrument profile.
- Quickly access the Instrument Settings screen.

Battery Level

The battery icon at the bottom of the Main Menu displays the condition of the data collector's rechargeable battery. The icon has five variations depending on the level of charge remaining:  100%,  75%,  50%,  25%,  5% and  charging.


Tapping the battery icon is a shortcut to the Microsoft Power Settings screen. You can get more information while viewing this screen from the online help.

Quick Pick

The  (Quick Pick) button is used to quickly access any of a variety of commonly-used routines. The list of routines available is customizable using the Quick Pick Editor.





Online Help


Tapping the  button opens the online help, which allows you to access information similar to the information you would find in the reference manual for each screen.


Other Command Bar Buttons


The following command bar buttons are available in screens other than the Main Menu. Each is described below.

 (OK): Performs the desired action then closes the current screen.

 (Cancel): Closes the current screen without performing the action intended by the screen.

 (Close): Closes the current screen.

 (Settings): Opens the Settings screen associated with the current screen.

 (GPS Status): This is used to view the current status and access the settings for a GPS receiver when using the GeoLock feature. It is only available from the [Remote Control](#) and [Remote Shot](#) screens when using a Trimble or Geodimeter robotic total station.

File Menu

The [File Menu](#) contains routines to open or create a new job, import and export different file formats, and transfer files between the Data Collector and another device.

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Open / New

[File] [Open / New]

The Open / New screen is used to open a recent job or create a new one. This screen also appears when the software is first started.

[Open]: opens the job selected in the Open a Recent Job list.

[Browse...]: will open the Open screen where an existing job to open can be selected.

[New...]: will open the New screen where a new job can be created.

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Open

[File] [Open/New] [Browse...]

The Open screen is used to open any existing job and is required to open a job that is not listed in the Recent Job list in the Open / New screen.

A list of all the jobs in the current directory is displayed. Simply tap on the job name that you want to open and then tap .

Note: A *.JOB file can be opened just like any *.survey file. When a *.JOB file is opened, it is automatically converted and stored to a *.survey file with the same name.

When a job is being opened, the [Loading JOB file](#) screen will open briefly and display the status of the loading process.

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New Job

[File] [Open / New] [New...]

The [New Job](#) screen is used to create a new job.

Create a New Job - File Name Screen

Directory: displays the directory where the current job will be stored.


Job Name: is where the name of the new job is entered. The default name is the current date.

[**Browse...**]: allows you to select a different directory where to store the new job.

Current Settings: displays the last used settings for creating a job. These settings will be used to create a new job when you tap [**Create Job Now**].

[**Create Job Now**]: creates a new job with the job name using the current new job settings.

[**Settings >**]: opens the [Units and Format Screen](#) where you can modify the default settings for creating a new job.

 (Cancel): cancels the creation of a new job and brings you back to the [Main Menu](#).

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Create a New Job – Units and Format Screen

Azimuth Type: specifies if you are surveying with a North Azimuth or South Azimuth.

Grid Direction: specifies if your grid coordinates are increasing positive in the North East or the South West direction.

Units for Distances: specifies if your distances will be entered in International Feet, US Survey Feet, or Meters.

Note: You can enter a distance in any distance field in units other than what is set for the job by appending the distance value with the following characters:

- **f** or **ft** or **ift** = International Feet

usf or **usft** = US Survey Feet

- **i** or **in** = Inches
- **m** = Meters
- **cm** = Centimeters
- **mm** = Millimeters
- **c** or **ch** = Chains


Once the cursor leaves that field, the distance will be converted automatically. (A space between the value and the unit abbreviation is optional.)

Units for Angles: specifies if angles will be entered in Degrees or Grads.

Earth Curvature & Refraction: Allows you to select the earth curvature and refraction correction coefficient. Select **None** to turn Earth Curvature & Refraction correction off.

Note: To use a scale factor with a job, go to the [Scale Settings](#) card to configure the scale factor mode. If you select a mapping plane coordinate system, your scale settings will automatically be configured.

[Next >]: opens the [Select Control File Screen](#), where you can select a control file to load into the new job.

 (Cancel): cancels the creation of a new job and brings you back to the [Main Menu](#).

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Create a New Job – Select Control File Screen

No control or reference file: select this option to create a new job without a control file.

Use a Control File: select this option to create a new job by importing points from the control file into the new job file.

Use an external Reference File: select this option to create a new job by referencing points from the external reference file. The points from the external reference file will be loaded in the new job point database, but will not be imported into the new job file.

[Browse...]: allows you to select a .JOB or a .SURVEY file to use as the control file or external reference file.

[<Back]: returns you to the [Units and Format Screen](#).

[Next >]: opens the [Select Coordinate System Screen](#), where you can specify the coordinate system to use for the new job.

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Create a New Job – Select Coordinate System Screen

Select Coordinate System: when you are not using a control file, check to select a coordinate system from the database. Leave this box unchecked if you are doing a survey in a flat earth plane coordinate system.

Note: If you are doing a GNSS survey and there is no projection and no datum to relate your local coordinates to latitude, longitude and height, then leave this box unchecked and the GNSS survey will start in Default Ground Calibration mode.

Use Control File's Projection: when you are using a control file, check to create the new job with the coordinate system of the control file. Leave this box unchecked if you want to pick a different coordinate system for the new job.

If [**Select Coordinate System**] is checked, select the coordinate system from the data base using the following controls:

Select what type of coordinate system record to choose. You can use:

- **Database Zone:** Displays controls to pick a map projection and datum from the regions and zones in the database.
 - **Broadcast RTCM Datum:** Displays controls to pick a map projection from the regions and zones in the database. The datum will be set by the NTRIP network broadcasting RTCM 1021/1023 messages.
-

Note: If you are using Broadcast RTCM Datum, you must start a GNSS survey and connect to a NTRIP mount point that is broadcasting RTCM message types 1021 and/or 1023 before the coordinate system definition is complete.

[**Region**]: select the coordinate system region.

[**Zone**]: select the coordinate system zone.

[**Datum**]: displays the datum for the selected zone, or, allows you to select a datum for zones in the database that have no preset datum.

[**Use Geoid**]: check to use a geoid model with the selected coordinate system.

[**Geoid**]: select the geoid model to use with the zone when [**Use Geoid**] is checked.

[<**Back**]: returns you to the [Select Control File Screen](#).

[**Next >**]: opens the [Enter First Point Screen](#) where you can enter a coordinate for your first point in the new job.

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Create a New Job – Enter First Point Screen

Enter First Point: when this box is checked, the additional fields will appear allowing you to create a new point.

Note: You can create a job with no initial point.

Point Name: is the name of the initial point.

Northing: is the Y-coordinate of the initial point.

Eastings: is the X-coordinate of the initial point.

Elevation: is the elevation of the initial point.

Description / Code: is the description or code of the initial point.

Note: When you are doing a survey in a south west grid system, the meaning of the X/Y axes are reversed, so the south coordinate is labeled on the X axis and the west coordinate is labeled on the Y axis .

[< **Back**]: returns you to the [Select Coordinate System Screen](#).

[**Finish**]: creates the new job and stores the .survey file with the initial settings.

✘ (Cancel): cancels the creation of a new job and brings you back to the [Main Menu](#).

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Save As

[**File**] [**Save As**]

The Save As screen allows you to save a copy of the current job under a new name. The copy that is created will then become the current job.

The Save As screen is identical to that found in other Windows applications. Simply enter a new name for the current job and then tap the [**Save**] button.

Note: It is not necessary to include the .survey extension since it will automatically be added for you.

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Import

[**File**] [**Import**]

The Import screen is used to add the points from another source into the current job or import the data from a LandXML file to the current job.

Warning: Coordinate values can change when they are imported!

Importing coordinates from certain sources requires that the distance units used in the source file be specified. For example, importing coordinates from ASCII text files (*.txt/*.csv) or from old TDS coordinate files (*.CR5) requires that you specify the units of the file. Importing coordinates from newer format survey files such as Survey Pro files (*.job/*.survey), or jobXML files (*.JXL) does not require you to specify the coordinate units because it is stored as part of these file formats.

If importing coordinates where the distance units in the source file are different than the distance units for the current job, the imported coordinates will be converted to the current job's distance units when they are imported. This is normally the desired result, but it can cause a problem if any distance units were set incorrectly. This situation can most commonly occur when working with International Feet and US Survey Feet where the conversion from one to the other is not always obvious.

Usually the difference between International Feet and US Survey Feet is negligible (2 parts per million), but when

dealing with State Plane or UTM mapping plane coordinates, which are often very large in magnitude, the difference can be substantial if the coordinates are converted from one format to the other.

If importing coordinates from a source where you are not sure if the units are in International Feet or US Survey Feet into a job that is set to International Feet or US Survey Feet, you will usually just want to import them without any conversion being performed. To do this, be sure to select the same distance units for the source file as those set for the current job.

Survey Pro supports a number of different known file formats for import. Select one of the **Default Importers** to import coordinates in a known format:

- [Survey Files \(*.survey\)](#): import coordinates from a Survey Pro version 5 file.
- [Job Files \(*.JOB\)](#): import coordinates from a Survey Pro version 4 file.
- [Coordinate Files \(*.CR5\)](#): import coordinates from a CR5 coordinate file.
- [Text Files \(*.TXT\)](#): text files can contain coordinates in several different possible formats. The [Import ASCII Wizard](#) is used to define the format of the text file being imported.
- [Text Files \(*.CSV\)](#): this is a simplified text file import routine where the source file is comma delimited and has a *.CSV extension.
- [LandXML Files \(*.xml\)](#): imports points, alignments, polylines, and parcels from a LandXML file.
- [JobXML Files \(*.jxl\)](#): imports points and coordinate system from a JobXML file.


Survey Pro also supports custom import definitions using an *.IXL file to define the import format. Select one of the **Custom Importers** to import coordinates from a custom format file.

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Import Survey Pro version 5 (*.survey) Coordinates

When importing coordinates from another *.survey file, the [Import](#) screen is used.


A list of all the .survey files available in the current directory is displayed. Simply tap on the job name that you want to import and then tap the  button. The points in the selected job will be added to the points in the current job.

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Import Survey Pro version 4 (*.JOB) Coordinates

When importing coordinates from another *.JOB file, the [Import](#) screen is used.

A list of all the jobs available in the current directory is displayed. Simply tap on the job name that you want to import and then tap the  button. The points in the selected job will be added to the points in the current job.

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Import *.CR5 Coordinates

The [Import CR5](#) screen will open when importing coordinates from a *.CR5 coordinate file after selecting a layer.



Simply select the distance units that the coordinates were stored in and tap .

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Import *.TXT Coordinates

Since the coordinates in an ASCII *.TXT file can be stored in a variety of formats, two screens are used to define the format of the file that is being imported once a layer is selected. The source *.TXT file can contain either plane coordinates or geodetic coordinates.

Delimiters: is the character that separates each column of text in the ASCII file.

Units: are the units that the distances in the file were stored in.

Coordinates: is used to specify if the coordinates are plane coordinates, geodetic coordinates in degrees-minutes-seconds format, or geodetic coordinates in decimal format.

Skip the first row: should be checked if the first line in the ASCII file contains non-coordinate information, such as a heading.

[Next >]: opens the [second screen](#).

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Import *.TXT Coordinates – Screen Two

[> **Name Column No.**] / [> **Start Point Name**]: When the first option is selected here, the column number used for the name field in the *.TXT file is specified here. When the second option is selected, it is assumed that the *.TXT file does not contain point names and will assign the first point the name specified here and increment to the next available point name for the remaining points.

Columns: is where the column number for each specified coordinate exists in the source *.TXT file. The coordinates types displayed here can either be for plane coordinates or geodetic coordinates depending on the selections made in the previous screen. If a coordinate has a checkbox, which is unchecked, it is assumed that the source *.TXT file does not contain columns for that type of coordinate.

Specify Missing Elevation Threshold: if the source file was created from coordinates with no elevations, but the file contains an elevation column with values, such as 0, check this box and indicate the value in the field that will appear to the right.

[**Preview**]: opens the [ASCII Import Preview](#) window containing all the point data that will be imported. This is useful to check for errors before actually importing new data.

[< **Back**]: returns to the [previous screen](#).

[**Finish**]: imports the new point data into the current project.

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Import LandXML Coordinates

Points, alignments, polylines, and parcels can be imported from a LandXML file.

The way the LandXML data is imported depends on how the data is stored in the source file and how the settings are configured in the screens described here.

Consult the User's Manual for more information on the conditions that affect how the data is imported.

On specified layer: will import all the data on the specified layer.

On different layers by groups: will import points, alignments, and parcels to layers named by the group name for the data in the source file. If the group name is an invalid layer name (e.g., it is empty or contains invalid characters), the data will be stored to the active layer.

[Next >]: opens the second configuration screen.

Import polylines, alignments and parcels: When this is checked, polylines, alignments and parcels will be imported, as well as the points. When unchecked, only the points will be imported.

Import parcels to the specified layer: When this is checked, imported parcels will be stored to the selected layer. If unchecked, parcels will be stored to the layer specified in the previous screen.

For more information on how parcels are imported, consult the User's Manual.

Point and Line Descriptions: You can select what information to use as the description for imported lines and points in the corresponding two fields.

Lines can either be assigned the name or description from the source file and points can either be assigned the description or code from the source file.

[Back]: returns to the previous screen.

[Import]: imports the specified data into the current project. A results screen will open listing the details of the imported data.

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Import JobXML Coordinates

Points and coordinate system information can be imported from a JobXML file.

Once a *.JXL file is selected, you will be prompted to select the layer where you want to put the imported points.

Layer: will import all the data on the specified layer.

If no coordinate system is configured for the current job, a dialog asks if you want to set the coordinate system for the current job to the coordinate system used in the *.JXL source file.

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Import KOF Coordinates

Grid coordinates for points can be imported from a KOF file.

Once a *.KOF file is selected, you will be prompted to select the layer where you want to put the imported points.

Layer: will import all the data on the specified layer.

Note: KOF files are assumed to be always in metres, and coordinates will be imported into the current job using the grid coordinate values in metres.

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Confirm Point Replace

If a point being imported has the same name and the same coordinates as a point that is already in the current job, it is ignored and a message will be displayed after the remaining points are imported indicating this.

If an imported point is encountered with the same name, but with different coordinates as a point in the current project, the [Confirm Point Replace](#) screen will open.

[**Yes**]: will replace the point in the current job with the point being imported.

[**Yes to All**]: will replace the point in the current job with the point being imported and perform the same action for any remaining duplicate points.

[**No**]: will not import the duplicate point, keeping the coordinates for the existing point unchanged.

[**No to All**]: will not import the duplicate point, keeping the coordinates for the existing point unchanged and perform the same action for any remaining duplicate points.

[**Rename**]: will store the new point in the current job under the name specified in the **Starting At** field.

[**Rename All**]: will store the new point in the current job under the name specified in the **Starting At** field and perform the same action for any remaining duplicate points, storing them with the next available point name.

Starting At: is the point name assigned to the imported point when using the [**Rename**] or [**Rename All**] functions.

[**Compare Coordinates...**]: will open a screen showing the coordinates for the duplicate points to assist in making a decision of how to handle the new point.

[**Stop Importing**]: will not import the current duplicate point and will stop importing any remaining points. (All previous points will still be imported into the current job.)

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Export

[**File**] [**Export**]

The **Export** screen allows you to export selected points from the current job to a new job or to a coordinate file in another format. This first screen is used to specify the type of file that you want to export data to.

Note: If the export format supports a selection of points you will also be able to select specific job points to export. If the export format supports only exporting the entire job file, then you will not be prompted to select points.

Select the Type of File to Export: is where you select the format for export. Choices are:

Survey (.survey) File: when selected, the chosen points and lines are exported to a Survey Pro version 5 format file.

Job (.JOB) File: when selected, the chosen points and lines are exported to a Survey Pro version 4 format file.

Survey Pro 4.x (.JOB / .RAW) File: when selected, the entire job is exported to a Survey Pro version 4 format .JOB/.RAW file pair.

Coordinate (.CR5) File: when selected, the chosen points are exported to a CR5 coordinate file format.

Text (.TXT) File: when selected, the chosen points are exported to an ASCII text file.

CSV (.CSV) File: when selected, the chosen points are exported to an ASCII text file that is comma delimited and the file is automatically given a *.CSV extension.

LandXML (.XML) File: when selected, all points and lines in the job are exported to a LandXML file.

JobXML (.JXL) File: when selected, all points, lines, and observation raw data in the job are exported to a JOB XML file.

DXF (.DXF) File: when selected, the chosen points and lines are exported to a DXF format file.

Stylesheet Report: when selected, you can generate a custom report using any style sheet available on the device.

Select the Points to Export: is visible when the export format chosen supports a selection of points.

[**To/From...**]: allows you to specify a range of points to export.

[**Tap Points...**]: allows you to select the points to export by tapping them from a map view.

: The power button provides additional point selection options, which include selecting all control points, all non-control points and selection by description or code.

Export: appears when there are no additional settings required to define the export. Tap this button to be prompted for a file location and to create the new export file.

[**Next >**]: appears when there are additional settings required for the export format. The **Next** button will open either the proper page depending on the export format selected.

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Export *.survey Coordinates

When exporting to another *.survey file, the [Save As](#) screen is opened where the file name and location is entered for the new *.survey file.

Export *.JOB Coordinates

When exporting to another *.JOB file, the [Save As](#) screen is opened where the file name and location is entered for the new *.JOB file.

Export a Survey Pro version 4 .JOB/.RAW file pair

This option is used to export the Survey Pro version 5 (.survey) file contents as a Survey Pro version 4 .JOB/.RAW file pair, which you could then import into third party software that uses the old format Survey Pro files.

If your job does not have any codes or any code feature attributes, the [Save As](#) screen is opened where the file name and location is entered for the .JOB/.RAW file pair.

If your job does have codes or code feature attributes, you will see the [Job Raw Export Settings Screen](#) where you can specify how you want your codes to be converted into the .RAW file.

Export Survey Pro version 4 .JOB/.RAW Settings

This screen is used to specify how to translate your codes into the .RAW file.

Export Codes in Foresight Format: use this option to export your codes to be parsed by Foresight office software.

Export Codes in 3rd party Format: use this option to export your codes to be parsed by common third party software.

Export: opens the [Save As](#) where the file name and location is entered.

Export *.CR5 Coordinates

The [Export CR5](#) screen will open when exporting coordinates to a CR5 coordinate file.

CR5 File Options: specifies if the resulting file should be Sequential or Non-Sequential.

[< **Back**]: returns to the [previous screen](#).

[**Export**]: exports the selected coordinates to the new CR5 file.

Export *.TXT Coordinates

Since the coordinates in an ASCII *.TXT file can be stored in a variety of formats, two screens are used to define the format of the resulting file.

Delimiters: is the character that separates each column of text in the ASCII file.

Coordinates: is used to select if the resulting coordinates should be plane coordinates, geodetic coordinates in degrees-minutes-seconds format, or geodetic coordinates in decimal format.

Units: are the distance units that will be written to the resulting TXT file. These units are automatically set to the same units that are set for the current job.

Headers in the first row: When checked, a heading describing each column is inserted in the first row. For example, the following header could be inserted:

Name,Northing,Easting,Elevation,Description

[< **Back**]: returns to the previous screen.

[**Next** >]: opens the second screen.

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Export *.TXT Coordinates – Format

Select the desired order and format for the resulting TXT file from the list of options.

[**Finish**]: exports the selected points to the TXT file.

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Export *.CSV Coordinates

This routine is identical to the Export *.TXT Coordinates routine, described above with the exception that the formatting for the exported file is automatically set to comma delimited and the extension for the file name will be *.CSV.

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Export LandXML (.XML) File

The LandXML export routine allows you to export points along with polylines and alignments.

Export polylines and alignments: will export the points in the current project as well as any polylines and alignments.

If this is unchecked, only the points will be exported.

Export polylines on the specified layer as parcels: will export the polylines on the selected layer as parcels. (Polylines on other layers will still be exported, only not as parcels.)

Export point description as: allows you to select to export the point descriptions as LandXML descriptions or codes.

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Export JobXML (.JXL) File

The JobXML export routine will export points, coordinate system, and all survey raw observation data from the job to a JobXML file.

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Export DXF (.DXF) File

The DXF export routine allows you to export points and lines to a DXF file.

Export Points as Blocks: will export points as DXF blocks with descriptive text attached. If this box is checked, configure the **Point Block Settings** to control how the point blocks appear in the DXF file. If this box is unchecked, points are exported as point entities in the DXF file.

Include Code / Descriptions: check this to include either the code or the description in the point block.

Code: will include codes in the point block.

Description: will include descriptions in the point block.

Include Elevation: check this to include elevation text in the point block. This setting does not affect the export to 3D objects in the DXF, only the text printed in the point block. Three dimensional points in your survey file will always become 3D point objects in the DXF.

Text Height: sets the text height for the point block, in meters.

Text Vertical Spacing: sets the text vertical spacing for the point block, in meters.

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Export Style Sheet Report

You can generate a customized report from your current survey data using a report template. A report template is a XML style sheet that defines how to format and display your survey data. Survey Pro comes with some standard report templates installed. You can also create your own customized XML style sheets to generate reports in a number of different formats, including html (.htm) for viewing with a web browser, and comma separated values (.csv) for viewing with a spread sheet.

Report Templates: Select a report from the list of report templates. Any valid XML style sheet file (*.xsl) in the directory "Program Files\Survey Pro\XSLT" will show up as a report template in this list.

[Finish]: Tap to open the report template and check for any required user input for this report. If this report template specifies user input, the [Enter User Input](#) screen will open and prompt you for the required settings for this report. If this report template does not require any user input, the report will be generated and saved to disk.

Enter User Input

The [Enter User Input](#) screen is used to collect any user input specified in the report template. Enter a value for each required input.

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Import Control

[File] [Import Control]

This screen is used to select a Survey Pro file (.survey / .JOB) to import control point coordinates:

[Import]: opens up the file browse dialog where you can select a Survey Pro version 5 (.survey) or a Survey Pro version 4 (.JOB) file to import control coordinates into the current job.

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Reference File

[File] [Reference File]

This screen is used to select a Survey Pro file (.survey / .JOB) to use as an external reference file. Points from an external reference file will be loaded into the job's point database without importing them into the job file.

[Use an external Reference File]: check this box to utilize an external reference file. Uncheck this box to unload the external reference file from the current job.

[Current Reference File]: displays the name of the currently active external Reference File.

[Browse]: browse the file system to pick an External Reference File.

[Clear]: unloads the external reference file from the current job and clears the link to the external Reference File.

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Backup / Restore Job

[File] [Backup / Restore]

The [Backup / Restore](#) wizard consists of a series of screens that are used to backup or restore all the files associated with

the current job.

The routine also gives you the option of storing a snapshot of a customized map view to the archive. This can then be used to visually identify an archive.

Any number of backups can be created for a particular job. All the existing backups for the current job are listed in the main [Backup / Restore](#) screen, along with other information including the date the backup was created, the number of files stored in the archive and if the archive includes a snapshot. Archives that include a snapshot are shown with a  icon, while those without a snapshot have a  icon. A new (empty) archive has a  icon.

All of the backups for a particular job are physically stored to a single compressed file located in the \Survey Pro Jobs directory on the data collector. This file will have the same filename as the current job, only the *.Backup extension is appended to the name. For example, the backups for a job with a filename of Smith.survey will be stored in a file called Smith.survey.Backup.

[New Archive...]: opens the [New Archive](#) screen where a name is entered for the new backup archive being created. Once created, an empty archive will be listed in the main [Backup / Restore](#) screen, which can then be selected to backup the current job.

[Delete Archive...]: opens a prompt asking if you are sure. If you select Yes at the prompt, the archive selected from the main [Backup / Restore](#) screen will be deleted.

[Properties...]: opens the [Archive Properties](#) screen.

Backup: when selected, tapping **[Next>]** will begin the backup routine where the data for the current job will be stored to the selected archive.

Restore: when selected, tapping **[Next>]** will begin the restore routine where the data from the selected archive will be restored, overwriting the current job.

[Next>]: opens the next screen.

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Backup / Restore - Archive Properties

[File] [Backup / Restore] [Properties...]

The [Archive Properties](#) screen lists the files stored within the selected archive along with other information.

The file sizes listed in this screen are in bytes. Since all backup archives are compressed, the file sizes displayed represent the compressed files, or the amount of space actually being used by the file(s) on the data collector.

[View Snapshot...]: will display the snapshot from the selected archive if one was included when the archive was originally created.

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Backup / Restore – Backup

When performing a backup, all the files associated with the current job are listed and will be included in the archive.

Create Snapshot: When checked, the next screen will prompt you to create a snapshot of the current job's map view, which will then be included in the archive.

[< **Back**]: returns to the previous screen.

[**Backup**]: opens the next screen.


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Backup / Restore - Create a Snapshot

The Create a Snapshot screen is a map view that is used to configure the map as desired and the resulting image will be saved in the archive as a snapshot along with the job files.

 (OK): will create the archive along with a snapshot of the map as it is configured on the screen.

 (Cancel): will create the backup archive without a snapshot.

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Backup / Restore - Restore

When restoring the job files from an archive, the archived files will replace the existing files of the current job.

Warning: If you do not want to lose any new data that was collected after the archive being restored was created, you should first backup the current job to a new archive before restoring an older archive.

[< **Back**]: will return to the previous screen.

[**Restore**]: will restore the backed up job from the selected archive. The current job is then deleted and replaced by the backup job.

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Transfer

[**File**] [**Transfer**]

The Transfer screen allows you to transfer files between the data collector and another device running the survey software.

Connecting to: specifies which device you are communicating with from the following options:


- Survey Pro (WM/WinCE): if you are connecting to a Windows device running Survey Pro.

COM Port: specifies which COM port you are using on the local machine. (COM 1 is the only available serial port on a

Ranger.)

Baud Rate: specifies the communications speed. The baud rate must match in both units for successful communications.

Parity: specifies the parity. The parity must match in both units. When in doubt, select None here.

[**Send File...**]: will open the Open screen where the file that you want to send can be selected. Once selected, the file is sent from the data collector to the specified device. A progress bar will be displayed that indicates how much of the file has been transferred. Tapping  (Cancel) will stop the file transfer.

Note: The [**Send**] routine should be initiated shortly after issuing the receive command on the other device.

[**Receive File...**]: allows you to receive a file from another device. This should be tapped prior to issuing the Send command on the other device. Tapping [Cancel] will stop the file transfer.

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Share

[File] [Share]


The Share screen is used to share files using E-Mail.

Sharing with E-mail

E-mail Profile: Select the E-mail profile. You must setup your E-mail profile using the Windows Mobile operating system settings application.

[**Upload Files**]: Tap to select files on this data collector to send via your E-mail account. After you have selected files to send, you will be prompted to enter the E-mail address of any recipients and cc recipients. You can specify a subject and type a message into the body of the E-mail before it is sent with the selected files. All files selected to share via E-mail will be compressed into a .zip file and included in the E-mail as a single attachment.

Sharing Directly from the File Dialog

You can also use the Share features directly from certain Survey Pro routines that require loading or saving a file. If the select file screen has a  icon, you can tap this icon to open up a menu that allows you to choose the source or destination for the file to import or save. You can choose a location on the **Device** or you can choose your **Central** account.

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Register Modules

[File] [Register Modules]

The Register Modules screen is used to enter your code to license the software.

If no modules have been registered, the software will run in Demo Mode. When running in Demo Mode, users are able

to test and use every routine available in the software. Although, Demo Mode limits all jobs to no more than 25 points. If a job exists on the data collector that contains more than 25 points, it cannot be opened while running in Demo Mode.

Registered: Indicates that the corresponding module has been authorized.

[Enter Registration Code]: Opens the Register screen where you can enter the registration number to authorize one or more modules.

Note: For Survey Pro running on a Windows Mobile data collector such as the Ranger, Nomad, and T41, you will enter a 9 character registration code. This single code will register all modules you have purchased for this data collector. For Survey Pro running on a Windows tablet, you must enter a Proof of Purchase Number (POPN) for each individual module you have purchased.

Note: For Survey Pro running on a Windows tablet, you can unregister all POPNs used by this device in order to transfer them to another device. On the Register Modules screen, tap the **U** button on the keyboard. After confirming that you wish to unregister all POPNs from this device, Survey Pro will display the POPN for the Standard module. It will also store this POPN in a text file in your Desktop folder. You can use this single code to register all of the modules previously used on this device onto a new device.

Note: For Survey Pro running on a Windows tablet, you must be connected to the internet to register or unregister POPN codes.

Note: For Survey Pro running on a Windows tablet, the current warranty status and expiry date is displayed.

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Display Settings

[File] [Display Settings]

The Display Settings screen is used to set how you want the Survey Pro tablet version to be presented on your device.

Full Screen (Automatic): Use this mode to have Survey Pro run as a full screen application, which will fill the entire screen of your tablet. Survey Pro will detect if you are holding your tablet in portrait or landscape orientation, and choose the correct presentation for the device orientation detected at startup. This is the default mode.

Windowed: Use this mode to have Survey Pro run in a window on the desktop. You can select to use landscape, portrait, or tall portrait orientation, choosing the best presentation for your particular device.

Scale: Sets the scale when running in Windowed mode. You can choose 100%, 200%, or 300%, depending on which one looks best on your device.

Keyboard Scale: Use this to scale the on screen keyboard larger or smaller.

Note: Survey pro will activate with the display settings that are present at the time of program startup. If you rotate your device between portrait and landscape while you are running Survey Pro, the display will not change to the alternate orientation. You must stop and restart Survey Pro to get a new display setting to take effect. This includes changing keyboard scale.

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About

[File] [About]

The About screen displays the version of the software.

[**Hardware Information**]: is a shortcut to the Windows System Information screen.

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Instrument Settings

[Job] [Settings] [Instrument]


The [Instrument Settings](#) card shows the list of currently configured optical instrument profiles. An instrument profile defines the communication settings and any additional settings specific to the brand and model of the instrument. This card allows you to create new instrument profiles, import or export an instrument profile, and easily edit the settings of an existing profile.


Each instrument profile is shown as a row on the Instrument Profiles List

Tap on a row to set that instrument as the current active instrument.

Communications Settings Icon: shows the type of connection to the instrument. It can be one of:


: The instrument is set for Bluetooth communications.

: The instrument is set for serial communications.

: The robotic instrument is set for radio communications.

Instrument Settings Icon : Tap to access the [Instrument Settings](#) screen where you can modify the communication settings and any configuration specific to your brand and model of instrument.

Note: When editing an existing instrument profile, you cannot modify the instrument brand or model.


Add Instrument Icon : Tap to open the [Add Instrument](#) screen.

Tap and hold on an instrument profile to show the context-sensitive menu:

Rename: Select to rename the instrument profile.

Delete: Select to delete the instrument profile.

Note: The [Instrument Profiles](#) screen will always contain a profile named 'Manual Mode'. Select this profile to type in angles and distances manually for any optical observation routine.

Note: When running in leveling mode, select the settings icon  to open the [Level Method](#) screen where you can configure the type of leveling manual input you are using.

[GeoLock]: Opens the [GeoLock Settings](#) screen.

[Import]: Imports an instrument profile from an instrument profile file that was previously loaded on the data collector.

[Export]: Saves the selected instrument profile to a file, which can then be transferred to another data collector and then imported.

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Instrument Setup

The [Instrument Setup](#) screen opens whenever a new instrument profile is being created, or when an existing profile is being edited.

The options available on this screen will vary slightly depending on the total station model selected.

Name: The name of the instrument profile being created or changed. This is the name that appears in the list on the first [Instrument Settings](#) screen.

Brand: Specify the manufacturer of the instrument that you are using from a dropdown list.

Model: Specify the model of the instrument that you are using from a dropdown list.

Serial Port: The serial port on the data collector used for communications with the total station. You can choose a COM port or you can choose to use Bluetooth.

Baud Rate: The speed at which communication occurs with the total station. This must match the baud rate configured within the total station.

Parity: The parity used for communication with the instrument. This must match the parity setting configured within the total station.

Bluetooth Connection: Select the Bluetooth connection to use for the instrument.

Bluetooth Settings: Tap to launch the [Bluetooth Instruments](#) screen, where you can do an automatic scan for supported Bluetooth survey equipment, or

Note: Some instruments require that you setup an outgoing COM port using the Windows operating system Bluetooth settings application. When configuring one of these instruments, **[Bluetooth Settings]** will open the operating system settings application, and not the [Bluetooth Instruments](#) screen.

[Defaults]: Set the Serial Port, Baud Rate and Parity to their default values based on the selected total station.

[Instrument Settings...]: Opens the [Instrument Model Settings](#) screen where you can configure settings specific to your instrument brand and model.

[Send to Instrument]: (applicable only to specific total stations) Sends the selected instrument settings to the total station. This is particularly useful with robotic total stations after the total station has been reset.

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Instrument Model Settings

The [Instrument Model Settings](#) screen has a number of settings cards used to configure settings specific to your selected instrument brand and model. The cards available will depend on the brand and model of your instrument. You will need to refer to the manual that came with your total station for a complete description of the settings that may be available with your specific instrument. Settings cards common to all instruments, as well as some settings for certain instruments, are described below:

Settings for All Instruments

Precision Settings

The Precision Settings card is used to enter the instrument precision, as well as the centering error. These values are used only by the resection least squares solution algorithm to weight observations. These values are not used to apply corrections to any measurements.

Angle Accuracy: Enter the horizontal and vertical angle accuracy of your instrument in the edit boxes. If your instrument supports a query for these parameters, Survey Pro will connect to the instrument and the values will be shown on the screen. You do not need to enter values in this case.

EDM Accuracy: Enter the EDM distance and PPM precision of your instrument in the edit boxes. If your instrument supports a query for these parameters, Survey Pro will connect to the instrument and the values will be shown on the screen. You do not need to enter values in this case.

Setup Error: Enter the centering error to use when weighting angle and distance observations for the least squares resection solution.

Additional Settings for Spectra Precision Focus 30

General Settings

The General card is used to show information about your Focus 30 instrument. This card shows the name, type, firmware version, and last service date of your instrument.

EDM Settings

The EDM Settings card is used to configure the operation of the EDM.

Target Type: Select **Prism** or **Reflectorless** target type. You can also enable or disable the laser pointer for the reflectorless target.

EDM Mode: Select **Tracking** for continuous fast observations. Select **Standard** for more precise observations. Select **Precise** mode (if it is available for your model of Focus 30) for the best quality observation.

Enable **Smart Aiming** to increase the precision of your observations.

Note: The more precise EDM modes and the use of **Smart Aiming** will improve the precision of the observation, but it will take slightly longer to collect the measurement data when these settings are in place.

Lights Settings

The Lights Settings card is used to configure the operation of the tracklight, the face 2 display on the instrument, and the reticle illumination.

Search Settings

The Search Settings card is used to configure the search settings of the instrument.

Enable Autosearch: Check this setting to have the instrument automatically search for the prism after it loses lock. The automatic search starts approximately 3 seconds after loss of prism lock.

Enable Snap to Target: Check this setting to have the instrument automatically lock onto the prism if tracking lock is lost and the prism is still in telescope view.

Search Window: Set the horizontal and vertical range for the search window.

Joystick Turn Speed: Set the turning speed of the instrument when controlling it with the joystick buttons.

Follow After Target Loss: Set a duration in seconds for the instrument to follow you along your current track when target lock is lost. If you are moving and the instrument loses lock on the prism, the instrument will continue to turn along your trajectory and speed for this duration. You can disable this feature.

Collimation Settings

The Collimation Settings card is used to launch a number of different work flows that guide you through performing all the necessary collimations of your instrument. When you complete a collimation work flow, the instrument firmware is updated with the collimation parameters. The instrument will apply collimation corrections to all measurements returned to Survey Pro.

[Optical and Trunnion Axis Tilt Collimations ...]: Opens a work flow to guide you through performing collimation of the optical axis and then of the trunnion axis.

[Trunnion Axis Tilt Collimations ...]: Opens a work flow to guide you through a collimation of the trunnion axis.

[Tracker Collimation]: Opens a work flow to guide you through a collimation of the tracker for prism lock.

[Compensator]: Opens a work flow to guide you through a collimation of the compensator.

Additional Settings for Nikon and Focus 8/6 Instruments

Mode Settings

The Mode Settings card is used to configure the instrument settings.

Distance Averaging Mode: Select **Single** to have each measured distance from a single EDM observation. Select **Average** to have each measured distance from an average of multiple EDM observations. It will take longer to collect a distance measurement when using **Average** mode.

Distance Measuring Mode: Select **Precise** to use the most precise EDM mode. Select **Normal** to use a faster but slightly less precise EDM mode.

Target: Select **Prism** when you are observing a prism target. Select **N-Prism** when you are using reflectorless mode.

Send Stakeout Data to Total Station: Check this control to have Survey Pro send the stakeout angle and distance to the instrument. The horizontal angle of the instrument will be set such that 0-00-00 will be online to your stakeout design location. The instrument will show the stakeout distance on its display.

Enable Laser Pointer: Check this control to enable or disable the laser pointer.

Use Lumiguide: Check this control to enable or disable the Lumiguide.

Additional Settings for Most Other Instruments

Correction Settings

The Correction Settings card is used to enter horizontal and vertical collimation values to be applied to angular observations in Survey Pro. By default, these values are set to 0, because it is highly recommended that you use your instrument's built in collimation features for this purpose. If you need to apply instrument collimation corrections, you

should set the collimation parameters directly into your instrument. If you do decide to use the Correction card to set a collimation correction, Survey Pro will apply the correction to the horizontal and vertical angles before they are used for computation and booked to raw data. The collimation correction values are not recorded in the job raw data for the survey.

Note: If you use the Correction Settings card to have Survey Pro apply collimation corrections, make sure the collimation correction is turned off in your instrument to avoid applying this correction parameter twice.

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Bluetooth Instruments

The Bluetooth Instruments screen is used to manage your Bluetooth connections. This screen shows a list of Bluetooth devices known to your data collector that also support a serial port service. You can use this screen to scan for new devices, as well as to manage the Bluetooth PIN code if this is required for any of your survey instruments.

[**Start Scan ...**]: Tap to launch the Bluetooth Scan screen, which will scan for Bluetooth devices.

[**Windows Bluetooth**]: Tap to open the Windows operating system Bluetooth settings application.

Tap and hold on any device to edit or delete the selected device.

Edit Device

The Edit Device screen is used to edit the name and change the PIN code for the selected Bluetooth serial service.

Name: Enter the name for this Bluetooth connection.

Set Bluetooth PIN: Check this box if your instrument requires a PIN code. When checked, you must enter a PIN code for this Bluetooth connection.

Bluetooth Scan

When the Bluetooth Scan screen opens, it automatically starts scanning for Bluetooth devices. Any new Bluetooth devices in the vicinity are shown in the list of new Bluetooth devices. Check any devices you wish to select to add to your data collector's list of Bluetooth connections.

[**Select All**]: Tap to select all of the new Bluetooth devices in the list.

[**Rescan**]: Tap to scan for Bluetooth devices again.

[**Select None**]: Tap to deselect all of the new Bluetooth devices in the list.

[**Add Selected**]: Tap to add all selected new Bluetooth connections.

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Level Method

[Job] [Settings] [Instrument] (select Manual Mode) [Instrument Settings...]

The [Level Method](#) screen is used to select the Manual Mode leveling method. This setting will control what edit fields you are prompted for when you take a leveling observation using the Manual Mode optical instrument. If you are using an actual instrument, the method is determined automatically. The electronic level method will be used when you are connected to an electronic automatic level, and the trigonometric method will be used when you are connected to an optical total station.

Three Wire: Prompts for shot data will require upper, center, and lower wire readings.

Single Wire: Prompts for shot data will require center wire readings only.

Electronic: Prompts for shot data will require a vertical and horizontal distance.

Trigonometric: Prompts for shot data will require a zenith angle and horizontal distance.

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[Job Menu Index](#)

GNSS Receiver Profile Settings

[Job] [Settings] [Receiver Profiles]

The [Receiver Profiles](#) card shows the list of currently configured receiver profiles. A receiver profile defines the receiver brand and model, the communication settings, the survey setup type, and the receiver settings. This card allows you to create new receiver profiles, edit your existing receiver profiles, import or export a receiver profile, and access the receiver settings for the selected profile.

You can create multiple profiles for a single GNSS receiver. Each profile can be used to define a different configuration for the receiver. For example, you may want to have a rover profile and a network rover profile for a single receiver that is used for both radio RTK and network RTK at different times.


Each receiver profile is shown as a row on the Receiver Profiles list. Each row shows the following:

Survey Setup Type Icon: Shows the type of receiver profile. A receiver profile can be one of four types:

 Base Receiver: RTK base receiver to broadcast corrections with a radio modem data link.

 Network Base Receiver: RTK base receiver to broadcast corrections with an Internet protocol (IP) modem.

 Rover Receiver: RTK rover to receive corrections from an RTK base using a radio modem data link.

 Network Rover Receiver: RTK rover to receive corrections using an Internet modem.

Profile Name: Shows the name of the profile.

Communications Settings Icon: Tap to access [Receiver Communications](#) settings. The following icons may appear:

: The receiver is set for Bluetooth communications.

: The receiver is set for serial communications.

Receiver Settings Icon : Tap to access the [Receiver Settings](#) screen where you can modify the receiver profile settings and configure the receiver modem.

Add Receiver Icon : Tap to open the [Add Receiver Profile](#) wizard.

Tap and hold the receiver profile to show the context-sensitive menu:

Receiver Info: Select to launch the [Receiver Info](#) screen.

Rename: Select to rename the receiver profile.

Delete: Select to delete the receiver profile.

Note: The [Receiver Profiles](#) screen will always contain a profile named 'Demo Mode'. Select this profile to have the GNSS module work in demonstration mode. In this mode you can simulate GNSS work flows and data collection for training or demonstration purposes.

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Receiver Communication

The [Receiver Communication](#) screen is used to configure the communication settings between the data collector and the GNSS receiver.

Name: Displays the name of the receiver profile.

Model: Displays the brand and model of the receiver.

Bluetooth / Serial: Select the method of communication between the data collector and the receiver. Choose **Serial** to select a COM port (1-9). Choose **Bluetooth** to select a Bluetooth device.

Serial mode

When you select serial mode, the [Receiver Comms](#) screen shows the following:

Port: Select the COM port required to connect to your receiver from the drop-down list.

Baud Rate: Select the baud rate required to connect to your receiver from the drop-down list.

Parity: Select the parity required to connect to your receiver from the drop-down list.

[Defaults]: Tap to return all the serial port settings to their Survey Pro defaults.

[Autodetect]: Tap to automatically detect the serial port settings for your receiver.

[Change on Receiver]: Tap to change the serial port settings on your receiver. In order for this to work, you must first have the correct serial port settings to communicate with your receiver.

Bluetooth mode

When you select Bluetooth mode, the [Receiver Comms](#) screen shows the following:

Bluetooth Device: Select the Bluetooth device associated with your receiver.

Bluetooth Settings: Tap to launch the [Bluetooth Instruments](#) screen, where you can do an automatic scan for supported Bluetooth survey equipment, or you can open the Windows operating system Bluetooth settings application. When you return to the [Receiver Communication](#) screen, your new Bluetooth device is automatically selected.

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Add Receiver Profile

[Job] [Settings] [GNSS Receivers] [Add Receiver or [Connect to Receiver](#) [Add Receiver...]

The [Add Receiver Profile](#) screen is used to create a new receiver profile, connect to the receiver, and configure the settings for this profile.

You can set up a receiver automatically using the Spectra Auto Configure scan, or manually where you specify the brand and model, and configure the communication parameters yourself.

To use Spectra Auto-Configure:

[Start >]: Tap to automatically create profiles for Spectra Precision receivers detected in the vicinity.

To perform manual setup:

Brand: The brand of this receiver.

Model: The model of this receiver.

Connect with Bluetooth / Serial: Select the communication mode for this receiver.

If you select **Bluetooth** you must select the device for connection.

Bluetooth Device: Select the Bluetooth device for this receiver connection.

Bluetooth Settings: Tap to launch the [Bluetooth Instruments](#) screen, where you can do an automatic scan for supported Bluetooth survey equipment, or you can open the Windows operating system Bluetooth settings application. When you return to the [Receiver Communication](#) screen, your new Bluetooth device is automatically selected.

If you select **Serial**, you must configure the following:

Port: The data collector port used to communicate with the receiver.

Baud Rate: The baud rate used by the data collector for receiver communications.

Parity: The parity used by the data collector for receiver communication.

Note: If you do not know the receiver's settings, leave the default values. If the program fails to connect, it attempts to auto-detect the correct settings.

[Connect]: Tap to establish a connection to the receiver, and open up the [Receiver Settings](#) screen to configure the settings of the new receiver profile. When you tap OK to accept the new receiver profile settings, you will be prompted to name the receiver profile.

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Receiver Settings

The Receiver Settings screen is used to configure a receiver profile. The receiver settings screen has up to six cards, depending on the receiver's capabilities:

Survey: This card is used to configure the setup type, elevation mask, and correction format for the receiver profile.

Modem: This card is used to configure the modem used to transmit or receive RTK corrections between the base and rover.

General: This card is used to configure settings specific to your receiver brand and model, if your receiver supports any specific settings.

Alerts: This card is used to configure the receiver alert messages, and the Anti-Theft contact settings.

Anti-Theft: This card is used to configure and test the Anti-Theft password.

Multi Base RTK: This card is used to configure Multi Base RTK.

Reset: This card is used to perform a soft or hard firmware reset on the receiver, if your receiver supports firmware reset functions.

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Survey Settings


The **Survey** settings card is used to configure the setup type, elevation mask, and correction format for the receiver profile.


Setup Type: choose the setup type for this profile. Setup type can be one of:

 Base Receiver: RTK base receiver to broadcast corrections with a radio modem data link.

 Network Base Receiver: RTK base receiver to broadcast corrections with an Internet protocol (IP) modem.

 Rover Receiver: RTK rover to receive corrections from an RTK base using a radio modem data link.

 Network Rover Receiver: RTK rover to receive corrections using an Internet modem.

 RTX Receiver: RTX rover to receive corrections using an Internet modem.

Elevation mask: Set the elevation mask for satellite tracking. The receiver will not use satellites below the given angle. The elevation angle is given in degrees above the horizon and can be anywhere from 0 degrees (use all satellites) to 90 degrees (use no satellites).

[Set Rx. to OFF Mode]: Tap to set your receiver to Off mode. This is where your receiver does not output or accept base corrections, effectively stopping RTK operations. This may be necessary in order to configure the radio.

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Data Modem Settings

The **Data Modem** card is used to view and configure the settings for the modem used to transmit RTK base corrections or receiver RTK rover corrections.

Modem: Select the type of modem. There will be several options here, depending on your **Survey Setup Type** and the brand and model of your receiver. If the modem you are using is not in the list of known devices, select Generic Serial to set the communication parameters to work with just about any external data modem. The icon to the left of the modem selection list indicates the RTK capabilities of the data modem. The following icons indicate that the data modem:

: Supports Internet modem.

: Supports both base and rover operations.

: Supports only rover operations.

: Supports only base operations.

The fields that appear on the screen change, depending on the modem you select:

Modems connected through a serial cable

Baudrate: Displays the baud rate the receiver uses to communicate with the modem.

Parity: Displays the parity the receiver uses to communicate with the modem.

Serial Port: Displays the serial port the receiver uses to communicate with the modem.

[**Configure**]: Opens the [Modem Serial COM](#) screen where you can change the settings for communication between the receiver and the data modem.

Modems where you can set the channel and configure radio settings

Serial Port fields

Baudrate: Displays the baud rate the receiver uses to communicate with the modem.

Parity: Displays the parity the receiver uses to communicate with the modem.

Serial Port: Displays the serial port the receiver uses to communicate with the modem.

[**Configure**]: Opens the [Modem Serial COM](#) screen where you can change the settings for communication between the receiver and the data modem.

Radio Settings fields

Channel: Displays the last radio channel when applicable.

Sensitivity: Displays the last radio sensitivity when applicable.

[**Configure**]: Establishes communication with the radio firmware and opens the [Radio Settings](#) screen where you can change the radio channel and sensitivity settings.

Modems where you cannot configure COM settings, but can configure channel settings

Channel: Displays the last radio channel when applicable.

Sensitivity: Displays the last radio sensitivity when applicable.

[**Configure**]: Establishes communication with the radio firmware and opens the [Radio Settings](#) screen where you can change the radio channel and sensitivity settings.

Cellphone modem settings

Serial Port fields

Baudrate: Displays the baud rate the receiver uses to communicate with the cellphone.

Parity: Displays the parity the receiver uses to communicate with the cellphone.

Serial Port: Displays the serial port the receiver uses to communicate with the cellphone.

[**Configure**]: Opens the [Modem Serial COM](#) screen where you can change the settings for communication between the receiver and the cellphone.

Select modem fields

Select Modem: Select the specific cellphone modem that applies.

[**Edit Modem**]: Edit the existing modem parameters.

[**Manage Modem**]: Manage saved GSM modems.

Base Phone #: Enter the telephone number of the RTK base receiver's cell phone.

Internet Protocol modem settings

Serial Port fields

Baudrate: Displays the baud rate the receiver uses to communicate with the cellphone.

Parity: Displays the parity the receiver uses to communicate with the cellphone.

Serial Port: Displays the serial port the receiver uses to communicate with the cellphone.

[**Configure**]: Opens the [Modem Serial COM](#) screen where you can change the settings for communication between the receiver and the cellphone.

Select modem fields

Select Modem: Select the required IP modem.

[**Create Modem**]: Create a new modem.

[**Edit Modem**]: Edit the existing modem parameters.

[**Delete Modem**]: Delete the existing modem parameters.

Windows networking settings

Dial-up Connection: Select the required connection from the drop-down list.

[**Manage Connections**]: Manage all existing connections.

[**Show Advanced Settings**]: Show advanced settings.

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Modem Serial Communication Screen

The [Modem Serial Communication](#) screen is used to change the settings for communication between the base or rover receiver and the data modem.

GNSS Receiver Port: Select the serial port the receiver will use to communicate with the modem.

Baudrate: Select the baud rate the receiver will use to communicate with the modem.

Parity: Select the parity the receiver will use to communicate with the modem. This setting disabled for receivers that do not support user defined parity setting.

[Defaults]: Automatically sets all the selectable values to their defaults based on the current receiver hardware.

[Receiver Set]: Sets the selected modem communication settings for the specified port on the receiver.

Note: The modem communication settings are also set in the receiver during the base and rover setup procedure. Therefore, you will not usually have to use the **[Receiver Set]** button on this page.

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Radio Settings Screen

The Radio Settings screen is used to configure settings of the base or rover radio modem. Some common settings available are described below. However, not all radios support all of the described settings, so if you do not see one of these fields, it is because the radio type does not support it.

Channel: Select the channel the radio will use to communicate with the other radio.

Sensitivity: Select the sensitivity of the radio.

Mode: Select the transmit format used by the base radio. The rover radio must be listening for the same format the base is broadcasting.

Baud: Displays the baud rate the radio is currently set to. There is no way for the software to change this value, so you must set the receiver to radio communications to match what you see here.

Parity: Displays the parity the radio is currently set to.

[Set]: Sends commands to the radio firmware to configure the settings selected on this screen.

Note: Some settings on the radio cannot be modified with Survey Pro. To fully program the radio modems, you need to use PC software that should be supplied with the radio.

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Cell Phone Settings

[Edit Modem]

or **[Manage Modems ...] [Edit]**

The Cell Phone Settings screen is used to create or modify a cell phone data modem configuration.

Auto Answer Command: Alternate Hayes AT command to use for auto answering.

Note: The default auto answer command (ATE0S0=1), default dial command (ATE0DT), and hang up command (ATH0) are entered by default on a new configuration. See [IP Modem Settings](#).

Number to Dial: Enter the telephone number of the RTK base receiver's cell phone.

Hang Up: Alternate Hayes AT command to use for hanging up.

Dial Command: Alternate Hayes AT command to use for dialing.

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IP Modem Settings

The [IP Modem Settings](#) screen is used to create or modify an IP modem configuration for a network server. (You can only configure in IP modem when RTK Rover is selected for the receiver.)

Connect Command: AT modem command to connect to the base server. Default it "ATE0&D0DT".

Disconnect Command: AT modem command to disconnect from the Internet. Default is "ATH0".

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General Settings

The [General](#) settings card is used to configure settings specific to your receiver brand and model.

Some of the settings available for different brands of receiver are described below.

Settings for Spectra Precision Receivers

If the current profile is for Promark 500/800 receiver, the general page also shows the following settings:

Storage Location: Select Internal Memory to store post processing data to the receiver's internal memory. Select USB Memory to store post processing data a USB storage device connected to the receiver.

NMEA Outputs: Select On to enable NMEA outputs on the receiver COM port at 9600 baud, 8 data bits, and no parity. Select Off to disable NMEA outputs.

If the current profile is for Promark 200 receiver, the general page also shows the following settings:

Storage Location: Select Internal Memory to store post processing data to the Promark device's internal memory. Select SD Card to store post processing data an SD card in the Promark device.

NMEA Outputs: Select On to enable NMEA outputs on the Promark device's COM port. Select Off to disable NMEA outputs.

If the current profile is for an Epoch 50 receiver, the general page also shows the following settings:

NMEA Outputs: Select On to enable NMEA outputs on receiver COM port 2 at 9600 baud, 8 data bits, and no parity.

Select Off to disable NMEA outputs.

Note: NMEA outputs are only possible when your RTK mode is NTRIP with windows networking.

Settings for Spectra Precision Receivers

If the current profile is for an Epoch 35 receiver, the general page also shows the following settings:

SBAS Tracking: Select On to enable tracking SBAS satellites. Select Off to disable tracking SBAS satellites.

Confidence Level: Select High to have the receiver ambiguity resolution use a high confidence level. This is the desired setting for the most robust ambiguity resolution, but will result in the inability to get a fixed RTK position in challenging GNSS environments. Select Low to have the receiver ambiguity resolution use a low confidence level. This setting should only be used in challenging GNSS environments, and you should be aware of the possibility that the RTK solution may fix on incorrect ambiguities.

Settings For Trimble Receivers

If the current profile is for a Trimble receiver, the general page also shows the following settings:

Log post process data to: Select handheld or receiver memory.

Glomass tracking: Select On or Off.

Settings for Thales (Ashtech) Receivers

If the current profile is for a Thales (Ashtech) receiver, the general page also shows the following settings:

Canopy: is where you set a parameter to describe the multi-path environment. This command is relevant for ROVER mode or RVP. Choices are:

Open Sky (default)

Under Canopy (forest, urban canyon)

Confidence Level: is where you set the confidence level for ambiguity fixing. The values here are the statistical confidence level in percent. The higher the confidence level, the more certainty that the ambiguities are fixed correctly. But the longer it will take to fix them choices are:

- 99.0%
- 99.9%

Settings for Topcon (Javad) Receivers

If the current profile is for a Topcon (Javad) receiver, the general page also shows the following settings:

Co Op Tracking: Set the 'common loops' mode of the receiver. There are two choices:

- Off
- On

Multi Path Reduction: Set to use C/A code phase multipath and C/A carrier phase multipath reduction. This feature is

only applicable if your receiver has the “_MRP” option enabled. There are two choices:

- Off
- On

Confidence Level: Set the statistical criteria to use in the RTK engine’s fixed ambiguity resolution algorithm. The settings of ‘Low’, ‘Medium’, and ‘High’ correspond to confidence levels of %95, %99.5, and %99.9 respectively. There are three choices:

- Low
- Medium
- High

Note: It is recommended you set this value to High. This will usually mean the RTK engine may take longer to resolve a fixed position. It might even mean not being able to resolve a fixed solution in some situations. However, the consequence of a lower confidence level is that it makes it more likely to resolve an incorrect fixed ambiguity. The results of using an incorrect fix are usually much worse than the results of using a float solution.

Antenna: Set the source for antenna input. There are two choices:

- Internal
- External

Note: This setting is only available when your receiver model is Hiper .

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Alerts Settings

The [Alerts](#) settings card is used to configure the receiver alert messages, and the Anti-Theft contact settings.

Contacts: The list of contacts displays the contact information known by the receiver. Contacts can be either email addresses or phone numbers. The icon on the right shows if this contact is to be used for one or both of Alerts and/or Anti-Theft messages. Tap and hold on an existing contact to test the connection to that contact. You can also edit or delete a contact.

Add Contact: Tap to enter a phone number or email address for the new contact

Alerts: Select the type of alerts you would like to use. You can choose from:

- **Off:** Not using alerts.
- **Standard:** You will receive alerts about critical receiver state information, such as low battery warnings and the receiver being displaced.
- **Full:** You will receive alerts about all receiver conditions.

[Email Settings]: Tap to enter the email server details including user name and password.

[Internet Connections]: Tap to setup the configuration for the receiver internet connection.

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Anti-Theft Settings

The [Anti-Theft](#) settings card is used to configure the password and test the Anti-Theft connection.

[Change Password]: Tap to reset the Anti-Theft password.

[Enable]: Tap to turn on Anti-Theft monitoring.

[Disable]: Tap to turn off Anti-Theft monitoring.

[Prompt to enable anti theft]: Check this if you want to be prompted to enable Anti-Theft every time you start an RTK survey or post processing data collection.

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Multi-Base RTK Settings

The [Multi-Base RTK](#) settings card is used to configure the Multi-Base RTK feature for receivers that support it.

Multi-Base RTK allows you to configure the receiver to use an alternate source for real time corrections. It is only enabled when the receiver setup type is Rover.

Mode: select the mode for Multi-Base RTK.

- **None**: disable Multi-Base RTK
- **Backup RTK**: configure an alternate source of base data using an NTRIP network, and the receiver will use this alternate source when primary source is not available.
- **UHF Networking**: setup a network with multiple base stations on UHF radios, and the receiver will use the base station received over the radio link.
- **RTX**: configure an alternate source of base data using RTX precise point positioning, and the receiver will use this alternate source when primary source is not available.

Modem: Select the modem to use to connect to the backup source.

Additional Settings ...: Additional settings as required for your modem selection.

Note: When starting a survey with a rover setup to use Multi-Base with an NTRIP mount point, you will be prompted to select a mount point from the NTRIP table when configuring the rover receiver.


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NMEA Outputs

The [NMEA Outputs](#) settings card is used to configure output of NMEA messages on a selected receiver port for receivers that support this feature.

+: Tap to add a new NMEA output to the configuration.

: Tap to add configure the selected NMEA output.

: Tap to remove the selected NMEA output from the configuration.

For each NMEA output, you can configure:

- **Message Type:** Select the message type to output.
- **Port:** Select the port to output the message to.
- **Output Rate:** Set the rate for message output.

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Reset Settings

The Reset settings card is used to perform a soft or hard firmware reset on the GNSS receiver.

[Set Rx. to OFF Mode]: Tap to set your receiver to Off mode. This is where your receiver does not output or accept base corrections, effectively stopping RTK operations. This may be necessary in order to configure the radio.

[Soft Reset]: Tap to soft reset the GNSS receiver firmware.

[Hard Reset]: Tap to hard reset the GNSS receiver firmware. Warning: this will usually clear the non volatile RAM on the receiver, and it may take as long as 10 minutes for the receiver to be able to calculate a fixed RTK position after a hard reset.

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NMEA Generic GPS


The NMEA Generic GPS settings card is used to configure the data collector's built in GPS receiver, or to connect to an external NMEA GPS receiver.

Serial Port: Select to configure the NMEA receiver to use a serial port. This is the setting to use for direct connection to the built in GPS (usually COM2) or when using Shared GPS (see below).

Device (available only when using a Bluetooth GPS receiver and *Bluetooth* is selected for the *Serial Port*): Select the Bluetooth device that represents your GPS receiver here.

[Bluetooth...] (available only when using a Bluetooth GPS receiver and *Bluetooth* is selected for the *Serial Port*): Accesses the Bluetooth configuration screen where you can quickly check or change Bluetooth settings. See the User's Manual for more information on configuring Bluetooth.

Baud Rate: The speed that communication takes place. This must match the baud rate set in the GPS receiver.



[Shared GPS...]: Shortcut to the  > *Settings* > *GPS* screen. Use this Windows setting screen to configure the built in GPS to work with multiple applications at the same time. This screen allows you to specify the real COM port the GPS is connected to (usually COM2) and then select a virtual COM port that multiple applications can access simultaneously.

You can get more information while viewing this screen by tapping  then .

Network Settings

[Job] [Settings] [Networks Card]

The Network settings card displays all of the network profiles you have setup on this data collector.

To add a new network to the list, tap the add network icon  on the Networks tab to open the Add/Edit Network screen. To edit a network, tap the gear icon . Tap and hold on a network to open the context menu in order to rename or delete the selected network.

Add/Edit Network

The Add/Edit Network screen is used to set the configuration for a new or existing network.

Name: Enter a unique name for the network server.

Setup Type: Chose the type of GNSS setup this network will be used for: Network Rover or Network Base

Server Type: Select the server type for this network.

For Network Rover, server type will be one of:

- **Automatic:** Select this server type to have Survey Pro detect the server type automatically. The server type will be either an NTRIP login page, or a direct connection to an Internet base. Survey Pro will start the survey based on the network server type detected.
- **NTRIP:** Select this server type if you know that the IP address and port specified is for an NTRIP login page.
- **Direct IP:** Select this server type if you know that the IP address and port specified is for a direct IP single base server, or if you are using a static IP base you have setup yourself.

For Network Base, server type will be one of:

- **Direct Connect:** Select this server type to allow other GNSS receivers to connect to this receiver and receive corrections over an internet connection.
- **TCP/IP Forwarding:** Select this server type to configure a base GNSS receiver to send corrections to a known internet address.
- **NTRIP Forwarding:** Select this server type to configure a base GNSS receiver to send corrections to a known NTRIP mountpoint.

Address: Enter the IP address or URL for the network server.

Port: Enter the IP port for the network server.

User Name: Enter the user name needed to sign in to the network, can be left empty if no user name is needed to sign in.

Password: Enter the password needed to sign in to the network, can be left empty if no password is needed to sign in.

Force Password: Check this setting to always send the user name and password when connecting to an NTRIP service. This setting only appears when your **Server Type** is set to **Automatic** or **NTRIP**.

Corrections: Select the type of RTK corrections to use. This setting only appears when your **Server Type** is set to

Direct IP, Direct Connect, TCP/IP Forwarding, or NTRIP Forwarding.

Mount Point: Enter the name of the NTRIP mount point to connect to when sending corrections to a NTRIP server. This setting only appears when your **Server Type** is set to **NTRIP Forwarding**

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Measure Mode Settings

[Job] [Settings] [Measure Mode]

The Measure Mode card is used to configure the RTK data collection settings. You can configure the measure mode settings independently for different types of points:

- **Data:** These settings are applied to data collection points. This includes points collected from the [Data Collection](#) screen, points occupied from the [Survey Map](#).
- **Topo:** These settings are applied to topo sideshot points. This includes points collected with the [Topo SS] button on the [Data Collection](#) screen, from the [Survey Map](#), or using the [Topo SS] button on any stakeout screen.
- **Check:** These settings are applied to check point observations collected with the [Check] button on the [Control Points](#) screen.
- **Control:** These settings are applied to GNSS control point observations collected with the [Control] button on the [Control Points](#) screen, or the [Occupy Control Setup](#) screen as part of the initial start survey calibration solution.
- **Stakeout:** These settings are applied to any stakeout as staked point stored.
- **RTX:** These settings are applied to any points stored when using the RTX correction service.

For each type of point collection, you can set the criteria for the solution quality:

Solution Quality: Control the solution quality acceptable for storing measurements. You have two options:

- **Fixed RTK only:** Allows storage of fixed solution only.
- **Code, Float, or Fix:** Allows storage of any differential solution.

Note: The Solution Quality setting is not available for RTX since RTX is a unique type of correction service.

For each type of point collection, you can choose to apply any of the following criteria. To apply each criteria, check the box next to the criteria to apply, and set the criteria acceptance value:

HRMS <=: The horizontal precision of the solution must be equal to or less than this criteria when you accept the point.

VRMS <=: The vertical precision of the solution must be equal to or less than this criteria when you accept the point.

PDOP <=: The PDOP of the solution must be equal to or less than this criteria when you accept the point.

Min SV >=: The minimum number of satellites tracked during the entire occupation must be equal to or greater than this criteria when you accept the point.

For each type of point collection except Topo, you can also specify a minimum duration of the solution, and if you would like to automatically accept the solution after that duration provided all of the other criteria set above is met.

Occupy For >=: Set the minimum duration for the RTK receiver to collect positions for the final solution.

Automatically accept: Check this box if you wish to automatically accept the point once the duration to average for has

been met. Survey Pro will automatically store the point after this duration provided all of the other criteria is met.

Note: Because Topo sideshot points are always collected with a single epoch of data, you can not set a minimum duration for the occupation, nor can you use the automatic acceptance for this type of point.

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Post Process Settings

[Job] [Settings] [Post Process]

The Post Process card is used to configure the settings for logging post processing data, and the collecting and storing of post processing points in the software.

RTK Autonomous Points: Specify action to take when accepting autonomous points during RTK data collection. There are three options.

- **Do not store:** Select to prohibit acceptance of autonomous points in RTK data collection routines.
- **Allow in PPK Survey:** Select to allow storing of autonomous points when in an RTK survey that is also storing PPK data to a post processing file.

Session Monitor: Select to use the session monitoring thresholds when collecting data with the Static / Rover Session screen. To have the software display warnings during post processing data collection, check Warn me if, and specify threshold values for the number of SV, HDOP and memory.

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Units Settings

The Units Settings card defines the units that are used within the software, sent from the total station, entered from the keypad and displayed on the screen. You can select the following settings for your project from the following dropdown lists.

Units for Distances: Defines the units used for length as Meters, International Feet, or US Survey Feet.

Display Feet/Inches: Allows you to view distances in feet and inches. Available only if the current distance is International Feet or US Feet. If selected, you can then choose the required fractions of an inch (2, 4, 8, 16, 32, 64).

Note: You can enter a distance in any distance field in units other than what is set for the job by appending the distance value with the following characters:

- **f** or **ft** or **ift** = International Feet
- **usf** or **usft** = US Survey Feet
- **i** or **in** = Inches
- **m** = Meters
- **cm** = Centimeters
- **mm** = Millimeters
- **c** or **ch** = Chains

Once the cursor leaves that field, the distance will be converted automatically. (A space between the value and the unit abbreviation is optional.)

Warning: When creating a new job, it is important that the Units for Distances field be set to the correct units. This allows you to seamlessly switch between different units in mid-job.

Problems can arise if these units are inadvertently set to the incorrect units when entering new data. For example, assume you created a control file by hand-entering a list of coordinates in a new job where the job was set to International Feet and the coordinates being entered were in US Survey Feet. Now assume you created another new job and correctly set it to US Survey Feet. If you then selected the previous job as a control file for the new job, the display of all of the coordinates in the control file would be converted from International Feet to US Survey Feet.

Units for Angles: Defines the units used for angles as Degrees or Grads (gons).

Display Directions as: Display directions as a Bearing or Azimuth.

Azimuth type: Defines if you are using a North Azimuth or a South Azimuth.

Grid Direction: specifies if your grid coordinates are increasing positive in the North East or the South West direction.

Coord. Order: Allows you to customize the labeling and order for coordinates used throughout the software. You can select any of the following formats:

- N, E, Elev. (Northing, Easting, Elevation)
 - X, Y, Z
 - E, N, Elev. (Easting, Northing Elevation)
 - Y, X, Z
-

Note: When you are doing a survey in a south west grid system, the meaning of the X/Y axes are reversed, so the south coordinate is labeled on the X axis and the west coordinate is labeled on the Y axis .

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Format Settings

The [Format Settings](#) card defines the number of places beyond the decimal point that are displayed for various values in all screens, and how stations are defined. (All internal calculations are performed using full precision.)

Northings / Eastings: Allows you to display from zero to six places passed the decimal point for northing and easting values.

Elevations: Allows you to display from zero to six places passed the decimal point for elevations.

Sq feet / meters: Allows you to display from zero to four places passed the decimal point for square feet or square meter values.

Acres / Hectares: Allows you to display from zero to four places passed the decimal point for acre or hectare values.

Distances: Allows you to display from zero to six places passed the decimal point for distances.

Angles: Allows you to include from zero to two fractional seconds with angle values.

Stations: Allows you to display stations in any of the following formats:

- 12+34.123: Displays stations where the number to the left of the + advances after traveling 100 feet or meters.
- 1+234.123: Displays stations where the number to the left of the + advances after traveling 1,000 feet or meters.
- 1,234.123: Displays standard distances rather than stations.

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Coding Settings

[Job] [Settings] [Coding]

The Coding Settings card allows you to configure using codes and descriptions in your data collection workflow.

Code or Desc: Toggle between using codes or descriptions for your data collection points.

Use Code Definition File: Mark this item to use a feature code file (*.FXL) with the current job. FXL files can be created and customized with the Spectra Precision Feature Definition Manager. When this setting is marked, tap the [Browse] button to select an FXL file.

Show Suggestion List Automatically: Marking this item results in a drop-down list of codes displayed as soon as text is entered into a **Code:** field. If unmarked, the list can be displayed by selecting **Suggestion List** using the power button associated with a **Code** field. Double-clicking a code in the list will replace the entered text with the selected code.

Use Description Shortcuts File: Mark this item to use a description file that contains description shortcut abbreviations and click the associated [Browse] button to navigate to and select the file.

Description Shortcuts files contain one shortcut/description pair per line where the shortcut and description are separated by a space or a tab. (The shortcut cannot contain spaces.)

Use Description List File: Mark this item to use a description file containing a list of descriptions without codes – one description per line and click the associated [Browse] button to navigate to and select the file.

Load Description List from Job File: Marking this item results in descriptions used in the current job, as well as any new descriptions entered, to be included in the description list.

Add New Descriptions to Description List: Marking this item results in only new descriptions entered since marking this box to be included in the description list. (If the preceding box is marked, new descriptions are added whether or not this item is marked.)

Show Suggestion List Automatically: Marking this item results in a drop-down list of descriptions displayed as soon as text is entered into a **Description:** field. If unmarked, the list can be displayed by selecting **Suggestion List** using the power button associated with a **Description** field. Double-clicking a description in the list will replace the entered text with the selected description.

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As Staked Point Naming

[Job] [Settings] [Point Naming]

The [Point Naming Settings](#) card is used to customize the behavior of the default point name and description used to store as staked points.

Default Point Name: is used to control what you wish to use for the default point name for as staked points. You have four options.

- **Next Available:** will use the next available point name in the job, starting with the name of the last stakeout point stored in the job.
- **Prefix + Design:** will use the entered prefix prepended on the design point name.
- **Design + Suffix:** will use the entered suffix appended on the design point name.
- **Add Constant:** will use the design point number plus the entered constant. This option is only appropriate if your design point names are not alphanumeric.

Default Point Description: is used to control what you wish to use for the default point description for as staked points. You have two options:

- **Design Name:** will use the name of the design point for the default description of the as staked point.
- **Design Description:** will use the description of the design point for the default description of the as staked point.

Note: These settings control the default name and description offered when storing the stakeout point from point staking, where there is a design point name. When there is no design point name, such as stake to line or stake line and offset, the default name is the next available point name derived from the last stake point stored, and the default description is derived from the line station and offset you are staking.

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Surveying Settings

The [Surveying Settings](#) card allows you to select various options that affect how data collection is performed.

Prompt for PPM during Station Setup: When checked, you will be prompted to enter the PPM correction factor as part of your optical station setup.

Prompt for Description: When checked, a prompt for a description will appear before any new point is stored from only the routines under the [Survey](#) menu.

Note: Descriptions can be no longer than 256 characters.

Prompt for Height of Rod: When checked, a prompt for the rod height will appear before any new point is stored.

Prompt for Layer: When checked, a prompt to select a layer will appear before any new point is stored from only the routines under the [Survey](#) menu.

Prompt for Code and Attributes: When checked, a prompt to select feature information will appear before any new point is stored from only the routines under the [Survey](#) menu. This also requires that a feature file be selected from the [Coding Settings](#) card.

Prompt for Picture: When checked, a prompt will appear before storing a point where you have the option of taking one or more pictures associated with the current point. (Only available when running on a Nomad or a Ranger 3 with a digital camera.)

Survey Map Use Enter Button for Topo: When checked, the enter key on the active survey map will take a topo shot. When unchecked, the enter button on the active survey map will take a normal shot.

Detect Duplicate Shots: When checked, a prompt will appear before attempting to store a second shot to the same location. This helps to catch when robotic total stations have lost lock while surveying. The distance tolerances set in the [Repetition Settings](#) screen are used in determining when two shots are at the same location.

Survey with True Azimuths: Automates the process of adjusting the circle on the total station when traversing so that you can survey with azimuths rather than horizontal angles.

Earth Curvature & Refraction: Allows you to select the earth curvature and refraction correction coefficient. Select **None** to turn Earth Curvature & Refraction correction off.

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Scale Factor Settings

The [Scale Factor](#) card shows you the current scale factor mode for scaling ground to grid distances. This is the scale factor used when reducing the horizontal distance measured with a total station on the ground to the coordinate system of the job's north, east (YX) local grid. This scale factor is also used to calculate ground distances when showing the results of a COGO calculation with grid coordinates.

[**Setup Scale ...**]: opens up the [Scale Settings](#) screen where you can select the desired method to use for scaling ground to grid distances.


Note: Scaling of ground to grid distances is usually only required when your coordinate system is set to some kind of conformal mapping plane. For a simple plane survey using a flat earth model, where ground measured distances are 1:1 to coordinate grid distances, you should leave your scale factor turned off.

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Scale Settings

[**Job**] [**Settings**] [**Scale Factor**] [**Setup Scale**]

The [Scale Settings](#) screen is used to configure the scale factor mode for scaling ground to grid distances. This is the scale factor used when reducing the horizontal distance measured with a total station on the ground to the coordinate system of the job's north, east (YX) local grid. This scale factor is also used to calculate ground distances when showing the results of a COGO calculation from grid coordinates. Once configured, you will return to the Surveying Settings screen where you must then tap  to save the scale settings.

You can choose from one of 5 modes:

No Scale Factor: No scale factor will be applied to distances measured with a total station on the ground. A horizontal

distance measured on the ground will be 1:1 with the distance between the grid coordinates, and you will only see one horizontal distance in results from COGO calculations.

Combined Scale Factor: Uses a combined scale factor, where the mapping plane grid scale and elevation scale for all observations are corrected with a single scale factor. You can specify a known combined factor you wish to use for a certain site, or one can be computed with the [Calculate Scale](#) wizard. A horizontal distance measured on the ground will be scaled to the grid using this factor, and you will see both grid and ground distances in results from COGO calculations.

Grid Factor with Sea Level: Uses a single mapping plane scale factor (grid factor) for the survey, and an elevation factor that is computed for each observation. A horizontal distance measured on the ground will be scaled to the grid using the single mapping plane scale factor (grid factor) and the elevation factor calculated for the height of each observation. You will see both grid and ground distances in results from COGO calculations.

Automatic Mapping Plane (Grid): Uses a mapping plane scale factor (grid factor) automatically calculated at each total station setup location, and an elevation factor that is computed for each observation. A horizontal distance measured on the ground will be scaled to the grid using the mapping plane scale factor (grid factor) for its location and the elevation factor calculated for the height of the observation. You will see both grid and ground distances in results from COGO calculations.

Automatic Mapping Plane (Ground): Is an extension of **Automatic Mapping Plane (Grid)** mode, and is active when you have a mapping plane ground coordinate system setup. A mapping plane ground coordinate system allows you to conduct your survey on a defined map projection, but to operate with ground scale coordinates. When using mapping plane ground coordinates, you specify the location of your project, and then the mapping plane grid coordinates are scaled up to the ground at this specific location. You can also specify an arbitrary offset so it is easy to recognize when you are looking at mapping plane grid or ground coordinates. A horizontal distance measured on the ground will be 1:1 to the grid at your reference location.

Because you are still using the underlying map projection behind the scenes, a new mapping plane scale factor (grid factor) is automatically calculated at each total station setup location, and an elevation factor is computed for each observation. However, the grid and elevation factors are calculated relative to the reference location for ground coordinates. For example, if you setup a total station close to your mapping plane ground reference location, and made a measurement over flat terrain, the grid factor used would be 1.0 and the elevation factor used would be 1.0, and the measured distance would be 1:1 with the grid distance. This is because the coordinate system has been adjusted to your location on the ground. As you move further away from your ground coordinate system origin, you will notice small differences between grid and ground distance, because we are still maintaining the correct mapping plane grid scale in the background, and the grid factor changes as you move around on the mapping plane.

Note: You can switch back and forth between mapping plane grid and mapping plane ground mode. The coordinates of all of your points, including key in grid points, will be readjusted

Combined Factor: Enter a combined scale factor if already known, otherwise is the combined scale factor computed from the [Calculate Scale](#) wizard.

Grid Factor: Enter a map plane scale factor if already known, otherwise is the scale factor computed from the [Calculate Scale](#) wizard.

[**Calculate Scale**]: Opens the [Calculate Scale](#) wizard, which is used to calculate a combined scale factor or map plane scale factor.

[**Set Reference Location**]: Opens the [Scale Reference](#) screen, where you can enter a reference point for 2D coordinate calculations when 3D scale parameters are required.

[**Setup Map Ground Coordinates**]: First checks that a map projection is selected and if not, prompt you to select one. Next, opens a wizard where after providing an origin point and ground system offset coordinates, the entire job northing/easting database will be updated with the ground coordinate system transformation.

[**Change Map Zone**]: Opens the [Select Coordinate System](#) wizard where you can choose a mapping plane zone or calibrated site from the coordinate system database file. You can also create a new zone and datum with user-specified parameters.

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Scale Reference

[**Job**] [**Settings**] [**Scale Factor**] [**Setup Scale**] [**Set Reference Location**]

The [Scale Reference](#) screen is used to select a reference height, or a reference location and height which is used in scale calculations when there is no reference point defined.

Note: For most operations, the location and change in elevation required for scale calculations is defined by the measurement or input. For example, a total station observation will use the grid factor of the station and the elevation factor calculated from the change in height of the observation, similarly a point in direction COGO calculation will use the reference point and entered vertical distance. The Scale Reference location entered on this page is used only when there is no specific points that define location for scale calculation. This is the case when you do 2D surveying when in mapping plane mode, or when you do COGO calculations that have no defined reference point such as triangle solutions.

[**Grid / WGS84 LLH / Local LLH**] Select the reference location coordinate type, and enter the reference location coordinate. Note, if your scale mode is **Grid Factor with Sea Level**, then you only need to enter the reference height. If your scale mode is **Automatic Mapping Plane** you will need to enter both horizontal and vertical reference locations.

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Calculate Scale

[**Job**] [**Settings**] [**Scale Factor**] [**Setup Scale**] [**Calculate Scale**]

The [Calculate Scale](#) wizard is available when *Use a single combined scale factor* or *Use a grid factor with sea level correction* is selected in the [Scale Settings](#) screen and is used to compute a scale factor. If a map zone is not currently selected, you will first be required to [set one up](#) before continuing.

Projection: Displays the details about the current map zone.

Select Point: Specify a reference point.

[**Calc Scale >**]: Opens Screen Two if *Use a single combined scale factor* was selected. If *Use a grid factor with sea level correction* was selected, you will return to the [Scale Settings](#) screen and the computed grid factor will be entered for you.

- Screen Two -

Ellipsoid Height: The height of the ground above the ellipsoid surface.

[< **Back**]: Returns to the previous screen.

[**Solve >**]: Opens Screen Three.

- Screen Three -

Mapping Plane Scale Factor: Displays the scale factor that will correct for the effects of map projection distortion.

Ellipsoid Scale Factor: Displays the scale factor to correct for the geometric effect of your height above the ellipsoid surface.

Ground to Grid: Displays the combined scale factor that will be used for ground to grid calculations. **Grid to Ground:** displays the inverse of the combined scale factor for grid to ground calculations.

[< **Back**]: Returns to the previous screen.

[**Solve >**]: Returns to the [Scale Settings](#) screen where the combined scale factor will be entered for you.

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Stakeout Settings

The [Stakeout Settings](#) card contains the settings that control how stakeout is performed. (The settings available depend on if you are running in Optical or GNSS mode.)

Stake “Corners,” Not Just Even Intervals: When staking by stations, locations where a line segment changes, such as from a straight section to a curve, will also be staked when this is checked.

Stake Bisector of Non-tangent Corners: When staking an offset to a centerline that contains a corner, this option, when checked, will stake the corner point where the two offsets intersect.

Always Start Stakeout With Coarse Mode: When checked, the EDM mode toggle button found in all stakeout screens will initially be set to coarse mode (fast shot). This instructs the total station to measure distances faster, but with slightly less accuracy.

Use Manual Updating (Remote Control): When checked, a [**Shot**] button in the stakeout screens must be tapped to take a shot. When this not checked, shots are continuously taken in the stakeout screens. (This is only valid when running in remote mode, using a robotic total station.)

Design Elevation from Offset Segment: Determines where the cut/fill value is computed from in the [Offset](#) and [Road Stakeout](#) screens when the **Offset** checkbox is checked and a non-zero offset is entered. When checked, the cut/fill value is calculated from the design elevation of the node you are staking to. When unchecked, the cut/fill value is calculated from the design elevation at the specified offset location.

Note: If the specified offset extends beyond the end of the road profile, the cut/fill value is always computed from the design elevation of the node you are staking to.

View from Instrument to Rod (non-remote): When checked, the move left or right information will be presented from the rod person’s point of view. When unchecked it will be presented from the total station’s point of view. (This option only applies when a robotic total station is selected in the [Instrument Settings](#).)

View from Rod to Instrument (remote): When checked, the move left or right information will be presented from the rod person's point of view. When unchecked it will be presented from the total station's point of view. (This option only applies when a non-robot total station is selected in the [Instrument Settings](#).)

Prompt for Layer: When checked, a prompt to select a layer will appear before any new point is stored from the routines under the [Stakeout](#) menu.

Prompt for Code and Attributes: When checked, a prompt to select feature information will appear before any new point is stored from only the routines under the [Stakeout](#) menu. This also requires that a feature file be selected from the [Coding Settings](#) card, described earlier.

Note: There is no Prompt for Description checkbox as in the [Surveying Settings](#) card because you are always prompted for a description when storing a point from a stakeout routine.

Prompt for Picture: When checked, a prompt will appear before storing a point where you have the option of taking one or more pictures associated with the current point. (Only available when running on a Nomad or Ranger 3 that has a digital camera.)

Use Perfect Stationing: When checked, staking locations will be computed at perfect stationing intervals. For example, if your starting station was 0+15 and your station interval was 100, your next stakeout location will occur at 1+00 instead of 1+15.

Point Tolerance: Affects the [Remote Staking](#) routine. When performing Remote Stakeout, the final graphic screen that is displayed when you are near the stake point will occur when you are within the distance to the stake point specified here.

Line Tolerance: Affects the [Stake to Line](#) routine. When staking to a line and the prism is located at a perpendicular distance to the specified line that is within the range set here, a message will state that you are on the line.

Horizontal Distance Tolerance: Affects the GNSS staking routines. When you are within the specified distance to the location you are staking, you are considered on that location.

Turn instrument to design point: Applies only to motorized total stations. The following options are available:

- 2D (HA only): A motorized total station will turn horizontally toward the design point after tapping the Turn Instrument button in the particular stakeout screen.
- 3D (HA and ZA): A motorized total station will turn horizontally and vertically toward the design point after tapping the Turn Instrument button in the particular stakeout screen.
- Automatic 2D (HA only): A motorized total station will automatically turn horizontally toward the design point when the stakeout screen opens.
- Automatic 3D (HA and ZA): A motorized total station will automatically turn horizontally and vertically toward the design point when the stakeout screen opens.

Cut Sheet Offset stored: The cut sheet offset information can be stored to the raw data file in either of the following formats when performing any offset staking routine:

- Design Offset: When selected, a cut sheet report will list the design-offset values.
- Actual Offset: When selected, a cut sheet report will list the measured-offset values.

Display Directions As: Guides you to the GNSS stakeout location using one of the following formats:

- **Northing / Easting:** Suggests you Go South/Go North and Go West/Go East.
- **Distance / Azimuth:** Displays the necessary Azimuth and Distance to the stakeout location.

- **Forward / Back:** Suggests you go FORWD/BACK and Go Left/Go Right when you are within 3 meters to the location. When you are farther than 3 meters, a distance and azimuth is used.

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Level Settings

[Job] [Settings] [Level]

The Level Setting screen is only available when running in leveling mode. It is used to configure all of the settings for performing a level loop.

BS1...BSn>FS1...FSn: This sequence requires that you take all the shots for each set to the backsight, turn to the foresight, and then shoot all the shots for each set to the foresight.

[BS1 FS1>FS2 BS2]n: A single set in this sequence requires that you shoot the backsight, turn and shoot the foresight, shoot the foresight again, turn and shoot the backsight. Repeat for all remaining sets.

Number of Sets (n): The number of sets you want to shoot from each setup.

Stadia Constant: The scale of the upper and lower stadia (wires) in the telescope. The vertical distance measured between these stadia multiplied by the value entered here (usually 100) equals the horizontal distance to the rod.

V Dist Tolerance: The maximum change in vertical distance that can occur between all the shots to any specific point from a single setup. If this value is exceeded, a warning will occur.

H Dist Tolerance: The maximum change in horizontal distance that can occur between all the shots to any specific point from a single setup. If this value is exceeded, a warning will occur.

BS-FS Sight Length < Per Shot: When checked, a warning will occur whenever the horizontal distance of each leg in any given setup differs by more than this value.

BS-FS Sight Length < Per Loop: When checked, the sum of the horizontal distances measured to all the backsight shots are compared to the sum of the horizontal distances to all the foresight shots. If the difference exceeds this value, a warning will occur.

Max Sight Lengths: When checked, a warning will occur whenever the horizontal distance measured to any point exceeds this value.

Min Ground Clearance: When checked, a warning will occur if a shot is taken at a location on the rod that is within this distance to the ground.

Max Loop Misclosure: When checked, the error computed after a level loop is closed will be surrounded with exclamation points in the Close Loop screen and Level Notes screen if the error exceeds this value.

Upper-Lower Wire Reading <: When checked a warning will occur if the difference between the upper stadia and crosshair exceeds the difference between the crosshair and lower stadia by this value. (This only applies to the Three Wire level method.)

[Load FGCS Defaults]: Opens the FGCS Defaults screen, described below, where the default tolerances for a specified level loop order and class can be loaded.


FGCS Defaults

[Job] [Settings] [Level] [Load FGCS Defaults]

The FGCS Defaults screen is used to load the default FGCS tolerances in the Level Settings screen for the order and class of level loop specified here.

Order: Indicates the order of the level loop that you want to load the default tolerances for.

Class: Indicates the class of the level loop that you want to load the default tolerances for.

Tapping  loads the tolerances into the Level Settings screen based on the FGCS specifications for the order and class selected. (These tolerances can still be manually changed later.)

Note: It is important to recognize that the software can only display a warning if tolerances are not met. It is up to the surveyor to determine if the level loop meets the criteria for a particular standard.

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Repetition Settings

The Repetition Settings card contains the settings that control how repetition shots are performed and acceptable tolerances.

Horizontal Tolerance: A warning message will be displayed if a horizontal angle exceeds the tolerance entered here during a repetition shot.

Zenith Tolerance: A warning message will be displayed if a vertical angle exceeds the tolerance entered here during a repetition shot.

Distance Tolerance: A warning message will be displayed if a distance exceeds the tolerance entered here during a repetition shot.

Shoot Distance To Backsight: When checked, a distance will be measured to each shot to the backsight. When unchecked, only the angles are measured.

Do Not Shoot Reverse Distances: When checked, distances are not measured during reverse shots.

Enable Automatic Repetition: When checked, all remaining shots after the first shot to the backsight and foresight will occur automatically when using a motorized instrument.

Shooting Sequence: Specifies the order that the shots are taken from the following options:

- BS > FS ^ FS > BS: Backsight, Foresight, *flop* Foresight Backsight
- BS > FS ^> BS > FS: Backsight, Foresight, *flop* Backsight, Foresight
- BS ^ BS > FS ^ FS: Backsight, *flop* Backsight, Foresight, *flop* Foresight
- FS ^ FS > BS ^ BS: Foresight, *flop* Foresight, Backsight, *flop* Backsight
- FS > BS ^ BS > FS: Foresight, Backsight, *flop* Backsight, Foresight
- FS > BS ^> FS > BS: Foresight, Backsight, *flop* Foresight, Backsight
- BS ^ BS ^> FS ^ FS ^: Backsight, *flop*, Backsight, *flop*, Foresight, *flop*, Foresight, *flop*

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Date/Time Settings

The [Date/Time Settings](#) card is used to set the date and time in the data collector.

Time: Displays the current time.

Date: Displays the current date.

Format: Select Local to display your local time, or UTC to display Coordinated Universal Time.

DUT Correction: The polar wandering correction factor, in seconds, used to convert UTC to UT1. (UT1=UTC+DUT)

Note: The date, time and UTC are computed using Window CE's Date/Time properties.

[Set Date]: Sets the system date with the date that is entered.

[Set Time]: Sets the system time with the time entered.

[Synchronize]: Zeros the fractional portion of the current time and advance to the nearest second so that the time can be set more accurately.

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NMEA GPS Settings

Note: The NMEA GPS Settings is now managed on the [NMEA GPS Settings](#) card.

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Data Out settings

The [Data Out Settings](#) card is used to configure settings for exporting data to a serial port or file.

Enable Data Out: When selected, enables export of external data output to a serial port or to a file.

To Serial Port: Select to export data to the serial port on the data collector. You must enter the Serial Port, Baud Rate, and Parity. If you select Bluetooth as the serial port, you can check or change the Bluetooth settings.

To File: Select to export data to a file. You must enter the output file name.

Send Point Coordinates: Select to export point coordinates. For optical surveys, the plane (N, E, Elev) coordinates for each stored point are exported. For GNSS surveys, the plane (N, E, Elev) and geodetic (Lat, Lng, Ht) coordinates for each stored point are exported.

Send Observations: Select to export setup and observation records. This will enable you to calculate solved

coordinates from raw observations.

Serial Port: (available when the output method is 'To Serial Port') Select the serial port on the data collector for the external data output. This cannot be the same port as the current active instrument (optical or GNSS).

Baud Rate: The baud rate for the external data output port.

Parity: The parity of the external data output port.

[Bluetooth]: (available when the port for external data output is set to Bluetooth) Opens the Bluetooth configuration screen where you can quickly check or change Bluetooth settings. See the User Manual for more information on configuring Bluetooth technology.

Path: (available when the output method is 'To File') Shows the location of the saved file. To select a different path, click **[Browse]**.

File: (available when the output method is 'To File') Enter the file name for saving the external data output. To select a different file type, click **[Browse]**.

[Browse]: (available when the output method is 'To File') Click to open a file browse dialog where you can select the file name and path for the output file. The default file extension is .XML, but you can use any extension.

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Buttons Settings

The [Buttons Settings](#) card is used to customize the function for the physical buttons located on the data collector. The features on this card will depend on the operating system of the data collector:

For Windows Mobile / Windows CE

The upper half of the screen lists all of the customizable button's current assignments. A particular button must be selected from this list prior to changing its settings from the lower half of the screen.

Assignment Within Survey Program: Select the function for the selected button when it is used within the software. The function of the button will switch back to its global assignment when it is used outside the software. Selecting <Global> from this field will result in the global assignment also being used from within the software.

Global Assignment: Select the function for the selected button when it is used outside the software.

[Survey Defaults]: Set all assignments in the *Assignment Within Survey Program* field to the software's default settings.

[System Defaults]: Set all assignments in the *Global Assignment* field to the system default settings and set all the assignments in the *Assignment Within Survey Program* field to <Global>.

For Windows 10 Tablets

Menu Items: Select the top level menu from the drop down, and any sub menu items that are eligible to assign to a button will show up in the list. Select a sub menu item from the left hand side, and then tap a button designation on the right hand side to assign this function to the button.

Note: You can not assign any features to either the F1 or F2 buttons. These buttons are reserved for opening help, and

taking a screen shot respectively.

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General Settings

The [General Settings](#) card contains the following miscellaneous settings:

Auto time stamp every: When checked, a note will be entered into the .survey file consisting of the current time each time the number of minutes specified passes. This can help track when specific events occurred.

Remind to backup job every: When checked, a prompt will occur each time the specified number of hours passes reminding you to backup your job.

Use Enter Key to Move Between Fields: When checked, the [Enter] key will move the cursor to the next field in all screens. When unchecked, the [Enter] key will perform a different function depending on the field selected.

Note: The arrow keys can also be used to move the cursor between fields.

Allow Alphanumeric Point Names: When checked, numeric or alpha character can be used for point names. If unchecked, only numeric point names are valid.

Beep When Storing Points: When checked, a beep will sound whenever a new point is stored.

Beep On Control Activation: When checked, a beep occurs when any button, checkbox, or other control is tapped.

Prompt for Description: When checked, a prompt for a description will appear before any new point is stored from any routine other than those included in the [Survey](#) and [Stakeout](#) menus.

Prompt for Layer: When checked, a prompt to select a layer will appear before any new point is stored from any routine other than those included in the [Survey](#) and [Stakeout](#) menus.

Prompt for Code and Attributes: When checked, a prompt to select feature information will appear before any new point is stored from any routine other than those included in the [Survey](#) and [Stakeout](#) menus. This also requires that a feature file be selected from the [Coding Settings](#) card, described earlier.

Prompt for Picture: When checked, a prompt will appear before storing a point where you have the option of taking one or more pictures associated with the current point. (Only available when running on a Nomad or a Ranger 3 with a digital camera.)

Prompt to Backup When Closing Job: When checked, you will be reminded to backup the current job prior to closing it.

Prompt for Elevation of 2D Cogo Points: When checked, a majority of the COGO routines will prompt you for an elevation before storing a 2D point. When unchecked, 2D points will be stored without the prompt.

Always Use ALL CAPS in Edit Fields: When checked, characters will always be entered using capital letters in edit fields, regardless of the keyboard setting.

Log Serial Port Traffic: When checked, all serial port traffic will be logged to a text file called TDS-Log.txt for troubleshooting purposes and is stored in the Jobs folder. The file is automatically overwritten when logging traffic on a

date that is different from the previous date.

Use Smart Soft Input Panel Activation: When checked, the SIP will automatically open when the cursor is inside an input field and close when the cursor is moved outside an input field. (Not available on Ranger data collectors.)

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Compass Settings

The [Compass Settings](#) card is visible on data collectors with a built in electronic compass. This card is used to turn the compass on or off, enter a magnetic declination, and perform a compass calibration.

[Enable data collector compass]: Check this box to turn the compass on. Uncheck this box to turn the compass off.

Magnetic Declination: Enter the magnetic declination to apply to the compass readings. East declination is positive.

[View Compass]: opens a graphical compass screen where you can see the current compass reading.

[Calibrate Compass]: opens up the operating system routine for calibration of the compass. Follow the instructions given by the calibration application to recalibrate the compass.

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Central Settings

The [Central Settings](#) card is used to configure the Spectra Precision Central synchronization settings. Tap the button to drop down a list of options.

[Automatic - All]: Central will automatically synchronize using any available data connection including WWAN (GPRS/CDMA mobile data connection) and WiFi.

[Automatic - WiFi]: Central will automatically synchronize using the WiFi data connection.

[Manual]: Central will only synchronize when the Sync now button on the [Central Sign in](#) screen is tapped.

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Map Context Menu

The [Map Context Menu](#) card is used to configure which items appear on the active map context (tap and hold) menu. For a description of all available functions, please see the

[Active Map View](#) help description.

Check the box next to each available function you wish to see on the active map context menu.

[Clear All]: Will uncheck all items in the list.

[Default]: Will reset the list to the default items selected.

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Points

[Job] [Points]

The [Points](#) screen allows you to view point details, add, edit, delete, and undelete points in the current job. The [Points](#) screen can be opened from the main menu or from the Points item on the favorites menu. When the [Points](#) screen is opened from the main menu, you can perform any of the actions described below. When the [Points](#) screen is opened from the favorites menu, you can view point details, but you cannot add, edit, delete, or undelete points.

To view point details, simply double tap on the point in the list to open up the [View Point Details](#) screen.

The four icons at the top of the screen control the most common actions on the [Points](#) screen:



Find A Point: Search the point list for a matching point name, description, or feature code.



Find Next: Find the next point in the list based on the Find Point search.



Insert Point: Opens the [Insert Point Screen](#) where you can key in the location and properties for a new point.



Edit Point: Opens the [Edit Point Screen](#) where you can modify the location for keyed in points, and the properties for any point.

You can control which types of points you wish to view in this list. By default, the [Points](#) screen shows you only the current existing points in the job. However, you can also use this screen to view deleted points in the job.



View Filter: Select which points to display in the list. You can select to view:

- **Show Points:** this choice will show you all of the active points in the job, which are all points that are not deleted.
- **Show Deleted :** this choice will show you only the deleted points in the job.
- **Show All:** this choice will show you all points, active and deleted, in the job.
- **Design & Staked Pts. Only:** this choice will show you all active design and as staked points.
- **Design Pts Only:** this choice will show you only design points from the current collection of managed stakeout points
- **Staked Pts Only:** this choice will show you only active staked points

You can access several other functions by tapping and holding on any point in the list to bring up a context menu on the selected points. From this menu you can choose:

- **Delete Point:** Select this item to delete the currently selected active point.
- **Delete Points ...:** Select this item to open up a [Select Points](#) screen where you can select any number of points from the job to delete all at once.
- **Undelete Point:** Select this item to undelete the currently selected deleted point.
- **View Point Details...:** Select this item to open up the [View Point Details](#) screen.
- **View Raw ...:** Select this item to open up the [View Raw Data](#) screen. The raw data record that creates the selected point will be highlighted in the raw data view.
- **View Map ...:** Select this item to open up the [Map View](#) with the currently selected point at the center of the map.

Edit Point

[Job] [Edit Points] [Edit...] or [Insert...]

The [Edit Point](#) / [Insert Point](#) screen is used to edit an existing point's properties, or to create a new point and set its properties.

There are five cards on the [Edit Point](#) screen:

- **General** [Edit Point - General Card](#)
- **Location** [Edit Point - Location Card](#)
- **Derivation** [Edit Point - Derivation Card](#)
- **Feature** [Edit Point - Feature Card](#)
- **Notes** [Edit Point - Notes Card](#)

Edit Point - General

[Job] [Edit Points] [Edit...] or [Insert...] [General]

The [General](#) card of the [Edit Point](#) screen is used to modify the name description, layer and picture information for the selected point.

Point Name: Displays the selected point's name. If this is a new point, the default insert point name is the next available point in the job. If this is an existing point, you can edit the point name. In either case, if you enter a name that conflicts with an existing point in the job, you will be prompted.

Description: The description for the selected point.

Layer: The layer for the selected point.

Note: Only user entered points (key in or imported) can be assigned as control points. If the point selected for editing is derived from a measurement, then you will not see the Control layer in the layer edit box.

Picture: Displays a list of pictures associated with a point. You can click the drop-down list to see the pictures associated with the job. Use the Power button to view or delete any of the pictures associated with a point. Use the camera button to open the camera application and take additional pictures for a point.

Note: When you delete a picture using the menu item, the picture is disassociated from this point in the job, but the picture file is not removed from the disk. To get rid of the actual picture file, you must use the file explorer to delete the file.

Note: The camera button is only available on a handheld data collectors with an integrated digital camera.

Edit Point - Location

[Job] [Edit Points] [Edit...] [Location]

The Location card is used to show the coordinate of a point created from a survey measurement, or to modify the coordinate of a point that was keyed in by the user (or imported from an external file). You can also use the location card to turn a point that was derived from a survey measurement into a keyin point. You can modify the horizontal and vertical derivation of the point's coordinate independently.

If the selected point is derived from a survey observation, the Location card will show the current coordinate of the point in static display. If the selected point was entered by the user, the coordinates will be displayed in edit fields. It is possible that a point has a different horizontal and vertical source. In this case, you may see one dimension of a point's coordinates displayed in static fields, and the other dimension in edit fields.

Coordinate Type is used to select what kind of coordinate is entered for this point:

- **Grid** enter a northing, easting, elevation coordinate for this point.
- **WGS84 LLH** enter a latitude, longitude, height coordinate in the global geodetic datum for this point.
- **Local LLH** enter a latitude, longitude, height coordinate in the local datum for this point.

[GNSS Control Point]: Opens up the [GNSS Control Point Pair Screen](#).

If the point is derived from a survey measurement, then you can modify either or both of the horizontal and vertical source for this point.

[Edit Location]: Opens up the [Edit Location Prompt](#) where you can choose to modify an observed point's horizontal and/or vertical coordinate.

Note: Changing a measured point into a keyin point will allow you to modify its coordinate value. However, you must be aware that once you have turned a point into a keyin point, it will become disconnected from its measurement source, and will not be readjusted along with the other measurements when the survey is recalculated from vector measurements, such as when you edit raw data.

GNSS Control Point Pair

[Job] [Edit Points] [Edit...] [Location] [GNSS Control Point]

The GNSS Control Point Pair screen is used to associate a pair of points together to form a GNSS control point. One of the points must be a local grid point, and one point must be a GNSS point.

[Use as Calibration Control Point]: check this box if you wish to use the selected point as a GNSS calibration control point.

[GNSS Point / Grid Point]: choose a point to pair with the selected point to form a calibration point pair.

[**Use for Horizontal Calibration**]: check this box if the calibration point pair is suitable to use for horizontal calibration.

[**Use for Vertical Calibration**]: check this box if the calibration point pair is suitable to use for vertical calibration.

[Edit Points Index](#)

[Job Menu Index](#)

Edit Location Prompt

[**Job**] [**Edit Points**] [**Edit...**] [**Location**] [**Edit Location**]

The Edit Location prompt is used to change a point's horizontal and/or vertical source from an observation to a keyin coordinate. You may want to do this if you wish to edit either the horizontal and/or vertical coordinate of a measured point.

[**Edit N, E, Elev**]: Choose this option if you want to replace the horizontal and vertical source with a keyin value.

[**Edit Elevation**]: Choose this option if you want to edit the point's vertical coordinate only. The point's original horizontal source will be preserved and still linked to the optical or GNSS measurement vector, and only the vertical source will be from the keyin value.

[**Edit N,E**]: Choose this option if you want to edit the point's horizontal coordinate only. The point's original vertical source will be preserved and still linked to the leveling or optical Remote Elevation measurement.

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Edit Point - Derivation

[**Job**] [**Edit Points**] [**Edit...**] [**Derivation**]

The Derivation card is used to show you how the coordinate of the selected point is derived in the job. A point in Survey Pro can be derived in one of two ways. Points can be keyed in or observed. Key in points include points that are created by entering coordinates in the Edit Point screen and points that are imported using one of the File Import routines. Observed points include points created with an optical, GNSS, or leveling survey observation.

Additionally, a point in Survey Pro may have a separate derivation for its horizontal and vertical coordinates. For example, a point can be observed with a total station in optical surveying mode, and then also observed with a level in leveling survey mode. This point would have the optical observation as its' horizontal derivation source, and the leveling observation as its vertical derivation source. Alternatively, a point can be observed with an optical measurement, and then you can edit the point's vertical coordinate to create a vertical key in source with the horizontal observation source. The derivation screen will give you details about each dimension of the point's derivation.

Note: Most points will not have a separate vertical source unless you have used leveling survey mode to measure their vertical, or if you have used the point editor to create a separate key in vertical source for a point. The elevation of any point that does not have a separate vertical source will be calculated from the horizontal source measurement. For example, a point that was observed only with optical or GNSS measurements will only have a horizontal source, and the North, East, and Elevation of this point will be from that one measurement. A point that was observed with an optical or GNSS measurement and also observed with a level in leveling survey mode will have both a horizontal and vertical source. The North and East of this point will be from the horizontal source measurement, and the Elevation of this point

will be from the vertical source measurement.

[**View Raw ...**]: opens up the [View Raw Data](#) screen. The raw data record that derives the horizontal coordinate of the selected point will be highlighted in the raw data view.

[Edit Points Index](#)

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Edit Point - Feature

[**Job**] [**Edit Points**] [**Edit...**] [**Feature**]

The [Feature](#) card is used to modify the feature code and line work control code associated with the point.

Any feature codes for the selected point are shown in the list of codes. Each line of the list of codes shows:

- **Code Icon:** Icon for the code. If you are using an FXL feature file, this icon will show whether the code is for a point feature or a line feature. If you are not using a FXL feature file, or if this code is not defined in the FXL file, the icon will be blank showing that it is a user entered feature.
- **Code Name:** The abbreviated code string for this code.
- **Line work Icon:** An icon representing the state of the auto line work for the point with this code.
- **Attribute:** If this code also has feature attributes defined for it, the attribute icon will show if the attributes have been entered.
- **Delete:** Tap the x to remove this code from the point.

[**+**]: opens up the [Pick a Feature Screen](#) where you can key in any code you wish or select one from a list of codes defined in the Feature File (.FXL).

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Pick a Feature

The [Pick a Feature](#) screen is used to enter a feature code string. You can pick a feature code from the list of codes, or you can enter the string directly into the edit field. If you are using a Feature Code File (.FXL), you can pick from the list of codes defined in the file, or you can enter any other code string to define a new feature. If you are not using a Feature Code File, you can simply enter any string you wish to define the feature code for a point.

Filtered By: shows the current selection filter. You can tap on the filter icon to change the view filter.

[**Feature Code**]: enter the text string for a code, or double tap on the list to select the code string for an existing code.

Note: You can enter a code and the line work control code separated by a space in the [**Feature Code**] edit field, or you can enter just the feature code and then assign the line work code with by tapping the line work icon next for that feature code in the list of codes for this point.

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[Job Menu Index](#)

Edit Point - Notes

[Job] [Edit Points] [Edit...] [Notes]

The Notes card is used to display any notes attached to the selected point.

[Add Note ...]: Opens up the [Raw Data Note](#) screen where you can add an additional note to this point.

[Edit Points Index](#)

[Job Menu Index](#)

Edit Points - (multiple point editing)

[Job] [Edit Points] [Edit Point]

This screen is opened by selecting **Edit Point** when more than one point is selected in the list. The changes made in this screen will be applied to all the selected points.

Description: When checked, allows you to change all the selected point's descriptions to the Description entered in the description edit field.

Layer: When checked, allows you to move the selected points to the layer selected in the layer edit control.

Note: Only user entered points (key in or imported) can be placed on the Control layer. If any of the points in the selection are derived from measurements, then the control layer will not be an option in the layer edit box.

Elevation: When checked, allows you to move the selected points to the elevation entered into the elevation edit field.

Note: You can only change the elevation of multiple points if all of the points in the selection are derived from user input (key in or imported). If any of the points in the selection are derived from observations, the Location card will not be displayed.

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[Job Menu Index](#)

View Point Details

[Job] [Points] | View Point Details...

This screen shows the point details on three cards.

- **Details** This card shows the point's name, description, attributes, and coordinate.
- **Derivation** This card shows how a point's coordinate is currently derived, and is the same as the [Edit Point - Derivation Card](#)
- **Notes** This card shows all the notes attached to this point, and is the same as the [Edit Point - Notes Card](#)

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Edit Polylines

[Job] [Edit Polylines]

The [Edit Polylines](#) screen is used to add, edit, and delete polylines in the current job.

The first screen will display a list of all the polylines that are stored in the current job. Selecting any of the polylines listed will display a horizontal (overhead) and vertical (side) view of that polyline.

[Edit...]: Open the selected polyline in the [New Polyline](#) screen, described below.

[Delete...]: Delete the selected polyline.

[New...]: Open the [Polyline Editor](#) where a new polyline can be created.

Import PL5: Import polylines. Available on the Power menu button item. Tap the down arrow to open this menu from the Edit Polylines screen.

Export PL5: Export polylines. Available on the Power menu button item. Tap the down arrow to open this menu from the Edit Polylines screen.

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New Polyline

The second screen is used to define all of the points that are used in the polyline. Any curve information will be entered later, but the end points must still be selected at this point.

The current polyline is shown on color displays with bold red lines and all other polylines are shown using thin black lines. Only the current polyline data can be edited.

[Tap Points...]: Opens a map view where the points in your polyline can be tapped. They must be tapped in the order that they occur in the polyline.

[To/From...]: Allows you to define a range of points to define a polyline.

[Edit...]: Opens the third screen, described next, where the current polyline can be modified.

[Clear]: Removes the current polyline.

[Properties]: Allows you to enter a **Description** and select a **Layer** for the Polyline. If you have a feature code loaded, you can also add [Attributes].



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Polyline Editor

Once the initial points are selected for the current polyline, the third screen allows you to modify the polyline and define any curve and grade information for the polyline sections.



Selecting any point in the left column of the screen will select that point and the line segment that follows it up to the next point. The selected section is then highlighted in the map portion of the screen. Any edits will occur on the selected section.

[Remove]: Remove the selected point and the line segment that follows it. The previous line segment will be automatically joined to the following point. The change will only be saved if you then tap . Tapping  will return to the previous screen without saving the changes.

[Clear All]: Completely removes the current polyline. The change will only be saved if you then tap . Tapping  will return to the previous screen without saving the changes.

[Curves...]: Opens the fourth screen, described below, where a horizontal, vertical, or spiral curve can be added to the selected polyline segment.

Horizontal / Vertical: Toggles between showing the map in a Horizontal (overhead) view or a Vertical (side) view.

[<- Insert]: Insert a point, or a group of points in front of the selected point. The change will only be saved if you then tap . Tapping  will return to the previous screen without saving the changes.

Note: if <End> is selected in the list, the [**<-Insert**] button will change to an [**<-Append**] button to indicate that additional points will be appended to the end of the list.

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Add/Edit Curve

The fourth screen is used to modify a selected polyline segment that occurs between two points. A horizontal, vertical, and/or spiral curve can be applied to the polyline segment.

Adding a Horizontal Curve Tap the [**Arc / Spiral**] tab.

Curve: Set to Arc to enter a horizontal curve.

[Radius] | [Delta] | [Degree Arc] | [Degree Chord]: Allows you to specify the radius of the curve using a variety of methods.

[Turn]: Specifies if the curve turns toward the Right or Left as you occupy the initial point and face the end point.

[Arc]: Specifies if the arc of the curve is Small (less than 180°) or Large (greater than 180°).

Adding a Spiral: Tap the [**Arc / Spiral**] tab.

Curve: Set to Spiral to enter a spiral curve.

Radius: The radius of the spiral curve. (The same radius of the circular curve adjacent to the spiral.)

Length: The length of the spiral, measured along the curve from the TS to the SC.

Turn: Specifies if the spiral curve turns to the Right or Left as you occupy the initial point and face the end point.

Direction: Specifies if the curve runs from where the tangent intersects with the spiral toward where the spiral intersects

with the curve (TS->SC) or if the curve runs from where the curve intersects with the spiral toward where the spiral intersects with the tangent (CS->ST).

Adding a Vertical Curve: Tap the [**Parabolic Curve**] tab.

Apply Curve: Checked to enter a vertical at curve.

Grade at EVC / BVC is the known grade at either the end of vertical curve or beginning of vertical curve. The grade entered here is determined by the selection made in the Auto-Compute field.

Auto-Compute: Automatically compute the grade at the selected point and display it on the screen. The grade at the point that is not checked here must be specified in the field defined above.

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Edit Alignments

The [Edit Alignments](#) screen is used to create and edit alignments, which can then be used with routines such as Offset Staking, Offset Points, Offset Lines and Road Layout.

Alignments are used to describe all of the horizontal and vertical details of a road's centerline. An alignment does not use existing points to define any particular locations on the alignment, although a point can be used to anchor the starting location, which is the same location for both the horizontal and vertical parts of the alignment. Any location on an alignment where a change occurs is called a *node*.

An alignment can contain straight sections, grades, horizontal, vertical, and spiral curves. The horizontal and vertical portions of an alignment are defined separately and independently, but they are both combined within the software to create a single alignment with horizontal and vertical characteristics.

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Add / Edit Alignments

[**Job**] [**Edit Alignments**] or [**Roads**] [**Edit Alignments**]


The [Add / Edit Alignments](#) screen displays a list of all the existing alignments in the current job. The right portion of the screen shows a graphic of the horizontal and vertical portion of the selected alignment.

[**New...**]: Opens the [Edit Alignment](#) screen where a new alignment can be created from scratch.

[**Edit...**]: Opens the [Edit Alignment](#) screen where the details of the selected alignment can be edited.

[**Delete...**]: Used to delete the selected alignment.

: The power button opens the following routines:

- **Create Points:** Opens the [Create Points](#) screen where points can be stored that coincide with the selected alignment.
- **Import .RD5 File:** Opens the [Open](#) screen and lists all the *.RD5 alignment files in the Jobs directory. Select the desired file and tap .

Edit Alignment

[Job] [Edit Alignments] [Edit...]
or [Job] [Edit Alignments] [New...]

The Edit Alignment screen is used to edit an existing alignment or create a new one.

Edit Alignment Screen – HAL Tab

The HAL (**H**orizontal **A**lignment) tab in the Edit Alignment screen is used to enter or modify only the horizontal details of an alignment.

[**Insert...**]: Opens the Edit Segment screen where a new horizontal alignment segment can be inserted prior to the selected segment.

[**Edit...**]: Opens the Edit Segment screen where the selected horizontal segment can be modified.

[**Remove**]: Removes the selected segment and automatically joins the next segment with the previous segment.

Note: The station and azimuth at the beginning of the selected horizontal segment are displayed at the bottom of the screen.

Edit Alignment Screen – VAL Tab

The VAL (**V**ertical **A**lignment) tab in the Edit Alignment screen is used to enter or modify only the vertical details of an alignment.

Note: The total horizontal length of the VAL must be equal to or greater than the total horizontal length of the HAL when the alignment is used for road layout.

[**Insert...**]: Opens the Edit Segment screen where a new vertical segment can be inserted prior to the selected segment.

[**Edit...**]: Opens the Edit Segment screen where the selected vertical segment can be modified.

[**Remove**]: Removes the selected segment and automatically joins the next segment with the previous segment.

Note: The station and elevation at the beginning of the selected vertical segment are displayed at the bottom of the screen.

Edit Alignment Screen – POB Tab

The POB (**P**oint **O**f **B**eginning) tab in the Edit Alignment screen is used to define the starting location of the alignment. The first horizontal and vertical segment will always begin at this location.

[**Location**]: Starting location for the horizontal and vertical alignments will be at the specified North, East and Elev coordinates.

[**Point**]: Starting location for the horizontal and vertical alignments will be at the specified Point.

Start Station: The station on the alignment that corresponds with the starting location or point.

Edit Alignment Screen – General Tab

The General tab in the Edit Alignment screen is used to describe the alignment and select the layer where it is located.

Description: The description of the alignment.

Layer: The layer where the alignment will be located.

[**Attributes**]: Opens the [Point Feature Attributes](#) screen where the feature attributes for the alignment can be selected.

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Edit Segment

The Edit Segment screen is accessed anytime an existing horizontal or vertical segment is added or edited. A variety of segment editing screens are possible depending on the type of segment being edited or created. Each segment editor is discussed below.

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Edit Segment - Line Card


The Line card is used to add a straight horizontal line segment in the alignment.

Length: The horizontal length of the line.

Make this segment tangent to previous: When checked, the specified line will be tangent to the ending tangent of the previous segment.

Note: When making a new horizontal segment tangent to the previous segment, the new segment will appear in the Edit Alignment screen tagged with a (P). This means that if the previous horizontal segment is edited or deleted, where the orientation changes, all subsequent horizontal segments that have the (P) tag will also be adjusted so they will remain tangent to the previous segments. This does not hold true for vertical alignment segments. Vertical segments will always begin with the specified starting grade unless they are manually modified.

[**Azimuth**] / [**Bearing**]: Used to enter a known azimuth or bearing of the line.

: Adds the line to the current horizontal alignment.

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Edit Segment - Arc (Horizontal Curve) Card

The Arc card is used to add a horizontal curve to the alignment.


The curve can be defined by two of the following:

- [**Radius**]: The distance from the radius point to the curve
- [**Delta**]: The internal angle from center to tangent points.
- [**Degree Arc**]: The internal angle equivalent to a 100-ft arc length.
- [**Degree Chord**]: The internal angle equivalent to a 100-ft chord length.
- [**Length**]: The arc length.
- [**Chord**]: The chord length.
- [**Tangent**]: The distance from the PC or PT to the PI.
- [**Mid Ord**]: The distance between the curve and the chord at the center of the curve's length.
- [**External**]: The minimum distance between the PI and the curve.

Turn: Specifies if the curve turns to the Left or Right as you face the curve from the beginning.

Make this segment tangent to previous: When checked, the start of the specified curve will be tangent to the ending tangent of the previous segment.

[**Azimuth**] / [**Bearing**]: Used to enter a known azimuth or bearing at the start of the curve.

: Adds the curve to the current horizontal alignment.

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Edit Segment - Spiral Card

The Spiral card is used to add a spiral curve to the alignment.

Radius: The radius of the spiral. (This equals the radius of the horizontal curve tangent to the spiral.)

Length: The length of the spiral.

Turn: Specifies if the curve turns to the  Left or  Right as you face the curve from the beginning.

Dir: Specifies if the curve runs from TS to SC (Tangent to Spiral, to Spiral to Curve) or CS to ST (Curve to Spiral, to Spiral to Tangent).

Make this segment tangent to previous: When checked, will automatically turn the spiral so the beginning is tangent to the end of the previous segment.

[**Azimuth**] / [**Bearing**]: Used to specify a known azimuth or bearing of the start of the spiral.

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Edit Segment - Vertical Grade Card

The Vertical Grade card is used to enter a segment with any grade.

Length: The horizontal length of the segment.

Grade: The grade (slope) of the segment.

Get Previous Grade: Automatically enter a grade equal to the grade at the end of the previous segment.

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Edit Segment - Vertical Curve

The Vertical Curve card is used to enter a parabolic vertical curve to the alignment. **Length:** is the horizontal length of the vertical curve.

Start Grade: The starting grade of the vertical curve.

End Grade: The ending grade of the vertical curve.

[**Get Previous Grade**]: Automatically enter a Start Grade equal to the grade at the end of the previous segment.

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Code Linework

[**Job**] [**Code Linework**]

The Code Linework screen is used to display the current state of active code based automatic line generation. The list of current lines shows:

- [**Code**]: The code string defining the line.
- [**Status**]: The status of the line, indicating the current and pending linework control state.
- [**Points**]: A list of the points currently used for this line.

[**View**]: Opens up the [View Polyline](#) screen where you can view all of the segments making up the selected line.

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View Raw Data

[**Job**] [**View Raw Data**]

The View Raw Data screen displays the raw observation data of the current job. You can use this screen to attach a note to the job, or to any specific record. You can also edit certain raw records and reprocess the job coordinates.

The raw data is displayed in a tree view, with the root nodes of the tree showing a record of each survey action taken in the current job. You can expand a tree node by tapping on the [+] next to the node or double tapping on the node. This will show you the individual fields of the selected record.

You can navigate through the raw data view using the navigation buttons:

- [**Up**]: Navigate to the beginning of the records.
- [**Down**]: Navigate to the end of the records.

- **[Left]**: Navigate to the previous record in your navigation history.
- **[Right]**: Navigate to the next record in your navigation history.
- **[Find Point]**: Opens up the [Find Point](#) screen where you can enter the name of a point to search for in the records
- **[Find Next Point]**: Searches for the next reference to the point name selected by the [Find Point](#) screen.

You can tap and hold on selected records to open up a screen to edit that specific record. The following records can be edited:

- **[Optical Setup]**: Opens up the [Edit Station Setup](#) screen.
- **[Optical Target]**: Opens up the [Edit Target](#) screen.
- **[GNSS Base Setup]**: Opens up the [Edit GNSS Base](#) screen.
- **[GNSS Antenna]**: Opens up the [Edit GNSS Antenna](#) screen.
- **[Optical Observation]**: Opens up the [Edit Optical Observation](#) screen.
- **[Leveling Observation]**: Opens up the [Edit Leveling Observation](#) screen.

Note: You can only edit optical observations that were taken with the 'Manual' total station using the manual observation key in dialog. You cannot edit optical observations that were collected with a live instrument. Similarly, you can only edit single wire and three wire leveling observations that were keyed in by the user. You cannot edit leveling observations that were taken with a live instrument.

You can tap and hold on any record to attach a note to this specific record. You can also append a note to the end of the file by tapping the **[Note...]** button.

[Note...]: Opens the [Raw Data Note](#) screen.

[Time]: Appends the current date and time in the form of a note to the end of the raw data records.

[View Raw Data Index](#)

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Raw Data Find Point

[Job] [View Raw Data] [Find Point]

The [Raw Data Find Point](#) screen allows you to enter an existing point name to search for in the raw data records.

[Point]: Enter the name of the point to search for.

[View Raw Data Index](#)

[Job Menu Index](#)

Raw Data Edit Station

[Job] [View Raw Data] [Edit Station]

The [Raw Data Edit Station](#) screen allows you to edit the optical station setup.

[Occupy Point]: Enter the occupy point for this station setup.

Note: If you wish to change the station setup point, you can only choose a user entered point (key in or imported) as the new station point for this setup. If you wish to use a point derived from a survey measurement, you must first go to the

[Edit Points](#) screen and insert a copy of that point.

[**HI**]: Enter the height of instrument for this setup.

[**Backsight**]: Enter the backsight azimuth or backsight point name for this setup.

Note: If you wish to change the backsight point, you can only choose a user entered point (key in or imported). If you wish to use a point derived from a survey measurement, you must first go to the [Edit Points](#) screen and insert a copy of that point.

[**Apply PPM**]: Check this box if you wish to apply a PPM correction to measured slope distances. Enter the PPM correction factor in the edit box.

[**Calculate**]: (Survey Pro On Board only) Opens up the [Calculate PPM](#) screen.

[**Earth Curvature and Refraction**]: Set the earth curvature and refraction correction coefficient. Select [**None**] to turn earth curvature and refraction correction off for all observations from this station setup.

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[Job Menu Index](#)

Raw Data Edit Calculate PPM

[**Job**] [**View Raw Data**] [**Edit Station**] [**Calculate**]

(Survey Pro On Board only)

The [Calculate PPM](#) screen allows you to calculate the PPM correction factor from the given temperature and pressure inputs.

[**Pressure**]: Enter the atmospheric pressure, and set the units for pressure.

[**Temperature**]: Enter the temperature, and set the units for temperature.

[**PPM**]: The calculated PPM value.

[**Calculate**]: triggers the instrument to calculate the PPM correction factor from the given pressure and temperature inputs.

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[Job Menu Index](#)

Raw Data Edit Target

[**Job**] [**View Raw Data**] [**Edit Target**]

The [Raw Data Edit Target](#) screen allows you to edit the optical target and height of rod.

[**HR**]: Enter the height of rod.

[**Add Offset**]: Enter any vertical offset for the height of rod.

[**Prism Constant**]: Enter the prism constant, in millimeters.

[**Select Observations**]: Select the survey observations that you wish to apply this edit to.

[**Select All**]: Select all of the observations currently using this target record.

[**Unselect All**]: Clears the selection of observations.

Note: If you selected the target record to edit from the root of the record tree, by default all observations that use that target will be updated with the new target. If you selected the target record to edit from an individual observation, by default only that observation's target will be updated.

[View Raw Data Index](#)

[Job Menu Index](#)

Raw Data Edit GNSS Base

[**Job**] [**View Raw Data**] [**Edit GNSS Base**]

The Raw Data Edit GNSS Base screen allows you to edit the GNSS base setup.

[**Base Point**]: Enter the base point for this setup.

Note: If you wish to change the base setup point, you can only choose a user entered point (key in or imported). If you wish to use a point derived from a survey measurement, you must first go to the Edit Points screen and insert a copy of that point.

Note: To edit the antenna height for the base setup, tap and hold on the antenna record under the GNSS base record and choose Edit GNSS Antenna.

[View Raw Data Index](#)

[Job Menu Index](#)

Raw Data Edit GNSS Antenna

[**Job**] [**View Raw Data**] [**Edit GNSS Antenna**]

The Raw Data Edit GNSS Antenna screen allows you to edit the GNSS antenna height for the base or rover setup.

[**Antenna**]: Displays the antenna type for this antenna record.

[**Measured**]: Enter the measured antenna height.

[**To**]: Enter the measure to mark for this antenna measurement.

[**Serial #**]: Enter the antenna serial number for record keeping purposes.

[**Select Observations**]: Select the survey observations that you wish to apply this edit to.

[**Select All**]: Select all of the observations currently using this GNSS antenna record.

[**Unselect All**]: Clears the selection of observations.

Note: If you selected the GNSS antenna record to edit from the root of the record tree, by default all observations that use that antenna will be updated with the new antenna. If you selected the GNSS antenna record to edit from an individual observation, by default only that observation's antenna will be updated.

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[Job Menu Index](#)

Raw Data Edit GNSS Offset Distance / Azimuth

[**Job**] [**View Raw Data**] [**Edit GNSS Offset Distance / Azimuth**]

The Raw Data Edit GNSS Offset Distance / Azimuth screen is used to edit the inputs for a GNSS offset Distance / Azimuth observation.

Ref Point: Select the reference point that this offset originates from.

Azimuth: Enter the magnetic azimuth from the reference point to the offset point.

Zenith: Enter the zenith angle from the reference point to the offset point.

Slope Distance: Enter the slope distance from the reference point to the offset point.

Laser HI: Enter the height of the laser range finder above the ground.

Laser HR: Enter the height of the laser measurement relative to the offset point. This value will usually be 0 unless you aimed the laser at a point that was above or below the actual offset point of interest.

Magnetic Declination: Enter the magnetic declination used to correct magnetic azimuth into grid azimuth for your job. Use 0 if you want to enter grid azimuth for the offset measurement.

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[Job Menu Index](#)

Raw Data Edit GNSS Offset Distance / Distance

[**Job**] [**View Raw Data**] [**Edit GNSS Offset Distance / Distance**]

The Raw Data Edit GNSS Offset Distance / Distance screen is used to edit the inputs for a GNSS offset Distance / Distance observation.

For each of the two reference points used in the distance / distance offset:

Ref Point: Select the reference point that this offset originates from.

Zenith: Enter the zenith angle from the reference point to the offset point.

Slope Distance: Enter the slope distance from the reference point to the offset point.

Laser HI: Enter the height of the laser range finder above the ground.

Laser HR: Enter the height of the laser measurement relative to the offset point. This value will usually be 0 unless you aimed the laser at a point that was above or below the actual offset point of interest.

Then select which solution you wish to use:

Solution 1 / Solution 2: A distance / distance intersection typically produces two different solutions. Pick which of the two possible answers you wish to store for the offset point.

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[Job Menu Index](#)

Raw Data Edit Optical Observation

[Job] [View Raw Data] [Edit Optical Observation]

The Raw Data Edit Optical Observation screen allows you to edit the horizontal angle, zenith angle, and slope distance that was keyed in by the user while using the manual instrument type.

[**Angle Right / Angle Left / Azimuth**]: Enter the horizontal angle for this observation.

[**Zenith / Vertical Distance**]: Enter either the zenith or the vertical distance for this observation.

[**Slope Dist / Horizontal Dist**]: Enter either the slope distance or the horizontal distance for this observation.

When you tap OK, the observation is updated and the survey is recalculated from the new record.

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Raw Data Edit Leveling

[Job] [View Raw Data] [Edit Leveling Observation]

The Raw Data Edit Leveling Observation screen allows you to edit the leveling rod readings from a single wire or three wire leveling observation.

[**Upper Wire**]: Enter the reading from the upper wire of the stadia (three wire leveling only).

[**Center Wire**]: Enter the reading from the center wire of the stadia.

[**Lower Wire**]: Enter the reading from the lower wire of the stadia (three wire leveling only).

When you tap OK, the observation is updated and the survey is recalculated from the new record.

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Raw Data Note

[Job] [View Raw Data] [Note...]

The Raw Data Note screen is used to append a note to an individual raw data record or to the end of the raw data records in the job. The note can consist of any string of text.

The buttons in the lower portion of the screen can be tapped to quickly enter any of ten default Foresight linework commands. These buttons can also be customized, or new buttons can be created.

[Write Now!]: Appends the text in the upper portion of the screen to selected record or to the end of the raw data records in the job.

Code Page

The Code page lists the default line work command code buttons and/or customized buttons. Tapping any button will enter the text associated with that button to the upper portion of the screen.

[Customize]: Toggles the page between normal mode and customize mode. When in customize mode, any of the default line work command buttons can be customized or new buttons created.

[Default] (only available after tapping **[Customize]**): Restores the default contents of the Code page. Any customized buttons will be lost.

History Page

The History page provides a quick way to enter a note that was used earlier. The page lists up to the last 30 notes used.

Notes that were entered from the buttons on the Code page are excluded from this list to reduce clutter since those notes are already easily accessible.

Sort: Allows you to sort the list of previous notes using a variety of methods.

Select: Copies the note currently selected from the list into the upper portion of the screen where it can then be appended to the raw data file using the **[Write Now!]** button.



: Removes the selected note from the list.

Code Edit

[Job] **[View Raw Data]** **[Note...]** **[Code]** **[Customize]** *click a button*

Tapping any of the 16 available buttons while in customize mode will open the contents of that button in the Code Edit screen where it can be modified as desired.

Button Label: This is the text that will appear on the selected button. A maximum of 5 characters can be entered here.

Actual Text: This is the text that will be entered in the upper portion of the Raw Data Note screen when the selected button is tapped. A maximum of 127 characters can be entered here.



: Saves the changes and returns to the previous screen.



: Cancels any changes made and returns to the previous screen.

Note: Custom code buttons remain intact even when switching or creating new jobs because the details of these buttons are stored to a text file in the program's folder called NoteCode.ini. If you want to copy custom code buttons to another data collector, you must copy this file to the same folder on the other data collector.

[View Raw Data Index](#)

View Report

[Job] [View Report]

The View Report screen is used to generate a customized report from your current survey data using a report template. A report template is an XML style sheet that defines how to format and display your survey data. Survey Pro comes with some standard report templates installed. You can also create your own customized XML style sheets to generate reports in a number of different formats, including html (.htm) for viewing with a web browser, and comma separated values (.csv) for viewing with a spread sheet.

Report Templates: Select a report from the list of report templates. Any valid XML style sheet file (*.xsl) in the directory "Program Files\Survey Pro\XSLT" will show up as a report template in this list.

[Next >]: Tap to open the report template and check for any required user input for this report. If this report template specifies user input, the Enter User Input screen will open and prompt you for the required settings for this report. If this report template does not require any user input, the report will be generated and displayed in the viewer.

Enter User Input

The Enter User Input screen is used to collect any user input specified in the report template. Enter a value for each required input.

Report Viewer

When the report is generated, it is automatically launched with the appropriate viewer. If it is a text file report, including .csv files, it will be opened with a Survey Pro report viewer. If it is a html report, it will be opened with Internet Explorer. If it is a .KML file, it will be launched with Google Maps (if you have Google Maps installed on your device). If the appropriate viewer for your report format is not installed on your device, the report is not opened.

[View Report]: Tap to open the report again with the associated viewer.

[Save Report]: Tap to save this report file, and add a linked file record in the job. You will be able to see the saved report as a node in the raw data viewer, and you can open the report for viewing from the raw data viewer at any time. Also, when you download this job into your Spectra Precision Survey Office project, any saved reports will automatically be transferred as files associated with this survey.

[Another Report >]: Tap to return the first page and select a report template to produce another report.

View DTM

[Job] [View DTM]

Before viewing a DTM, the Setup DTM 3D screen will open where the DTM layers must be defined. This screen is also used to define other parameters for the DTM.

[Layers]: Opens the Layers for Staking DTM screen where the DTM layers are selected.

[Boundary]: Opens the Choose Polyline screen where a polyline can be selected that defines the boundary of the DTM.

Exclude points...: Move any points that exist outside the selected boundary to the Auxiliary layer. If a point is later stored outside the boundary, they will also be moved to the Auxiliary layer.

Discard the boundary...: Initially moves any points that exist outside the boundary to the Auxiliary layer. If a point is later stored outside the boundary, the selected boundary is automatically unselected.

[**Clear**]: Unselect the selected boundary and move it to the Auxiliary layer.

[**Breaklines...**]: Open the [Add/Edit Break lines](#) screen where DTM break lines can be added or edited.

[**Points...**]: Open the [Points on DTM Layer](#) screen where the points on the DTM layer can be viewed, new points can be imported, and existing points can be deleted (moved to the Auxiliary layer).

[**3D View...**]: Open the 3D View screen where the DTM can be viewed from any angle.

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Layers for Staking DTM

[**Job**] [**View DTM**] [**Layers...**]

The [Layers for Staking DTM](#) screen is used to select the non-reference DTM layer and an optional layer where invalid objects are stored.

Select DTM Layer: The non-reference DTM layer used for stake points that are stored and other objects that exist on the surface you are staking. These points will be used to generate a DTM surface to compare to the reference DTM surface.

Select Auxiliary Layer: If this is checked and a point is stored that is located outside the selected DTM boundary, the point is automatically stored on the Auxiliary layer. If left unchecked, a prompt will appear when storing a point outside the boundary where you must specify the layer to store the new point.

Layer (Auxiliary): The layer that all points will be stored to if they cannot be stored to the DTM layer.


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Choose Polyline

[**Job**] [**View DTM**] [**Boundary...**]

The [Choose Polyline](#) screen is used to select an existing polyline that defines a boundary for your non-reference DTM surface.

All the polylines in the current job are displayed. Select the appropriate polyline and tap .

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Add/Edit Breaklines

[Job] [View DTM] [Breaklines...]

The [Add/Edit Breaklines](#) screen is used to select, edit, create, or delete the break lines that will be used when computing the DTM. The break lines that will be used when computing the DTM are listed in this screen.

[Edit...]: Opens the [Edit Polyline](#) screen where the selected polyline can be modified or a new polyline can be created.

[Delete...]: Move the selected polyline to the Auxiliary layer.

[Add Existing...]: Displays all the polylines in the current job. Selecting a polyline and tapping  will move the selected polyline to the DTM layer.

Note: If a boundary is defined, only polylines that fall within the boundary can be added.

[New...]: Opens the [New Polyline](#) screen, which is identical to the [Edit Polyline](#) screen and is used to create a new polyline.

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Edit Polyline

[Job] [View DTM] [Breaklines] [Edit...] or [Job] [View DTM] [Breaklines] [New...]

The [Edit Polyline](#) screen is used to perform some preliminary editing to a polyline prior to accessing the polyline editor with the [Edit...] key.

[Tap Points...]: Allows you to tap points to define a new polyline. If a polyline was already selected prior to accessing this screen, it will be replaced by the polyline being created.

[To / From...]: Allows you to define a range of points that define a polyline. If a polyline was already selected prior to accessing this screen, it will be replaced by the polyline being created.

[Edit...]: Opens the [Polyline Editor](#) where the polyline can be further edited.

[Clear]: Permanently removes the selected polyline from the job.

[Properties...]: Opens the [New Line](#) screen where the description, layer and feature attributes can be modified.



[Map Display Options]: Opens the [Map Display Options](#) screen to select what is displayed on the screen.

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[Job Menu Index](#)

Points on DTM Layer

[Job] [View DTM] [Points...]

The Points on DTM Layer screen displays all the points on the DTM layer and allows you to add points from another layer or delete (move) points to a different layer.

[Delete]: Move the selected point(s) to the Auxiliary layer. If the Auxiliary layer is not specified, you will be prompted to select the layer to move the points to.

Note: Points on a boundary or break line cannot be deleted.

[GoTo]: Quickly find and select the specified point.

[Add From To]: Opens the Select Point(s) screen where a point range can be entered. The points will then be moved to the DTM layer.

[Del From To]: Opens the Select Point(s) screen where a point range can be entered. The points will then be moved to the Auxiliary layer.

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3D View


[Job] [View DTM] [3D View...]

The 3D View screen is used to view the DTM from any angle.


[Settings]: Opens the 3D View Settings screen, described below, where the information displayed in the 3D view can be configured.

[Volume]: Displays the total cut and fill volume between the area that has been staked and a reference datum, whose elevation is specified in the 3D View Settings screen; or the total cut and fill between the area that has been staked and the selected DTM.

Datum: Displays the datum elevation set in the 3D View Settings screen.

 : Toggles to display or hide the point names and descriptions.

 : When this button is activated, dragging within the 3D View will result in the image being rotated to any angle.

 : When the button is activated, dragging within the 3D View will pan the image.

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3D View Settings

[Job] [View DTM] [3D View...] [Settings]

The 3D View Settings screen is used to configure the information displayed in the 3D View screen.

Height Exaggerated to the Maximum: When checked, the height exaggeration is automatically set to a high value.

When unchecked, the height exaggeration can be set manually in the next field.

Height Exaggeration Ratio: The value that the height is multiplied by in the 3D view. Higher values mean more exaggeration; a value of 1.0 would result in no exaggeration.

Hidden-line Removal: When checked, will hide all the lines that occur behind other surfaces in the 3D View. The image shown here is identical to the image shown on except the hidden lines are not removed.

Display the Difference: This applies only to DTM stakeout. When checked, the vertical portion (z-axis) of the 3D View screen is computed by the elevation differences between the non-reference DTM surface and the reference DTM surface. This will result in any objects that occur above or below the reference DTM to clearly stand out as hills and valleys and the volume information provided in the 3D View screen will be between the staked points and the reference DTM.

When unchecked, the Datum field can be set to a reference elevation. Cut and fill volumes in the 3D View screen will then be based on the difference of a horizontal plane at the elevation specified here and the non-reference DTM surface.

Datum: When the Display the Difference checkbox is unchecked, cut and fill volumes will be computed in the 3D View screen based on the difference of a horizontal plane at the elevation specified here and the staked points.

View Direction (from view point to the center): Allows you to specify the exact horizontal and vertical angle in which to view the DTM.


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Manage Layers

[Job] [Manage Layers]

The Manage Layers screen is used to manage the layers for the current job. All existing layers are displayed along with which layers are visible and how many objects are on each layer.

[Set Active]: Set the selected layer as the active layer. The active layer is marked with a  symbol.


[New...]: Opens the New Layer screen where a new layer can be added. You are prompted for a name and if the new layer should be visible.

[Edit...]: Opens the Edit Layer screen where the selected layer can be edited. The layer name and visibility can be changed.

Note: You can toggle layer visibility by tapping on the [Visible] column of the layer list.

[Delete]: Delete the selected layer.

Note: Only layers that contain no objects can be deleted. Layer 0 is required and cannot be deleted or renamed.

Tip: To move several points from one layer to another, select the desired points in the Edit Points screen and tap [Edit]. Select the layer you want to move them to and tap .

Job Information

[Job] [Job Info]

The Job Information screen displays details of the current job and allows you to remove wasted space in the current job file.

Filename: Displays the current job file name.

Feature Code File: Displays the feature code filename used in the current job.

Folder: Displays the directory where the current job file is located.

Size: Displays the size of the current job.

Created: Displays the date that the current job was created.

Points: Displays the first and last point names and if alphanumeric point names are being used.

Lines: Displays the number of polylines and alignments that are in the current job.

Roads: Displays the number of roads in the current job and the filenames associated with them.

Basemaps: Displays the number of basemaps in the current job and the filenames associated with them.

Attributes Collected: Displays the number of point and line attributes used in the current project.

Pictures: Displays the number of pictures used in the current project.

Total Storage: Displays the total amount of memory that is installed on the data collector.


Available Storage: Displays the amount of free memory that is available to use for jobs.

Wasted Space: Displays the amount of empty space that is being used by the current job. This space can be recovered as described below.

[Recover Wasted Space Now]: As you add and remove points and lines in a job, empty gaps can result within the job file. These gaps use storage space. This button will remove any gaps in the job file, thus recovering the wasted space.

Note: The software checks for low memory situations every minute. When the available system memory falls below 256K of RAM, a warning is displayed.

Calculator

[Job] [Calculator] or , Calculator (where applicable)

The Calculator screen behaves exactly like any other RPN-format calculator. It consists of a stack that can contain any

number of values and buttons that perform various operations. When a value is being entered from the keypad, it is displayed in a special area called the active area. This value is then placed in Level 1 of the stack after tapping the Enter key.

Tapping a button on the display performs the corresponding operation on either the last value in the display, or the last two values, depending on the operation. Each button is explained below where the value in Level 1 is x and the value in Level 2 is y .

+: Adds x and y .

÷: Divides y by x .

-: Subtracts y from x .

×: Multiplies x and y .

[Enter]: Moves the active value to Level 1 of the stack, or duplicates Level 1 if there is no active value.

Swap: Swaps positions of x and y in the stack.

Drop: Drops (removes) x from the stack.

Edit: Moves the value in Level 1 to the active area where it can be edited.

±: Changes the sign of x .

1/x: Inverse of x .

pi: Enters 3.141592654 to the stack.

Clr: Clears the stack.

√x: Square root of x .

Sin⁻¹: Arc sine of x .

Cos⁻¹: Arc cosine of x .

Tan⁻¹: Arc tangent of x .

°>dms: Converts x in decimal degrees to degrees.minutes-seconds.

xⁿ: Raises x to the power of n .

x²: Squares x .

Sin: Sine of x .

Cos: Cosine of x .

Tan: Tangent of x .

dms>°: Converts x , in degrees.minutes-seconds to decimal degrees.

Ln: Natural logarithm (base e) of x .

Log: Common logarithm (base 10) of x .

°>R: Converts x , in decimal degrees to radians.

G>R: Converts x , in Grads to radians.

P>R: Converts the polar coordinates (y,x) to rectangular coordinates.

dms -: Subtracts x in degrees.minutes-seconds from y in degrees.minutes-seconds.

e^x: Raises 2.718281828 to the power of x .

10^x: Raises 10 to the power of x .

R>°: Converts x , in radians to decimal degrees.

R>G: Converts x , in radians to Grads.

R>P: Converts the rectangular coordinates (y,x) to polar coordinates.

dms +: Adds x in degrees.minutes-seconds and y in degrees.minutes-seconds.

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Manage Pictures

[Job] [Manage Pictures]

The [Manage Pictures](#) screen is used to manage pictures that are associated with the current job.

The list of pictures is sorted by the picture names by default, but they can also be sorted by point association, date, or file size by tapping the desired column's heading. For example, tap **[Date]** to sort all the pictures by date. Tapping **[Date]** again will reverse the sort order.

Various icons are used to indicate the type of point the corresponding pictures is associated with.

[View]: Opens the selected picture in the Windows Mobile® Pictures & Video application. Tap [ok] to return to the software. Additional options are available from the **[Send]** and **[Menu]** buttons, but are not related to the software and are not covered in this manual.

[Del]: Deletes the selected picture.

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Take Pictures

[Job] [Take Picture]

The [Take Picture](#) routine is only available on a Nomad or Ranger 3 with a built-in camera. The routine is used to take a new picture and optionally associate it with an existing point.

Align the shot in the first Take Still Picture screen and when ready, press **[Enter]** on the data collector to take the picture. The picture will be displayed on the second screen automatically. The first two screens of the routine are part of

the Windows Mobile® Pictures & Video application.


The second screen is used to preview the picture. You must tap **[ok]** or press **[Enter]** on the data collector button to continue to the final screen. If the picture is unacceptable, you can cancel from the third screen and start over.


Note: The options available from the bottom of this screen are part of the Windows Mobile® Pictures & Video application and are not supported in the software.

The third screen is used to name and describe the picture.

New Picture File Name: Enter the picture name here. The previous name entered will initially be entered in this field for you, except the number will be advanced by one.

Point Associated with Picture: You can specify an existing point in this field to associate the picture with the specified point. Raw Data Note: Any text entered here will be stored to the job as a note along with the picture details.

: can be used to cancel out of the routine without saving the picture.

: Saves the picture and closes the routine.

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Survey Menu

The Survey Menu contains the routines used for collecting data with an optical or robotic total station.

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Station Setup

[Survey] [Station Setup]

The Station Setup wizard is used to set the occupy point and orient the optical instrument. You must complete station setup before you can measure and store points with your optical instrument. The station setup wizard will guide you through all the steps required to complete the station setup.

The first step in the station setup procedure will depend on your Survey Settings:

If you have **Prompt for PPM** enabled on the [Survey Settings](#) card, then you start your station setup on the [PPM Correction](#) screen.

After that, the procedure through the wizard will depend on your type of station setup:

Station Setup Type

After setting your instrument PPM (if enabled), the next screen of the station setup wizard prompts you to pick a **Station Setup Type**:

- Choose [Known Point](#) to set the station on a known point in the job.
- Choose [Unknown Point/Resection](#) to set the station on a new point in the job, and solve the coordinate of the new point using measurements to 2 or more known points.
- Choose [Multiple Backsights](#) to set the station on a known point in the job and use multiple backsight points to set the orientation.
- Choose [Use Last Setup](#) to reset the station on the same point using the same backsight as the last used setup.

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Station Setup PPM Correction

The following screens are used to setup PPM correction parameters for the station setup.

Apply PPM [In Instrument] : Use this option if you set the instrument to apply the PPM correction. In this case, the distances returned to Survey Pro by the instrument have already been corrected for PPM.

[Record PPM values to file ...]: Opens up the [PPM Booking](#) screen where you can record the temperature and pressure values entered into the instrument for book keeping purposes.

Apply PPM [In Survey Pro] : Use this option if you set the instrument to 0 PPM correction, and you want to have Survey Pro correct measured slope distances for PPM.

[Pressure]: Enter the atmospheric pressure and pressure units.

[Temperature]: Enter the temperature and temperature units.

[PPM]: Enter the parts per million correction factor for measured slope distances.

Certain instruments use the Survey Pro application to control PPM correction, if you are connected to an instrument of this type, the PPM correction page will show the following controls:

[PPM Off] : Use this option to disable PPM correction of measured slope distances.

[**PPM On**] : Use this option to enable PPM correction of measured slope distances.

[**Pressure**]: Enter the atmospheric pressure and pressure units.

[**Get Pressure**]: (if available) Gets the atmospheric pressure from the barometer built into the instrument.

[**Temperature**]: Enter the temperature and temperature units.

[**Get Temperature**]: (if available) Gets the temperature from the thermometer built into the instrument.

[**Calculate**]: Triggers the instrument to calculate the PPM correction factor from the input values.

[**PPM**]: Enter the parts per million correction factor for measured slope distances.

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PPM Booking

The PPM Booking screen is used to record the temperature, pressure, and PPM values that were set on the instrument for the case where the instrument is applying the PPM correction.

[**Pressure**]: Enter the atmospheric pressure and pressure units.

[**Temperature**]: Enter the temperature and temperature units.

[**PPM**]: Enter the parts per million correction factor for measured slope distances.

Note: The PPM correction values entered on this page are for book keeping purposes only. When PPM is being applied in the instrument, the instrument will correct measured slope distances for PPM and the corrected distance is returned to Survey Pro.

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Station Setup Known Point

The following screens are used when the **Setup Type** is set to **Known Point**.

+ **Occupy Point**: Select a point to setup on. You can enter a point name, select from a list or from the map. If you enter a new point name here, you will have to enter known coordinates for that point and store it before proceeding with the wizard.

2D Survey: Check this box to conduct a 2D survey. This option will allow you to select a 2D point for the occupy point, and will disable the height of instrument and rod controls in setup and measurement taking user interface.

Information: Shows the location (N, E, Elev) and description of the selected occupy point.

HI: Enter the height of instrument if you are doing a 3D survey.

[**Remote Elevation**]: This button is available when using 3D survey Mode. Tap this button to open the [Remote](#)

[Elevation](#) screen where you can calculate the height of the instrument from a shot on the rod on a different point.

[Check Setup]: This button is only available when there is already a station setup in place. Tap **Check Setup** to open the [Station Check](#) screen.

[Next >]: Advances to the [Orient Instrument](#) page.

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Station Setup Known Point – Orient Instrument

New Point/BS Point/BS Azimuth: Select the type of backsight used to orient the instrument:

- Choose [New Point](#) to enter a known azimuth between the station setup point and the backsight point, then measure the distance to the backsight point. A new point will be created for the backsight at the known azimuth and measured distance from the station setup point.
- Choose [BS Point](#) to select an existing point in the job to use for your backsight.
- Choose [BS Azimuth](#) to enter a known azimuth to a backsight mark, and orient your instrument to this mark.

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Station Setup Known Point – Orient Instrument – New Point

BS Azimuth / BS Bearing: Enter the azimuth or bearing to the new backsight point.

Fixed Target / Roving Target: Select the target type at the backsight point. Choose fixed target if you will use a dedicated target at the backsight. Choose Roving Target if you will use the same target at the backsight as you will for foresight points.

HR: Enter the height of the backsight target.

Perform Backsight Repetition Set: Check this box if you wish to set the instrument circle in the instrument Face 1 (direct observation), and then observe the backsight again in instrument Face 2 (reverse observation)

[Measure & Set >]: Sets the instrument circle to 0, or to the true azimuth value, triggers a measurement from the total station, and stores the new backsight point.

Note: When you tap **[Measure & Set >]**, Survey Pro will set the horizontal circle of the instrument to 0, or to the true azimuth value when in this mode, for the direction to the backsight. Some older instruments do not support setting the horizontal circle with the data collector, the circle can only be set using the controls on the instrument. When using such an instrument, the button will be labeled **[Measure & Read >]**. In this case, the horizontal circle when pointed at the backsight will be set to whatever the instrument reads. When you are surveying in true azimuth mode, you must set the circle manually on the instrument to match the true azimuth before you tap **[Read Backsight >]**.

[< Back]: Returns to the [Station Setup Known Point](#) page.

[Finish]: Records the setup and exits the wizard.

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Station Setup Known Point – Orient Instrument – BS Point

BS Point: Enter the point name to use for the backsight point.

BS Azimuth: Displays the azimuth to the backsight point.

Note: When you are surveying in true azimuth mode, the backsight circle will be set to match the backsight azimuth. For some older instruments which do not support setting the circle with the external data collector, you must set the circle manually on the instrument to match the true azimuth before you tap [**Measure and Read Backsight**].

Fixed Target / Roving Target: Select the target type at the backsight point. Choose fixed target if you will use a dedicated target at the backsight. Choose Roving Target if you will use the same target at the backsight as you will for foresight points.

HR: Enter the height of the backsight target.

Perform Backsight Repetition Set: Check this box if you wish to set the instrument circle in the instrument Face 1 (direct observation), and then observe the backsight again in instrument Face 2 (reverse observation)

[**Set >**]: Sets the instrument circle to 0, or to the true azimuth value, and advances to the [Station Setup Finish](#) page.

[**Measure & Set >**]: Sets the instrument circle to 0, or to the true azimuth value, and triggers a distance measurement to the backsight target. This observation is recorded as your backsight check to the known point, and you will see the results displayed on the [Station Setup Finish](#) page.

Note: Some older instruments do not support setting the horizontal circle with the data collector, the circle can only be set using the controls on the instrument. When using such an instrument, the button will be labeled [**Read Backsight >**]. In this case, the horizontal circle when pointed at the backsight will be set to whatever the instrument reads. When you are surveying in true azimuth mode, you must set the circle manually on the instrument to match the true azimuth before you tap [**Read Backsight >**].

[**< Back**]: Returns to the [Station Setup Known Point](#) page.

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Station Setup Known Point – Orient Instrument – BS Azimuth:

BS Azimuth: Enter the azimuth to the known azimuth reference mark.

Note: Some older instruments do not support setting the horizontal circle with the data collector, the circle can only be set using the controls on the instrument. When using such an instrument, the button will be labeled [**Read Backsight >**]. In this case, the horizontal circle when pointed at the backsight will be set to whatever the instrument reads. When you are surveying in true azimuth mode, you must set the circle manually on the instrument to match the true azimuth before you tap [**Read Backsight >**].

Perform Backsight Repetition Set: Check this box if you wish to set the instrument circle in the instrument Face 1

(direct observation), and then observe the backsight again in instrument Face 2 (reverse observation)

[**Set Backsight >**]: Sets the instrument circle to 0, or to the true azimuth value, and advances to the [Station Setup Finish](#) page.

Note: When you tap [**Set Backsight >**], Survey Pro will set the horizontal circle of the instrument to 0, or to the true azimuth value when in this mode, for the direction to the backsight. Some older instruments do not support setting the horizontal circle with the data collector, the circle can only be set using the controls on the instrument. When using such an instrument, the button will be labeled [**Read Backsight >**]. In this case, the horizontal circle when pointed at the backsight will be set to whatever the instrument reads. When you are surveying in true azimuth mode, you must set the circle manually on the instrument to match the true azimuth before you tap [**Read Backsight >**].

[**< Back**]: Returns to the [Station Setup Known Point](#) page.

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Station Setup Finish / Check Setup

The [Station Setup Finish](#) screen is used to display the details of the backsight setup just completed, and to give you the opportunity to check the setup.

OCC: Displays the occupy point and backsight details of the current setup.

Check Type: Select the method to check the backsight:

- **By Angle:** Use this method to check the current backsight circle compared to the set backsight circle.
- **By Distance:** Use this method to check the distance between the occupy point and the backsight point, plus the current backsight circle compared to the set backsight circle.
- **By Point:** Use this method to measure to a third point and check the closure to that point.

[**Check**]: Triggers the instrument to take a measurement appropriate for the check type you are performing.

Note: Performing a backsight check is an optional step. If you wish to start surveying without performing a check, simply tap [**Finish**] on this page.

[**Backsight Sets ...**]: Opens up the [Backsight Sets](#) screen where you can see a list of all the direct/reverse backsight sets you have collected for the current station setup, and add new observation sets to the collection.

[**< Back**]: Returns to the [Orient Instrument](#) page.

[**Finish**]: Completes the station setup procedure.

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Station Setup Resection

The following screens are used when the setup type is set to **Unknown Point / Resection**. Resection station setup will calculate the coordinate of a new station setup point using observations to two or more known points. The resection is

solved using a fully weighted least squares solution. The weights of the observations in the solution are based on the [Precision](#) card of the [Instrument Settings](#) screen. This settings card allows you to modify the default weighting for angles, distances, and centering error to be used in the least squares resection solution.

Store Pt: Enter the name for the new point to be stored as a result of the resection.

Description / Code: Enter the description or the code for the new point.

HI: Enter the height of instrument if you are doing a 3D survey.

2D Survey: Check this box to conduct a 2D survey. This option will allow you to select a 2D point for the occupy point, and will disable the height of instrument and rod controls in setup and measurement taking user interface. Survey Pro will not solve an elevation for the resection station setup point when using 2D survey mode.

Shots per Resect Point: Enter the number of repetition sets you will collect for each point.

Sequence: Select the mode to shoot each set of the resection measurements. You can choose between: Direct and Reverse, or Direct Only.

[Check Setup]: This button is only available when there is already a station setup in place. Tap Check Setup to open the [Station Check](#) screen.

[Next >]: advances the wizard to the [Resection - Observations](#) page.

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Station Setup Resection - Observations

Resect Point: Enter the name of the known point to observe next in the resection.

Option: Select the measurement option. You can choose between: **Distance and Angle**, and **Angle Only**.

HR: Enter the height of rod for each observation.

Observe: Triggers the instrument to take an observation, and adds the results. The resection will automatically be resolved with each new observation added, and the results will be updated and displayed on the screen.

Note: When you are not working in true azimuth mode and you take the first observation to your first resection control point, Survey Pro will set the instrument circle to 0. It is expected that this point will be used as your backsight point. If you wish to change the point used for the backsight upon completing the resection, you can modify this at the end of the resection routine.

Note: If you are working in true azimuth mode, upon completing the resection, the instrument circle will be updated so that it will read the true azimuth from your newly solved resection station point to the first resection control point. Again, if you wish to change this assignment, you can modify this at the end of the resection routine.

Point List: Shows the **Point Name** of all the points observed in this resection solution. For each point in the list, you will see the following details.

- **H:** The point is used for the horizontal resection solution. Tap in this column to enable or disable the point in the horizontal solution. The resection is automatically resolved when you change the use for horizontal condition of any point.

- **V:** The point is used for the vertical resection solution. Tap in this column to enable or disable the point in the vertical solution. The resection is automatically resolved when you change the use for vertical condition of any point.
- **Desc:** The description of the point.
- **dHD:** The residual on the horizontal distance observation. This is the measured horizontal distance minus the horizontal distance of the least squares best fit solution.
- **dHA:** The residual on the horizontal angle observation. This is the measured horizontal angle minus the horizontal angle of the least squares best fit solution.
- **North (Y):** The northing or Y coordinate of the known point.
- **East (X):** The easting or X coordinate of the known point.
- **Elev. (Z):** The elevation or Z coordinate of the known point.
- **HA:** The horizontal angle observed to the known point. This will be the mean turned angle for all of the sets observed to this point.
- **HD:** The horizontal distance observed to the known point. This will be the mean horizontal distance for all sets observed to this point.
- **VD:** The vertical distance observed to the known point. This will be the mean vertical distance for all sets observed to this point.

Solution: The status of the resection least squares solution is shown below the point list. If the resection least squares solution can solve using all of the currently enabled resection known points, then the root mean squared of the horizontal errors is shown for the solution.

[< **Back**]: Returns to the [Station Setup Resection](#) page.

[**Next** >]: Advances to the [Resection - Results](#) page. You must have enough observations to solve the resection before you can advance.

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Station Setup Resection - Results

The list shows the results of the resection solution, including the coordinate and error estimates for the new station setup point.

New Setup displays the values for the new setup resulting from your resection.

Occupy: displays the name of the newly stored station point resulting from the resection.

HI: displays the height of the instrument for this station setup.

Backsight: displays the name of the backsight point assigned for this setup. By default, this is the first resection control point used in the solution.

Azimuth: displays the azimuth from the newly stored resection point to the backsight point.

Circle: displays the circle reading to the backsight point.

[< **Back**]: Returns to the [Station Setup Resection - Observations](#) page.

[**Finish**]: Stores the point and completes the resection station setup.

Note: The backsight point and circle are automatically assigned by the reading to the first resection control point used in

the solution. However, if you wish to change the backsight point or the backsight circle used, you can tap the [Backsight>] button to advance to the [Station Setup wizard in BS Point mode](#) and complete a standard backsight setup.

Backsight> stores the point and advances to the [Station Setup wizard in BS Point mode](#), where you can reassign the backsight point or circle for this station setup, and/or check the backsight.

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Station Setup using Multiple Backsights

The following screens are used when the **Setup Type** is set to **Multiple**.

+ **Occupy Point**: Select a point to setup on. You can enter a point name, select from a list or from the map. If you enter a new point name here, you will have to enter known coordinates for that point and store it before proceeding with the wizard.

2D Survey: Check this box to conduct a 2D survey. This option will allow you to select a 2D point for the occupy point, and will disable the height of instrument and rod controls in setup and measurement taking user interface.

Information: Shows the location (N, E, Elev) and description of the selected occupy point.

HI: Enter the height of instrument if you are doing a 3D survey.

[Remote Elevation]: This button is available when using 3D survey Mode. Tap this button to open the [Remote Elevation](#) screen where you can calculate the height of the instrument from a shot on the rod on a different point.

Sequence: Enter the type of measurement sequence to use. Choice is Direct and Reverse or Direct Only./p>

of Sets: Enter the number of measurement sequences, or sets, to activate. The measurement sequence will repeat this many times.

[Check Setup]: This button is only available when there is already a station setup in place. Tap **Check Setup** to open the [Station Check](#) screen.

[Next >]: Advances to the [Observe Backsights](#) page.

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Station Setup Multiple Backsights – Observe Backsights:

BS Point: Select an existing point to observe. Use the Power Menu to Choose from list, Choose from map, or Create new point. The first point used will be the actual backsight point of record.

Option: Select a measurement type: Distance and Angle or Angle Only.

HR: Enter the height of the backsight target. Use the Power Menu to choose a different target or to manage targets.

Point List: Shows the **Point Name** of all the points observed in this multiple backsight solution. For each point in the list, you will see the following details.

Used: The point is used for the multiple backsight solution. Tap in this column to enable or disable the point in the solution. The multiple backsight is automatically resolved when you change this condition for any point.

- **Desc:** The description of the point.
- **dHD:** The residual on the horizontal distance observation. This is the measured horizontal distance minus the expected horizontal distance.
- **dHA:** The residual on the horizontal angle observation. This is the measured horizontal angle minus the expected horizontal angle.
- **North (Y):** The northing or Y coordinate of the known point.
- **East (X):** The easting or X coordinate of the known point.
- **Elev. (Z):** The elevation or Z coordinate of the known point.
- **HA:** The horizontal angle observed to the known point. This will be the mean turned angle for all of the sets observed to this point.
- **HD:** The horizontal distance observed to the known point. This will be the mean horizontal distance for all sets observed to this point.
- **VD:** The vertical distance observed to the known point. This will be the mean vertical distance for all sets observed to this point.

Solution: The status of the multiple backsight solution is shown below the point list. If the multiple backsight solution can solve using all of the currently enabled known points, then the Face 1 orientation correction is shown for the solution.

[< **Back**]: Returns to the [Station Setup Multiple Backsights](#) page.

[**Observe**]: Triggers the measurement. Measurements will follow the sequence and repetitions previously set.

[**Next >**]: Calculates the current backsight and correction factor and advances to the [Station Setup confirmation](#) page.

Note: When you tap [**Next >**], Survey Pro will set the horizontal circle of the backsight direction to 0 or to the true azimuth (depending on settings) and will store the calculated correction factor based on the measurements made. The correction factor will be applied to any future foresight measurements. An error will display if no measurements to a backsight point have been made.

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Station Setup Multiple Backsights – Setup Confirmation:

Information display: Displays the backsight point and the correction factors to use for Face 1 (Direct) and Face 2 (Reverse) measurements.

[< **Back**]: Returns to the [Station Setup Multiple Backsights](#) page.

[**Finish**]: Stores the current station setup and backsight information and exits the routine.

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Station Setup Use Last

The following screens are used when the setup type is set to **Use Last**.

HI: Enter the height of instrument if you are doing a 3D survey.

[Check Setup]: This button is only available when there is already a station setup in place. Tap Check Setup to open the [Station Check](#) screen.

[Next >]: Advances to the [Station Setup Use Last - Set Circle](#) page.

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Station Setup Use Last - Set Circle

Fixed Target / Roving Target: Select the target type at the backsight point. Choose fixed target if you will use a dedicated target at the backsight. Choose Roving Target if you will use the same target at the backsight as you will for foresight points.

HR: Enter the height of the backsight target.

[Set Circle]: Sets the Backsight Circle for this setup to the instrument.

[< Back]: Returns to the [Station Setup - Use Last](#) page.

[Set Backsight >]: Sets the instrument circle to 0, or to the true azimuth value, and advances to the [Station Setup Finish](#) page.

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Station Setup Remote Elevation

The [Station Setup Remote Elevation](#) screen will compute the elevation for the occupy point by shooting a foresight with a known elevation.

Elevation: enter the known elevation for the foresight point that you will occupy with the rod.

Shoot: select if you want to perform a Direct shot only, or Direct & Reverse shots to the foresight.

HI: enter the length of the instrument.

HR: enter the length of the rod at the foresight point.

 : Opens the [Smart Target](#) options.

[Take Shot...]: Triggers the instrument to take a shot and computes the elevation for the station setup point.

Results

OCC Elevation: Displays the elevation for the occupy point.

FS Elevation: Displays the elevation for the foresight point.

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Check Setup

[Survey] [Check Setup]

The [Check Setup](#) screen is used to display the details of the current backsight setup. You can check the current setup and reset the instrument circle.

OCC: displays the occupy point and backsight details of the current setup.

Check Type: Select the method to check the backsight:

- **By Angle:** Use this method to check the current backsight circle compared to the set backsight circle.
- **By Distance:** Use this method to check the distance between the occupy point and the backsight point, plus the current backsight circle compared to the set backsight circle.
- **By Point:** Use this method to measure to a third point and check the closure to that point.

[Check]: Triggers the instrument to take a measurement appropriate for the check type you are performing.

[Backsight Sets ...]: Opens up the [Backsight Sets](#) screen where you can see a list of all the direct/reverse backsight sets you have collected for the current station setup, and add new observations sets to the collection.

[Reset Backsight]: resets the backsight circle to the exact value specified for the current station setup.

[New Setup]: Opens the [Station Setup wizard](#) where you can setup a new station and backsight.

Backsight Sets

The [Backsight Sets](#) screen is used to view the list of backsight direct/reverse sets you have collected for the current station setup, and to add new observations to the collection. Backsight sets are used to calculate the mean angle for foresight observations you take using [Multiple Sideshots](#), [Angles Only](#), or any direct/reverse observation pair using [Traverse/Sideshot](#).

Sets: Enter the number of sets to add when you tap **[Measure]**.

Sets List: Shows the list of backsight sets. Each set has a direct and reverse observation. You can check or uncheck any row to enable or disable any specific measurement to be used or not.

[Toss]: Deletes the observation pair for the selected row.

[Measure]: Triggers a new measurement pair to the backsight. You will be prompted to measure angles to the backsight in both the direct and reverse instrument face.

Traverse / Sideshot

[Survey] [Traverse / Sideshot]

The Traverse / Sideshot screen is the main screen used for data collection. From the Traverse / Sideshot screen you can collect single face observations or multiple sets of direct and reverse observations to new foresight points. You can also collect horizontal angle offset, vertical angle offset, and distance offset observations directly from this screen.

The top of the Traverse / Sideshot screen has one or more buttons (depending on your active instrument)

For all instrument types, you will see:



: Opens the [Station Setup](#) screen where you can set and check your station occupy point and backsight.

If you are using a robotic total station, you will also see:



: Triggers the robot to start searching for a prism to lock onto.




: Sends the stop command to the robot. This will stop a search in progress and then turn off autolock mode on the instrument so it will stop attempting to lock onto a target.






: Triggers the robot to flip to the opposite face. This is used when you are measuring multiple sets of direct and reverse observations to a single foresight point.



: Opens up the [Remote Control](#) screen where you can control all aspects of the robotic total station.

The  button also shows you status information about your robotic instrument. When connected to the instrument, this button will display the prism lock status. The prism lock status will be in one of three states:

- : The robot is locked onto the target.
- : The robot is in tracking mode, but is not locked onto the target.
- : The robot is not in tracking mode.

When the instrument battery is running low, the remote button will alternately flash between prism lock status, and the low battery indicator.

When there is no connection to the instrument, the remote button will show 



: Additional robotic control features are available from the drop down menu:

- **GeoLock**: Triggers the robot to start a GeoLock search.
- **Turn To ...**: Opens the [Turn To](#) screen where you can control the robot to turn to specific angles or points.
- **Instrument Settings**: Opens up the settings pages specific to your brand and model of instrument.
- **GeoLock Settings**: Opens the [GeoLock Settings](#) screen where you can configure the GeoLock settings.

Foresight: The point name that will be used for the next stored point.


Description / Code: Enter the description or the code for the new point.

HR: The height of the rod.



: Opens the [Smart Target](#) options.

[Measure]: Triggers the instrument to take a measurement and updates the results display with the current measurement. This action does not store the point.

Tap the  to set the function of the measure button. Choices are to take a full measurement of angles and distance, or to measure angles only.

If you are measuring angles and distances:

[Sideshot / Store]: The Sideshot / Store button stores a point with the current measurement. If you have already taken an observation using the **[Measure]** button, then this button will be labeled **[Store]** and it will store a new point using the measurement already collected. If you have not taken any observations, this button will be labeled **[Sideshot]** and it will trigger the instrument to take an observation and then immediately store it as a new point.


If you are measuring angles only:

[Observe / Store]: The Observe / Store button stores a point with the current measurement. If you have already taken an observation using the **[Measure]** button, then this button will be labeled **[Store]** and it will store a new point using the measurement already collected. If you have not taken any observation, this button will be labeled **[Observe]** and it will trigger the instrument to take an observation and then immediately store it as an angles only measurement.


How to Measure Repetition Sets:

You can measure multiple sets of direct and reverse observations to a foresight point from the Traverse / Sideshot screen. First, sight the target in Face 1 and tap **[Measure]**. You will notice the results of the observation in the display. Then flip the instrument, sight the target in the Face 2, and tap **[Measure]**. You will notice the results view changes to a display of the direct and reverse observations collected to the same point. You can repeat this procedure for as many sets as you would like to collect for any particular foresight point.


Note: You must have at least as many backsight direct/reverse observation sets as you intend to use for your foresight point. If you try to collect more foresight sets than you have matching backsight sets, you will be prompted to collect


additional backsight sets before you can continue. You can also tap  to open the [Check Setup](#) screen, and tap **[Backsight Sets ...]** where you can add more sets of backsight direct and reverse observations.

How to Measure Angle Offsets:

You can measure horizontal and vertical angle offset points from the Traverse / Sideshot screen. First, sight the target and tap **[Measure]**. Next, turn the instrument scope to point at the horizontal or vertical angle offset point. Finally, tap the  next to the **[Store]** button and select one either **Horizontal Angle Offset** or **Vertical Angle Offset** (see below).

How to Measure Distance Offsets:

You can measure distance offset points from the Traverse / Sideshot screen. First, sight the target and tap **[Measure]**. Next, tap  next to the **[Store]** button and select **Tape In** (see below).

To store different kinds of foresight observations, tap the  and select one of the following choices:

- **Traverse:** Opens the [Traverse Now](#) screen where you can choose to observe a new point to traverse to, or select a point you have previously occupied from this setup.
- **Tape In:** Opens a prompt like the [Distance Offset](#) screen where you can enter a taped distance that is left/right and/or above/below the point observed at the target when you tapped the **[Measure]** button.
- **Horizontal Angle Offset:** Triggers the instrument to update the angle reading, and then stores the point like a

[Horizontal Angle Offset](#).

- **Vertical Angle Offset:** Triggers the instrument to update the angle reading, and then stores the point like a [Vertical Angle Offset](#).
- **Clear Measurements:** Tosses all of the current measurements and clears any pending results.

How to Measure from the Map

You can store a measurement directly from the map tab of the [Traverse / Sideshot](#) screen. Simply press the enter button on the device keyboard (or whatever button you have mapped to the enter key for handheld devices without a full keyboard).

Note: Prior to storing a point, you may then be prompted for description, rod height, layer, and/or code depending on the selections made in the [Surveying Settings](#) screen.

: A shortcut to the [Surveying Settings](#) screen.

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Traverse Results

Angle Right: The horizontal angle right around the Occupy Point from the Backsight to the Foresight Point.

Azimuth: The azimuth from the Occupy Point to the Foresight Point.

Zenith: The zenith angle measured by the total station to the prism.

Slope Dist: The slope distance measured by the total station to the prism.

Horz Dist: The horizontal distance from the Occupy Point to the Foresight Point.

Vert Dist: The vertical distance from the Occupy Point to the Foresight Point.

Point: The name of the stored point.

Desc: The description of the stored point.

Location N: The Y-coordinate of the stored point.

Location E: The X-coordinate of the stored point.

Location Z: The elevation of the stored point.

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Traverse Now

Before taking a shot with the [**Traverse**] button, the [Traverse Now](#) screen will open where you can choose to take a new observation as your traverse point, or you can choose among any of the observations already taken from this station setup as your traverse point.

[Measure and Traverse Now]: This option will trigger the instrument to take a new observation, and then open the [Traverse Wizard](#) to guide you through moving the station setup to the forward point.

[Traverse to an Existing Point]: Shows a list of points already observed from this station setup. Select any point from the list and then tap:

[Pick a point and Traverse To...] opens the [Traverse Wizard](#) to guide you through moving the station setup to the forward point.

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Traverse Wizard

[Survey] [Traverse / Sideshot] [Traverse] [Traverse Now]

This wizard is used to setup the occupy point and backsight after a traverse observation.

Note: If you have Prompt for PPM turned on in the [Survey Settings](#), the Traverse Wizard will start with the [PPM Setup](#) screen.

HI: Enter the height of the instrument at the new setup point.

New Occupy Point: Displays the name of the traverse to point. This would be the name of the point you shot with the Traverse button.

New Backsight Point: Displays the name of the new backsight point. This would be the point you were just occupying.

Fixed Target / Roving Target: Select the target type at the backsight point. Choose fixed target if you will use a dedicated target at the backsight. Choose Roving Target if you will use the same target at the backsight as you will for foresight points.

HR: Enter the height of the backsight target.

[Set Backsight]: Sets the instrument circle to 0, or to the true azimuth value, and advances to the [Station Setup Finish](#) page.

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Point Exists Screen

[Survey] [Traverse / Sideshot] [Traverse] or [Sideshot]

When performing a traverse or sideshot and the foresight point name already exists, the [Point Exists](#) screen will open where you select how to handle the new point.

[Overwrite Existing]: Overwrite the existing point with the new coordinates.

[Store Observation]: Stores the observation data, but does not update the point coordinate. The observation results will show you the differences between the observed coordinate and the existing coordinate.

[Compute Average]: Computes an average coordinate using this new observation and all other observations (Optical and GNSS). You will see a prompt showing you the agreement between this observation and the previous coordinate for the point. If you accept the prompt, the point will be updated with the new averaged coordinate.

[Use Next Available]: Store the coordinates using the next available point name.


Note: Certain points are protected and cannot be changed. If you are taking an observation to a protected point, the option to overwrite or compute average will not be available.

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Remote Shot Screen (Remote Mode)

[Survey] [Traverse / Sideshot] 

When running in remote mode, tapping the  button from the [Traverse / Sideshot](#) screen will open the [Remote Shot](#) screen.

The [Remote Shot](#) screen is identical to the [Remote Control](#) screen with the addition of a **[Take Shot]** button that allows you to trigger the total station to take a shot.

[Take Shot]: After the total station is properly aiming toward the prism, this will trigger the total station to take a shot. If you are performing a sideshot, you will remain in the [Remote Shot](#) screen once the shot is completed. If you are performing a traverse shot, you will return to the [Traverse / Sideshot](#) screen when the shot is completed.

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Repetition Shots

[Survey] [Repetition Shots]

The [Repetition Shots](#) screen is used to perform sideshots or traverse shots using any number of repetitions.

Note: The sequence that the repetition shots are performed is selected in the [Repetition Settings](#) screen.

Foresight: The name of the point that will be stored.

Number of Sets: The desired number of sets to shoot to the backsight and foresight.

Note: One set is equivalent to two shots to the backsight and foresight point.

HR: The rod height.

 : Opens the [Smart Target](#) options.

Average (of): Shows the average angle or distance to the foresight from all the shots taken. The value in parenthesis is the total number of repetitions performed.

Worst Residual: Displays the worst residual calculated from all the sets of the selected measurement type.

Description / Code: Enter the description or the code for the new point.

Note: A residual is the difference between a single measurement and the average of all the measurements.

Note: If a residual exceeds the tolerances set in the [Repetition Settings](#) screen, that value is displayed in **bold** text.

[**HA**], [**ZA**], [**SD**]: Allows you to replace the current repetition data for the corresponding button with new data. Once tapped, the repetition data for the tapped button will be deleted. You will then need to perform all sets defined in the Number of Sets field again, where the new data will replace the corresponding deleted data.

[**All**]: Open a screen that asks if you want to add an additional set to those already done or start over.


[**Toss**]: Delete the corresponding set that has the worst residual.

Note: A set can only be “tossed” when three or more sets have been collected.

[**Sideshot**]: Use the repetition data gathered to create a new sideshot point. The foresight point will automatically advance to the next available point.

[**Traverse**]: Use the repetition data gathered to create a new traverse point. The occupy point will automatically update to the previous foresight point and the backsight point will automatically update to the previous occupy point.

[**Backsight...**]: Opens the [Station Setup](#) screen where the current backsight can be modified.

: A shortcut to the [Surveying](#) and [Repetition Settings](#) screens.

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Multiple Sideshots

[**Survey**] [**Multiple Sideshots**]

The [Multiple Sideshots](#) screen is used to perform multiple sideshots using any number of repetitions to each foresight without the need to re-shoot the backsight.

Foresight: The point name that will be stored.

Description / Code: Enter the description or the code for the new point.

HR: The length of the rod.

 : Opens the [Smart Target](#) options.


Number of Sets: The desired number of sets to shoot to the foresight.

Note: You must observe an equal number of foresight sets as you have backsight sets.

[**Backsight...**]: Opens the [Station Setup](#) screen where the current station and backsight setup can be modified.

[**Backsight Sets ...**]: Opens the [Backsight Sets](#) screen where you can add more direct and reverse observations to the backsight to be used with the foresight sets.

[**Sideshot**]: Used to shoot a sideshot. Once the final set is complete, the new point is stored and the foresight point will automatically advance to the next available point.


: A shortcut to the [Surveying](#) and [Repetition Settings](#) screens.

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Radial Sideshots

[Survey] [Radial Sideshots]

The [Radial Sideshots](#) routine combines the functionality of the [Multiple Sideshots](#) routine with the accuracy of the [Repetition Shots](#) routine. It is used to perform repetition shots to a backsight and any number of foresights (sideshots) from the same occupy point.

: Accesses the [Surveying Settings](#) screen and [Radial Sideshot Settings](#) screen, which is identical to the [Repetition Settings](#) screen with the exception of the choices for the **Shooting Sequence**. Select **B>F1>..>Fn^F1>..>Fn>B** to shoot all Face 2 sideshots in the same order as the Face 1 sideshots, or **B>F1>..>Fn^Fn>..>F1>B** to shoot the Face 2 sideshots in reverse order.

Option: When shooting the first set, measuring a distance and angle for each shot is required, but when starting all subsequent sets, **Angle Only** can also be selected for this field.

Number of Sets: Where the desired number of sets is specified.

[**Done with SS >**]: Used when you are finished shooting sideshots. This is only available while taking Face 1 sideshots for the first set.

[**Shoot**] / [**Shoot BS**]: Used to shoot the current point. If the shot was already performed, the [**Next >**] button will be enabled. Tapping [**Shoot**] again will throw out the results of the last shot and re-shoot it.

[**Next >**]: Used to take the next required shot in the routine. The button label will contain additional information to help indicate which shot is required next.

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Distance Offset

[Survey] [Distance Offset]



The [Distance Offset](#) screen is used to store a new point that is a known distance away from the rod location. This screen is useful when the rod cannot occupy the new point's location.

Foresight: The point name that will be stored.

Description / Code: Enter the description or the code for the new point.

HR: The length of the rod.

 : Opens the [Smart Target](#) options.

Offset: The offset distance that is to the left (when  L is selected) or right (when  R is selected) of the prism from the total station's point of view.

Horz Dist Offset: The offset distance that is beyond the prism (positive value) or in front of the prism (negative value) from the total station's point of view.

Elevation Offset: The offset distance that is below the prism (negative value) or above the prism (positive value).

Note: Multiple offsets can be applied simultaneously.

[**Topo SS**]: Take an observation to the prism, and store the point at the prism location without any offsets applied. You can use this button when you want to perform a normal observation without leaving this screen.

[**Backsight...**]: Opens the [Station Setup](#) screen. where the current backsight can be modified.

[**Shoot Offset**]: Take an observation to the prism, apply the offset(s) entered, and then store the new point at the location offset from the prism.

: A shortcut to the [Surveying Settings](#) screen.

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Horizontal Angle Offset

[Survey] [**Horizontal Angle Offset**]

The [Horizontal Angle Offset](#) screen allows you to compute and store the location of a new point that cannot be occupied, such as at the center of large tree.

The routine shoots a prism positioned at the side of the new point and then reads the horizontal angle when aiming toward the center of the new point to compute the new point's location.

Foresight: The point name that will be used when storing the new point.

Description / Code: Enter the description or the code for the new point.

HR: The length of the rod.

 : Opens the [Smart Target](#) options.

[**Backsight...**]: Opens the [Station Setup](#) screen..

[**Aim Center**]: Record the horizontal angle from the total station, which should be facing the center of the new point.

[**Shoot Prism**]: Take a shot to the prism, which is located at the side of the new point.

: A shortcut to the [Surveying Settings](#) screen.

Note: The new point will have the same elevation as the point occupied by the prism.

Note: The prism only needs to occupy the location at the side of the new point. A prism is not necessary when shooting the location directly in front of the new point.

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Vertical Angle Offset

[Survey] [Vertical Angle Offset]

The Vertical Angle Offset screen allows you to compute and store the location of a new point that exists directly above or below the rod location, but cannot be occupied, such as the top of a utility pole.

The new point will have the same coordinates as the rod location, but with a different elevation.

Foresight: The point name that will be used when storing the new point.

Description / Code: Enter the description or the code for the new point.

HR: The length of the rod.



: Opens the [Smart Target](#) options.

[Shoot Prism]: Take a shot to the prism.

[Aim Zenith]: Read the vertical angle measured by the total station, which should be facing the new point's location.

[Backsight...]: Opens the [Station Setup](#) screen..



: A shortcut to the [Surveying Settings](#) screen.

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Plane and Vertical Angle Offset

[Survey] [Plane and Vertical Angle Offset]

The Plane and Vertical Angle Offset screen allows you to define a vertical plane by measuring distance and angles to two points, and then store any number of points on that plane by measuring angles only to those points. A common usage of this routine would be to measure the location of two power poles with a prism or reflectorless observation, and then observe the power lines between the poles with angles only.

Foresight: The point name that will be used when storing the new point.

Description / Code: Enter the description or the code for the new point.

HR: The length of the rod.



: Opens the [Smart Target](#) options.

[Shoot Plane]: Take an observation to a prism or with the reflectorless EDM to one of the points that define the vertical

plane. After you have observed the first point on the plane, move the prism or aim the reflectorless EDM at the second point and tap [Shoot Plane] when you are ready to observe the second point on the plane.

[**Aim and Store**]: Aim the instrument at any point on the plane and tap **Aim and Store** to observe horizontal and vertical angle to the point, and to store the point. You can observe angles and store any number of points on the plane after you have observed the two points with distance measurements to define the plane.

[**Backsight...**]: Opens the [Station Setup](#) screen..

: A shortcut to the [Surveying Settings](#) screen.

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Auto Collect

[Survey] [Auto Collect]

The [Auto Collect](#) screen allows users with robotic total stations to automatically collect points either at a specified time interval or after the rod has moved a specified horizontal distance.

Note: This routine only works when used with a robotic total station in remote control mode.

Foresight: The point name that will be used when storing the first new point. Each successive point name will automatically be incremented by the next available point number.

Description / Code: Enter the description or the code for the new point.

Method: Select the method of continuous data collection. The available methods are described below:

- **Time Interval:** After accepting the first point, additional points will automatically be stored after the specified time interval (in seconds) has elapsed. Each successive point name is incremented to the next available name.
- **Horiz. Distance:** After accepting the first point, additional points will automatically be stored after traveling the specified horizontal distance. Each successive point name is incremented to the next available name.
- **Vertical Distance:** After accepting the first point, additional points will automatically be stored after traveling the specified vertical distance. Each successive point name is incremented to the next available name.

Interval: Enter the interval criteria used for continuous collection modes. The Interval field is not available if either of the manual methods is selected.

Note: The accuracy that a point will be stored when auto collecting by Distance will vary depending on how frequently the total station measures a distance and how fast the prism is traveling.

: A shortcut to the [Surveying Settings](#) screen.

[**Backsight...**]: Opens the [Station Setup](#) screen..

[**Next >**]: Opens the next [Auto Collect](#) screen.

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Auto Collect- Screen 2

The second [Auto Collect](#) screen displays information related to the points that have been stored and when the next point will be stored.

The box in the upper-left corner displays the direction and distance the total station is aiming relative to the backsight.

The upper-right corner displays the next store point number and when the next point will be stored in either seconds or distance.

The lower-left corner is a graphic that shows the current total station position, the current prism position, and when collecting by distance, the approximate location of the next store point (represented by an X) based on the speed and direction the prism is moving from the previous store point. Previous stored points are also displayed as dots in this part of the screen.

The lower-right corner of the screen displays the number of points that have been stored and the speed and direction the prism is traveling.

[**Store Now**]: Stores a point at the current prism location, even if the time / distance criteria are not yet met.

[< **Back**]: Returns to the previous [Auto Collect](#) screen.

[**Start / Stop**]: Toggles between starting or stopping the [Auto Collect](#) routine.

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Quick Codes

[Survey] [Quick Codes]

The [Quick Codes](#) screen is used to rapidly take shots with different descriptions or codes.

Foresight: Is where you enter the foresight point name.

HR: The height of the rod.

: Opens the [Smart Target](#) options.

[**Backsight**]: Opens the [Station Setup](#) screen where you can set and check your station occupy point and backsight.

Tap any of the buttons to take a shot and store the point with the description or code of the button label. This shot is taken using the current smart target and all relevant settings. The point is stored with the description or code labeled on the button, for example, [**Ditch**] or [**TOPO**]. You can also tap [**Enter**] to take a shot with the last used button.

Note: Storing points in this routine does not change the last user-specified description or code used in any survey routine.

Note: To enter a new description or code, or edit an existing button description in the [Quick Codes](#) screen, tap and hold the button. The Quick Code button labels are saved in the \Program Files\Survey Pro\QuickCodes.ini file. You can copy these files from one data collector to another to preload the list.

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Corner & 2 Lines

[Survey] [Corner & 2 Lines]

The Corner and 2 Lines screen is used to store a point at the corner of a structure using a reflectorless total station where a direct measurement to the point is not possible, but two points on two intersecting lines can be shot.

Foresight: The name of the point that will be stored.


Description / Code: Enter the description or the code for the new point.

HR: 0.000: Shows that no rod height will be used with this routine since all shots are direct reflectorless.

[Shoot Line 1]: Prompts you to take two shots on Line 1, which intersects with Line 2 at the point you want to store.

Note: Each shot for a line can be in any location on the same line. (Shot 1 can be to the left or the right of Shot 2.)

[Shoot Line 2]: Prompts you to take two shots on Line 2, which intersects with Line 1 at the point you want to store.

Note: After all shots are done, the computed elevation is displayed for the new point. You can either enter a different elevation or tap  to accept the computed elevation.

[Backsight]: Opens the [Station Setup](#) screen you can set and check your station occupy point and backsight.

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Corner & Angle

[Survey] [Corner & Angle]

The Corner and Angle screen is used to store a point that cannot be shot on a reference line using a reflectorless total station where two other points on the same line can be shot.

Foresight: The name of the point that will be stored.

Description / Code: Enter the description or the code for the new point.

HR: 0.000: Shows that no rod height will be used with this routine since all shots are direct reflectorless.

[Shoot Line]: Prompts you to take two shots on a line that intersects with the point you want to store.

Note: Each shot can be in any location on the line. (Shot 1 can be to the left or the right of Shot 2.)

[Aim at Corner]: Prompts you to aim at the corner (the point that you want to store). Although no shot is taken, the angles to the point will be used to compute its location.

Note: After all shots are done, the computed elevation is displayed for the new point. You can either enter a different elevation or tap to accept the computed elevation.

[Backsight]: Opens the [Station Setup](#) screen where you can set and check your station occupy point and backsight.

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Corner & Offset

[Survey] [Corner & Offset]

The Corner and Offset screen is used to store a point using a reflectorless total station for a point that cannot be shot directly, but the offset(s) to the point can be measured from a reference line that can be shot.

Foresight: The name of the point that will be stored.

Description / Code: Enter the description or the code for the new point.

HR: 0.000: Shows that no rod height will be used with this routine since all shots are direct reflectorless.

Horiz Offset: The horizontal distance on the line from Shot 1 to the new point. Select L if the new point falls to the left of Shot 1, or select R if it falls to the right.

Perpendicular Offset: The horizontal distance, perpendicular to the reference line, from the line to the new point (see diagram). A positive value extends away from the total station where a negative value is closer to the total station.

Elevation Offset: The vertical offset from the line to the new point. (See diagram.) A positive value will result in a new point above the reference line and a negative value results in a new point below the reference line.

[Shoot Line]: Prompts you to take two shots on the horizontal reference line.

Note: Each shot can be in any location on the reference line (Shot 1 can be to the left or the right of Shot 2), but the Horiz Offset is always measured from Shot 1.

[Backsight]: Opens the [Station Setup](#) screen where you can set and check your station occupy point and backsight.

Note: After each shot is complete, the computed elevation is displayed for the new point. You can either enter a different elevation or tap to accept the computed elevation.

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Corner & Plane

[Survey] [Corner & Plane]

The Corner and Plane screen is used to store a point using a reflectorless total station for a point that cannot be shot, but three points on the same plane can be shot.

Foresight: The name of the point that will be stored.


Description / Code: Enter the description or the code for the new point.

HR: 0.000: Shows that no rod height will be used with this routine since all shots are direct reflectorless.

[Shoot Plane]: Prompts you to take three shots on the same flat surface that the new point is located.

Note: Each shot can be in any location on the same plane, but they must not form a straight line and they should not be grouped close together.

[**Aim at Corner**]: Prompts you to aim at the corner (the point that you want to store). Although no shot is taken, the angles to the point will be used to compute its location.

Note: After all shots are done, the computed elevation is displayed for the new point. You can either enter a different elevation or tap  to accept the computed elevation.

[**Backsight**]: Opens the [Station Setup](#) screen you can set and check your station occupy point and backsight.

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Surface Scan

[Survey] [Surface Scan]

The [Surface Scan](#) screen takes advantage of a robotic, reflectorless total station to automatically take a sequence of shots of a surface. PC software can then use the data to generate a 3-D raster image of the surface or a DTM surface to compute volume information. Consult the User's Manual for more information on performing a surface scan.

Select Type of Surface Scan: Select the type of surface scan to perform here. The option selected will determine how you will define your perimeter and distance intervals.

Distance Grid:

[**Point 1**], [**Point 2**], [**Point 3**]: Are the point names that will be used when storing the upper-left, upper-right and lower points that define the surface perimeter.

Note: If any points defining your perimeter already exist, the point names can be entered in these fields without re-shooting them.

[**Shoot 1**] , [**Shoot 2**], [**Shoot 3**]: Shoots and stores the corresponding point.

Horizontal Distance Interval: The horizontal distance between each shot taken during the surface scan.

Vertical Distance Interval: The vertical distance between each shot taken during the surface scan.

Angle Grid:

[> **HA/ZA**] / [> **Point**]: Allows you to define the corners of your perimeter by taking a shot to measure the horizontal and zenith angles to each corner (or enter them in by hand), or by selecting existing points from the current job, respectively.

Horizontal Angle Interval: The horizontal angle that will be turned between each shot taken during the surface scan.

Vertical Angle Interval: The vertical angle that will be turned between each shot taken during the surface scan.

HR: The rod height, which should typically be set to zero since all shots taken are reflectorless (no rod).

[**Show Outline**]: This will cause the total station to scan the perimeter of the defined surface. This is useful to visually check the perimeter of your surface when the laser pointer is activated on the total station.

[**Show Unit**]: This will cause the total station to scan a single horizontal/vertical interval. This is useful to visually check your interval settings when the laser pointer is activated on the total station.

[**Next >**]: Opens [Surface Scan Statistics](#) screen.

Surface Scan Statistics

[Survey] [Surface Scan] [Next >]

The [Surface Scan Statistics](#) screen displays details about the surface that was just defined.

Store Pts: This box should be checked to store the points that are shot during the surface scan. Enter the starting point number in the corresponding field.

[Back]: Returns to the [previous screen](#).

[Go >]: Opens the [Surface Scan Results](#) screen

[Surface Scan Index](#)

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Surface Scan Results

[Survey] [Surface Scan] [Next >] [Go >]

The [Surface Scan Results](#) screen contains two cards that detail the progress of the surface scan. The [Map](#) card shows the points that were shot in green, points that have not yet been shot in gray and rejected points in red.

[Stop] (Results card): Will stop the surface scan.

[> X,Y View] / [> X,Z View] (Map card): Changes the orientation of the current view.

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Shoot From Two Ends

[Survey] [Shoot From 2 Ends]

The [Shoot From 2 Ends](#) screen is used to observe a traverse leg from both ends to eliminate the effects of curvature and refraction. The routine requires that a foresight point is shot, but it is not stored until after it is occupied and another shot is taken to the previous occupy point. The coordinates for the foresight point are computed from an average of data gathered at each occupy point.

Note: Because the shoot from two ends procedure eliminates the effects of earth curvature and refraction, the individual observations from each end are not reduced with the curvature and refraction parameter set on the [Surveying Settings](#) card. Instead, curvature and refraction are eliminated by averaging the observations from both ends of the traverse leg.

Foresight: The name given to the next stored point.

Description / Code: Enter the description or the code for the new point.

HR: The length of the rod.

 : Opens the [Smart Target](#) options.

Number of Sets: The desired number of sets required when shooting each foresight. You must select at least one set.

[Traverse]: Prompts you to shoot the Foresight point. After each set is performed, the [Move To Other End](#) dialog box will open and prompt you to set up on the new point and enter a new instrument and rod height. The [Traverse Wizard](#) screen will then open to guide you through the setup on the forward point.

[BS Setup...]: Opens the [Station Setup](#) screen where the current backsight can be modified.

: A shortcut to the [Surveying Settings](#) and [Repetition Settings](#) screens.

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Record Mode

[Survey] [Record Mode]

When running in Record Mode, all control of the total station is performed from the total station's keypad. The data collector will simply log each shot that is taken from the total station.

This routine is typically used for topo work, where the total station remains over a single occupy point during all shots.

Note: Not all total stations support record mode.

Foresight: The point name that will be used when storing the next point. Once a point is stored, it will be incremented to the next available point.

Description / Code: Enter the description or the code for the new point.

HR: The length of the rod.

 : Opens the [Smart Target](#) options.

Start Recording]: Starts recording all shots performed from the total station.

[Stop]: Stops record mode.

[Backsight...]: Opens the [Station Setup](#) screen. where the current backsight can be modified.

: A shortcut to the [Surveying Settings](#) screen.

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Remote Elevation

[Survey] [Remote Elevation]

The [Remote Elevation](#) screen will compute the elevation for the occupy point by shooting a foresight with a known elevation, or it will compute the elevation for a foresight when the occupy elevation is known.

Known Elevation Is...: Where you specify if the Occupy point or the Foresight point has a known elevation.

Elevation: The known elevation for the selected point.

Shoot: Defines if you want to perform a Direct shot only, or Direct & Reverse shots to the foresight.

HR: The length of the rod.



: Opens the [Smart Target](#) options.

Store Pt: When checked, the elevation of the point specified here will be replaced with the computed elevation.

[Take Shot...]: Computes the elevation for the point that had an unknown elevation and optionally writes that elevation to the specified Store Pt.

Results

OCC Elevation: Displays the elevation for the occupy point.

FS Elevation: Displays the elevation for the foresight point.

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Check Point

[Survey] [Check Point]

The [Check Point](#) screen compares the rod location with an existing point in the project. This routine is similar to the [Check Setup](#) routine and is used to verify that the rod and/or the total station is over the correct point. This routine does not store a new point.

Point: The point from the project that will be compared to the observed point (rod location).

Height of Rod: The length of the rod.

[Backsight...]: Opens the [Station Setup](#) screen..

[Take Shot]: Takes a shot and displays the deltas between the observed point and the selected point. High delta values can indicate either the rod and/or total station is over the wrong point. The deltas can also be viewed in the [Results](#) screen and [Map](#) screen.



: A shortcut to the [Surveying Settings](#) screen.

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Solar Observation

[Survey] [Solar Observation]

The [Solar Observation](#) screen is used to compute the azimuth to an arbitrary backsight based on the position of a celestial body; typically the sun.

Input Card **WARNING! Direct viewing of the sun without a proper filter will cause serious eye damage.** Pointing a total station directly toward the sun without a solar filter can also damage the EDM components.

: A shortcut to the [Date/Time Settings](#) screen.

Lat. / Long.: The latitude and longitude of the total station. These values can be scaled from a map, such as a U.S.G.S. 7.5-minute quadrangle sheet or collected with a handheld GNSS unit.

Aim: Selects the portion of the celestial body that where you intend to aim. You can select *Left Edge of Center*, *Center*, or *Right Edge of Center*.

Note: Typically *Left Edge of Center* is selected when performing a sun shot in the northern hemisphere and *Center* is selected for star shots.

[Corrections]: Displays which corrections are currently selected with an *N* for no, or a *Y* for yes. When tapped, the [Corrections](#) screen opens where the following corrections are configured.

- **Non-linear Declination Correction:** Applies a correction for the linear interpolation of the declination of the sun for the time that an observation is taken. This error is usually negligible, but is removed when this is checked. (This should only be checked when performing sun shots.)
- **Correct to State Grid:** When selected, the computed azimuth is referenced from the local State Plane grid rather than true north.
- **Center Meridian / Zone Constant:** These values are used to adjust the computed azimuth to the local State Plane grid. Appendix A lists these values for the United States.

GHA0: The Greenwich Hour Angle of the sun at zero hour Universal Time, Greenwich, on the current date.

Decl0: The declination of the sun at zero hour on the current date.

GHA24: The Greenwich Hour Angle of the sun at zero hour Universal Time, Greenwich, on the following day (24-hours later).

Decl24: The declination of the sun at zero hour on the following day.

Solar Semi-Diameter: The semi-diameter of the sun, expressed in minutes and seconds.

Shots Card

Number of sets: The number of sets that will be taken to the celestial object.

Reverse Shots: When checked, reverse shots will be required with each set. When unchecked, only direct shots are required.

[Shoot]: Opens the Enter Shot Data screen, described below, where the shot data is entered for the selected observation.

[Toss] / [Incl]: Toggle the selected observation so that it will be hidden or un-hidden, respectively. When an observation is hidden, it will not be used when calculating the final azimuth.

Note: The **[Toss]** / **[Incl]** buttons perform the same function / as checking / un-checking the checkbox in front of each observation.

Note: A backsight observation cannot be tossed.

[Del]: Permanently deletes the most current observation if it is selected allowing you to shoot that shot again.

[Reset]: Permanently deletes all observations. A warning prompt will appear before the observations are deleted.

The Enter Shot Data Screen

Horizontal Angle: Displays the horizontal angle measured by the total station. This value is updated with the **[Take Shot]** button, described below.

Current Date / Time: Displays the current date, time, and DUT. These settings can be changed from the [Date/Time Settings](#) screen.

Date: If incorrect, the current date should be entered here.


Time: Where the precise time that the observation occurred is entered.

Hrs to GMT: The number of hours that the time at the current location differs from Greenwich Mean Time.

Take Shot: Records the horizontal angle from the total station.

[Get Local Time]: Fills in the Time field with the current time that is set in the data collector. This function is not available when shooting the backsight.

Sun Shot Procedure Summary

- Point the telescope ahead of the path of the sun and lock the horizontal movement of the total station.
- Immediately record the horizontal angle from the total station using the **[Take Shot]** button.
- When the target becomes properly aligned with the cross-hairs, record the current time as accurately as possible. The time can be automatically read from the data collector using the **[Get Local Time]** button, or measured from an external time piece and manually entered in the appropriate fields.
- When finished, tap the  button to complete the current observation.

When all observations are complete, the [Results](#) page displays the computed azimuth to the backsight.

Results Card

BS D/R: The horizontal angle recorded to the backsight for the particular direct/reverse observation.

Azi D/R: The computed azimuth to the backsight for the particular direct/reverse observation.

Avg: The computed average azimuth of the backsight, relative to true north.

Grid Avg: The computed average azimuth of the backsight, relative to the local State Plane grid.

This field is only displayed when a state grid correction is applied.

Note: See the User Manual for more information on the usage of the Solar Observation routine.

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Remote Control

[Survey] [Remote Control]

Remote control mode is a special mode that makes it easier for users to control fully robotic total stations from a remote data collector.

Note: The remote control functions are available only after a supported robotic total station is selected and enabled in the [Instrument Settings](#) screen.

The [Remote Control](#) screen allows you to turn the total station in any direction using the arrow buttons on the keypad and control the tracking functions.

The arrow keys are typically used to get the total station to aim in the general vicinity of the prism prior to initiating a search. The total station will continue to turn in the direction of the button as long as the button remains pressed.

[^]: Aims the scope upward.

[v]: Aims the scope downward.

[>]: Turns the scope to the right (as you face the total station from the data collector).

[<]: Turns the scope to the left.



: This button is available when GeoLock is enabled and when a supported total station has lost lock on the prism. Tapping it will turn the total station to the area of the prism computed by the GNSS solution, followed by a prism search. (See the User's Manual for more information on using GeoLock.)



: Starts the search routine where the total station searches in a specific pattern until it “sees” the prism and then stops.



: Puts the total station in track mode where it will track the movements of the prism.



: Stops the total station from tracking or searching.



: Opens the [Turn To](#) screen where the total station can be turned to a specified direction or quickly flipped between face one and face two.

EDM Mode: Allows you to select from various EDM modes. The options available depend on the total station being used. Consult the total station's documentation for more information on the EDM modes that it supports.

[**Results**]: Displays the [Results](#) card.

[**Map**]: Displays the [Map](#) card.

[**Aim**]: Displays the [Aim](#) card.

[**Foresight**]: Displays the [Foresight](#) card.

The satellite icon in the Command Bar indicates the status of the satellite connection when using GeoLock. Tapping this icon will display a pop-up list with the following items:

- **Sky Plot:** Opens the [Sky Plot](#) screen.
- **Settings:** Opens the [GeoLock Settings](#) screen.
- **Reset:** Resets the GNSS localization solution.
- **Sats:** An output-only field that will display one of the following messages, which will change along with the color of the satellite icon:

GREEN: On - Ready: GeoLock is active and a localization solution exists.

YELLOW: On - Collecting Data: GeoLock is active but a localization solution does not yet exist.

RED: No GNSS Data or GeoLock requires Backsight set: No NMEA data is available or the backsight has not yet been set.

GRAY: Off: GeoLock is not enabled.

[Remote Index](#)

[Survey Menu Index](#)

Results Card

[Survey] [Remote Control] [Results]

The Results card displays live angle data from the total station and live distance data is displayed depending on the current EDM mode.

[HD/VD] / [ZA/SD]: Toggles the data displayed from the total station between HA, HD and VD, or HA, ZA and SD.

[Remote Index](#)

[Survey Menu Index](#)

Map Card

[Survey] [Remote Control] [Map]

The Map card displays a live map showing the total station position relative to the current foresight and backsight.

[Remote Index](#)

[Survey Menu Index](#)

Aim Card

[Survey] [Remote Control] [Aim]

The Aim card is used to precisely aim the instrument. Tapping the arrow buttons will turn the instrument in that direction. You can select the rate of instrument turning speed:

- **Progressive:** In this mode, the instrument will start turning slow when you first tap the on screen arrow button, but will then turn faster and faster the longer you hold the button down.
- **Fast:** In this mode, the instrument will always turn at fast speed when you tap the on screen arrows.
- **Slow:** In this mode, the instrument will always turn at slow speed when you tap the on screen arrows.

You can also turn the instrument with the keyboard arrow keys. When using the keyboard arrow keys, the instrument will turn in progressive mode by default. Hold down the Shift key to enable fast turning. Hold down the Control key to enable slow turning.

Foresight Card

[Survey] [Remote Control] [Foresight]

The Foresight card is available only if the backsight is solved. It displays live coordinates for the current foresight.

Turn To

[Survey] [Remote Control] [Turn To]

The Turn To screen is used to turn a robotic total station to a specified horizontal and zenith angle, or to a specified point.

Horizontal Angle: The horizontal angle that the total station will turn to.

Zenith Angle: The zenith angle that the total station will turn to.

[Turn to Angles]: Turns the total station to the specified horizontal and zenith angles.

Existing Point: The point from the current job that the total station will turn to.

[Turn to Point]: Turns the total station to the specified point.

[Turn to Backsight]: Turns the total station to the backsight point.

[Flip]: Quickly rotates the total station from face one to face two, or vice versa.

Sky Plot

[Survey] [Remote Control] [] [Sky Plot]

The Sky Plot screen displays the relative location of the visible satellites in the sky, as well as if they are being used to calculate a position.

Satellites with a usable signal are shown with **red** flashing indicators.

The Elevation Mask is the minimum angle above the horizon where locked satellites are used for a solution. This area is indicated on the screen by the inner circle.

GeoLock Settings

[Survey] [Remote Control] [] [Settings]
or [Job] [Settings] [Instrument] [GeoLock]

The GeoLock Settings screen is used to enable/disable GeoLock and to configure GeoLock settings, including the connection to the built in GNSS receiver.

GeoLock is a feature you can use to improve robotic total station tracking and loss of lock recovery. GeoLock uses a GNSS position from either the data collector's built in GNSS or from your RTK GNSS receiver if you are running in integrated survey mode. The GNSS position is checked against the latest robotic target position to warn you when you might be tracking something other than your intended target. When you are sure you have lost lock on the robotic target, you can actuate GeoLock to turn the instrument to the approximate location of the data collector and automatically initiate a search for the target.

Enable GeoLock: When checked, enables the GeoLock feature.

Use 3D GeoLock...: When checked, the GNSS elevation will also be used to compute your location and adjust the vertical angle of the total station accordingly. GNSS is generally less precise vertically than horizontally so unless you are using an RTK grade receiver in an integrated survey case, or unless you are working in very steep terrain, this item should remain unchecked.

Beep when target locked is questionable: When checked, Survey Pro will continuously monitor the position measured by GNSS compared to the position measured with the total station to the prism. When the positions differ by more than the **Distance Threshold**, Survey Pro will sound an audible tone based on the warning sound you have selected in the **Beep** field.

Select Receiver Profile: Select the receiver you wish to use with GeoLock. You can create a new receiver profile by tapping **Add Receiver Profile**. If your data collector has an internal GNSS built in you can select and configure this receiver connection here.

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[Survey Menu Index](#)

Angles Only Measure

[Survey] [Angles Only Measure]

The Angles Only Measure screen is used to collect horizontal and vertical angle measurements to points. The coordinates of these points can be solved later from the raw observations using office software.

Foresight: The name of the point you are observing.

Description / Code: Enter the description or the code for the new point.

Direct Only or **Observe Dir & Rev:** allows you to specify if you wish to take only direct readings or direct and reverse readings to each point.


Number of Sets: set the desired number of sets if you are taking direct and reverse observations to the point.

[**Shoot Backsight**]: Used to shoot the backsight. You will be required to shoot the number of sets to the backsight entered in the Number of Sets field.

[**Backsight...**]: Opens the [Station Setup](#) screen where the current station and backsight setup can be modified.

[**Backsight Sets ...**]: Opens the [Backsight Sets](#) screen where you can add more direct and reverse observations to the backsight to be used with the foresight sets.

[**Observe Angles**]: Triggers the instrument to start an observation sequence (direct or direct and reverse) to the specified foresight point.

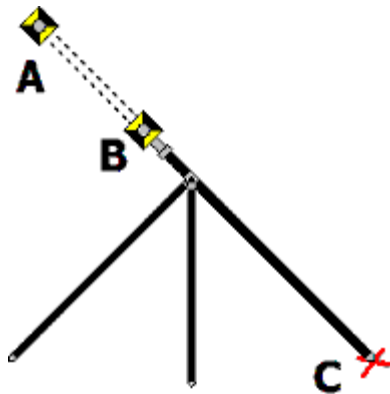
: A shortcut to the [Surveying](#) and [Repetition Settings](#) screens.

[Survey Menu Index](#)

Dual-Prism Offset

[Survey] [Dual-Prism Offset]

The [Dual-Prism Offset](#) screen allows you to compute and store the location of a new point that can be occupied with the tip of the prism pole, but where the prism pole cannot be plumbed over the point and still remain visible to the total station.



To perform a dual prism offset observation, place the tip of the prism pole on the point to store, C in the diagram above, and make sure it remains steady at this location for both observations. Make an observation to a prism on the pole at positions A and B. You can either use the same prism for both observations by changing the length of the telescopic prism pole, or you can have two different prisms mounted on the same pole. You can shoot prism A and prism B in any order, and the point will be stored after the second observation is made. The offset point will be calculated using the HR of the first observation (A or B).

Note: The HR is not required for the observation to the second prism location. The point is calculated using the direction vector between A and B, offset by the height of rod recorded for the first observation. If you are using the same type of prism for the observation to A and B, then you do not need to modify target settings in between observations. If you are using different prisms at location A and B, make sure you change the prism type between observations.

Foresight: The point name that will be used when storing the new point.

Description / Code: Enter the description or the code for the new point.

HR: Enter the correct prism type and height of rod for the observation to the first location. The height of rod is not required for the second observation, therefore, there is no need to change rod details unless your second observation is to a different prism type.

[**Backsight...**]: Opens the [Station Setup](#) screen..

[**Shoot Prism B**]: Take a shot to the prism or prism position that is closest to the point you wish to store.

[**Shoot Prism A**]: Take a shot to the prism or prism position that is farthest from the point you wish to store.

: Opens the [Surveying Settings](#) screen.

[Survey Menu Index](#)

Prism-Wall Offset

[Survey] [Prism-Wall Offset]

The [Prism-Wall Offset](#) screen allows you to place the prism adjacent to a wall or other vertical surface, observe the prism, and automatically calculate the location offset to the base of the wall, or at the intersection of two walls.

To perform a prism-wall offset, touch the side of the prism to the wall, or touch the side and back of the prism to the wall intersection. You can then specify how the prism is contacting the wall, observe the prism, and Survey Pro will calculate the position at the base of the wall, or the intersection of two walls, adjacent to where the prism is contacting the surface.

Foresight: The point name that will be used when storing the new point.

Description / Code: Enter the description or the code for the new point.







HR: The height of the rod.

 : Opens the [Smart Target](#) options.

Left / Right Direction: Explains the perspective for the offset direction of how the prism is contacting the wall. If you are using robotic instrument, the perspective is from rod to instrument. If you are using a mechanical total station, the perspective is from instrument to rod.

Prism Thickness: Enter the thickness of the prism. If you have selected a known prism type, then this value is filled in for you and you do not need to set it. If you are using a generic prism, enter the distance between the center of the prism and the outside of the prism bracket.

Offset Contact Point: Specify how the prism is contacting the wall with respect to the left / right perspective of your setup.

-  : Left side of the prism is contacting the wall.
-  : Left side and back of prism is contacting the two wall intersection.
-  : Prism is on the wall from the rod's point of view
-  : Prism is on the wall from the station's point of view
-  : Right side and back of the prism is contacting the two wall intersection.
-  : Right side of the prism is contacting the wall.

Elevation Offset: Enter an optional elevation offset to add to the rod height. This allows you to store the offset point at an elevation other than the tip of the rod.

[Topo SS]: Take an observation to the prism, and store the point at the prism location without any offsets applied. You can use this button when you want to perform a normal observation without leaving this screen.

[Backsight...]: Opens the [Station Setup](#) screen..

[Shoot Offset]: Take an observation to the prism, and calculate the location at the base of the wall or at the base of the intersection of two walls.

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Quick Shot routine

Opens when you start the software, or when you press the STAR key from anywhere in the application.

This includes the following:

- [No Job mode](#)
 - [Job mode](#)
 - [Quick Shot Settings](#)
 - [Shell to external mode](#)
-

No Job mode

On starting Survey Pro On board, the [No Job Mode](#) screen appears. You can:

- Take measurements, but not store points.
- Change instrument settings.
- Allow for the setting of circle.

HA: Horizontal angle.

ZA: Vertical angle.

SD (or HD/VD): Bold for current shot for 3 seconds to show the shot is new; then normal to show the data is old.

Note: SD (or HD/VD) from a shot initiated by the MSR2 key is prefaced with “*”.

The icons on the screen are used as follows:

Circle: Select one of the following:

- **Circle 0:** The horizontal angle is set to 0. You are prompted to accept.
- **Circle Az:** You are prompted for the new horizontal angle reading. The instrument is set to this reading.

Turn to: Appears if the instrument supports motorized turning. There are two options:

- **Turn To:** Launch the [Turn To](#) screen.
- **Flip:** Change the face of the instrument.

Search: Appears if the instrument supports auto lock. There are three options:

- **Search:** Find a prism and lock onto it.
- **LockNGo:** Lock onto a prism and follow it.
- **Stop:** Stop tracking prism.

Open/New: Opens the [Open/New Job](#) screen.

Laser Pointer/Tracklight: Toggle between using the laser pointer or tracklight.

Lock: Toggle the prism lock state.

Close: Tap to exit the application.

Job mode

Once you have opened a job, you can:

- Perform station setup.
- Go to stakeout mode.
- Store sideshot or traverse shots or angle offset shots.

HA: Horizontal angle.

ZA: Vertical angle.

SD (or HD/VD): Current shot is bold until it is stored as a point. Non-bold values cannot be stored and the user is prompted to take a new shot.

Note: SD (or HD/VD) from a shot initiated by the MSR2 key is prefaced with “*”.

The icons on the screen are used as follows:

Station setup: There are three options:

- **Stakeout:** Launches the [Quick Stake](#) dialog.
- **Station Setup:** Launches the [Station Setup](#) wizard.
- **Check Station:** Launches the [Check Setup](#) dialog.

Turn to: Appears if the instrument supports motorized turning. There are two options:

- **Turn To:** Launch the [Turn To](#) dialog.
- **Flip:** Change the face of the instrument.

Search: Appears if the instrument supports auto lock. There are three options:

- **Search:** Find a prism and lock onto it.
- **LockNGo:** Lock onto a prism and follow it.
- **Stop:** Stop tracking prism.

Store Sideshot: There are two options:

- **Sideshot:** Store the currently displayed data as a sideshot, and invalidate the distance.
- **Traverse:** Store the currently displayed data as a traverse shot, and invalidate the distance.

Laser Pointer/Tracklight: Toggle between using the laser pointer or tracklight.

Lock: Toggle the prism lock state.

Close button: Tap to go to the Survey Pro main menu.

Note: Taking a shot can be a two-step process, depending on the setting for the MSR key. First, initiate a measurement with the MSR key. Once the shot has returned data, it appears on the dialog. You can then store the displayed values as a sideshot or a traverse shot.

Quick Shot dialog settings

To open the dialog, tap the settings icon in the title bar.

Display: Options are HA,ZA,SD or HA,HD,VD. Controls the values that appear in the Quick Shot screen.

MSR Key: There are two options:

- **Measure Only:** When the MSR key is pressed, a measurement is initiated but no shot is stored.
 - **Measure and Store:** When the MSR key is pressed, a measurement is initiated and a sideshot is stored if a JOB is open.
-
-

Note: The MSR2 key always operates in **Measure and Store** mode.

Shell to External Mode

Tap the Data Collector icon to open the Data Collection mode screen. This enables you to use an external data collector.

[Exit and Go Robotic...]: Tap to change the radio channel and ID before the software is set to the internal radio and exits the software.

[Exit and Go RS232 / USB]: Exits the application.

Quick Stake Routines

Quick Stake enables you to quickly and simply stake out and store a point and will work for both motorized instruments with AutoLock capability and optical mechanical total stations:

- [Quick Stake States](#)
 - [Operating Quick Stake](#)
 - [Stakeout settings](#)
-
-

Note: For a description of common controls, see [Quick Shot](#).

Quick Stake States

Blank: When no valid design point has been entered when it first started.

ANGLE TO TURN TO, DISTANCE: Once a valid point has been entered and an angle reading is received from the instrument, Angle to Turn To appears with an arrow icon and the angle itself is in the current angle unit. When the instrument is turned to the left by hand, the instrument operator sees the angle count down to 0 and past 0 and the angle increases while the left arrow icon changes to a right arrow icon .

Note: If the instrument has servo motors, tap the turn icon so that the instrument can turn to 0 by itself.

COME/GO, LEFT/RIGHT, CUT/FILL: Tap the MSR button to shoot the target. If a slope distance is available, it goes into the third state and shows stakeout information of Come/Go, Left/Right, and Cut/Fill.

The icons on the screen are used as follows:

Survey: There are two options:

- **Survey:** Return to [Quick Shot](#) quickly.
- **Check Station:** Launches the [Check Setup](#) dialog.

Turn to: Appears if the instrument supports motorized turning. There are two options:

- **Turn To Line:** Turn the instrument to turn point 2D.
- **Turn to:** Starts the [Turn To](#) dialog.

Search: Appears if the instrument supports AutoLock. There are three options:

- **Search:** Find a prism and lock onto it.
- **LockNGo:** Lock onto a prism and follow it.
- **Stop:** Stop tracking prism.

Store: There are two options:

- **Store:** Store the staked point with a description.
- **Store Sideshot:** Store the point just shot as a sideshot point with sideshot raw data records, but not as a staked point.

Note: The Design point name will be incremented by 1, to allow convenient staking of the next point.

The following icons may appear in the horizontal angle count down:

(Green arrow, left) GO LEFT within Point Tolerance you specified in Stakeout Settings.

(Green arrow, right) GO RIGHT within Point Tolerance you specified in Stakeout Settings.

(Yellow arrow, left) GO LEFT, larger than Point Tolerance; less than 0.3 meters (1 foot) in horizontal distance.

(Yellow arrow, right) GO RIGHT, larger than Point Tolerance; less than 0.3 meters (or 1 foot) in horizontal distance.

(Red arrow, left) GO LEFT, larger than 0.3 meters (or 1 foot) in horizontal distance.

(Red arrow, right) GO RIGHT, larger than 0.3 meters (or 1 foot) in horizontal distance.

(Green arrow, down) COME, within Point Tolerance you specified in Stakeout Settings.

(Green arrow, up) GO, within Point Tolerance you specified in Stakeout Settings.

(Yellow arrow, down) COME, larger than Point Tolerance; less than 0.3 meters (1 foot) in horizontal distance.

(Yellow arrow, up) GO, larger than Point Tolerance; less than 0.3 meters (or 1 foot) in horizontal distance.

(Red arrow, down) COME, larger than 0.3 meters (or 1 foot) in horizontal distance.

(Red arrow, up) GO, larger than 0.3 meters (or 1 foot) in horizontal distance.

(Brown triangle, plus sign) FILL, that is, the point shot is below the Design point.

(Blue triangle, minus sign) CUT, that is, the point shot is above the Design point.

The following icons may appear in the vertical angle count down:

(Green arrow, down) DOWN, within Point Tolerance you specified in Stakeout Settings.

(Green arrow, up) UP, within Point Tolerance you specified in Stakeout Settings.

(Yellow arrow, down) DOWN, larger than Point Tolerance; less than 0.3 meters (1 foot) in vertical distance.

(Yellow arrow, up) UP, larger than Point Tolerance; less than 0.3 meters (or 1 foot) in vertical distance.

(Red arrow, down) DOWN, larger than 0.3 meters (or 1 foot) in vertical distance.

(Red arrow, up) UP, larger than 0.3 meters (or 1 foot) in vertical distance.

Operating Quick Stake

Prerequisites: Open a job. Make sure that backsight and occupying have been solved.

1. **Pick a design point:** Enter the point, tap the map button to pick it from a map, or select the map from the drop-down list.
 2. **Turn to the design point:** Turn the instrument to the angle as its reading counts down to zero degree. If the instrument has servo motors built-in, tap the Turn To Line icon.
 3. **Tap the MSR key to measure to the rod:** Quick Stake goes into COME/GO, LEFT/RIGHT mode and shows a CUT/FILL.
 4. **Store the staked point:** Tap Enter or the stake icon. You are prompted to store the point as a new point. A description defaults, based on one of the following selections:
 - Design point's description.
 - PT and the design point name.
 5. **Stake Next, exit:** When you have stored the point, a new design point is already entered into the Design Point field and ready to be staked. The dialog has already been changed from "COME/GO, LEFT/RIGHT, CUT/FILL" to "ANGLE TO TURN TO, DISTANCE".
-

Live update fields

This option enables you to update fields automatically with live data from the instrument. A **[Start / Stop]** button allows you to toggle the field between live mode and data entry mode. When a field is in live mode, it is updated constantly and cannot be edited.

Only one field can be live at a time.

Hotkeying to a new dialog and starting a live field, will stop any live fields on the previous dialog.

Angle/Direction fields: Populated with angle and direction information.

Distance fields: Populated when new shot data comes in (either from a continuous measurement, or a single measurement initiated by the user). The fields are populated with the HD or VD converted from the returned SD (adjusted for earth curve, PPM, and prism constant). HI and HR are **not** taken into account.

Location/Elevation fields: Only show Start/Stop once a Backsight setup is completed. After a Backsight setup is completed, the fields populate when shot data comes in (either from a continuous measurement, or a single measurement initiated by the user). These fields do take HI and HR into account.

MSR/MSR2 Key Support

The following table lists the routines that support MSR/MSR2 keys to take shots:

- The MSR key takes a shot with the currently selected Smart Target.
- The MSR2 key takes a reflectorless shot with a 0.0 prism constant and a 0.0 height of rod. It also stores the shot as a Sideshot (if able) when used in the [Traverse/Sideshot](#) and [Quick Shot](#) routines.

Note: For Spectra Precision Focus 30 Stakeout functions, if you want to use the MSR key to update shot data, you must set **Use Manual Updating (Remote Control)** option for MSR key support in the [Stakeout Settings](#).

Routine	MSR Supported	MSR2 Supported
Live Fields	Yes	Yes
Quick Shot	Yes	Yes
Quick Stake	Yes	No
Repetition Shots (Shot Prompt)	Yes	No
Remote Shot	Yes	No
Survey\Traverse/Sideshot	Yes	Yes
Stakeout\Stake Points	Yes	No
Stakeout\Stake List of Points	Yes	No
Stakeout\Stake To Line	Yes	No
Stakeout\Offset Staking	Yes	No
Stakeout\Slope Staking	Yes	No
Stakeout\Point Slope Staking	Yes	No
Stakeout\Line and Offset	Yes	No
Stakeout\Curve and Offset	Yes	No
Stakeout\Spiral and Offset	Yes	No
Stakeout\Show Station	Yes	No
Stakeout\Stake DTM	Yes	No
Stakeout\Station Staking	Yes	No
Roads\Road Stakeout	Yes	No
Roads\Slope Staking	Yes	No
Roads\Show Station	Yes	No

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GNSS Status

[[Survey](#)] [[GNSS Status](#)]

The [GNSS Status](#) screen contains several index card-format screens providing real time status of the active receiver.

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Receiver

The [Receiver](#) card displays information about the receiver mode and GNSS solution quality.

Mode: Displays if the receiver is set to Off, Base, Rover, or Post Processing mode.

Memory: Displays the amount of memory remaining in the receiver's internal storage card.

Battery: Displays the remaining battery charge in the receiver.

Satellites: Displays the number of satellites:

- **Used:** Number of satellites used by the receiver for the current GPS solution.
- **Tracked:** Number of satellites tracked by the receiver.

[[Reset Ambiguities](#)]: Used to reinitialize the receiver's RTK engine.

Solution: Displays the type and quality of solution. It will be one of the following values:

- **No Communication:** Not receiving a response to commands.
 - **No Data:** Receiving an unknown or a bad response to commands.
 - **No RTK Solution:** Receiving a response, but the receiver is not computing a solution.
 - **Autonomous:** Receiving a stand-alone solution (accuracy is about 100 meters).
 - **Code:** The receiver is calculating a code differential solution (precision is about 1 to 10 meters).
 - **Float:** The receiver is calculating a carrier phase differential solution with float ambiguities (precision is typically within 0.1 m to 0.5 m).
 - **Network Float:** The receiver is calculating a carrier phase differential solution using NTRIP network corrections with float ambiguities (precision is typically within 0.1 m to 0.5 m).
 - **Fixed:** The receiver is calculating a carrier phase differential solution with fixed ambiguities (precision is typically within 15 mm).
 - **Network Fixed:** The receiver is calculating a carrier phase differential solution using NTRIP network corrections with fixed ambiguities (precision is typically within 15 mm).
-

Note: If the solution type is preceded by a "~", this means there is no survey setup. Survey Pro is getting the GNSS position from the receiver with the precision and solution type indicated. However, because there is no survey setup, the base reference position is not known, so Survey Pro is not able to calculate RTK vectors for this measurement. Points

stored when there is no survey setup will be stored as GNSS coordinate observations (latitude, longitude, height). If you wish to store GNSS measurements as RTK vectors from a known base, you must go to the [Start Survey](#) wizard.

Vector Length: Displays the length of the vector from base to rover when the solution type is RTK fixed or float. If the solution is not a network RTK solution, then the PPM value of the vector length is also displayed.

H Precision: Displays the root mean squared (RMS) error of the horizontal solution reported by the receiver. It is displayed in project units.

V Precision: Displays the RMS error of the vertical solution reported by the receiver. It is displayed in project units.

Note: This value is supplied by the receiver, and the software displays the receiver's value without modification. Most manufacturers report this value at the 2 or 3 sigma level. However, since different manufacturers use different statistical methodology, it is not necessarily valid to compare the RMS values between brands, or even between models with different firmware.

HDOP: Displays the Horizontal Dilution of Precision. It is a measure of the geometrical quality of the solution. DOP has no units and lower numbers indicate better solution geometry.

VDOP: Displays the Vertical Dilution of Precision. It is a measure of the geometrical quality of the solution.

PDOP: Displays the Position Dilution of Precision. It is a combination of HDOP, VDOP and Time Dilution of Precision. It will always be larger than HDOP and VDOP.

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Data Link

The [Data Link](#) card displays information about the base to rover communications when the modem is a radio.

Receiver mode: See the [Receiver](#) card.

Modem Reception: Displays two values indicating the data modem signal quality. This information is only displayed if the receiver is in rover mode.

Signal Latency: Displays the age of the differential correction used in the current GNSS solution. This value should be one second or less for good RTK solutions. If this value is consistently greater than one second, check the data modem link.

Reception: Displays the receiver's estimation of the percent quality of the radio link.

Modem Settings: Displays the current modem settings

Channel: The radio modem channel.

Sensitivity: Displays the modem sensitivity (squellch).

Configure Modem...: Opens the [Radio Settings](#) screen where you can change the radio channel and sensitivity settings.

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Cell/IP Modem

The [Cell/IP Modem](#) card displays information about the base to rover communications when the modem is a cell phone or Internet modem.

Receiver mode: See the [Receiver](#) card.

Modem Reception: Displays two values indicating the data modem signal quality. This information is only displayed if the receiver is in rover mode.

Signal Latency: Displays the age of the differential correction used in the current GNSS solution. This value should be one second or less for good RTK solutions. If this value is consistently greater than one second, check the data modem link.

Reception: Displays the receiver's estimation of the percent quality of the radio link.

[Dial]: Dials the cell phone or IP modem using the configuration set in the [Cell Phone Settings](#) or [IP Modem Settings](#) screen, respectively.

[Hang up]: Disconnects the cell phone or IP modem connection.

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Post Process

The [Post Process](#) card displays information about GNSS raw data logging for post processing.

Note: Some GNSS receivers monitor post processing session status while others simply record event markers in the log file. If your receiver does not monitor sessions, some fields are not displayed.

Recording: displays the state and information about the recording.

Interval: displays the current recording interval in seconds

On Point: displays the name of the point when the receiver is in an occupying session. This field is empty during kinematic surveys when the receiver is roving.

Elapsed: displays the time the receiver has been occupying the point in the current session. This field is empty during kinematic surveys when the receiver is roving.

Battery: displays the battery status of the receiver.

Free Memory: displays the free memory remaining on the device that is recording the data. This will usually be the receiver free memory, unless you are recording post processing data to the hand held, in which case it will be the hand held free memory.

Est. Recording Time: displays the estimated recording time remaining given the amount of free memory on the device (for receivers that support this feature).

Sky View

The [Sky View](#) card displays a plot of the satellites tracked and the elevation mask boundary. Satellites that are currently used in the solution will appear as a colored ellipse, while satellites that are tracked but not used in the solution will appear as a grey ellipse. Satellites from different constellations are identified both by their ellipse color, and by the constellation designation:

- **Gxx**: GPS satellite.
- **Rxx**: GLONASS satellite.
- **Cxx**: BeiDou satellite.
- **Exx**: Galileo satellite.
- **Jxx**: QZSS satellite.
- **Sxx**: SBAS satellite.

When different satellites are in close proximity in the sky, their icons can overlap on the sky plot, making it difficult to determine the number or system of satellites not on top of the picture. You can tap on a cluster of satellite icons on the plot to change which satellite icon is on top.

Used: Number of satellites used by the receiver for the current GPS solution.

Tracked: Number of satellites tracked by the receiver.

Elev Mask: Displays the elevation mask currently set on the [Receiver Survey Settings](#) screen. For receivers that support changing the elevation mask outside of receiver setup, you can enter a new value here and tap [**Reset Mask**].


Reset Mask: Changes the current elevation mask to the value entered in the **Elev Mask** field.

Note: If the receiver setup has not yet been performed, the elevation mask will not be displayed. Also, if you have changed the elevation mask setting, and have not yet reconfigured this receiver, the value you see on this display will be the value from the settings, and not the value the receiver is currently using.

Sat Info

The [Sat Info](#) card displays signal quality information for the satellites used by the receiver, and allows you to disable tracking specific satellites, or of entire satellite systems, which is useful if the receiver is tracking a ‘noisy’ satellite, or if you want to exclude an entire satellite system from your solution.



Satellites : select the satellite systems you would like to display in the plot, you can choose

- **Show Tracked:** this option will display only tracked satellites in the SNR plot.
- **Show All:** this option will display all satellites, tracked and not tracked, in the SNR plot.
- **Show "system":** this option will display only the satellites from the chosen system (GPS, GLONASS, BeiDou ...). You will only see systems that your receiver firmware supports.

SNR Plot: The SNR (signal to noise ration) plot shows the SNR as a color coded bar.

- **Green:** bar is good SNR.
- **Yellow:** bar is marginal SNR.
- **Red:** bar is poor SNR

Below or next to each satellite and SNR bar is a circle. A solid circle indicates that the satellite is used in the current position solution, an empty circle indicates that the satellite is not used in the current position solution.

You can tap and hold on any satellite in the SNR plot to bring up a context menu. Your choices will be:

- **Disable G10:** select this option to disable tracking of the specific satellite (in this example, disable GPS satellite 10).
- **Enable R15:** select this option to enable tracking of the specific satellite (in this example, enable GLONASS satellite 15).
- **Enable All:** select this option to enable all satellites in all systems currently tracked.

Tracking: Opens up a prompt where you can enable or disable tracking of entire satellite systems. You will only see the option to enable/disable satellite systems that your receiver firmware supports.

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Position

The Position card displays your current position as well as your course and speed information if you are moving. The Position card will display one of three coordinates: WGS84 latitude, longitude, height; Local latitude, longitude, height; or Grid north, east, elevation.

Solution: See the [Receiver](#) card.

Latitude/Longitude/Height: or North/ East/ Elevation: displays the location of the receiver.

Heading: Displays your course over ground if you are moving. If your coordinate display is geodetic, this heading is with respect to geodetic north. If your coordinate display is grid, then this heading is with respect to grid north.

Speed: Displays your horizontal speed over ground if you are moving.

WGS84: Set the position display to show WGS84 latitude, longitude, and height. This option is always available.

Local LLh: Set the position display to show Local latitude, longitude, and height. This option is only available when you have a coordinate system selected and solved.

Note: Local LLh numbers make sense when in mapping plane mode. When using Ground – Default Ground Calibration mode, you should not use Local LLh display.

Grid: Set the position display to show Grid north, east, and elevation. This option is only available when you have a coordinate system selected and solved.

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Starting a Survey

[Survey] [Start Survey]

The [Start Survey](#) wizard is used to start any RTK survey. The [Start Survey](#) wizard will guide you through all of the steps required to setup your RTK equipment and solve the coordinate system required to transform GNSS measurements into your local grid points. You can start a survey with a RTK base and rover, you can start a survey at the RTK rover if your base is already set or if you are using NTRIP, or you can simply setup a RTK base to broadcast corrections and then setup the RTK rover later.


When you tap **Start Survey** you will first be prompted to select a receiver profile with the [Connect to Receiver](#) screen. The type of receiver profile you choose will determine the steps required to start the survey:

 **Base Receiver:** Select this type of profile to setup a RTK base receiver to broadcast corrections with a radio modem data link.

 **Network Base Receiver:** Select this type of profile to setup a RTK base receiver to broadcast corrections with an Internet protocol (IP) modem.

When you select a base or network base receiver profile, the [Start Survey](#) wizard will begin on the [Set Base Receiver](#) screen.

 **Rover Receiver:** Select this type of profile to setup a RTK rover to receive corrections from a RTK base using a radio modem data link.

 **Network Rover Receiver:** RTK rover to receive corrections using an Internet modem.

When you select a rover or network rover receiver profile, the [Start Survey](#) wizard will begin on the [Set Remote Rover Receiver](#) screen.

Along with setting up the GNSS equipment, the [Start Survey](#) wizard will guide you through the steps required to setup and solve a coordinate system to transform GNSS measurements to your local grid coordinates. If you have already selected a map projection and datum for your job, the [Start Survey](#) wizard will proceed directly to equipment setup. If you have not yet selected a coordinate system, or if there is no projection and no datum for your local grid coordinates, then you will be prompted to select your projection mode with the [Projection Prompt](#) before you proceed to equipment setup.

Note: You can collect data and stakeout points using your GNSS receiver without starting a survey. If you go to any GNSS data collection or stakeout function, and a survey is not setup, you will be prompted if you want to start a survey, or use the autonomous rover for data collection/stakeout. If you choose to start a survey at this prompt, you will begin here at the [Start Survey](#) wizard. If you choose to use the autonomous rover, you can collect data points or stakeout design locations with the GNSS receiver. All points you store when using the autonomous rover are stored as GNSS coordinate observations (latitude, longitude, height). You must use the [Start Survey](#) wizard if you wish to store GNSS measurements as vectors from a known base reference position.

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Connect to Receiver

The [Connect to Receiver](#) screen is used to select a receiver profile to connect to. The display of the receivers list is identical to the [Receiver Settings](#) screen. Below the list of receivers, the modem for the currently selected profile is displayed. The additional user interface on this screen depends on the modem type for the selected profile.

For Radio Modems

Modem: Displays the current modem type for the selected receiver profile.

Channel: Displays the last known radio channel used with this modem.

[Configure Modem]: Opens up the [Radio Settings](#) screen.

For Internet Modems

Network: Is where you select the network to use.

Connect to ...: Enable this check box to connect to the last used NTRIP mount point for this network. Disable this check box to get the NTRIP table from the network for each survey setup to select the mount point from the table.

[Manage Networks ...]: Opens up the [Network Settings](#) screen.

For RTX over IP

RTX Region: Is where you select the regional service you would like to use. Select Worldwide for any RTX location around the world. Select a specific region to get faster convergence times and better precision in that region.

[Connect>]: Connects to the selected receiver. If the selected receiver is of a base profile, you will advance to the [Set Base Receiver](#) screen. If the selected receiver is of a rover profile, you will advance to the [Set Remote Rover Receiver](#) screen.

Note: If your rover receiver is setup to use Backup RTK, then you will see the main rover modem settings on this page. You will be prompted to select an NTRIP network for your alternate correction source after you tap **[Connect>]**

Note: If your active receiver profile is currently set to 'Demo Mode', you will see only the demonstration receiver profiles in the [Connect to Receiver](#) prompt. Select a demonstration profile to launch the start survey wizard with the work flow appropriate for that type of receiver profile. You can switch in and out of 'Demo Mode' by selecting a live receiver profile on the [Receiver Profile Settings](#) card, or by picking a live receiver from the instrument selector on the main menu.

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[GNSS Survey Menu Index](#)

Projection Prompt

The [Projection Prompt](#) screen is used to select the projection mode to use for this survey.

[Use Ground Calibration>]: Tap to launch the Start Survey wizard in default ground calibration mode. The Start Survey workflow (set base / rover, collect control, and solve calibration) will define the projection. In this mode, the next step will be to select to use a geoid model with the [Select Geoid](#) screen.

[Select a Mapping Plane>]: Tap to launch the [Select Coordinate System](#) screen. You must select a mapping plane zone

to continue. Once you have selected a coordinate system, the [Start Survey](#) wizard advances to the next screen.

Don't Ask Me Again: Check to start the survey with the method selected above, and subsequent instances of the start survey workflow will skip this prompt and start with the chosen method.

Note: If you have previously checked the Don't Ask Me Again check box, this screen is skipped. To reset all optional messages, tap **[Reset Optional Messages]** on the [General Settings](#) screen.

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[GNSS Survey Menu Index](#)

Select Geoid

[Start Survey Survey] | Projection Prompt, or

[Survey] [Projection] [Select Geoid...]

The [Select Geoid](#) screen is used to choose a geoid model to use with the default ground calibration coordinate system.

[Use a geoid model]: Is where you select if you want to use a geoid. Leave this box unchecked if you want to use ellipsoid heights for the vertical coordinate.

[Geoid Model]: Select the geoid model from the list of available geoids.

[File Name]: Shows the geoid file descriptive name.

[File]: Shows the name of the file on the disk that matches the selected geoid record. If there are multiple files that match the selected geoid, then you may choose a default file to use. If there are no files to match the selected geoid, then you will not be able to use this geoid model.

Note: If you have multiple sub grids for a geoid model, Survey Pro will use the file you have selected here as the default file. Survey Pro will automatically switch to a different sub grid file for the selected geoid if you attempt to transform a coordinate that is out of bounds of the selected file.

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Set Base Receiver

The [Set Base Receiver](#) screen is used to enter the base receiver antenna and setup the base receiver hardware.

Base Receiver: Displays information about the status of the GNSS receiver.

Base Antenna: Displays information about the base antenna.

Antenna Type: Select the antenna type to use.

[Setup]: Tap to change the antenna for the base receiver. See [Receiver Antenna](#).

Measured: Enter the distance from the ground to the *Measured To* location.

To: Specify the location on the antenna or receiver where the antenna height should be measured to.

Post Processing Recording Interval: Sets the period for logging GNSS raw data for RTK + post processing. Set it to *Off* to disable post processing data collection.

[Next >]: Tap to open the [Select Base Point](#) screen.

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Receiver Antenna

The [Receiver Antenna](#) screen is used to select the type of antenna used with the receiver, and to enter optional parameters for the antenna setup. This screen may be opened for the Base Receiver Antenna, Rover Receiver Antenna, Remote Base Receiver Antenna, or the Post Processing Antenna screen. When opened for the RTK base or rover antenna, you can also use this screen to set Max+ integrated survey antenna / target height synchronization.

Brand: Displays the current receiver brand when setting the base, rover, or post processing receiver antenna. Select the antenna brand when setting the antenna used by the base receiver when setting up a remote base at the rover.

Type: Select the antenna type to use.

Measure To: Specify the location on the antenna or receiver where the antenna height should be measured to.

Measured: Enter the distance from the ground to the *Measured To* location.

Radius: Shows the radius of the antenna from the measure to mark if the measure to mark is not for a true vertical height.

Offset: Shows the offset from the measure to mark to the L1 phase center of the antenna. The L1 phase center is the location that RTK fixed positions are measured to.

Serial#: Enter the serial number for the antenna. This information is optional, and is written to the raw data.

Notch: Enter the notch identifier where the antenna was measured. This information is optional; typically only precise geodetic antennas with large ground plane will have different notches for measuring antenna height.

Note: If you are measuring the antenna to the bottom of the mount, you have an additional option to synchronize this antenna with an optical target.

Sync With: Check this if you are doing Max+ integrated surveying. With antenna synchronization enabled, when you change the GNSS antenna height it will automatically update the optical target height of the synchronized target. Similarly, when you change the optical target height, it will automatically update the GNSS antenna height.



: Select the optical target to synchronize with the GNSS antenna heights.



: Opens the [Smart Target](#) editor where you can configure the optical target.

Note: There is a special optical target called "Telescopic Rod". Use this target type if you have your GNSS antenna on

top of a Spectra graduated pole and you wish to enter the pole graduation reading as the antenna height. This will add the extra offset between the pole graduated reading and the actual height when using the telescopic pole without an optical target on top.

Optical Offset: Enter the offset from the center of the optical target to the bottom of the GNSS antenna mount. If you are syncing with a smart target of a known prism type, such as the Spectra 360 prism, this value will be automatically filled in for you. If you are using a manually defined target type, you can input the extra offset value here.

Note: If your antenna type is Manual, then the Radius and Offset fields will allow you to enter values, otherwise, they display the known values for the chosen antenna.

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Select Base Point

The Select Base Point screen is used to choose the point in the job file where the base is located, or to store a new point for the base receiver setup location. When this screen is first opened, Survey Pro searches the job file and the GNSS reference station database for a location close to the base receiver's current autonomous position. This screen will then open in one of three states:

- [No Matching Base Point](#)
- [One Matching Base Point](#)
- [Multiple Matching Base Points](#)

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No Matching Base Point

This screen appears when the base receiver's location does not match any points in the job file or the GNSS reference station database.

Base is set on a new job point: Select this if the base is set up on a point that is not already stored in the job.

Base is set on an existing job point: Select this when the base is set up on a point stored in the job.

Base Point: Specifies the name of the base point. This is a new point name when the base is set on a new point or an existing point name when the base is set on an existing job point.

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One Matching Base Point

This screen appears when the base receiver's location matches a single point in the job file or the GNSS reference station database.

Base Point: Shows the name of the point matching the base receiver's location.

[**Change >**]: Changes this screen to the [No Matching Base Point](#) display described above where you can override the point selected to match the base receiver's location.

[Select Base Point Index](#)
[GNSS Start Survey Index](#)

More Than One Matching Base Point

This screen appears when the base receiver's location matches more than one point in the job file or the GNSS reference station database. This will happen when there are multiple points in the job within 10m of the base receiver's current autonomous position.

Select a Base Point: Allows you to select a point from the dropdown list that contains all the matching points found in the job.

[**Change >**]: Changes this screen to the [No Matching Base Point](#) display described above where you can override the point selected to match the base receiver's location.

[**< Back**]: Return to the [Set Base Receiver](#) screen.

[**Next >**]: Sets the base receiver to broadcast corrections in the chosen format at the specified base point location, then opens the [Connect to Receiver](#) screen where you can select your Rover receiver profile. Once your rover receiver profile is selected, you will advance to the [Set Rover Receiver](#) screen.

Note: If you wish to set only the base receiver at this time, you can tap cancel at the connect to rover prompt. Survey Pro will setup the base receiver for RTK operation, write the raw data to the survey file, and close the [Start Survey](#) wizard.

[Select Base Point Index](#)
[GNSS Start Survey Index](#)

Set Rover Receiver

The [Set Rover Receiver](#) screen is used to enter the rover receiver antenna and setup the rover receiver hardware following base receiver setup.

Rover Receiver: Displays information about the status of the receiver.

Antenna Type: Select the antenna type to use.

[**Setup**]: Tap to change the antenna for the rover receiver. See [Receiver Antenna](#).

Measured: Enter the distance from the ground to the *Measured To* location.

To: Specify the location on the antenna or receiver where the antenna height should be measured to.

Post Processing Recording Interval: Sets the period for logging GNSS raw data for RTK + post processing. Set it to *Off* to disable post processing data collection.

[Finish]: Tap to open the [Data Collection](#) screen. The **[Finish]** button will appear on this screen if the coordinate system and any required calibration are already solved.

[Next >]: Tap to advance to the [GNSS Resection / Backsight Calibration](#) screen. The **[Next >]** button will appear on this screen if a calibration solution is required before data collection can begin.

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Set RTX Receiver

The [Set RTX Receiver](#) screen is used to enter the rover receiver antenna and setup the rover receiver hardware.

Rover Receiver: Displays information about the status of the receiver.

[QuickStart]: Tap to open the [RTX QuickStart](#) screen. The **[QuickStart]** button will appear after the receiver starts computing a stable RTX position.

Antenna Type: Select the antenna type to use.

[Setup]: Tap to change the antenna for the rover receiver. See [Receiver Antenna](#).

Measured: Enter the distance from the ground to the *Measured To* location.

To: Specify the location on the antenna or receiver where the antenna height should be measured to.

Post Processing Recording Interval: Sets the period for logging GNSS raw data for RTK + post processing. Set it to *Off* to disable post processing data collection.

[Finish]: Tap to open the [Data Collection](#) screen. The **[Finish]** button will appear on this screen if the coordinate system and any required calibration are already solved.

[Next >]: Tap to advance to the [GNSS Resection / Backsight Calibration](#) screen. The **[Next >]** button will appear on this screen if a calibration solution is required before data collection can begin.

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RTX QuickStart

The [RTX QuickStart](#) screen is used to enter the rover receiver antenna and setup the rover receiver hardware.

Initialize on: Select the existing job point you are occupying.

Type: Select the antenna type to use.

[Setup]: Tap to change the antenna for the rover receiver. See [Receiver Antenna](#).

Measured: Enter the distance from the ground to the *Measured To* location.

To: Specify the location on the antenna or receiver where the antenna height should be measured to.

[Start]: Tap to begin the QuickStart initialization in the receiver.

[**Stop**]: Tap to cancel the current QuickStart initialization in the receiver.

[**Done**]: When the QuickStart initialization is complete, this button will appear. Tap to return to [Set RTX Receiver](#).

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GNSS Resection / Backsight Calibration

The [GNSS Resection / Backsight Calibration](#) screen is used to collect the control points required to setup and solve the coordinate system before you can collect data with valid local grid coordinates.

GNSS Resection Calibration

This screen is called GNSS Resection Calibration when you have set the base on a new point. The number of control points required to solve the calibration is displayed.

[**Occupy Control** >]: Opens the [Occupy Control Setup](#) screen. When you have occupied enough control to solve the calibration, the [Check GNSS Resection/Backsight](#) screen opens.

[**Start Now**]: Solves a temporary calibration, which will allow you to collect data before the calibration is fully solved, then opens the [Data Collection](#) screen. You can collect the required number of control at any point in your survey in order to solve the calibration. When you solve the calibration, all of your GNSS measured points will automatically be updated with the latest coordinate system solution.

GNSS Backsight Calibration

This screen is called GNSS Backsight Calibration when you have set the base on an existing point. The number of control points required to solve the calibration is displayed.

[**Occupy Control** >]: Opens the [Occupy Control Setup](#) screen. When you have occupied enough control to solve the calibration, the [Check GNSS Resection/Backsight](#) screen opens.

Use base as vertical benchmark: Check this box if the base is set up on a job point with an accurate elevation to include it as vertical control during calibration.

[**Start Now**]: Solves a temporary calibration, as described above.

[**One Point**]: This will solve a valid calibration using the base point as the horizontal and vertical control point, then open the [Data Collection](#) screen.

Note: The [**One Point**] button appears in place of the [**Start Now**>] button when the conditions for One Point setup are met:

- You must be in Default Ground Calibration projection mode.
 - You have started a new job with only one point, and that point was selected as the base point location, or the base was setup on a new autonomous point and that one point was used as a GNSS control point.
 - You do not yet have a coordinate system initialized or solved.
-

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Occupy Control Setup

The Occupy Control Setup screen is used to specify which job point with accurate NEE coordinates you are occupying and if you want to use the point for horizontal and/or vertical control in the calibration. The assignment of H and/or V can be modified later.

Point: Select the existing job point you are occupying.

H: Select this option if the point has good horizontal coordinates to use for horizontal control in the calibration solution.

V: Select this option if the point has a good elevation to use for vertical control in the calibration solution.

[Set HR]: Opens the [Receiver Antenna](#) screen where you can change the rover antenna setup and update the receiver.

[Start Control Point Occupy]: Starts a GNSS measurement to the selected control point. If you do not yet have the minimum number of control points for the calibration, the [Occupy Control Point](#) screen is used for this occupation. If you have at least the minimum number of control collected already, the [Check Control Point](#) screen is used for this occupation. In both cases, when you accept the GNSS measurement, Survey Pro stores the measured GNSS point with the selected grid point as a GNSS calibration control point.

Note: A GNSS Control point is made up of a pair of job points which are linked together. One of the job points must be a grid point. The grid point can be derived from a key in or imported grid coordinate, or from an optical measurement. The other job point must be a GNSS point. The GNSS point can be derived from a key in or imported geodetic coordinate, or from a GNSS measurement.

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Check GNSS Resection / Backsight Calibration

The Check GNSS Resection / Backsight Calibration screen is used to occupy an additional control point to provide redundancy in order to verify the quality of the calibration solution.

GNSS Resection / Backsight: The points used for the Resection (base setup on a new point) or the Backsight (base setup on an existing point) are shown in the display.

[Occupy Control >]: Opens the [Occupy Control Setup](#) screen to select an existing job file point to create an additional control point for the calibration. When you have created an additional control point for the horizontal and vertical calibration, the [Solve Calibration](#) screen will open.

[Start Now]: Solves the calibration with the current control points, and opens the [Data Collection](#) screen. This calibration solution will use the minimum number of points required, so there will be no redundancy of the solution, and therefore no way to verify the results. You should occupy an additional control point at some time during the survey to check the quality of your solution.

[One Point]: Solves a valid calibration using the one control point collected, then open the [Data Collection](#) screen.

Note: The **[One Point]** button appears in place of the **[Start Now>]** button when the conditions for One Point setup are met:

- You must be in Default Ground Calibration projection mode.
- You have started a new job with only one point, and that point was selected as the base point location, or the base

- was setup on a new autonomous point and that one point was used as a GNSS control point.
- You do not yet have a coordinate system initialized or solved.

[<Back]: Tap to return to the [GNSS Resection / Backsight Calibration](#) screen.

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Solve Calibration - Results

The [Solve Calibration Results](#) screen is used to display the results of the GNSS Resection / Backsight, as well as make any changes to the horizontal and/or vertical control point assignments. You can also use this screen to access the [Calibration Settings](#) screen to input the calibration parameters manually.

Before the [Solve Calibration](#) screen opens, the calibration is computed using all the assigned control points, and then the automatic blunder detection routine runs to detect obvious blunders in the solution. If blunders are detected, then you are prompted if you want to automatically remove the assigned points from the solution and resolve. If you tap [Yes], the dimensions (H and/or V) of the points detected as blunders will be unassigned and the calibration will be resolved. If you tap [No], then the results will open with all points still assigned with their original dimension in the solution.

GNSS Resection / Backsight Calibration: Displays the current status of the solution:

Green Light: If the calibration is solved and no blunders were detected, you will see a green light and the status line will show the root mean squared (RMS) error of the horizontal and vertical solution.

Yellow Warning Triangle: If the calibration is solved and no blunders were detected, but some of the points used have a large residual error, you will see a yellow triangle and the status line will show the point with the largest horizontal and/or vertical residual.

Red Stop Sign: If the calibration is solved, and blunders were detected that could not be clearly identified, or if you were prompted to remove blunders and you said no, then you will see a red stop sign and the status line will indicate there are possible blunders in the solution.

Yellow Arrow: If the calibration is solved, but the control points are not spaced far enough apart to run the automatic blunder detection, then you will see a yellow arrow, and the status line will indicate the poor geometry of the control points, or if the calibration fails to solve, you will see a yellow arrow and the status the status line will indicate the failure to solve the calibration.'

The list of GNSS control points is shown in the box, along with the horizontal and/or vertical assignment of each point. You can tap on the H and/or V column for each point to change the dimension assigned to use in the solution. You can double tap on any point to see details about that point. When the calibration is solved, you will see horizontal and vertical residuals (errors) in the columns for each point used for that dimension.

[Add Point...]: Tap to open the [Occupy Control Setup](#) screen where you can select additional points to add as control for the calibration solution.

[Details ...]: Tap to open the [Projection Details](#) screen and shows the exact numeric parameters of the pending calibration solution.

[Resolve]: Tap to recalculate the solution. This button appears if you change the horizontal or vertical control point assignments

[Finish]: Tap to apply the calibration solution and open the [Data Collection](#) screen.

[< Back]: Tap to return to the [Check GNSS Resection / Backsight Calibration](#)< screen.

Note: The calibration blunder detection routine will attempt to determine if there are any blunders in the GNSS control points used. This detection is done independently of the residuals of the least squares solution. The blunder detection routine is limited to a maximum of 15 GNSS control points. If you have more than 15 GNSS control points, the blunder detection cannot run and you will see the yellow warning for your calibration solution status. You must evaluate the quality of the solution manually if this is the case.

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Set Remote Rover Receiver

The Set Remote Rover Receiver screen is used when you are starting a survey at the rover and your base is already setup, or you are using an NTRIP server for base corrections. The Set Remote Rover screen will configure the RTK rover hardware, then wait for the GNSS base reference position and antenna to be received at the rover. The base position and antenna received at the rover are used to setup the survey to measure RTK vectors.

Rover Receiver: Displays information about the status of the receiver.

Antenna Type: Select the antenna type to use.

[Setup]: Tap to change the antenna for the base receiver. See [Receiver Antenna](#).

Measured: Enter the distance from the ground to the *Measured To* location.

To: Specify the location on the antenna or receiver where the antenna height should be measured to.

Post Processing Recording Interval: Sets the period for logging GNSS raw data for RTK + post processing. Set it to *Off* to disable post processing data collection.

Note: If the base reference position and antenna received at the rover match a point in the job file or in the GNSS reference station database, Survey Pro will display the name of the known base point, and you will not need to select the base point in the user interface. If the base reference position and antenna received at the rover does not match a known location, you must create a new point for the base in the job.

[Finish]: Tap to open the [Data Collection](#) screen. The **[Finish]** button will appear on this screen if the base location is a match and the coordinate system and any required calibration are already solved.

[Next >]: Tap to advance to the [Backsight / Resection Calibration](#) screen. The **[Next >]** button will advance to this screen if the base location is a match, but you still need to solve the coordinate system.

[Next >]: Tap to advance to the [Select Base Point at Rover](#) screen. The **[Next >]** button will advance to this screen if the base location is not a match.

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Select Base Point At Remote Rover

The Select Base Point at Remote Rover screen is used to choose the point in the job file where the base is located, or to store a new point for the base receiver setup location. This screen is similar to the [Select Base Point](#) screen.

Base Antenna: Displays information about the base antenna received at the rover.

Note: If your receiver brand is capable of getting the base antenna information from the data link, or if the base position received is known in the job or the GNSS reference station database, then the known antenna height will be initialized here.

[**Change ...**]: Tap to change the antenna for the base receiver. See [Receiver Antenna](#).

[**< Back**]: Tap to return to the [Set Remote Rover Receiver](#) screen.

[**Finish**]: Tap to open the [Data Collection](#) screen. The [**Finish**] button will appear on this screen if the coordinate system and any required calibration are already solved.

[**Next >**]: Tap to advance to the [GNSS Resection / Backsight](#) screen. The [**Next >**] button will appear on this screen if a calibration solution is required before data collection can begin.

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Data Collection

The [Data Collection](#) screen is used to collect GNSS measurements and store new points in the job.

GNSS Status (at top of screen): Displays the current solution type, the data modem reception quality, the number of satellites used, HRMS and VRMS, PDOP, and the current rover coordinate position. When this area is tapped, the [GNSS Status](#) screen will open.

Point: Enter the point name for the next point to be stored.

Description / Code: Enter the description or the code for the new point.

[**Set HR**]: Displays the current antenna measurement and measure to setting. You can change the antenna measurement by entering a new value in the edit box. This new antenna height will be sent to the receiver with your next data collection point. You can change both the antenna measurement and measure to setting by tapping on Set HR to open the [Receiver Antenna](#) screen.

[**Control**]: Opens the [Control Points](#) screen.

[**Topo SS**]: Stores a point with a single epoch of data. The current position is checked against the criteria, and if acceptable, the point is stored.

[**Offset**]: Opens the [Offset Shots](#) screen.

How to Measure from the Map

You can store a measurement directly from the map tab of the [GNSS Data Collection](#) screen. Simply press the enter button on the device keyboard (or whatever button you have mapped to the enter key for handheld devices without a full keyboard), and this will trigger a [**Topo Sideshot**] observation.

Note: The Topo SS function never puts the receiver in static mode, so the precision of the rapid sideshot will be less than a point occupied in static mode.

[**Point**]: Opens the [Occupy Data Points](#) screen used to occupy and store a new point.

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Collect Feature

[**Survey**] [**Collect Feature**]

The [Feature Collection](#) screen is used when you wish to set up automated continuous data collection.

Points to be Stored: Displays the starting point name and description or code of the group of points to be stored.

Method: Select the method of continuous data collection. The available methods are described below:

- **Time Interval:** After accepting the first point, additional points will automatically be stored after the specified time interval (in seconds) has elapsed. Each successive point name is incremented to the next available name.
- **Distance Interval 2D / 3D:** After accepting the first point, additional points will automatically be stored after traveling the specified horizontal or 3D distance. Each successive point name is incremented to the next available name.
- **Distance Interval - Vertical:** After accepting the first point, additional points will automatically be stored after traveling the specified vertical distance. Each successive point name is incremented to the next available name.
- **Hold Still For:** After accepting the first point, additional points are automatically stored when the pole is held in the same spot for the specified interval of time (in seconds).
- **Manual: prompt once:** Stores points in the same way as tapping [**Topo SS**] from the [Data Collection](#) screen, incrementing the point name after each stored point.
- **Manual: prompt every point:** Performs the same function as the Manual Prompt Once routine, above, except you are prompted for a new description, layer, code and code attributes with each point stored.

Interval: Enter the interval criteria used for continuous collection modes. The Interval field is not available if either of the manual methods is selected.

Update Rate: Set the receiver to 1 Hz or 5 Hz mode. When 5 Hz is selected, the receiver will compute positions five times a second so the display will update in near real time and measurement latency will be minimized.

[**Start**]: Opens the [Occupy Data Points \(Feature Collection\)](#) screen where data can be collected.

Note: If you hotkey to another screen while using the [Feature Collection](#) routine, the [Occupy Data Points \(Feature Collection\)](#) will be suspended until you return to it.

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Collect Offset

[**Survey**] [**Collect Offset**]

The [Offset Shots](#) screen is used to collect a point you cannot physically occupy with GNSS. You can occupy a nearby point with the GNSS rover and then measure the offset distance and direction with tape and compass, or take a measurement with a laser range finder.

GNSS Status: Tap the button at the top of the screen to open up the [GNSS Status Page](#).

Offset Type: Select the method you will use to collect the offset point:

- **Azimuth/Distance:** Occupy a reference point, and then measure azimuth and distance to the offset point.
- **2 Point Azimuth:** Occupy a reference point, occupy an azimuth point, and measure the distance to the offset point. You can offset in the direction of your Azimuth to Reference point line, or you can do a perpendicular offset right or left from this line.
- **Distance / Distance:** Occupy the first reference point and measure the distance from reference point one to the offset point. Occupy a second reference point and measure the distance from reference point two to the offset point.

Azimuth and Distance Offset

Ref. Point: Tap to collect the offset reference point. This is the point from which the azimuth and distance will be applied.

Az/Dist.: Tap to open up the [Azimuth / Distance Prompt](#) screen where you enter the azimuth and distance from the reference point to the offset point. If you are using an electronic laser range finder, tapping this button will trigger the device to take a measurement, and then open the [Azimuth / Distance Prompt](#) screen where you can then inspect the measured distance and enter the height of laser device and height of target.

There are four modes to enter the offset measurement for Azimuth/Distance work flow:

- **Zenith / Slope Distance:** Use this mode to enter zenith angle (90 at the horizon) and slope distance to the offset point. You must enter the height of the laser on the rover pole (Laser HI) and the height of the offset (Laser HR).
- **Vertical Distance / Horizontal Distance:** Use this mode to enter vertical and horizontal distance to the offset point. You must enter the height of the laser on the rover pole (Laser HI) and the height of the offset (Laser HR).
- **Vertical Angle / Slope Distance:** Use this mode to enter vertical angle (0 at the horizon) and slope distance to the offset point. You must enter the height of the laser on the rover pole (Laser HI) and the height of the offset (Laser HR).
- **Slope Distance:** Use this mode to enter slope distance to the offset point. This mode is used only when the offset point is on the ground at the same elevation as your rover pole. In this mode you only need to enter the Laser HI because the offset target point is assumed to be on the ground at the same elevation as the bottom of the rover pole.

Store: Prompts you for a name, description, layer, code and code attributes (depending on your survey settings) for the new offset point, and stores the offset point in the survey.

2 Point Azimuth

Ref. Point: Tap to collect the offset reference point. This is the point from which the offset will be applied.

Az. Point: Tap to collect the azimuth point. This point is used to determine the azimuth from the reference point to the offset point.

Forward/Left/Right/Reverse: Specifies the direction, relative to the azimuth between the **Azimuth Point** and the **Reference Point** to the offset point.

Distance: Tap to open up the [Distance Prompt](#) screen where you enter the distance from the reference point to the offset point. If you are using an electronic laser range finder, tapping this button will trigger the device to take a measurement, and then open the [Distance Prompt](#) screen where you can then inspect the measured distance and enter the height of laser device and height of target.

Store: Prompts you for a name, description, layer, code and code attributes (depending on your survey settings) for the

new offset point, and stores the offset point in the survey.

Distance / Distance

Ref. 1: Tap to collect the first offset reference point.


Dist. 1: Tap to measure the distance from the first reference point to the offset point. The **Dist** button opens the Distance Prompt screen where you enter the distance from the reference point to the offset point. If you are using an electronic laser range finder, tapping this button will trigger the device to take a measurement, and then open the Distance Prompt screen where you can then inspect the measured distance and enter the height of the laser device and the height of the target.

Ref. 2: Tap to collect the second offset reference point.

Dist. 2: Tap to measure the distance from the second reference point to the offset point.

Solution 1 / 2: Tap to select the solution to store. A distance / distance intersection will produce two possible solutions. Both solutions are shown on the map. Select which solution to store for this offset.

Store: Prompts you for a name, description, layer, code and code attributes (depending on your survey settings) for the new offset point, and stores the offset point in the survey.

Note: You can tap the  next to any **Ref Point** button for a menu of additional options. From this menu you can choose the reference point from the list of job points or from the job map, instead of observing a new point with GNSS. You can also swap points to reverse the reference points (for 2 Point Azimuth mode or Distance / Distance mode). This menu also allows you to specify if you want to collect the reference points as a single epoch Topo SS, or if you wish to occupy the reference point for a period of time.

Note: You can store Offset Reference points and Azimuth points using a Topo SS single epoch measurement, or you can occupy these points for some amount of time for a more precise measurement. This behavior is configured in the [Job | Settings Index](#) .

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Occupy Data Points

The Occupy Data Points screen is used to collect measurements to data points.

Local Coordinates: Displays the local coordinates computed from the current geodetic measurement.

Solution Quality: Displays the quality of the current measurement: the solution type, the number of satellites used, the horizontal and vertical precision, and the PDOP. These values are explained with the [GNSS Status](#) screen.

Note: If the solution type is preceded by a "~", this means there is no survey setup. Survey Pro is getting the GNSS position from the receiver with the precision and solution type indicated. However, because there is no survey setup, the base reference position is not known, so Survey Pro is not able to calculate RTK vectors for this measurement. Points stored when there is no survey setup will be stored as GNSS coordinate observations (latitude, longitude, height). If you wish to store GNSS measurements as RTK vectors from a known base, you must go to the [Start Survey](#) wizard.

Session Time: Displays the total occupation time so far for this measurement.

Count Status: Displays information about the number of epochs in the current solution. When the solution is fixed, this field will display 'Averaging: xx', where xx is the number of continuously fixed epochs in the current solution. When the solution is not fixed, this field will simply display 'Measuring'.

[Accept] or **[Wait xx]**: This button is used to accept the measurement and store the point. When you are using a minimum duration for data points, this button will display [Wait xx] where xx is the duration minus the current fixed epoch count. Once the minimum occupation duration is exceeded, this button will display [Accept]. If you are not using a minimum duration for data points, this button will be labeled [Accept]. When you tap [Accept], the current solution type and quality is checked against the criteria for data points, and if any value does not meet the set criteria, you will see a prompt which displays the values that do not meet the set criteria. You can choose to keep measuring to wait for the criteria to pass, or you can accept the point anyway. If all criteria pass, or if you accept the point anyway, you will be prompted for description, layer, code and code attributes (depending on your Survey settings) for the new point, then return to the previous screen.

[GNSS Status]: Opens the [GNSS Status](#) screen.

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Occupy Data Points (Feature Collection)

The [Occupy Data Points](#) for feature collection screen is used to collect measurements to single epoch data points using a time or distance interval between points.

Local Coordinates: Displays the local coordinates computed from the current geodetic measurement.

Solution Quality: Displays the quality of the current measurement: the solution type, the number of satellites used, the horizontal and vertical precision, and the PDOP. These values are explained with the [GNSS Status](#) screen.

Remaining: Displays the total time or distance remaining before the next continuous point is stored.

Note: If your continuous interval is exceeded, but the current solution quality does not meet the criteria for Topo/Feature points, then you will see a message box indicating that Survey Pro is waiting for the criteria to pass. You can cancel this message box and your choices are to keep waiting, accept the point anyway, or abandon the continuous feature collection session and return to the [GNSS Data Collection](#) screen.

Count Status: Displays the type of continuous collection you are doing.

[Pause]: When you are collecting continuous points, the [Pause] button is used to pause the collection.

[Resume]: When you are have paused continuous collection, the [Resume] button is used to restart the continuous collection.

[View Data] or **[View Map]**: Is used to toggle the display between viewing the map and the data display.

[GNSS Status]: Opens the [GNSS Status](#) screen.

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Control Points

[Survey] [Control Points] or

[Data Collection](#) [Control]

The [Control Points](#) screen is used to measure GNSS control points to use in the calibration adjustment, or to check the location of existing points against GPS measurements and the latest coordinate system.

GNSS Status: Displays the current solution type, radio signal quality, number of satellites used, and the receiver's estimate of the horizontal precision of the current point. If this area is tapped, the [GNSS Status](#) screen will open.

[Set HR]: Displays the current antenna measurement and measure to setting. You can change the antenna measurement by entering a new value in the edit box. This new antenna height will be sent to the receiver with your next control or check point collection. You can change both the antenna measurement and measure to setting by tapping on [Set HR] to open the [Receiver Antenna](#) screen.

[Projection]: Opens the [Projection](#) screen.

[View Points]: Opens the [View Coordinates File](#) screen, where the project points can be examined.

[Post Process]: Opens the [Receiver Session](#) screen where you can occupy a point for a post processing only session. This allows you log a session in the post processing file using an existing point name without changing that point record in the job file.

[Check]: Opens the [Check Control Point](#) screen, where the local coordinate computed from the measurement is compared to the local coordinate's known value.

[Control]: Opens the [Occupy Control Point](#) screen, where geodetic coordinates are measured at a point with local coordinates and added to that point record in the job file. If the selected point is already a GNSS control point, you can choose to overwrite the existing GNSS observation used for control, or to average multiple GNSS observations together to update the control point.

Note: A GNSS Control point is made up of a pair of job points which are linked together. One of the job points must be a grid point. The grid point can be derived from a key in or imported grid coordinate, or from an optical measurement. The other job point must be a GNSS point. The GNSS point can be derived from a key in or imported geodetic coordinate, or from a GNSS measurement.

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Check Control Point

[Survey] [Control Points] [Check Point] or

[Data Collection](#) [Control] [Check Point]

The [Check Control Point](#) screen is used to check a control point. This is done when you want to verify the quality of the coordinate system solution.

Coordinates: Displays the local coordinates computed using the current measurement and the latest projection solution.

Solution Quality: Displays the quality of the current measurement: the solution type, the number of satellites used, and

the horizontal and vertical precision computed by the receiver. These values are explained with the [GNSS Status](#) screen.

Note: If the solution type is preceded by a "~", this means there is no survey setup. Survey Pro is getting the GNSS position from the receiver with the precision and solution type indicated. However, because there is no survey setup, the base reference position is not known, so Survey Pro is not able to calculate RTK vectors for this measurement. Points stored when there is no survey setup will be stored as GNSS coordinate observations (latitude, longitude, height). If you wish to store GNSS measurements as RTK vectors from a known base, you must go to the [Start Survey](#) wizard.

Errors: Displays the differences between the computed local coordinates and the known coordinates for the control point.

Note: If the Errors are larger than the measurement precision of the instrument, you probably have a problem with your projection solution.

Session Time: Displays the total occupation time so far for this measurement.

Count Status: Displays information about the number of epochs in the current solution. When the solution is fixed, this field will display 'Averaging: xx', where xx is the number of continuously fixed epochs in the current solution. When the solution is not fixed, this field will simply display 'Measuring'.

[Accept] or **[Wait xx]:** This button is used to accept the measurement and store the point. When you are using a minimum duration for check points, this button will display [Wait xx] where xx is the duration minus the current fixed epoch count. Once the minimum occupation duration is exceeded, this button will display [Accept]. If you are not using a minimum duration for check points, this button will be labeled [Accept]. When you tap [Accept], the current solution type and quality is checked against the criteria for check points, and if any value does not meet the set criteria, you will see a prompt which displays the values that do not meet the set criteria. You can choose to keep measuring to wait for the criteria to pass, or you can accept the point anyway.

[GNSS Status]: Opens the [GNSS Status](#) screen.

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Occupy Control Point

The [Occupy Control Point](#) screen is used to add geodetic coordinates to a known project point. The most common use of this screen is to measure control points for the calibration solution. This screen is also used by the [Calibration Calculator](#) routine for one point calibration setup.

Geodetic Coordinates: Displays the geodetic coordinates measured at the current local point.

Solution Quality: Displays the quality of the current measurement: the solution type, the number of satellites used, and the horizontal and vertical precision computed by the receiver. These values are explained with the [GNSS Status](#) screen.

Control Point: Select if the current point is to be used for Horizontal control and/or Vertical control by tapping the appropriate checkboxes.

Session Time: Displays the total occupation time so far for this measurement.

Count Status: Displays information about the number of epochs in the current solution. When the solution is fixed, this

field will display 'Averaging: xx', where xx is the number of continuously fixed epochs in the current solution. When the solution is not fixed, this field will simply display 'Measuring'.

[Accept] or **[Wait xx]**: This button is used to accept the measurement and store the point. When you are using a minimum duration for control points, this button will display [Wait xx] where xx is the duration minus the current fixed epoch count. Once the minimum occupation duration is exceeded, this button will display [Accept]. If you are not using a minimum duration for control points, this button will be labeled [Accept]. When you tap [Accept], the current solution type and quality is checked against the criteria for control points, and if any value does not meet the set criteria, you will see a prompt which displays the values that do not meet the set criteria. You can choose to keep measuring to wait for the criteria to pass, or you can accept the point anyway.

[GNSS Status]: Opens the [GNSS Status](#) screen.

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End GNSS Survey

[Survey] **[End GNSS Survey]**

The [End GNSS Survey](#) screen is used to stop the survey of the active receiver profile.

If the active receiver is the base or rover from the current RTK survey setup, then the [End Survey](#) screen will shut down the receiver hardware, and clear the RTK setup in Survey Pro. To restart your RTK survey, go to the [Start Survey](#) wizard.

If the active receiver is a post processing receiver, and not involved in the current RTK survey, then the [End Survey](#) screen will end the post processing logging and close the file on the active receiver.

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Quick Codes

[Survey] **[Quick Codes]**

The [Quick Codes](#) screen is used to rapidly take shots with different descriptions or codes.

GNSS Status (at top of screen): Displays the current solution type, the data modem reception quality, the number of satellites used and the horizontal precision computed by the receiver. Tap this area to open the [GNSS Status](#) screen.

Point: Enter the point name for the next point to be stored.

Note: If you specify an existing point in the Point field, you are prompted to overwrite or use the next available point. You will not have the option to store an observation.

[Set HR]: Displays the current antenna measurement and measure to setting. You can change the antenna measurement by entering a new value in the edit box. This new antenna height will be sent to the receiver with your next data quick code point. You can change both the antenna measurement and measure to setting by tapping **[Set HR]** to open the [Receiver Antenna](#) screen.

Tapping any of the buttons will store a point with the description or code of the button label. If the Occupy Point in Quick Codes box is checked on the [Job | Settings | Surveying card](#), the receiver is put into static mode and the [Occupy](#)

[Data Points](#) screen opens. If the box is not checked, the point will be stored with a single epoch of data from the receiver, without going into static occupation mode. The point is stored with the description or code labeled on the button, for example, **[Ditch]** or **[TOPO]**. You can also tap **[Enter]** to store a point with the last used description or code.

Note: Storing points in this routine does not change the last user specified description used in any survey routine.

Note: To enter a new description or code, or edit an existing button description in the [Quick Codes](#) screen, tap and hold the button. The Quick Code button labels are saved in the \Program Files\Survey Pro\QuickCodes.ini file. You can copy these files from one data collector to another to preload the list.

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Reference Station Info

[Survey] [Base Info]

The [Reference Station Info](#) screen is used to display the details about the currently set RTK base receiver and to list the other known reference station locations and antenna heights from the GNSS reference station database.

The [Current Base](#) card displays details about the current RTK base station.

Base Point: Displays the current base point name..

Latitude: Displays the current latitude of the base point set in the software.

Longitude: Displays the current longitude of the base point set in the software.

Height: Displays the current height of the base point set in the software.

Antenna: Displays the details about the base receiver antenna.

The [Reference Station List](#) card displays the list of known reference stations from this job and from the GNSS Reference Station database.

Each base set in this job file will be listed here. Reference stations are listed by name, and the icon in front of each reference station name tells you if it is a radio RTK base or an IP network RTK base. Reference stations from the current job have the text "(survey)" after their name. Reference stations in the database have the text "(database)" after their name.

Tap on the info icon to see reference station details.

Tap and hold on any (survey) reference station to save it to the database. This is useful if you have a radio RTK base that you use to setup a remote rover receiver in multiple new jobs.

Tap and hold on any (database) reference station to rename it in the database, remove it from the database, or edit its associated antenna.

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Projection

[Survey] [Projection]

The [Projection Information](#) screen is used to select and solve the horizontal and vertical projections, which are used to transform GNSS measured WGS84 coordinates (latitude, longitude, height) into local coordinates (North, East, Elevation). The upper portion of the screen displays the status and details on the current projection mode.

The screen is also used to switch between [Mapping Plane Mode](#) and [Default Ground Calibration mode](#). The buttons available will vary depending on the current projection mode.

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Projection – Default Ground Calibration Mode

The [Projection](#) screen is described here for when the horizontal projection mode is set to **Default Ground Calibration**.

Use this setting when you want ground level coordinates, and there is no projection and no datum to define a geodetic coordinate transformation. In this mode, a default map projection is created with the first GNSS control point collected. You collect GNSS measurement on points with known local coordinates, and solve a calibration adjustment. The calibration adjustment will translate, rotate, and scale the default map projection's (y,x) into your local coordinates (N,E).

[**Show Details...**]: Opens the [Projection Details](#) screen, where the complete details of the calibration solution, reference map projection, and Geoid model are displayed.

[**Reset Origin...**]: Opens the [Calibration Set Zone](#) screen, where you can enter the parameters of the intermediate mapping plane to be used for the calibration adjustment.

Note: This step is usually not necessary, since the intermediate mapping plane is automatically set up by default using the location of the first GNSS control point collected in this job. However, if the first GNSS control point is far away (more than 10km), or it is considerably higher or lower (+/- 200m) you may wish to enter the parameters of the intermediate mapping plane.

[**Select Geoid...**]: Opens the [Select Geoid](#) screen, where you can select the geoid model to use with the default ground calibration. This button is active only when the intermediate mapping plane is not yet set up. To change the geoid once the default mapping plane is setup, use the [Reset Origin] button.

[**Solve Calibration...**]: Opens the [Solve Calibration](#) screen, where control points can be selected and the horizontal and vertical calibration are solved. This button is active only when the intermediate mapping plane is already set up.

[**Switch to Mapping Plane...**]: Switches the horizontal projection mode from Ground – Default Ground Calibration to [Mapping Plane](#).

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Projection Details

[Survey] [Projection] [**Show Details...**]

The [Projection Details](#) screen is used to view the numeric parameters of the current coordinate system solution. You can

also choose to save the coordinate system to the data base from this screen.

[Save System To Database]: Saves the current projection record to a coordinate system database file. First, the current database file is checked for a matching record, and if found you will be prompted that you need not save the current coordinate system. If no matching record is found, then the current coordinate system will be saved as a new record. If a different record with the same name is found, you will be prompted to rename the current record before you can save.

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Calibration Set Zone

[Survey] [Projection] [Reset Origin...]

The Calibration Set Zone screen is used to manually configure the parameters of the calibration reference stereographic projection. It is also used to select the geoid model to use with calibration coordinate systems.

Projection Origin: Set the origin coordinate for the default projection.

Latitude: Enter the origin latitude of the reference stereographic mapping plane. This is usually set at the latitude of the first GNSS control point.

Longitude: Enter the origin longitude of the reference stereographic mapping plane. This is usually set at the longitude of the first GNSS control point.

North: Enter the north coordinate at the origin of the reference stereographic mapping plane. This is usually the grid northing of the first GNSS control point.

East: Enter the east coordinate at the origin of the reference stereographic mapping plane. This is usually the grid easting of the first GNSS control point.

[Origin Height] / [Origin Scale]: Enter either the height or the scale factor used to reference the calibration system to ground level.

[Same as Base]: Updates the values with the coordinate of the GNSS base station.

Use Geoid: Choose to use a geoid model with this zone. When this box is checked, you can select a geoid model from the dropdown list to use with the coordinate system. When this box is unchecked, no geoid will be used with the coordinate system. You can pick a geoid model from the database using the drop down box.

[Database]: Opens the [Select Coordinate System](#) screen where you can pick a reference stereographic map projection zone or a solved calibration site from the coordinate system data base file (.csd).

[Reset]: initializes a new calibration reference stereographic map projection with the input parameters.

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Solve Calibration

The [Solve Calibration](#) screen is used to calculate a calibration solution using the currently assigned horizontal and vertical control points. This is the same screen as the [Solve Calibration Results](#) screen described in the start survey sections.

You can also use this screen to open the [Calibration Settings](#) screen, where you can modify the way a calibration is solved from control points, or manually input calibration parameters. To open the [Calibration Settings](#) screen, tap on the settings icon when the [Solve Calibration](#) screen is open.

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Calibration Settings

The [Calibration Settings](#) screen is used to modify the default settings for solving a calibration from control points, or to manually enter calibration parameters from values.

Method: Select the desired state. The options are:

- [Solve from control points](#). Use this state to select the settings to be used when solving the calibration from the GNSS control points.
- [Key in parameters](#). Use this state to open interface that allows you to key in parameters for a calibration solution.
- [Calibration calculator](#). Use this state to setup a Default Ground Calibration coordinate system that is parallel to a selected mapping plane grid, using a single GNSS control point to determine the translation between the two systems. This state is only available when your projection mode is set to Default Ground Calibration.

Solve H: Check this box to apply only the horizontal solution. The current vertical solution is maintained.

Solve V: Check this box to apply only the vertical solution. The current horizontal solution is maintained.

Solve from Control Points

Calibration scale

[Calculate scale from control points]: Select this option to calculate the best-fit scale parameter from the horizontal control points. This is the default setting.

[Fix scale to 1.0]: Select this option to calculate a fixed scale calibration, where the rotation and translation are calculated from control points, but the scale is fixed to 1.0.

Note: When you are using Default Ground Calibration mode, a scale of 1.0 will give ground distance at the default origin height, which is usually the height of the first control point. You can modify the default calibration zone using the [Calibration Set Zone](#) screen. When you are using Mapping Plane mode, a scale of 1.0 will give you exact grid distances on the mapping plane.

Calibration origin

[Origin at centroid of control points]: Select this option to solve the origin parameter at the centroid of the horizontal control points. This is the default setting.

[Select a point for calibration origin]: Select this option if you wish to override the default behavior of using the

centroid of the control coordinates as the origin. You will need to assign an origin point below.

[Origin Point]: Enter a point for the calibration origin. This point must be one of the active horizontal control points.

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Key in parameters

The Key in parameters screen is used to input calibration horizontal and vertical parameters by hand. This can be done to copy a calibration solution between data collectors in the field, or to recreate a calibration solution from a raw data printout.

Horizontal Card

The Horizontal card is used to manually enter the six parameters of the horizontal calibration solution.

Scale: Enter the scale factor.

Rotation: Enter the rotation angle.

Translation (N,E): Enter the horizontal shift (N,E) from the intermediate map projection to the local coordinate system.

Origin N/E: Enter the origin location, in intermediate mapping plane coordinates, of the scale and rotation point.

Vertical Card

The Vertical card is used to manually enter the five parameters of the vertical calibration solution.

Slope N: Enter the slope of the inclined plane along the local north grid axis in parts per million.

Slope E: Enter the slope of the inclined plane along the local east grid axis in parts per million.

Separation: Enter the separation between the inclined plane and the local elevation.

Origin N / E: Enter the local origin (north,east) of the inclined plane.

[Solve >]: Updates the calibration solution using the values entered on the Horizontal and/or Vertical cards.

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Calibration calculator

The Calibration Calculator screen is used to setup a calibration parallel to a selected mapping plane zone, or some arbitrary rotation, from a single control point.

Rotation: Enter the rotation angle used for the calibration. This angle should be the negative of the meridian convergence from your desired grid origin the default ground calibration zone. You can use the [Calc Rotation] function to set the calibration to be parallel to a mapping plane zone. Alternatively, if you have some other origin for the grid directions, such as a sun shot or the central meridian of a township, you can enter the convergence between that

location and the origin of the default ground calibration zone.

[**Calc Rotation**]: Opens the [Projection Calculator](#) screen in calculate rotation mode. The results are filled into the Rotation field when you complete the calculation.

Base Station Local Coordinate: Enter the local plane coordinates of the base. If you set up on a new base point, these fields are blank and you need to occupy one control point to calculate the base station local coordinates.

[**Occupy Control**]: Opens the [Control Points](#) screen where you select a control point to occupy. When you are done, the base local coordinate is calculated using your entered rotation.

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Projection – Mapping Plane Mode

The [Projection](#) screen is described here for when the horizontal projection mode is set to Mapping Plane. Use this setting when you want your coordinate system to be a conformal map projection chosen from the coordinate system database file.

Status Line: The text at the top of the screen describes the status of the horizontal projection solution.

[**Show Details...**]: Opens the [Projection Details](#) screen, where the complete details of the calibration solution, reference map projection, and Geoid model are displayed.

[**Select Zone...**]: Opens the [Select Coordinate System](#) screen where you can choose a zone or site from the data base, key in a custom zone, and delete zones or sites from the database.

[**Mapping Plane Ground...**]: Opens the [Ground Coordinates](#) screen where the grid to ground conversion parameters can be calculated and applied.

[**Solve Calibration...**]: Opens the [Solve Calibration](#) screen where control points can be selected and the horizontal and vertical calibration are solved.

[**Switch to Default Ground Calibration...**]: Switches the horizontal projection mode from Mapping Plane mode to [Ground Default Ground Calibration mode](#).

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Select Coordinate System

The [Select Coordinate System](#) screen is used to choose a mapping plane zone or localized site from the coordinate system database file. You can also open the [Key In Zone](#) wizard to create a new zone and datum with user specified parameters.

Database: Select what type of coordinate system record to choose. You can:

- **Use Database Zone**: Displays controls to pick a map projection from the regions and zones in the database.
- **Broadcast RTCM Datum**: Displays controls to pick a map projection from the regions and zones in the database. The datum will be set by the NTRIP network broadcasting RTCM 1021/1023 messages.
- **Use Database Site**: Displays controls to pick a localized zone based site from the Site region in the database.

Note: If you are using Broadcast RTCM Datum, you must start a GNSS survey and connect to a NTRIP mount point that is broadcasting RTCM message types 1021 and/or 1023 before the coordinate system definition is complete.

Region: Select the region of the map projection zone.

Zone: Select the specific map projection zone.

Datum: View or select the horizontal datum for this zone.

Note: Some zones in the database may not have a default datum attached. In this case, the datum control is a list box and you must select from the data base datums before you can set the zone.

Use Geoid: Select to use a geoid model with this zone. You can pick a geoid model from the database using the drop down box.

[Delete Zone]: Deletes the currently selected site or zone.

Note: This delete function cannot be undone. Also, you cannot delete system database records. If you select a protected record, you will be prompted that the record cannot be deleted.

[Key In Zone >]: Tap to open the [Key In Zone](#) screen where you can create a custom map projection zone, ellipsoid and datum.

[Finish]: Accepts the currently selected zone and readjusts the job coordinates to the latest projection.

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Key In Zone

[Survey] [Projection] [Select Zone] [Key In Zone >]

The [Key In Zone](#) wizard is used to generate a custom mapping plane zone.

Key In Zone - Setup

The [Key In Zone Setup](#) screen is used to pick the zone and datum type for the new zone, as well as set the azimuth orientation and grid direction for the new zone.

Zone Type: Select what kind of map projection to use for the new zone. The options are:

- Transverse Mercator.
- Lambert 1 Parallel
- Lambert 2 Parallel
- Stereographic / Oblique Stereographic
- Oblique Mercator Angle

Datum Type: Select what kind of datum to use for the new zone. The options are:

- **Pick from database:** Choose this option to add a data base datum and ellipsoid to the new zone

Custom Molodensky: Choose this option to use a custom 3-parameter datum transformation, with either a custom ellipsoid or a data base ellipsoid.

- **Custom Similarity:** Choose this option to use a 7-parameter datum transformation, with either a custom ellipsoid or a data base ellipsoid.

Grid and Azimuth Parameters: is where you select the grid azimuth and the positive coordinate direction. The options are:

- **North Azimuth:** Set a north azimuth for your new zone.
- **South Azimuth:** Set a south azimuth for your new zone.
- **North/East Grid:** Set the coordinates increasing positive in the north, east direction
- **South/West Grid:** Set the coordinates increasing positive in the south, west direction.

Key In Zone - Mapping Plane Parameters

The Key In Zone Mapping Plane Parameters screen is used to enter the values for the map projection zone.

The parameters required depend on the zone type. They will include:

- **Central Longitude / Latitude:** Enter the geodetic origin of the map projection.
- **False Northing / Easting:** Enter the coordinate offsets at the origin of the map projection.
- **Scale factor:** Enter the scale factor of the map projection.
- **N / S Parallel:** Enter the north and south standard parallels of the map projection.
- **Azimuth:** Enter azimuth of the central line of the map projection.

Key In Zone – Oblique Mercator Settings

The Key In Zone Oblique Mercator screen is used to set extra parameters when the Zone Type is set to Oblique Mercator Angle.

Azimuth At: Enter the convention for projection azimuth. The options are:

- Equator
- Center of Projection

Origin At: Enter the convention for projection azimuth. The options are:

- Equator
- Center of Projection

Rectify Coordinates: Set if the coordinates are rectified. Coordinates are ‘rectified’ if the local plane is rotated by the azimuth angle of the central meridian of the projection so that grid North lines up with geodetic north at the origin.

Key In Zone - Ellipse

The Key In Zone Ellipse screen is used to set or create an ellipse for a new datum. This screen is only displayed when Datum Type is Molodensky or Similarity.

Choose an ellipse for the new zone.

Ellipse from Data Base: Choose this option to use the selected data base ellipsoid.

Key in Ellipse: Choose this option to enter the values for the custom ellipsoid.

Values: Enter the values for the custom ellipse if you are not using Ellipse from List:

Ellipse a: Enter the semi major axis of the new ellipsoid.

Other Parameter: Select the other ellipse parameter to enter. You can use one of: Semi minor axis; Flattening; Reciprocal flattening; First eccentricity; First eccentricity squared; Second eccentricity; Second eccentricity squared.

Key In Zone - Datum Translation

The Key In Zone Datum Translation screen is used to enter translations when the Datum Type is Molodensky or Similarity.

Datum Translate From WGS84 To Local: Enter the three translations from WGS84 to the local datum.

Note: The sign convention for the datum translations is from WGS84 to the local datum. If your datum transformation is defined for local to WGS84, be sure to inverse values before entering in the software.

Key In Zone - Datum Rotation and Scale

The Key In Zone Datum Rotation and Scale screen is used to enter translations when the Datum Type is or Similarity.

Datum Rotations From WGS84 To Local: Enter the three rotations from WGS84 to the local datum.

Scale Factor (ppm): Enter the scale of the datum transformation from WGS84 to the local datum. The scale factor is entered in parts per million.

Note: The sign convention for the datum rotations and scale factor is from WGS84 to the local datum. If your datum transformation is defined for local to WGS84, be sure to inverse the values before entering in the software.

Key In Zone - Datum from Database

The Key In Zone Datum from Database screen is used to select a database datum when the Datum Type is Pick from Data Base.

Datum: Select the data base datum to use for the new zone.

Key In Zone - Results

The Key In Zone Results screen is used to review the values you input for the zone to be created.

[**Store**]: Opens a prompt to enter the region and zone of the new map projection zone, stores the named zone in the data base and sets the zone as the current projection record.

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Ground Coordinates

[**Survey**] [**Projection**] [**Setup Ground Coordinates**]

The Ground Coordinates wizard is used to apply a switch between mapping plane grid and ground coordinates. This feature is only used when the horizontal projection mode is Mapping Plane.

Ground Coordinates - Setup

The Ground Coordinates Setup screen is used to toggle between grid and ground coordinates, and to select how to define the origin of the ground coordinate system.

Projection Definition: Choose how to represent the mapping plane coordinates. There are two options:

- **Use Grid Coordinates:** WGS84 geodetic coordinates will be transformed into mapping plane zone coordinates. Horizontal distances on the ground are usually scaled to the grid.
- **Use Ground Coordinates:** WGS84 geodetic coordinates will be transformed into ground scaled coordinates translated to a local origin. Horizontal distances on the ground are 1:1 on the grid, because the grid is scaled to the ground.

Ground Coordinates Origin: Select what point to use as the origin of the ground coordinate system relative to the origin of the mapping plane zone. The options are:

- **Origin at mapping plane origin:** Ground coordinate scale factor will be applied from the origin of the mapping plane zone.
- **Pick point to define origin:** Ground coordinate scale factor will be applied from a point selected from the job.
- **Key in coordinates to define origin:** Ground coordinate scale factor will be applied from a location entered by the user.

Ground Coordinates - Key In Origin

The Ground Coordinates Key In Origin screen is used to input the location of the ground coordinates origin. This screen is used when you select Key in coordinates to define origin on the Setup screen.

Project Location: Enter the local point from which the ground coordinate scale factor is to be applied.

Coordinate Type: Select the type of coordinates to enter. You can use WGS84 geodetic, local geodetic, or grid coordinates. This choice will affect the fields displayed below.

North/Latitude: Enter the northing / latitude of the local origin.

East/Longitude: Enter the easting / longitude of the local origin.

Elevation/Height: Enter the vertical coordinate of the local origin.

Ground Coordinates - Scale

The Ground Coordinates Scale screen is used to compute the scale factor to convert grid to ground coordinates for the reference height. This screen is used when you select either Key in coordinates to define origin or Pick point to define origin on the first page.

Reference Point Location (Local): Displays the local Latitude, Longitude, and Height of the ground origin point.

Scale Factor: Displays the inverse combined scale factor for this ground setup. This scale factor is automatically calculated based on the local ground origin.

Override scale factor: Where you can over ride the scale factor. Check this control to enable the scale factor edit field and enter any other scale factor.

Ground Coordinates - Location

The Ground Coordinates Location screen is used to define the local ground coordinate of the origin point. This coordinate will be used to calculate an offset from the mapping plane grid coordinates so that you can separate the grid and ground coordinates to make them recognizable. This screen is used when you select either Key in coordinates to define origin or Pick point to define origin on the first page.

Reference Point Location (Grid): Displays the local northing and easting of the ground origin.

Desired Local Ground Coordinate: Desired local northing and easting coordinate of the ground origin.

Ground Coordinates - Results

The Ground Coordinates Results screen is used to preview the values to be used for the ground coordinate system. This screen displays the parameters for the ground coordinate system. If the origin was set to use either Key in coordinates to define origin or Pick point to define origin on the first page, the values on this page are calculated from the parameters entered in the wizard. If the origin was set at the Mapping plane origin, then you need to enter the scale and offsets in the edit fields on this page.

Ground Offsets: Displays the shift applied to the mapping plane coordinates to get the desired local ground coordinate at the selected origin.

Scale: Displays the ground scale factor.

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Remote Elevation

[Survey] [Remote Elevation]

The Remote Elevation screen is used to compute and store a new base point elevation and vertical site by occupying a known vertical benchmark at the rover.

Note: The Remote Elevation screen is only available when a geoid model is used for the vertical projection, the horizontal projection is already solved and the base and rover are set.

Base Point: Displays the current base point number and elevation details.

[Info]: Opens detailed information about the base point.

Add Benchmark Elevation: When selected, a new point will be created in the job file with the entered elevation. We will calculate (N,E) from the GNSS measurement(lat,lng) and store the new point with the entered Elevation.

Elevation: When Add Benchmark Elevation is selected, this is the elevation of the new point.

Select Point / New Point: Existing or new benchmark point name that you will occupy.

[Set HR]: Displays the current antenna measurement and measure to setting. You can change the antenna measurement by entering a new value in the edit box. This new antenna height will be sent to the receiver with your next data collection point. You can change both the antenna measurement and measure to setting by tapping on [Set HR] to open the [Receiver Antenna](#) screen.

[**Accept**]: Updates the projection with the vertical solution calculated from the control point observation and adjusts the job coordinates to the latest projection.

[**Occupy Benchmark**]: Opens the [Occupy Control Point](#) screen where the measurement is taken by the rover on the remote benchmark. The New Elevation field of the [Remote Elevation](#) screen will then display the calculated elevation for the base point to be set on tapping [Accept].

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Import GNSS Control

[Survey] [Import GNSS Control]

The [Import GNSS Control](#) wizard is used to merge an accurate NEE location (control point source) with a GNSS collected point in the job file. This point will then be designated as a GNSS control point and can be used to solve a calibration adjustment. Solving the calibration adjustment can be done automatically at the end of this wizard, manually after the end of this wizard, or at a later time. There are three methods to import the control point source:

- Import from an XML format 'OPUS Solution Report'
- Import from a text format 'NGS Datasheet' file
- Key in a coordinate in NEE, LLH WGS84, or LLH local

Select Points and Import Source

The first screen is used to select the job points you want to merge with accurate NEE coordinates to convert to GNSS control and select how you will enter the control point source to get the accurate NEE.

[**To/From...**]: Opens the [Select Point\(s\)](#) screen where you can select points by specifying a point range.

[**Tap Points...**]: Opens a map view where you can select points by tapping them on the screen.

Select a method...: Used to select from the following sources for accurate coordinates.

- OPUS Solution Results .xml file
- NGS Data Sheet .txt file
- Key In Coordinate


[**Next >**]: Opens one of two possible screens depending on the choice made for the *Select a Method...* field in the first screen.

Enter Control Coordinate – OPUS or NGS Data Sheet

The purpose of this screen is to pick a data sheet point or OPUS solution file to use as the control point source. This is the second screen that appears when either *OPUS Solution* or *NGS Data Sheet* was selected in the first screen.

Point: Displays the name of the selected job point that the control point source will be merged into.

Search this directory...: Displays the path to look for OPUS .xml or NGS .txt files

[**Browse**]: Opens a new screen where you can select a different path to search for OPUS .xml or NGS .txt files. On , all .txt files in the specified directory are read and any valid data sheet points that are within 100 meters are then put into the drop-down list below.

Select the RINEX file, or NGS data sheet point...: Allows you to select any valid data sheet point found from the drop-down list.

[**Details**]: Opens a screen that lists the selected OPUS Solution Report or NGS data sheet point details.

[**Next >**]: Opens the final screen.

Enter Control Coordinate – Key In

The purpose of this screen is to manually input the control point coordinates. This is the second screen that appears when *Key In Coordinate* was selected in the first screen.

Point (n / x): Displays the name of the selected job point that the control point source will be merged into. A counter is included where n is the number of points set so far, including the one you are working on, and x is the number of total points to set in this sequence.

Coordinate Type: Select the type of coordinates being entered (*Grid, Local LLH, or WGS84 LLH*). The selection made here determines the format for the following three fields.

Latitude / North: The Latitude / Northing of the control point source.

Longitude / East: The Longitude / Easting of the control point source.

Height / Elevation: The Height / Elevation of the control point source.

[**Next >**]: Restarts the wizard if more control points need to be set, or opens the final screen if all control points are set.

Review Results and Finish

The final screen of the wizard shows a preview of the control point coordinates to be created. If there is only one point selected, the Single Point Results screen will open. If there are multiple points selected, the Multiple Points Results screen will be open.

Single Point Results

This page displays the values to be used to create the new GNSS control point.

New GNSS Control Point to be Created: This shows the new NEE location for the selected point, the existing LLH location, the existing NEE location, and the deltas between the new and old locations. This will also include data sheet details if the control point source comes from an NGS data sheet or an OPUS Solution Report file.

Tap [Finish] to...: Determines what will occur after tapping Finish from the following options:

- Automatically solve calibration / calibration
- Open the solve calibration/calibration wizard
- Solve the calibration/calibration later

[**< Back**]: Opens a prompt asking if you want to reenter the control source for the selected point. If [Yes], the control point source is cleared for the point and the previous screen is open. If [No], we leave the control point source and go back to the selection screen.

[**Finish**]: See the section on *Finish* below.

Multiple Point Results

This screen displays the values to be used to create the new GNSS control points.

New GNSS Control Points to be Created: For all of the selected points, this list box shows the new NEE location, the existing LLH location, and the existing NEE location.

[**Show Details**]: Shows the same details for the selected point as the [Single Point Results](#) screen shows, described above.

[**Re-Enter**]: Clears the control point source for the selected point in the list box and returns to the previous screen.

[< **Back**]: Returns to the selection screen.

[**Finish**]: See *Finish*, below.

Finish

The finish behavior will be one of three cases:

1. Create the control points, solve the calibration with all job file control points, launch the projection readjust wizard and apply the updated calibration to the map projection zone.
2. Create the control points and open the solve calibration wizard.
3. Create the GNSS control points and exit the wizard.

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Receiver Info

Access by tapping and holding the receiver in the [GNSS Receivers](#) screen or select Receiver Info from the Survey menu.

The [Receiver Info](#) screen shows the following:

Name: Name of the receiver that is currently connected.

Model: Receiver model.

Capabilities: Icons show what the receiver is capable of:



: RTK rover operations.



: RTK base operations.



: Post-processing operations.

Serial Number: Receiver serial number.

Firmware Ver: The firmware version the receiver is currently running.

Additional Information: Depending on your brand and model, additional information about the receiver may be displayed here.

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Projection Calculator

[Survey] [Projection Calc]

The [Projection Calculator](#) wizard is used to calculate scale factor or convergence (rotation) for any point on the selected mapping plane. You can use the computed values for calculations from the, Past Results power button option.

Projection: Displays the current mapping plane settings.

Select Point: Enter the name of the reference point where the rotation or scale is to be computed.

[**Calc Rotation >**]: Opens the [Projection Calculator](#) screen where the rotation is computed.

[**Calc Scale >**]: Opens the [Projection Calculator](#) screen where the scale is computed.

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Projection Calculator – Rotation

Convergence: Displays the computed rotation from grid north to geodetic north.

Rotation: Displays the computed rotation from geodetic north to grid north.

[< **Back**]: Returns you to the first [Projection Calculator](#) screen.

[**Accept**]: Copies the two computed values to past results and returns you to the first [Projection Calculator](#) screen.

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Projection Calculator – Scale – Height Correction

Ellipsoid Height: Enter the WGS84 ellipsoid height for your current location. This value will be used to calculate the height above the terrain component of the scale factor. This is sometimes referred to as the sea level correction.

[< **Back**]: Returns you to the first [Projection Calculator](#) screen.

[**Solve >**]: Takes you to the final screen.

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Projection Calculator – Scale

Mapping Plane Scale Factor: Displays the computed mapping plane scale factor on the selected mapping plane at the reference point.

Ellipsoid Scale Factor: Displays the computed ellipsoid scale factor at the reference point.

Combined Scale Factor: Displays the Mapping Plane Scale Factor multiplied by the Ellipsoid Scale Factor. This is the ground to grid scale factor.

Inverse Combined Factor: Displays the inverse of the Combined Scale Factor. This is the grid to ground scale factor and is the value used in the calibration solution.

[< **Back**]: Returns you to the previous [Projection Calculator](#) screen.

[**Accept**]: Copies the two computed values to past results and returns you to the [Main Menu](#).

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File Management

[Survey] [File Management]

The [File Management](#) routine is used to manage post processing files on a supported GNSS receiver. The routine can delete post processing files from the receiver or recover files that were recently deleted. Post processing files can also be copied or moved from the receiver to the data collector for more convenient transfers to a PC.

Active Files tab: The [Active Files](#) tab lists the details of all the files that are currently on the connection target:

- If connected to the receiver, the files on the receiver's internal memory are listed.
- If connected to the SD card, it shows all SP1 files in the SD card slots.

Files can be selected from this list to delete or copy/move to the data collector.

Connected To: The drop-down list shows the current connection mode. The states are Receiver and SD Card:

- If you change from SD Card to Receiver, the system attempts to connect to the active receiver. If this fails, or if the active receiver is not a Trimble receiver or the Spectra Precision Epoch 25 receiver, a message appears, and the setting reverts to SD Card.
- If the change is successful the file list is repopulated with the appropriate files.

[**Download Selected**]: Tap to download the selected files to \Survey Pro Jobs.

Delete After Download: Select to delete the files after they are successfully downloaded to \Survey Pro Jobs.

Note: If your connection is to the SD card, or a Trimble receiver with firmware greater than version 3.8, a message appears to warn you that it is not possible to reverse the deletion.

[**Delete Selected**]: Deletes the selected files from the receiver. If your connection is to the SD card, or a Trimble receiver with firmware ≥ 3.8 , then you see a message warning you that there is no undelete.

Recoverable Files tab: Lists the details of all the files on the receiver that were recently deleted. Files can be selected from this list and recovered.

Recover Selected File(s): Restores the selected files on the receiver.

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Start Recording

[Survey] [Start Recording]

The [Start Recording](#) screen is used to start static or kinematic (stop and go) post processing data recording on the selected receiver.

When you tap **Start Recording**, you will first be prompted to select a receiver profile with the [Connect to Receiver](#) screen.

If the selected receiver is currently not recording a post processing data file, the [Post Processing Start](#) screen will open where you can specify a recording interval to start static or stop and go data recording.

If the selected receiver is currently recording a static post processing data file, the [Static Receiver Session](#) screen will open where you can modify the session station name and antenna, or stop recording.

If the selected receiver is currently recording a stop and go post processing data file, the [Stop/Go Receiver Session](#) screen will open where you can continue stop and go data collection.

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Post Processing Start

[Survey] [Start Recording]

The [Post Processing Start](#) screen is used to select a recording interval and to begin logging either static or kinematic (stop and go) post processing data on the receiver.

Recording Interval: Select the recording interval for post processing data collection.

Start Static: Start a post processing log file in Static mode, where the receiver will remain over a single point for the duration of the session. Once the file is begun, the [Static Receiver Session](#) screen opens.

Start Stop/Go: Start a post processing log file in kinematic mode, also known as stop and go mode. The receiver will move between points, and stay stationary on points of interest for periods of time during the survey. Once the file is begun, the [Stop and Go Receiver Session](#) screen opens.

Note: The location of the file is usually on the receiver's built in memory. However, some models support collection of post processing data to a file on the data collector. For those receivers that support it, the location of the log file is specified on the [Receiver General Settings](#) screen.

Note: The Post Processing screen is used to start a post processing only survey. If you wish to record post processing data simultaneous with RTK, then you should set the recording interval on the [Set Base Receiver](#) screen and/or the [Set Rover Receiver](#) screen when starting a RTK survey

Static Receiver Session

[Survey] [Start Recording][Start Static >]
or [Survey] [Occupy]

The [Static Receiver Session](#) is used to enter the station name and antenna height for a static post processing occupation. This screen opens up after you have started a static session with the [Post Processing Start](#) screen, or if you tap [Survey] [Occupy] and you are connected to a receiver that is already logging static data.

Point : Enter the station name for the static session.

Description / Code: Enter the description or the code for the new point.

Antenna: Displays antenna setup for this receiver.

[**Set HR**]: Opens up the [Receiver Antenna](#) screen, where you can modify the antenna type and measurement for this receiver

[**Apply**]: Sends the current station and antenna information to the receiver.

Note: Some receivers cannot change the station name and antenna height of a session once it is started, therefore, this button may be disabled depending on your brand and model, and the state of the current post processing survey.

[**End Survey**]: Ends the static point occupation, and closes the file.

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Stop/Go Receiver Session

[**Survey**] [**Start Recording**] [**Start Stop/Go >**]

or [**Survey**] [**Occupy**]

or [**Survey**] [**Control Points**] [**Post Process**]

The [Stop/Go Receiver Session](#) screen is used to mark the beginning and end of static segments during the stop and go post processing log file. You can enter the point name and descriptions of the static segments, as well as change the antenna height for occupations. This screen can also be used by the RTK rover to record an extra occupation to the post processing file when logging post processing simultaneous with the RTK rover.

Point : Enter the station name for the stop and go point.

Description / Code: Enter the description or the code for the new point.

Session Duration: Allows you to specify how long you want each static occupation during the stop and go file to last.

Log Until Stop: Check this control to have the static occupation continue until you tap [**Stop**]. If this is unchecked, the static occupation will last as many minutes and seconds that you have set in the duration edit fields.

[**Start**]: Marks the beginning of a static point occupation with the entered *Site ID* and *Description* or *Code*.

[**Apply**]: Updates the static occupation with any changes of the Site ID, Description, or antenna height. This button only appears after you have tapped [**Start**] to begin a static occupation, and only for brands and models that support this function.

[**Stop**]: Marks the end of the static occupation.

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Stop Recording

[**Survey**] [**Stop Recording**]

The Stop Recording screen is used to stop post processing logging and close the file on the current active receiver.

When you tap [**Stop Recording**], you are first prompted to select a receiver with the [Connect to Receiver](#) screen. If the selected receiver is logging data, you will be prompted to end logging and close the file.

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Leveling Menu

The Leveling Menu contains routines to perform vertical leveling surveys with an optical automatic level, a digital automatic level, or using the trigonometric leveling procedure with an optical total station.

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Select/Create Loop

[Survey] [Select/Create Loop]

The Select/Create Loop screen is used to select a loop that has not yet been closed, view the notes for any existing loop, or create a new level loop.

Select an Existing Loop: allows you to select an existing loop from the dropdown list.

[Activate Selected Loop]: opens the selected loop so new data can be added to it. (This button will not be available when a closed loop is selected.)

[View Level Notes for Selected Loop]: displays the notes for the selected loop in the [Level Notes](#) screen.

[New Loop >]: opens the [New Level Loop](#) screen where a new loop can be created.

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New Level Loop

[Survey] [Select/Create Loop] [New Loop >]

The New Level Loop screen is used to create a new level loop.

New Loop: is where you enter a name for the new loop.

CBM: is the opening control benchmark (CBM). The opening CBM must be an existing point in the job with a vertical coordinate that is keyed in.

[Next >]: opens the [next screen](#).

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New Level Loop – Screen 2

Desc: is where you can enter an optional description for the new loop.

[< **Back**]: returns to the previous screen.

[Create Loop]: creates the new loop.

[Select/Create Loop Index](#)


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Level Notes

[Survey] [Level] [Notes]

or [Leveling] [Select/Create Loop] [View Level Notes for Selected Loop]

The Level Notes screen shows the details of every observation taken for the current loop. If the loop was closed, additional closure details are also provided.

The appearance of this screen can be customized by tapping the  button to open the [Level Notes Settings](#) screen.

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Level Notes Settings

[Survey] [Level] [Notes] 

The [Level Notes Settings](#) screen is used to customize what and how the information in the [Level Notes](#) screen is displayed.

Station/Point Name: displays the Station column where the name of each point and the number of each turning point observation is listed. This column cannot be turned off.

BS(+): is the column that lists all the backsight readings. This column cannot be turned off.

BS Dist: When checked, a column is displayed that lists the horizontal distances measured from the instrument to each backsight.

HI: is the column that lists the elevations computed for the instrument at each setup. This column cannot be turned off.

IS(-): When checked, a column is displayed that lists the readings for all intermediate observations. (Intermediate observations include sideshots and stakeout shots, which are not included as legs of the level loop.)

IS Dist: When checked, a column is displayed that lists the horizontal distances measured from the instrument to each intermediate observation. (Intermediate observations include sideshots and stakeout shots, which are not included as legs of the level loop.)

FS(-): is the column that lists all the foresight readings. This column cannot be turned off.

FS Dist: When checked, a column is displayed that lists the horizontal distances measured from the instrument to each foresight.

Elev: is the column that lists the elevation computed for every point observation. This column cannot be turned off.

Desc: When checked, a column is displayed that lists the description for each point observed that exists in the current job. (Turning points are not stored in the job and therefore do not have descriptions.)

Column Width: When Auto Resize is checked, the column widths are automatically sized so the content of each column is visible.

Style: When set to Compact, the backsight data for a particular setup is displayed on the same row as the foresight data from the previous setup. When set to Double Spaced, the data for each backsight and foresight observations are displayed in separate rows.

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Level

[Survey] [Level]

The [Level](#) screen provides information about the current level loop and is used to specify which of the four possible observation types to shoot next.

Current Loop Details: displays details about the current loop.

Backsight Point: displays details about the current backsight. Most of these details will only be available after the observation to the backsight is completed.

[**Sideshot>**]: Opens the [Leveling Shot](#) screen, where a leveling observation to a side shot point is taken or entered. You can create a new point with a level sideshot observation. This point will have a measured vertical coordinate, and no horizontal coordinate. You can also select an existing point to observe as a level sideshot. This point will have its vertical coordinate updated by the level measurement, but its horizontal coordinate will be unchanged.

[**Stakeout >**]: opens the [Stakeout](#) screen where a vertical design point is chosen, and then the leveling observation is taken or entered.

Note: Level sideshot points and level stake out points are spurs to the level loop, and are not included as benchmark points in the loop.

[**Turn to Benchmark >**]: Opens the [Leveling Shot](#) screen, where a leveling observation to a benchmark point is taken or entered. A benchmark point is a point in the level loop that you wish to store in the job file. You can create a new point with a level benchmark observation. This point will have a measured vertical coordinate, and no horizontal coordinate. You can also select an existing point to observe as a level benchmark. This point will have its vertical coordinate updated by the level measurement, but its horizontal coordinate will be unchanged.

Note: To close a level loop, your last observation should be a **Turn to Benchmark** sequence, where you select an existing control benchmark as the point to observe. When you select **Turn to Benchmark**, and then choose an eligible control bench mark as the point to observe, the [Point Exists](#) screen will give you the option of closing the loop on this observation.

[**Turn to Turning Point...**]: Opens the [Leveling Shot](#) screen, where a leveling observation to a turning point is taken or entered. Turning points are not stored in the job file, and you will see these observations referenced in the level notes as \$TP1 - \$TPn for each loop.

[**Notes**]: displays all the [notes](#) for the current level loop.

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Leveling Shots

[Survey] [Level] [Turn to ---]

The [Leveling Shots](#) screen is used to perform the required observations to the point in the level loop. The specific observations you are prompted for depends on the observation type, the number of sets, and the sequence.

You will only be prompted to observe a backsight while performing the first observation from any given setup.

The top line indicates if you are observing your backsight or foresight, and which point you are observing in relation to the entire loop.

The box on the second line tells you which observation to take next. The term B1 means to shoot the backsight for Set 1. If the box showed F3, it would mean to shoot the foresight for Set 3, and so on.

[**Take Shot**]: takes the observation indicated within the box on this screen.

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Leveling Shot Results

The Shot Results screen opens when you are finished taking the observation necessary for the current set.

[**Toss**]: will delete the observations from the set that has the worst residual. Each consecutive tap of this button will delete the next observation set with the worst residual until all the sets are eventually deleted.

[**BS...**]: allows you to take additional observations to the backsight. You will be prompted to take the number of sets specified in the Level Settings screen.

[**FS...**]: allows you to take additional observations to the foresight. You will be prompted to take the number of sets specified in the Level Settings screen.

[**All...**]: allows you to take additional observations to the backsight and foresight. You will be prompted to take the number of sets in the shooting sequence specified in the Level Settings screen.

[**Store Observation**]: records the observation and returns you to the Level screen where you can specify which type of observation to shoot next.

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Leveling Stakeout

[**Survey**] [**Level**] [**Stakeout >**]

The Leveling Stakeout screen is used to measure the elevation at an existing point and compute a cut/fill value.

Stk Point: is the point in the current job that you want to shoot to determine the cut/fill value.

Backsight Point: Lists the details for the current backsight. If this is the first observation from the current set up, most of the details will be unknown.

[**Next >**]: opens the Take Shot screen where the required observations are performed.

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Point Exists

The Point Exists screen will appear after shooting a benchmark that is already stored in the current job and is used to overwrite the point, create a new point, or access the Close Loop screen to close the loop.

[**Use Next**]: allows you to create a new point with an elevation measured from the leveling observation. This new point will have a vertical coordinate only.

[**Update Elevation of Existing Point**]: allows you to update the vertical coordinate of an existing point. Choose this option to set the vertical coordinate of the point from the level measurements, but to retain the existing horizontal coordinate.

[**Close Loop On Existing Point**]: This option only shows when the existing point chosen is a valid closing control benchmark. Choose this option to open the [Close Loop](#) screen where you can commit the final observation of the level loop and examine the closure.

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Close Loop

The [Close Loop](#) screen lists the notes for the current level loop and allows you to close the current loop. This is the only screen that can be used to close a loop.

[**Close Level Loop**]: closes the current level loop and opens the [Level](#) screen where no additional observations can be taken.

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2 Peg Test

[Survey] [2 Peg Test]

The [2 Peg Test](#) screen is used to check that the line of sight through the level is horizontal when the bubble is properly centered.

The graphic of this screen shows the current setup and indicates which observation you will be taking next with a red square. The first line of text also indicates which observation must be taken next.

[**Check H. Dist**]: This button only appears after shooting the initial observations to Point A. This will measure the horizontal distance to Point B and compare it with the distance already measured to Point A. Come/go information is then provided so the rod over Point B can be moved until it equals the horizontal distance to Point A. Use of this button is optional and the results are not used for computing the error.

[**Take Shot**]: takes the required sets of observations to the point indicated on this screen.

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2 Peg Shots

[Survey] [2 Peg Test] [Take Shot]

The [2 Peg Shots](#) screen is used to perform the required observations to whichever set you are performing. The specific observations you are prompted for depends on which rod you are shooting and the number of sets configured in the

Level Settings screen.

The top line indicates if you are shooting the rod over Point A or Point B, and if you are observing the sets for the first or second setup.

The box on the second line tells you which observation to take next. The term A1 means to observe the rod over Point A for Set 1. If the box showed B3, it would mean to observe the rod over Point B for Set 3.

[**Take Shot**]: takes the observation indicated within the box on this screen.

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Peg Test Results

The Peg Test Results screen appears after all the required observations are performed for a peg test. The screen lists the details for all the observations taken and the computed error. All the observations taken and the error are recorded only in the raw data file.

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Leveling Adjustment

[**Survey**] [**Adjustment**]

The Adjustment routine allows you to perform a simple arithmetic elevation error adjustment to an existing closed loop. You can choose to distribute the error equally to each setup, or apply a weighted adjustment proportional to the distance between each setup.

Weigh by # of Setups: This option divides the computed error equally among each setup selected in the loop.

Weigh by Length of Setups: This option distributes the error where each setup is adjusted by an error proportional to the length between them, so setups that are farther apart will carry a larger portion of the error adjustment than the setups that are closer together.

Adjust Loop From Begin To End: This option includes every setup of the selected level loop in the error adjustment.

Adjust Loop From a Specific Point To End: This option will only adjust the setups starting from an alternative benchmark specified in the Begin CBM Pt field to the end of the loop.

Closed Loop Name: is where you select the loop to adjust from the dropdown list. Only closed loops are available.


Begin CBM Pt: This item is only available when **Adjust Loop From a Specific Point To End** is selected above and allows you to select an alternative benchmark starting point in the loop for the adjustment. Any setups prior to the selected benchmark will not be adjusted. The description and elevation for the selected benchmark are displayed at the bottom of the screen.

[**Next >**]: opens the Adjustment Preview screen.

Adjustment – Preview Screen

The second adjustment screen allows you to preview the details of the adjustment before applying it.

[< **Back**]: Returns to the previous screen without applying the adjustment so changes can be made to the configuration.

Note: If you do not want to apply the adjustment and do not want to make changes to the configuration, simply tap  to cancel and close the screen.

[**Adjust**]: Performs the adjustment and opens a screen that details the results.

Note: If the selected loop has already been adjusted or if the computed error is negligible, the [Adjust] button will be inactive.

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Leveling Remote Control

[Survey] [**Remote Control**]

The Remote Control screen can only be accessed in leveling mode when trigonometric leveling with a robotic total station. The Remote Control screen.

All observations performed while trigonometric leveling with a robotic total station are performed from the Remote Control screen.

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Stakeout Menu

The [Stakeout Menu](#) contains a variety of stakeout routines, including offset staking.

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Note: The stakeout routines behave differently when running in remote control mode. For a description of this special mode, see the [Remote Control](#) section of the User's Manual.

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Stake Points

[**Stakeout**] [**Stake Points**]

The [Stake Points](#) screen is used to select design points and then stake them out.

[**By Points / By Managed Points**]: is used to select how you want to make the selection of design points.

- **By Points** is used if you want to enter design points manually. In this mode, you select the design points by inputting a point name one at a time, and then advance to the next point in the job file by proximity or by name increment.
- **By Managed Points** is used if you want to stake the collection of points from the [Manage Design Points](#) screen.

Point: is the name of the design point you will be staking when you tap [**Solve >**].

Desc: shows the description of the currently selected design point.

[**Manage Design ...**]: opens the [Manage Design Points](#) screen.

[**Next Point by Increment / Next Point by Closest Pt.**]: when staking individual points, is used to toggle how you want the design point to advance when you tap next:

- **Next Point by Increment** when staking individual points, is used if you want the design point to be the next point name incremented by the entered value.
- **Next Point by Closest Pt** when staking individual points, is used if you want the design point to be the next point that is closest to the currently entered design point

[**Next Closest / Next Point**]: when staking individual points, advances to the next design point, either by proximity or name increment.

[**Next Point**]: when staking the collection of managed points, advances to the next design point in the ordered sequence.

Height of Rod: is the length of the rod.

[**Backsight...**]: opens the [Station Setup](#) screen.

[**Solve >**]: takes you to the second [Stake Points](#) screen where the distance and direction to the design point is displayed, see below.

: opens the [Stakeout Settings](#) screen.

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Stake Points - Screen 2

The Stake Points Screen 2 is used to guide you where to turn the mechanical optical total station to be pointing at the design point. This screen only present when you are using a mechanical optical total station.

Design point: displays the name of the design point that was entered in the first screen.

Description: displays the description assigned to the design point.

Angle Right: is the horizontal angle to turn to face the design point.

Horz. distance: is the horizontal distance from the occupy point to the design point.

Vert Distance: is the vertical distance from the occupy point to the design point.

ZE to Rod: is the zenith angle required to face the prism over the design point.

[Circle Zero]: is used to modify the circle on the total station so that the angle right reading will be zero when it is facing toward the design point, which can sometimes be easier than turning to an obscure angle value. When this button is tapped, the following actions will occur:

1. A new backsight circle value is computed, sent to the instrument and stored in the raw data
2. The Angle Right value is changed to zero to reflect the change. The instrument now needs to be turned horizontally to zero to face the design point.
3. To prevent errors, the backsight set up is invalidated when exiting the Stakeout dialog if this button has been used. A circle zeroed on a design point is meaningless once the design point has been staked.
4. The first time **[Circle Zero]** is used during a stakeout session, a dialog will appear to warn that the original backsight reference will be lost.

Note: The **[Circle Zero]** button is not available when using a robotic total station.

[< Back]: returns to the first screen.

[Stake >]: opens the third and final Stake Points screen where the shots to the stake point are performed.

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Stake Points - Screen 3

Height of Rod: is the length of the rod.

Design Elev: displays the current design elevation, which can be modified with the **[Change...]** button.

FORWARD/BACK: indicates if the rod must move forward (toward the total station) or backward (away from the total station).

Go RIGHT/Go LEFT: indicates if the rod must move to the right or left from the total station's point of view.

EDM: This button can be toggled to shoot in various EDM modes. The options available depend on the total station being used. Consult the total station's documentation for more information on the EDM modes that it supports.

CUT/FILL: displays the required amount of cut or fill to bring the stake point to the design point's elevation.

Rod Elev: displays the elevation at the rod's location computed from the last shot.

[**Change...**]: is used to modify the current design elevation, which will also modify the associated CUT/FILL value for the current station being staked.

[**Shot**]: takes a shot to the prism and computes come/go, cut/fill information.

Shot data: displays the measurements from the last shot.

[**Store...**]: stores the stake point.

[**Store/Tape...**]: opens the [Stake Out Point \(Tape Offset\)](#) screen where the staked point can be stored that includes a specified offset. The default value is the appropriate distance correction to the design point.

[**Topo SS...**]: stores a sideshot using the data from the last shot taken. (This will not take a new shot.)

[**Turn Instrument**]: (available with robotic total station) turns the total station toward the design point.

[< **Back**]: returns to the second screen.

[**Stake Next >**]: returns you to the previous [Stake Points](#) screen where the Design point is advanced by the Increment value.

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Instrument Stakeout

[Instrument Stakeout](#) is a special stakeout option only available when using a Nikon DTM or NPL series total station while the [Send Stakeout Data to Instrument](#) option is checked in the [Instrument Settings](#) screen.

When using [Instrument Stakeout](#), a new stakeout screen will appear after you tap [**Stake >**] from the [Stake Points - Screen 2](#). The stakeout data is then sent to the total station where the controls on the total station are used to stake the point.

Once you are satisfied with the stake location, tap [**Take Final Shot >**] to shoot the final stakeout location and proceed to the [Stake Points – Screen 3](#).

If you tap [**Shot**] from [Screen 3](#) to take another shot, you will return to the [Instrument Stakeout](#) screen, where you can once again use the controls on the total station to stake the point.

HR: is the rod height.

[**Update HR on Instrument**]: If a new rod height is entered in the HR field, or if a new Smart Target is selected, this button sends the new HR information to the total station.

[**Take Final Shot >**]: Once you are satisfied with the stake location, this button will take a final shot before proceeding to the next Stake Point screen ([Screen 3](#)).

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Remote Staking

[Stakeout] [Stake Points] [Solve >] [Stake >]

Performing stake out in remote mode is different from running in a non-remote mode because the feedback is continuous and provided in the rod's point of view instead of the total station's point of view.

When staking in remote mode, the first four shots taken in a row where no distance is returned will result in a beep to warn that the instrument has possibly lost track of the prism.



[+]: Toggles the staking display between map view and bullseye view.

[Done]: when you are satisfied with the location of the prism, this button will open the final [Stake Points](#) screen where the staked point can be stored.

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Manage Design Points


[Stakeout] [Manage Design Points]


The [Manage Design Points](#) screen is used to select a set of job points to be staked out, and then to manage the collection as design points are staked and as staked points are stored.

Points: use the selection controls to make a selection of points. The selection will be added to the current collection of design points.

Add: Add the selected points to the collection of managed points.

- : Allows you to select points using a variety of other methods.


 **Staked**: shows the total count of points in the current collection that are marked as staked.


 **Unstaked**: shows the count of points from the current collection that still need to be staked out.



: allows you filter the list of the collection of design points. You can choose to view all points, only staked points, or only unstaked points.

The point list shows the current collection of managed stake points. Design points that have yet to be staked are marked with a point icon. Points that have already been staked are marked with a red flag.

 : tap this button to move the selected point up in the order.


 : tap this button to move the selected point down in the order.




: tap this button to toggle the state of the selected point between staked and not staked.



: tap this button to toggle the state of all points (staked to unstaked or unstaked to staked).

 : tap this button to remove the selected point from the collection.

 : tap this button to remove all points from the collection.

 : tap this button to reverse the order of the list.

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Stake to Line

[Stakeout] [Stake to Line]

The Stake to Line screen allows you to locate any location in relation to a predefined line. The line can be defined by two points, a point and direction, a polyline or the centerline of an alignment. Distance, direction and cut/fill information is provided so the rod can locate the line by traveling the shortest possible distance (a perpendicular offset to the line).

[> **Define Line**] / [> **Polyline**]: When set to [**Define Line**] (shown here), a line can be defined by two points or a point and a direction. When set to [**Polyline**], (shown below) the line is defined by an existing polyline.

Start Point: defines the first point of the line to be staked.

[> **Point**] / [> **Direction**]: defines the second point on the line, or the direction of the line to be staked, respectively.

Begin Station: defines the station associated with the Start Point.

[**Tap Line...**]: displays a map of all the polylines and alignments in the current job. Simply tap the line that you want to stake to and then tap .

[**To/From...**]: opens a window where a line can be defined by a range of points.

[**Backsight...**]: opens the [Station Setup](#) screen.

[**Stake>**]: takes you to the second [Stake to Line](#) screen.

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[Stakeout Menu Index](#)

Stake to Line- Screen 2

The second screen is where the staking is performed. The graphic display of this screen will change depending on how close the rod is to the specified line. The initial screen, that is displayed before a shot is performed, shows the position of the total station, the line of the backsight and the specified line to stake. Each type of graphic is displayed below.

HR: is the rod length.

EDM: This button can be toggled to shoot in various EDM modes. The options available depend on the total station being used. Consult the total station's documentation for more information on the EDM modes that it supports.

BACK / FORWARD: is the distance that the rod must travel **BACK** (away from the total station) or **FORWARD** (toward the total station) in order to occupy the specified line.

LEFT of Line / RIGHT of Line / ON LINE: is displayed if the rod is to the left or right side of the line, or is on the line. The LEFT and RIGHT side is determined as if occupying the Start Point and facing the Foresight Point or Direction of the line, specified in Screen 1. ON LINE is determined if you are within the Line Tolerance specified in the [Stakeout Settings](#) screen.

Offset Dist.: is the perpendicular offset from the specified line to the rod. This is the minimum distance that the rod must travel to occupy the line.

Station: is the station on the specified line where the offset occurs, relative to the Start Point.

Shot Data: displays the information measured by the total station during the previous shot.

Cut / Fill: displays the required amount of cut or fill to bring the stake point to the elevation of the reference line at the nearest perpendicular.

Note: If staking beyond the end points of the reference line, or if the reference line is defined by a 2D point, no vertical data is computed.

[**Meas**]: contains the information measured by the total station during the previous shot.

[**Shot**]: takes a shot to the prism.

[< **Back**]: returns to [Screen 1](#).

[**Store**]: opens the [Store Point](#) screen so you can store the last point that was shot.

[Stake Line Index](#)

[Stakeout Menu Index](#)

Remote Stake to Line

The contents of the [Stake to Line](#) screen when running in remote mode is nearly identical to running in non-remote mode except the graphic portion of the screen looks and behaves differently. Point the data collector toward the total station for proper orientation and the graphic tells you the direction to travel to reach the line in the shortest distance.

If the **Use Manual Updating (Remote Control)** field is checked in the [Stakeout Settings](#) screen, a [**Shot**] button will be available, which allows you to manually control when shots are taken.

[Stake Line Index](#)

[Stakeout Menu Index](#)

Offset Staking

[**Stakeout**] [**Offset Staking**]

The [Offset Staking](#) screen is used to stake the center of a road, the road edge, the curb/ditch edge, or any offset at fixed intervals. An existing polyline, alignment, or a specified point range can define the centerline of the road.

The first [Offset Staking](#) screen is used to define the centerline of the road that you want to offset stake.

[**Tap Line...**]: displays a map of all the polylines and alignments in the current job. Simply tap the line that you want to offset stake and then tap .

[**To/From...**]: opens a window where a range of points can be defined. The points within the specified range will define the centerline of the road to be offset staked.

Begin Station: is the station assigned to the first point of the selected polyline or point range.

[**Backsight...**]: opens the [Station Setup](#) screen.

[**Next>**]: takes you to the second [Offset Staking](#) screen.

[Stake Offset Index](#)

[Stakeout Menu Index](#)

Offset Staking - Screen 2




The second [Offset Staking](#) screen is used to define the cross section of the road that you want to offset stake.

1/2 Road Width: is the **Left** and **Right** width of the road, respectively, from the centerline to the edge of payment. (See diagram below.)

X-Slope (%): is the **Left** and **Right** slope of the road, respectively, from the centerline to the edge of payment.

Note: A negative slope will result in water running from the centerline toward the edge of payment.

Stake Curb / Ditch: When checked, a curb or ditch and an offset can be defined beyond the edge of the pavement.

[**Shape 1**]:  / [...2]:  / [...3]: : when staking a curb / ditch, this button allows you to select the shape of the curb, ditch, or slope beyond the edge of pavement so cut / fill information can be computed on this surface if a random offset is specified. The selected shape is displayed by an icon next to the button, as well as with a bold line in the road's cross-sectional profile at the bottom of the screen.

Note: The selected Shape is irrelevant if a random offset is not specified since the nodes are always in the same place for each shape that uses the same Height and Offset values.

Height: is the height of the curb, ditch, or slope in feet or meters. A positive value is considered a curb and a negative value a ditch.

Offset From Edge of Road: is the distance that the curb or ditch extends from the edge of pavement.

Note: The specified curb or ditch height and offset will be applied to both sides of the road.

[< **Back**]: returns to the [previous screen](#).

[**Next >**]: opens the [next screen](#).

[Stake Offset Index](#)

[Stakeout Menu Index](#)


Offset Staking - Screen 3

The third [Offset Staking](#) screen is used to select the station and section of the road to be staked and to specify an offset distance from the design point.

Station to Stake: is the station to be staked.

Station Interval: specifies how far to advance from the current station to the next station.

[**Next Sta**]: advances the current station by the Station Interval.

Note: When advancing, if you want to also stake the locations where the alignment of the road changes, be sure to check the Stake “Corners”, Not Just Even Intervals option in the [Stakeout Settings](#) card. Tapping the  button will access the [Stakeout Settings](#).

Automatic Advancement: Check this control if you want to stake stations and nodes in a sequence. You can choose to go in sequence back and forth, where you stake every node at each station before moving to the next station, or you can choose to go in sequence up and down, where you stake each station at every node before moving to the next node.

[**Configure**]: Opens up the [Automatic Advancement](#) screen where you can configure the sequence for automatic advancement of staking location.

[<<] / [>>]: These buttons are used to select the section of the road that you want to stake.

Offset: When checked, is the offset distance that will be applied to the selected design point. A positive offset extends from the design point away from the centerline. A negative offset extends towards the centerline.

Subgrade: When checked, allows you to specify a vertical offset from the actual node locations. Positive values result in the stake location occurring below the selected node. Negative values result in the stake location occurring above the selected node.

X-Slope (%): is the slope of the selected road section.

1/2 Road Width: displays the width of the selected road section defined in the previous screen. This value can quickly be edited from this field.

HR: is the rod height.

[**Backsight...**]: opens the [Station Setup](#) screen.

[< **Back**]: returns to the [previous screen](#).

[**Solve >**]: opens the [next screen](#).

[Stake Offset Index](#)

[Stakeout Menu Index](#)

Offset Staking - Screen 4

The fourth [Offset Staking](#) screen displays the information needed to aim the total station toward the selected design point.

Station: displays the current station and section of the roadway being staked and the current line segment type from the polyline that describes the centerline. If staking the center and an offset was specified, (To L) or (To R) is also displayed to indicate if the offset is to the left or right of the centerline, respectively.

Offset: displays the offset that is applied to the design point.

Slope: displays the slope of the road at the section being staked.

From Instrument to Design Point: displays the angle and distance information from the total station to the design point (plus offset if specified).

[Circle Zero]: is used to modify the circle on the total station so that the angle right reading will be zero when it is facing the current target, which can sometimes be easier than turning to an obscure angle value. When this button is tapped, the following actions will occur:

1. A new backsight circle value is computed, sent to the instrument and stored in the raw data
2. The Angle Right value is changed to zero to reflect the change. The instrument now needs to be turned horizontally to zero to face the current target location.
3. To prevent errors if this button is used, the backsight set up is invalidated when exiting the Stakeout dialog. A circle zeroed on a design point is meaningless once the design point has been staked.

Note: The **[Circle Zero]** button is not available when using a robotic total station.

[< Back]: returns to the [previous screen](#).

[Stake >]: opens the [next screen](#).

[Stake Offset Index](#)

[Stakeout Menu Index](#)

Offset Staking – Screen 5

Height of Rod: is the length of the rod.

Design Elev: displays the current design elevation, which can be modified with the **[Change...]** button.

FORWARD / BACK: indicates if the rod must move forward (toward the total station) or backward (away from the total station).

Go RIGHT / Go LEFT: indicates if the rod must move to the right or left from the total station's point of view.

EDM: This button can be toggled to shoot in various EDM modes. The options available depend on the total station being used. Consult the total station's documentation for more information on the EDM modes that it supports.

CUT / FILL: displays the required amount of cut or fill to bring the stake point to the design point's elevation.

Rod Elev: displays the elevation at the rod's location computed from the last shot.

[Change...]: is used to modify the current design elevation, which will also modify the associated CUT/FILL value for the current station being staked.

[Shot]: takes a shot to the prism and computes come/go, cut/fill information.

Shot data: displays the measurements from the last shot.

[Store...]: opens the [next screen](#).

[**Store/Tape...**]: opens the [Stake Out Point \(Tape Offset\)](#) screen where the staked point can be stored that includes a specified offset. The default value is the appropriate distance correction to the design point.

[**Topo SS...**]: stores a sideshot using the data from the last shot taken. (This will not take a new shot.)

[**Turn Instrument**]: (available with robotic total station) turns the total station toward the design point.

[**< Back**]: returns to the [previous screen](#).

[**Stake Next >**]: If **Automatic Advancement** is enabled, Survey Pro will advance the section and/or station you are staking, and initiate the stakeout observation for the next design location. If **Automatic Advancement** is disabled, returns you to the second [Offset Staking](#) screen, without storing a stake point, where the Design point is advanced by the Increment value.

[Stake Offset Index](#)

[Stakeout Menu Index](#)

Offset Staking – Screen 6

This screen is used to describe the stake point before it is stored and select if the [Results](#) screen should be displayed.

Point: is the point name for the stake point being stored.

Description: Enter the description for the new point.

Show Results on OK: When this checkbox is checked, a [Results](#) screen will open after tapping  from this screen.


Note: This screen will not appear if the *Write Cut Sheet Data Only (No Store Point)* checkbox is checked in the [Stakeout Settings](#) screen, although the [Results](#) screen will still appear if the *Show Results on OK* checkbox was never unchecked from this screen. (It is checked by default.)

[Stake Offset Index](#)

[Stakeout Menu Index](#)

Offset Staking – Stakeout Results

This screen shows detailed cut/fill values, which may be needed when marking a road or offset stake.

 (Close): returns you to the second [Offset Staking](#) screen where the *Design Point* is advanced by the *Increment* value.

[Stake Offset Index](#)

[Stakeout Menu Index](#)

Automatic Advance

The [Automatic Advance](#) screen is used to configure the sequence for staking road offset design locations.

Advancement Mode: Select one of four advancement modes:

- **Mode 1:** Use this mode to go left to right across the profile, staking every node at the current station, and then

return right to left staking every node at the next station.

- **Mode 2:** Use this mode to go right to left across the profile, staking every node at the current station, and then return left to right staking every node at the next station.
- **Mode 3:** Use this mode to go up the alignment, staking the current node at every station, and then return down the alignment staking the next node at every station.
- **Mode 4:** Use this mode to go down the alignment, staking the current node at every station, and then return up the alignment staking the next node at every station.

When using Automatic Advancement, the first design location to stake is always the currently selected node at the current stake station. The next design location to stake will be the next node defined by the **Advancement Mode** selection.

When your **Advancement Mode** is choice 3 or 4 (up and down), you can define a region of the selected alignment to stake in sequence. Enter a value for the **Start Station** and **End Station** to define the region.

Start Station: Enter a station to start this sequence at.

End Station: Enter a station to end this sequence at.

Note: When using the automatic advance feature, the stakeout routines will always behave as if the **Perfect Stationing** setting is enabled. This is required in order to line up the sections of the sequence. This will not change your **Perfect Stationing** setting on the [Stakeout Settings](#) screen.

[Stake Offset Index](#)

[Stakeout Menu Index](#)

Slope Staking

[Stakeout] [Slope Staking]

The [Slope Staking](#) screen is used to locate the catch points for a roadway in any terrain.

The first screen is used to define or select the line that describes the centerline of the road to be slope staked. An existing polyline or alignment can be selected, or a series of existing points can be entered to define the centerline.

[**Tap Line...**]: allows you to tap an existing polyline or alignment that defines the centerline of the road.

[**To/From...**]: allows you to enter a range of points to define the centerline of the road.

Begin Station: defines the station at the beginning of the centerline.

[**Backsight...**]: opens the [Station Setup](#) screen.

[**Next>**]: opens the [next screen](#).

[Slope Staking Index](#)

[Stakeout Menu Index](#)

Slope Staking - Screen 2

The second screen is used to describe the profile of the road.

1/2 Road Width: is the horizontal width of **Left** and **Right** sides of the road, respectively, from the centerline to the nearest edge of the curb or ditch.

X-Slope: is the cross slope of the **Left** and **Right** sides of the road, respectively. The slope is computed from (rise/run)x100. (A negative slope will cause water to run from the centerline toward the edge.)

Stake Curb / Ditch: When checked, this allows you to include a curb or ditch in the road profile.

Height: defines the height of the curb, or depth of the ditch. (A negative value would be used to define the depth of a ditch.)

Offset From Edge of Road: defines the width of the curb or ditch.

[< **Back**]: returns to the [previous screen](#).

[**Next** >]: opens the [next screen](#).

[Slope Staking Index](#)

[Stakeout Menu Index](#)

Slope Staking- Screen 3

Station to Stake: is the station that will be staked next.

Station Interval: is the value that is added to the Station to Stake after the [**Next Station**] button is pressed.

[**Next Station**]: advances the Station to Stake by the Station Interval.

Note: If the Stake Corners option is selected in the [Stakeout Settings](#) screen, the [**Next Station**] button will also stop at any horizontal or vertical alignment node that falls within the interval.

Fill Slope: is the desired slope, calculated from run over rise, between the hinge point and catch point when the area requires a fill.

Cut Slope: is the desired slope, calculated from run over rise, between the hinge point and catch point when the area requires a cut.

Segment # (Fill HP): when the terrain requires a fill, you have the option to compute the hinge point from either side of the second segment. The option to use segment # 1 can simplify the situation where a ditch meets an area requiring a fill, which would otherwise result in an area with two similar or identical negative slopes.

[< **Back**]: returns to the [previous screen](#).

[**Stake CP** >]: opens the [next screen](#).

[Slope Staking Index](#)

[Stakeout Menu Index](#)

Slope Staking- Screen 4

The fourth screen is used to perform the actual slope staking shots.

Left / Right: displays if a Cut or Fill slope is being computed and if it is on the Left or Right side of the road, respectively.

Rod Elev: is the current elevation at the rod location.

Des. Slope: is the design cut or fill slope.

Obs. Slope: is the computed (observed) cut or fill slope based on the last shot and the corresponding hinge point.

Cut / Fill: is the cut or fill required for the current rod location to be positioned on the design slope.

Toward CL / Away CL: is the computed horizontal distance that the rod must move either toward the centerline or away from it, respectively, before it is positioned at the catch point.

Note: The computed horizontal distance is based on the observed terrain computed from the last two shots. If only one shot has been taken, it is assumed that the terrain is level when computing this value.

On Station / Back Sta / Ahead Sta: informs you if the rod is on the station being staked, or the distance it must move (parallel to the centerline) back or ahead to be on the correct station.

HD to HP: is the horizontal distance from the rod to the hinge point.

VD to HP: is the vertical distance from the rod to the hinge point.

HD to CL: is the horizontal distance from the rod to the centerline.

VD to CL: is the vertical distance from the rod to the centerline.

EDM: This button can be toggled to shoot in various EDM modes. The options available depend on the total station being used. Consult the total station's documentation for more information on the EDM modes that it supports.

[Results]: This will display the following additional cut, fill, and location information:

- Type of slope (e.g. left/right, cut/fill)
- Design and observed slope ratios (run over rise)
- Design and actual stations
- HD and Cut/Fill to Hinge Point
- HD and Cut/Fill to Center Line
- If applicable, HD and Cut/Fill to Edge of Pavement and Edge of Curb
- Name of segment and HD and Cut/Fill to that segment extremity (Road Slope Stake only)

Note: The **[Results]** button is only available from the Store Catch Point screen (Screen 5, below) when using GNSS or Remote mode, which is accessed after tapping **[Store >]**.

The button described below selects which information is displayed on the screen from the following options:

- **[Vertical Map]:** displays a cross-sectional view at the current station.

Note: When you tap a map view, an expanded view of the same map will fill the screen.

Note: The Vertical Map will show an X at the location of each previous shot. This can be useful in determining if the current terrain will never intersect the slope (no catch point).

-
- [**Horizontal Map**]: displays an overhead view of the job.
 - [**Shot Data**]: displays the shot data for the latest shot.

The button described below selects the type of slope that will be used between the catch point and hinge point from the following options:

- [**Automatic Slope**]: selects the slope that is nearest to the current rod position.
- [**Force CUT Slope**]: forces all computations to be based on a cut slope.
- [**Force FILL Slope**]: forces all computations to be based on a fill slope.

[**Topo SS...**]: will store the last shot taken as a sideshot.

HR: is the rod height.

[< **Back**]: returns to the [previous screen](#).

[**Store >**]: opens the [next screen](#).

[Slope Staking Index](#)
[Stakeout Menu Index](#)

Slope Staking – Screen 5

The fifth screen is used to store a point for the last shot taken from the previous screen, which should be located at the catch point.

Point Name: is the name assigned to the stored point.

Description: Enter the description for the new point.

[**Results**]: This will display the following additional cut, fill, and location information:

- Type of slope (e.g. left/right, cut/fill)
- Design and observed slope ratios (run over rise)
- Design and actual stations
- HD and Cut/Fill to Hinge Point
- HD and Cut/Fill to Center Line
- If applicable, HD and Cut/Fill to Edge of Pavement and Edge of Curb
- Name of segment and HD and Cut/Fill to that segment extremity (Road Slope Stake only)

[**Store CP**]: stores the point.

Offset from CP: This field is used if you want to stake another location that is at the specified horizontal distance from the catch point away from the road.

[**Solve >**]: opens a [new screen](#) used to stake the point at the offset specified above.

[< **Back**]: returns to the [previous screen](#).

[**Next CP >**]: returns to the [third slope staking screen](#) where the station to stake can be advanced and the next catch point can be located.

[Slope Staking Index](#)

Slope Staking Offset Stake

The following screen is only accessed if you choose to stake a point at a specified offset away from the catch point.

Station: displays the current station being slope staked.

Offset from CP: is the offset from the catch point specified in the previous screen.

From Instrument to Design Point: displays the angle and distance information from the total station to the design point.

[Circle Zero]: is used to modify the circle on the total station so that the angle right reading will be zero when it is facing the current target, which can sometimes be easier than turning to an obscure angle value. When this button is tapped, the following actions will occur:

1. A new backsight circle value is computed, sent to the instrument and stored in the raw data
2. The Angle Right value is changed to zero to reflect the change. The instrument now needs to be turned horizontally to zero to face the current target location.
3. To prevent errors if this button is used, the backsight set up is invalidated when exiting the [Stakeout](#) dialog. A circle zeroed on a design point is meaningless once the design point has been staked.

Note: The **[Circle Zero]** button is not available when using a robotic total station.

[< Back]: returns to the [previous screen](#).

[Stake >]: opens the next screen, which is identical to the third [Stake Points](#) screen.

[Slope Staking Index](#)

[Stakeout Menu Index](#)

Point Slope Staking

[Stakeout] [Point Slope Staking]

The [Point Slope Staking](#) routine is a simplified version of the [Slope Staking](#) routine.

The [Point Slope Staking](#) routine determines the location of the catch point from a known hinge point and a specified horizontal direction from the hinge point, whereas the [Slope Staking](#) routine determines the location of the catch point from a perpendicular offset to a known centerline at a specified station.

The first screen is used to specify the hinge point and horizontal direction from the hinge point to the catch point.

[From Point]: is the hinge point.

[> Point] / [> Direction]: is either another point that lies in the same vertical plane as the hinge point and catch point, or the azimuth from the hinge point to the catch point, respectively.

Fill Slope: is the desired slope, calculated from run over rise, between the hinge point and catch point when the area requires a fill.

Cut Slope: is the desired slope, calculated from run over rise, between the hinge point and catch point when the area requires a cut.

Height of Rod: is the rod height.

[**Backsight...**]: opens the [Station Setup](#) screen.

[**Stake CP >**]: opens the [next screen](#).

[Point Slope Staking Index](#)

[Stakeout Menu Index](#)

Point Slope Staking – Screen 2

The second screen is used to perform the actual point slope staking shots.

Rod Elev: is the current elevation at the rod location.

Des. Slope: is the design cut or fill slope.

Obs. Slope: is the computed (observed) cut or fill slope based on the last shot and the corresponding hinge point.

HD to HP: is the horizontal distance from the rod to the hinge point.

Cut to HP / Fill to HP: is the cut or fill required to bring the current rod location level with the hinge point.

To Slope Offset: is the perpendicular offset between the rod location and the horizontal line from the hinge point to the catch point.

Direction (CW or CCW): is the horizontal angle (clockwise or counterclockwise, respectively) that the rod must turn around the hinge point for it to be over the line from the hinge point to the catch point.

Below DS / Above DS: is the vertical distance that the rod is located below or above the design slope. If the [**Automatic Slope**] option is selected, this will be the distance to the nearest slope, otherwise it will be the distance to the selected (cut or fill) slope.

Toward HP / Away HP: is the estimated horizontal distance the rod must move toward or away from the hinge point before it is over the catch point.

Note: The computed horizontal distance is based on the observed terrain computed from the last two shots. If only one shot has been taken, this value will be blank.

EDM: This button can be toggled to shoot in various EDM modes. The options available depend on the total station being used. Consult the total station's documentation for more information on the EDM modes that it supports.

[**Results**]: This will open the [Slope Staking Results](#) screen, listing detailed information for the current setup and last shot.

Note: The [**Results**] button is only available from the [Store Catch Point](#) screen when using GNSS or Remote mode, which is accessed after tapping [**Store >**].

The button described below selects which information is displayed in the screen from the following options:

- **[Vertical Map]**: displays a cross-sectional view at the current station.

Note: When you tap a map view, an expanded view of the same map will fill the screen.

Note: The Vertical Map will show an X at the location of each previous shot. This can be useful in determining if the current terrain will never intersect the slope (no catch point).

[Horizontal Map]: displays an overhead view of the job.

- **[Shot Data]**: displays the shot data for the last shot.

The button described below selects the type of slope that will be used from hinge point to the catch point from the following options:

- **[Automatic Slope]**: selects the slope that is nearest to the current rod position.
- **[Force CUT Slope]**: forces all computations to be based on a cut slope.
- **[Force FILL Slope]**: forces all computations to be based on a fill slope.

HR: is the rod height.

[Topo SS...]: will store the last shot taken as a sideshot.

[Shot]: takes a shot.

[< Back]: returns to the [previous screen](#).

[Store >]: opens the [next screen](#).

[Point Slope Staking Index](#)
[Stakeout Menu Index](#)

Point Slope Staking – Screen 3

The third [Point Slope Staking](#) screen is identical to the fifth [Slope Staking](#) screen.

[Point Slope Staking Index](#)
[Stakeout Menu Index](#)

Stake Skew Line

[Stakeout] [Stake Skew Line]

The [Stake Skew Line](#) wizard is used to define a skew line that intersects an alignment or polyline, and then to stake stations along the skew line.

The first screen is used to select the alignment or polyline to define the line.

[Tap Line...]: Opens a screen displaying a map of all the polylines and alignments in the current job. Select the line you wish to use for staking.

[To/From...]: opens a window where a range of points can be defined. The points within the specified range will define

a polyline.

Begin Station: is the station assigned to the first point of the selected alignment or polyline.

[**Backsight...**]: opens the [Station Setup](#) screen.

[**Next>**]: takes you to the second [Stake Skew Line](#) screen.

[Stake Skew Line Index](#)

[Stakeout Menu Index](#)

Stake Skew Line - Screen 2

The second [Stake Skew Line](#) screen is used to define the skew line and where it intersects the selected alignment or polyline.

Station of Point O: Select the station on the alignment or polyline where the skew line intersects the alignment or polyline.

Skew Angle: Enter the skew angle of the intersecting line. The skew angle is measured clockwise from the direction of increasing station.

[**Back>**]: takes you to the first [Stake Skew Line](#) screen.

[**Next>**]: takes you to the third [Stake Skew Line](#) screen.

[Stake Skew Line Index](#)

[Stakeout Menu Index](#)

Stake Skew Line - Screen 3

The third [Stake Skew Line](#) screen is used to define the stations on the skew line that you wish to stake, and any offset to the skew line at the staked station.

Station on Skew Line: Enter the station along the skew line to stake. Staking station 0+0.00 is the point of intersection of the skew line and the alignment or polyline. If you wish to stake stations to the left of the intersection point, use negative station values. If you wish to stake stations right of the intersection point, use positive station values.

Station Interval: Enter the station interval for staking. The station to stake along the skew line will be advanced by this amount when you tap [**Next Station**].

[**Next Station**] Advances the station to stake along the skew line by the station interval.

Offset: Enter an offset to the skew line to stake.

[**Back>**]: takes you to the second [Stake Skew Line](#) screen.

[**Solve>**]: For optical mechanical instruments, opens the fourth [Stake Skew Line](#) screen that that directs you to turn the total station to take a measurement to the design location.

[**Stake>**]: For robotic and GNSS instruments, opens the live measurement screen where the instrument is taking measurements and directing you to the design location. When you accept the measurement to the design location, the fifth [Stake Skew Line](#) screen is displayed.

Stake Skew Line - Screen 4

The fourth [Stake Skew Line](#) screen displays the information needed to aim the mechanical total station toward the selected design location on the skew line.

Station: displays the current station of the skew line being staked.

H Offset: displays the offset from the skew line.

From Instrument to Design Point: displays the angle and distance information from the total station to the design point (plus offset if specified).

[Circle Zero]: is used to modify the circle on the total station so that the angle right reading will be zero when it is facing the current target, which can sometimes be easier than turning to an obscure angle value. When this button is tapped, the following actions will occur:

1. A new backsight circle value is computed, sent to the instrument and stored in the raw data
2. The Angle Right value is changed to zero to reflect the change. The instrument now needs to be turned horizontally to zero to face the current target location.
3. To prevent errors if this button is used, the backsight set up is invalidated when exiting the [Stakeout](#) dialog. A circle zeroed on a design point is meaningless once the design point has been staked.

Note: The **[Circle Zero]** button is not available when using a robotic total station.

[< Back]: returns to the third [Stake Skew Line](#) screen.

[Stake >]: opens the fifth [Stake Skew Line](#) screen.

Stake Skew Line - Screen 5

The fifth [Stake Skew Line](#) screen is used to display the results of your staking.

Height of Rod: is the length of the rod.

FORWARD / BACK: indicates if the rod must move forward (toward the total station) or backward (away from the total station).

Go RIGHT / Go LEFT: indicates if the rod must move to the right or left from the total station's point of view.

EDM: This button can be toggled to shoot in various EDM modes. The options available depend on the total station being used. Consult the total station's documentation for more information on the EDM modes that it supports.

Rod Elev: displays the elevation at the rod's location computed from the last shot.

[Shot]: takes a shot to the prism and computes come/go information.

Shot data: displays the measurements from the last shot.

[**Store...**]: Prompts for as staked point name and description, and stores the as staked point.

[**Store/Tape...**]: opens the [Stake Out Point \(Tape Offset\)](#) screen where the staked point can be stored that includes a specified offset. The default value is the appropriate distance correction to the design point.

[**Topo SS...**]: stores a sideshot using the data from the last shot taken. (This will not take a new shot.)

[**Turn Instrument**]: (available with robotic total station) turns the total station toward the design point.

[< **Back**]: returns to the [previous screen](#).

[**Stake Next >**]: returns to the third [Stake Skew Line](#) screen where you can increment the station on the skew line to stake and advance to stake it.

[Stake Skew Line Index](#)

[Stakeout Menu Index](#)

Stake Line and Offset

[**Stakeout**] [**Line and Offset**]

The [Stake Line and Offset](#) screen is used to stake stations on a line, or at an offset to it, at fixed intervals.

You can define a line in one of two ways. You can pick a start point, and an end point or a direction. Alternatively, you can select a job polyline or alignment.

[>**Define Line**] / [>**Polyline**]: Use this toggle to switch between defining a line by start point and end point or direction, and defining the line by selecting a job file line.

If you are defining a line with a start point and end point or direction, enter the parameters in the following controls:

Start Point: defines the first point of the line to be staked.

[**End Point**] / [**Direction**]: defines the second point of the line, or the direction of the line to be staked, respectively.

If you are defining the line by picking a job file line, select the line from the line selection control:

[**Tap Line**]: allows you to select a polyline or alignment from the job file.

[**To/From**]: allows you to define a line with a point range.

Begin Station: defines the station associated with the Start Point.

[**Backsight...**]: opens the [Station Setup](#) screen.

[**Next>**]: opens the [next screen](#).

: opens the [Stakeout Settings](#) screen.

[Stake Line & Offset Index](#)

[Stakeout Menu Index](#)

Stake Line and Offset – Screen 2

Station to Stake: is the desired station that you want to stake.

Station Interval: is the value that is added to the Station to Stake after the [Next Sta] button is pressed.

[Next Sta]: advances the Station to Stake by the Station Interval.

Offset: defines the offset distance and if the offset occurs to the right of the line, when R is selected, or left, when L is selected. The right or left side is referenced while viewing the line from the Start Point.

[Vertical Offset]: is the offset distance that is below the design location (when D is selected) or above the design location (when U is selected).

[> Grade]: specifies a slope from the specified line to the parallel line that is being staked. When this is a non-zero value, the elevation for the staked points will increasingly differ from the design elevations as the Offset value increases.

Height of rod: is the length of the rod.

[Backsight...]: opens the [Station Setup](#) screen.

[< Back]: returns to the [previous screen](#).

[Solve>]: opens the third [Stake Line and Offset](#) screen, described next.

Note: A motorized total station will automatically turn toward the design point after pressing [Solve>] depending on the configuration of the [Stakeout Settings](#) screen.

[Stake Line & Offset Index](#)

[Stakeout Menu Index](#)

Stake Line and Offset – Screen 3

Station: displays the current station that is being staked.

H. Offset: displays the offset distance of the line being staked from the specified line and if it is on the Right or Left side of the specified line.

From Instrument to Design Point: displays the direction and distance that the total station must aim toward so that it is facing the current station.

[Circle Zero]: is used to modify the circle on the total station so that the angle right reading will be zero when it is facing the current target, which can sometimes be easier than turning to an obscure angle value. When this button is tapped, the following actions will occur:

1. A new backsight circle value is computed, sent to the instrument and stored in the raw data.
 2. The Angle Right value is changed to zero to reflect the change. The instrument now needs to be turned horizontally to zero to face the current target location.
 3. To prevent errors if this button is used, the backsight set up is invalidated when exiting the [Stakeout](#) dialog. A circle zeroed on a design point is meaningless once the design point has been staked.
-

Note: The **Circle Zero** button is not available when using a robotic total station.

[< **Back**]: returns to the [previous screen](#).

[**Stake >**]: opens the fourth [Stake Line and Offset](#) screen, which is identical to the third [Stake Points](#) screen.

Note: Tap the graphic portion of the screen for an expanded view.

[Click here](#) to view a summary of the [Stake Line and Offset](#) screens.

[Stake Line & Offset Index](#)

[Stakeout Menu Index](#)

Screen Summary

[Screen 1](#) is used to define the primary line used to determine the location of the line to be staked and the station associated with the Start Point.

[Screen 2](#) is used to define the offset distance and location, the station to be staked and the station interval.

[Screen 3](#) provides the distance and direction information to the current station to be staked.

[Screen 4](#) is used to stake the current station.

[Stake Line & Offset Index](#)

[Stakeout Menu Index](#)

Stake Curve and Offset

[**Stakeout**] [**Curve and offset**]

The [Stake Curve and Offset](#) screen is used to stake stations on a curve or at an offset to it at fixed station intervals.

PC Point: is the starting point of the curve (point of curvature).

[**PC Tangent Azm**] / [**PC Tangent Brg**] / [**Chord Azimuth**] / [**Chord Bearing**]: Tangent azimuth or bearing defines the direction of the tangent line at the PC point. Chord azimuth or bearing defines the direction of the chord from PC to PT.

[**Radius**] / [**Degree Arc**] / [**Degree Chord**]: defines the radius, degree, arc, or degree chord of the curve, respectively.

[**Delta**] / [**Length**] / [**Chord**] / [**Tangent**] / [**External**] / [**Mid Ord**] defines the third curve parameter. For more information on curve parameters. See the [Curve Solution](#) screen for a description of curve input parameters.

Turn: defines if the curve turns to the Left or Right from the point of view of the PC.

Begin Station: is the station assigned to the PC Point.

[**Backsight...**]: opens the [Station Setup](#) screen.

[**Next>**]: takes you to the second [Stake Curve and Offset](#) screen, described below.

: opens the [Stakeout Settings](#) screen.

[Stake Curve & Offset Index](#)

[Stakeout Menu Index](#)

Curve and Offset – Screen 2

Station to Stake: is the desired station on the curve that you want to stake.

Station Interval: is the value that is added to the Station to Stake after the [Next Sta] button is pressed.

[Next Sta]: advances the Station to Stake by the Station Interval.

Offset: is the horizontal distance of the offset from the specified curve. The offset occurs on the left (while viewing the curve from the PC) when the L is selected or on the right when the R is selected.

Note: An offset of zero would result in the specified curve being staked.

[V. Offset]: will result in the elevations for the design points to be adjusted by the value entered here and will change the cut / fill values accordingly. Design elevations will be lower when D is selected, and higher when U is selected.

[Grade]: specifies a slope from the specified curve to the curve that is being staked. When this is a non-zero value, the elevation for the staked points will increasingly differ from the corresponding design elevations on the specified curve as the Offset value increases.

Height of Rod: is the length of the rod.

[< Back]: returns to the [previous screen](#).

[Solve>]: opens the third [Stake Curve and Offset](#) screen.

Note: A motorized total station will automatically turn toward the design point after tapping [Solve>], depending on the configuration of the [Stakeout Settings](#) screen.

[Stake Curve & Offset Index](#)

[Stakeout Menu Index](#)

Curve and Offset – Screen 3

Station: displays the current station that is being staked.

H. Offset: displays the offset distance of the curve being staked from the specified curve and if it is on the Right or Left side of the specified curve.

Angle Right: is the horizontal angle that the total station must aim toward so that it is facing the current station.

Horz. distance: is the horizontal distance from the occupy point to the current station.

Vert Distance: is the vertical distance from the occupy point to the current station.

ZE to Rod: is the zenith angle that the total station must aim toward so that it is facing the current station.

[**Circle Zero**]: is used to modify the circle on the total station so that the angle right reading will be zero when it is facing toward the design point, which can sometimes be easier than turning to an obscure angle value. When this button is tapped, the following actions will occur:

1. A new backsight circle value is computed, sent to the instrument and stored in the raw data.
2. The Angle Right value is changed to zero to reflect the change. The instrument now needs to be turned horizontally to zero to face the design point.
3. To prevent errors, the backsight set up is invalidated when exiting the Stakeout dialog if this button has been used. A circle zeroed on a design point is meaningless once the design point has been staked.

Note: The [**Circle Zero**] button is not available when using a robotic total station.

[< **Back**]: returns to the [previous screen](#).

[**Stake >**]: opens the next screen, which is identical to the third [Stake Points](#) screen.

[Click here](#) to view a summary of all the [Stake Curve and Offset](#) screens.

[Stake Curve & Offset Index](#)

[Stakeout Menu Index](#)

Screen Summary

[Screen 1](#) is used to define the primary curve used to determine the location of the curve to be staked and the station associated with the PC Point.

[Screen 2](#) is used to define the offset distance and location, the station to be staked and the station interval.

[Screen 3](#) provides the distance and direction information to the current station to be staked from the occupy point.

[Screen 4](#) is used to stake the current station.

[Stake Curve & Offset Index](#)

[Stakeout Menu Index](#)

Stake Out Point (Store/Tape) Screen

The [Stake Out Point \(Store/Tape\)](#) screen allows you to store a point at a specified offset from the stake point, resulting in a point that is either closer to, or further away from the total station.

Point: is the name assigned to the new offset point.

Description: is the description assigned to the new offset point.

Tape Out/Tape In: is the specified offset from the stake point. A positive value will result in a new point that is further away from the total station. The default value is the appropriate distance correction to the design point.

: stores the new offset point.

[Stakeout Menu Index](#)

Stake Spiral and Offset

[Stakeout] [Spiral and Offset]

The **Stake Spiral and Offset** screen allows you to stake stations at fixed intervals on a spiral curve, or at an offset to it.

Start Point: is the point associated with the beginning of the spiral curve. This can either be the TS or the CS, which is specified later in this screen (see below).

[**Tangent Azm**] | [**Tangent Bearing**]: defines the tangent azimuth or bearing at the entrance to the spiral.

[**Radius**] | [**Degree Arc**] | [**Degree Chord**]: defines the radius, degree arc, or degree chord of the curve, respectively.

Length: is the length of the spiral curve.

Begin Station: is the station associated with the Start Point.

Turn: defines if the curve turns toward the Left or Right from the point of view of the Start Point.

Spiral: defines the direction of the spiral curve by the following options:

- **TS to SC:** the spiral begins at the tangent (Tangent to Spiral) and ends at the circular curve (Spiral to Curve).
- **CS to ST:** the spiral begins at the circular curve (Curve to Spiral) and ends at the tangent (Spiral to Tangent).

[Stake Spiral Index](#)

[Stakeout Menu Index](#)

Stake Spiral and Offset - Screen 2

Station to Stake: is the desired station on the spiral curve that you want to stake.

Station Interval: is the value that is added to the Station to Stake after the [**Next Sta**] button is pressed.

[**Next Sta**]: advances the Station to Stake by the Station Interval.

Offset: is the horizontal distance of the offset from the spiral curve. The offset occurs on the left (while viewing the spiral from the Start Point) when the L is selected or on the right when R is selected.

Note: An offset of zero would result in the spiral curve itself being staked.

[**V. Offset**]: will result in the elevations for the design points to be adjusted by the value entered here and will change the cut / fill values accordingly. Design elevations will be lower when D is selected, and higher when U is selected.

[**Grade**]: specifies a slope from the spiral curve to the curve that is being staked. When this is a non-zero value, the elevation for the staked points will increasingly differ from the corresponding design elevations on the spiral curve as the Offset value increases.

Height of rod: is the length of the rod.

[**Backsight...**]: opens the [Station Setup](#) screen.

[< **Back**]: returns to the previous screen.

[**Solve>**]: opens the third screen, described next.

Note: A motorized total station will automatically turn toward the design point after pressing [**Solve>**] depending on the configuration of the [Stakeout Settings](#) screen.

[Stake Spiral Index](#)

[Stakeout Menu Index](#)

Stake Spiral and Offset - Screen 3

Station: displays the current station that is being staked.

H. Offset: displays the offset distance of the spiral curve being staked from the specified spiral curve and if it is on the Right or Left side of the specified spiral curve.

Angle Right: is the horizontal angle that the total station must aim toward so that it is facing the current station.

Horz Dist: is the horizontal distance from the occupy point to the current station.

Vert Dist: is the vertical distance from the occupy point to the current station.

ZE to Rod: is the zenith angle that the total station must aim toward so that it is facing the current station.

[**Circle Zero**]: is used to modify the circle on the total station so that the angle right reading will be zero when it is facing toward the design point, which can sometimes be easier than turning to an obscure angle value. When this button is tapped, the following actions will occur:

1. A new backsight circle value is computed, sent to the instrument and stored in the raw data
 2. The Angle Right value is changed to zero to reflect the change. The instrument now needs to be turned horizontally to zero to face the design point.
 3. To prevent errors, the backsight set up is invalidated when exiting the [Stakeout](#) dialog if this button has been used. A circle zeroed on a design point is meaningless once the design point has been staked.
-

Note: The [**Circle Zero**] button is not available when using a robotic total station.

[< **Back**]: returns to the previous screen.

[**Stake >**]: opens the next screen, which is identical to the third [Stake Points](#) screen.

[Stake Spiral Index](#)

[Stakeout Menu Index](#)

Stake Spiral and Offset - Screen Summary

Screen 1 is used to define the primary spiral curve used to determine the location of the curve to be staked and the station associated with the Start Point.

Screen 2 is used to define the offset distance and location, the station to be staked and the station interval.

Screen 3 provides the distance and direction information to the current station to be staked from the occupy point.

Screen 4 is used to stake the current station.

[Stake Spiral Index](#)
[Stakeout Menu Index](#)

Show Station and Offset

[**Stakeout**] [**Show Station**]

The Show Station and Offset routine allows you to take a shot to a prism that is positioned anywhere near a polyline, a range of points that define a line, or an alignment to see where the prism is located in relation to the line.

[**Tap Line...**]: allows you to tap an existing polyline or alignment that the station and offset will be computed from.

[**To/From...**]: allows you to enter a range of points that define the line where the station and offset will be computed from.

Begin Station: is the station assigned to the beginning of the line.

[**Backsight...**]: opens the [Station Setup](#) screen.

[**Next >**]: takes you to the next Show Station and Offset screen where the slope staking parameters are set up.

[Show Station Index](#)
[Stakeout Menu Index](#)

Show Station and Offset- Screen 2

The second Show Station and Offset screen is used to take a shot to the prism and view the data.

Height of Rod: is the length of the rod.

EDM: This button can be toggled to various EDM modes. The options available depend on the total station being used. Consult the total station's documentation for more information on the EDM modes that it supports.

Station: displays the station at the rod position.

Offset Dist: displays the perpendicular offset from the centerline to the rod position.

Elev: displays the elevation at the rod position.

Offset: displays if the rod position is to the right of the line, left of the line, or on the line.

Segment: displays the name of the template's segment at the rod position.

Shot Data: displays the angles and distance measured by the total station from the last shot.

[**Shot**]: takes a shot to the prism.

[**< Back**]: returns to the previous screen.

[**Store...**]: stores the stake point.

Store Offset Points

[Stakeout] [Store Offset Points]

The [Store Offset Points](#) screen is used to store points in the current job at a specified offset from an existing polyline or alignment at a specified interval.

[**Tap Line...**]: allows you to tap an existing polyline or alignment that the station and offset will be computed from.

[**To/From...**]: allows you to enter a range of points that define the line where the station and offset will be computed from.

Begin Station: is the station assigned to the beginning of the line.

[**Next >**]: takes you to the next [Store Offset Points](#) screen where the slope staking parameters are set up.

Store Offset Points - Screen 2

The second [Store Offset Points](#) screen is used to define the road profile, or offset distances that will be used to compute the offset point coordinates.

1/2 Road Width: is the Left and Right width of the road, respectively, from the centerline to the edge of payment.

X-Slope (%): is the Left and Right slope of the road, respectively, from the centerline to the edge of payment calculated from $(\text{rise/run}) \times 100$.

Note: A negative slope will result in water running from the centerline toward the edge of payment.

Stake Curb / Ditch: When checked, a curb or ditch and an offset can be defined beyond the edge of the pavement.

Height: is the height of the curb or ditch in feet or meters. A positive value is considered a curb and a negative value a ditch.

Offset From Edge of Road: is the distance that the curb or ditch extends from the edge of pavement.

Note: The specified curb or ditch height and offset will be applied to both sides of the road.

[**< Back**]: returns to the previous screen.

[**Next >**]: opens the next screen.

Store Offset Points - Screen 3

The third [Store Offset Points](#) screen is used to define which offset points will be stored.

From Station: is the station where the stored offset points will begin.

To Station: is the station where the stored offset points will end.

Station Interval: is the distance between the stations where offset points are stored.

Note: If the Stake Corners option is selected in the [Stakeout Settings](#) screen, offset points will also be stored where ever the horizontal or vertical section of the road changes.

Start Point: is the point number that will be assigned to the first offset point that is stored. Each stored point that follows will be assigned the next available point number.

Description / Code: Enter the description or code for the new points to be generated by the routine.

Center Line: offset points will be stored at locations on the centerline when checked.

Edge of Pavement: offset points will be stored at the end of the first segment (the edge of the roadbed) on the left and/or right side when checked.

Curb: offset point will be stored at the end of the second segment (the end of the curb or ditch) on the left and/or right side when checked.

[**Unselect All**]: quickly unchecks all the checkboxes.

[< **Back**]: returns to the previous screen.

[**Store**]: stores all the offset points based on the information provided.

[Store Offset Points Index](#)

[Stakeout Menu Index](#)

Define a Location

[**Stakeout**] [**Define a Location**]

The [Define a Location](#) screen is used to manually enter the distance and direction to a new point from any existing reference point and then stakeout the new point.

From Point: is the reference point that the specified angle and distance information is applied to for locating the new point.

[**Azimuth**] / [**Bearing**]: is the direction from the reference point to the new point.

+/- **Angle:** is the angle to be added to the specified azimuth or bearing, thus modifying the direction to the new point.

Note: To subtract an angle from the specified azimuth or bearing, enter a negative +/- Angle value.

Horiz. Dist: is the horizontal distance from the reference point to the new point.

Vert. Dist: is the vertical distance from the reference point to the new point.

Store point: When this is checked, the computed point will be stored with the name specified here.

[**Solve**]: will compute the location for the new point and access the next screen.

[Define a Location Index](#)

[Stakeout Menu Index](#)

Define a Location- Screen 2

The second [Define a Location](#) screen displays the direction and distance information from the occupy point to the new point.

Ref. Point: is the reference point specified in the From Point field in the previous screen.

Description: is the description for the reference point.

From Instrument to Location: displays the angle and distance information from the total station to the new point. Users would aim their non-robotic total station the direction specified here.

[**Circle Zero**]: is used to modify the circle on the total station so that the angle right reading will be zero when it is facing toward the design point, which can sometimes be easier than turning to an obscure angle value. When this button is tapped, the following actions will occur:

1. A new backsight circle value is computed, sent to the instrument and stored in the raw data
 2. The Angle Right value is changed to zero to reflect the change. The instrument now needs to be turned horizontally to zero to face the design point.
 3. To prevent errors, the backsight set up is invalidated when exiting the [Stakeout](#) dialog if this button has been used. A Circle zeroed on a design point is meaningless once the design point has been staked.
-

Note: The [**Circle Zero**] button is not available when using a robotic total station.

[< **Back**]: returns to the previous screen.

[**Stake >**]: opens the third [Define a Location](#) screen where the new point can be staked out.

Note: The third [Define a Location](#) screen is identical to the third [Stake Points](#) screen.

[Define a Location Index](#)

[Stakeout Menu Index](#)

Where is Next Point

[**Stakeout**] [**Where Is Next Point**]

The [Where is Next Point](#) screen is used to assist the rod person in locating another point, given the current rod point, a reference point, and the point to locate.

Current Rod Pt: is the current rod point.

Next FS Point: is the point that the rod person wants to locate.

Increment: is added to the Next FS Point value after pressing the [**Next Point >**] button. (A negative integer can be entered to have point numbers advance in descending order.)

[**Next Point >**]: advances the Next FS Point value by the specified Increment, replaces the current rod point by the previous FS point, and accesses Screen 2.

Note: If the Next FS Point does not exist and the Increment value=1, pressing the [**Next Point**] button will access the next existing point. If the Increment is greater than one and the next point does not exist, a warning is displayed.

[> **Reference Pnt**] / [> **Reference Azm**]: is the reference point / azimuth used to determine the direction to the Next FS Point.

[**Solve >**]: computes the direction and distance to the Next FS Point and opens the [next screen](#).

[Next Point Index](#)

[Stakeout Menu Index](#)

Where is Next Point - Screen 2

This screen shows two graphics that indicate the direction and distance that the rod person must travel to reach the Next FS Point.

The clock-style graphic shows the current rod location at the center, a line in the 12 o'clock position indicates the direction to the Reference, and an arrow shows the direction to the Next FS Point. There is also a text indicator that explains the direction to travel in a clock format.

The second graphic is a map view that shows the Current Rod Point, the Reference and the Next FS Point. It also shows the Occupy Point if the backsight has been set.

The lower left portion of the screen displays the azimuth from the rod to the Next FS Point and the horizontal distance between them.

[< **Back**]: returns you to the first screen.

[**Done**]: closes the screen.

[Next Point Index](#)

[Stakeout Menu Index](#)

Navigation

The Navigation routine allows you to navigate to existing points using autonomous positions from a GPS receiver that outputs a NMEA signal. (Most inexpensive consumer handheld GPS receivers will output the required signal.) The routine also allows you to store course-precision GPS points.

[**Target...**]: opens a screen where you can select the target point to navigate to.

[**Store WP...**]: opens the Store GNSS Sideshot screen where you can store a new autonomous GPS point.

[**Best Fit**]: opens the [Best Fit](#) screen (below) used to add control points to the best fit solution.

Map Page

The [Map Page](#) of the Navigation screen displays a map of the points in the current job and your current position. When stationary, your position is marked with a flashing green circle. When moving, a green triangle is displayed that represents your current position and direction of travel and a blue arrow indicates your velocity. When navigating, a red arrow points from your current position to the target.



Zoom Extents Button: will change the scale of the screen so that all the points in the current job will fit on the screen.



Zoom In Button: will zoom the current screen in by approximately 25%.



Zoom Out Button: will zoom the current screen out by approximately 25%.



Zoom Window Button: allows you to drag a box across the screen. When your finger or stylus leaves the screen, the map will zoom to the box that was drawn.



Zoom to Point Button: prompts you for a point name and then the map view will be centered to the specified point with the point label displayed in red.



Map Options Button: expands a list where you can select additional map options.

Target Page

The [Target Page](#) is used to direct you to the current target. When you are close to the target, the graphic will change to help you more accurately locate the point.

Show N/E: When selected, the directions to travel are displayed in a Northing/Easting format.

Show Azi/Dist: When selected, the directions to travel are shown as an azimuth and distance.

Position Page

The [Position Page](#) is used to view the coordinates for your current position.

View GPS Position: Displays your current position in geodetic coordinates when selected.

View Local Position: Displays your current position in ground coordinates. This can only be selected after a Best Fit solution is computed, or if a coordinate system projection is solved.

[**Status...**]: opens the [Sky Plot](#) screen to view the GPS satellite constellation.

Navigation – Best Fit Screen

[**Stakeout**] [**Navigation**] [**Best Fit**]

The [Best Fit](#) screen is used to compute the rotation and scale necessary to align the geodetic coordinate system from the GPS receiver with the ground coordinate system used in the current job. A minimum of two points must be recorded to compute a Best Fit solution.

Note: The **Best Fit** button is not available when a coordinate system projection is solved.

Point: is the point in the job that you are occupying and want to add to the Best Fit solution.

[**Add Control and Re-Solve**]: Tap this while remaining stationary over the point. The position will be measured and added to the Best Fit solution. You will then return to the [Navigation](#) screen.

Points Currently Used in Best Fit: lists the points that are used in the Best Fit solution. This section is hidden when no best points have been collected. You can toggle the points used in the best fit solution by tapping on the **Use for H Control** column of the point list. If you toggle the best fit point assignments, you can then tap the [**Resolve with Existing Points**] button to update the best fit solution.

[Stakeout Menu Index](#)

Stakeout Menu for GNSS

[Stake Points](#)

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Stake Points (GNSS Staking)

[Stakeout] [Stake Points]


The [GPS Staking](#) screen is used to navigate to a design point with the receiver in roving mode. Once the design point has been staked, this screen is also used to control static occupations for the most precise measurement to the as built point.

The first screen of this routine is similar to the optical method, except that the [**Backsight**] button on the first screen and the [**Circle Zero**] button on the second screen are replaced with a [**Setup HR**] button to configure rover antenna. The backsight information is replaced with rover antenna height information. See the optical [Stake Points](#) for comparison.

There are three navigation methods available when staking a point and you can switch between them by tapping the [+]
/[**^**] /  button in the top right corner of the navigation graphic.

When using the [**^**] method, a large red arrow indicates the direction of travel and always appears at the top of the graphic. This arrow will dim when at a standstill or when near the design point. A north and south indicator are displayed on the graphic and will rotate depending on your direction of travel along with a blue line that indicates the direction to your reference point or azimuth. When you are near the design point, the graphic will change and the N/S indicator will stop updating to assist you in more precisely locating the design point.

When using the [+]
method, your reference point or azimuth will always appear at the top of the screen and that is the direction you should be facing while navigating. Like with the other navigation method, the graphic will change as you get closer to the design point.

When using the  method, you will see a map of your survey including your current location and the design point location. The map is oriented North at the top.

GNSS Status: displays the current solution type, the number of satellites used, and the horizontal and vertical precision computed by the receiver. When this area of the screen is tapped, the epoch count stops and the [GNSS Status](#) screen opens.

Go SOUTH / NORTH: displays the distance the rover must move in a south or north direction to reach the design point.

Go EAST / WEST: displays the distance the rover must move in an east or west direction to reach the design point.

Note: The **Display Directions As field** in the [Stakeout Settings](#) screen configures the format for the text that directs you to the design point.

CUT / FILL: displays the required cut or fill between the current elevation and the design point.

[Ref: 0°00'00"…]: opens a screen where you can select a reference azimuth or point, which will then be displayed on the navigation graphic as a blue line to assist in orienting yourself. When **Auto Snap to Reference When Close** is checked in this screen and when using the [^] navigation method, the navigation method will automatically switch to the [+] method when you are within 3 meters of the design point. (Checking this box while in using the [+] navigation method has no effect.)

[>OCCUPYING] / [>ROVING]: switches from ROVING to OCCUPYING mode. When ROVING, the receiver is in dynamic mode and will calculate your position as you move to the point. When OCCUPYING, the receiver is switched to static mode and will calculate the most precise position for the staked point.

[Topo SS]: allows you to store a sideshot measurement during stake out. This button behaves like the Topo SS button on the data collection page. The RMS and type of the current solution is checked against the criteria, and if acceptable, you are prompted

[Accepts]: opens the third and final [Stake Points](#) screen where the current stake point can be staked and optionally stored. When post-processing and in Occupying mode, this button will be labeled [Store] and will signal the end of the occupation and store the point.

[GNSS Stakeout Menu Index](#)

Stake to Line

[Stakeout] [Stake to Line]

The [Stake to Line](#) screen allows you to locate points on a continuous predefined line. Direction information is provided to locate the line by traveling the shortest possible distance (a perpendicular offset to the line) between the rover and the line.

The first screen of this routine is similar to the optical method, except that the **[Backsight]** button is replaced with a **[Setup HR]** button to configure rover antenna and the backsight information is replaced with rover antenna height information. See the [optical method](#) for details.

[GNSS Stakeout Menu Index](#)

Stake to Line – Screen 2

The second screen is where measurements take place and the staking directions are displayed. The graphic and display

direct you to points on line via the shortest route, a perpendicular offset from the rover to the line.

The graphic display will change depending on how close you are to the specified line.

Note: Tap the graphic portion of the screen for an expanded view.

GNSS Status: displays the current solution type, the number of satellites used, and the horizontal and vertical precision computed by the receiver. If this area of the screen is tapped, the epoch count stops and the [GNSS Status](#) screen opens.

Go SOUTH / NORTH: displays the distance the rover must move in a south or north direction to reach the closest point on the line.

Go EAST / WEST: displays the distance the rover must move in an east or west direction to reach the closest point on the line.

[>**OCCUPYING**] / [>**ROVING**]: switches from ROVING to OCCUPYING mode. When ROVING, the receiver is in dynamic mode and will calculate your position as you move to the point. When OCCUPYING, the receiver is switched to static mode and will calculate the most precise position for the staked point.

Results / Current Location: displays either the directions to the closest point on the line or the current local coordinate.

LEFT of Line / RIGHT of Line / ON LINE: displays the position of the rover with respect to the line. Left and right are relative to north. ON LINE is displayed when you are within the Line Tolerance specified in the [Stakeout Settings](#) screen.

Offset Dist.: displays the perpendicular offset distance from the line to the rover.

Station: displays the station on the line associated with the offset location. It is relative to the **Start Point** defined in the first screen.

[>**Results**] / [>**(N,E,Z)**]: toggles the display between Results and Current Location.

[**Store**]: prompts you for a point name and description and stores a point for the current location.

[GNSS Stakeout Menu Index](#)

Slope Staking

[**Stakeout**] [**Slope Staking**]

The [Slope Staking](#) screen is used to locate the catch points for a roadway in any terrain.

The first three and the last screens of this routine are similar to the optical method except that the [**Backsight**] and [**Circle Zero**] buttons are replaced with a [**Setup HR**] button to configure rover antenna and the backsight information is replaced with rover antenna height information. See the [optical method](#) for details.

Once the centerline of the road is selected and the road profile is defined, the fourth [Slope Staking](#) screen is used to locate the stake point at the current station.

[GNSS Stakeout Menu Index](#)

Slope Staking – Screen 4

The graphic portion of the Horizontal Map and Vertical Map is updated continuously. This allows the user at the rover position to watch the movement of the rover in relation to the slope and easily position the rod over the catch point.

Note: You can tap in the graphic portion of the screen to open the graphic in a larger window.

Although the graphic portion of the screen is continuously updated, the numeric values are not updated until the [**Shot**] button is tapped. The correct procedure for slope staking in GNSS mode is to use the graphic portion of the screen to locate the catch point as closely as possible and press [**Shot**]. Once the position is satisfactory, you can determine if the rover needs to be moved again.

GNSS Status: displays the current solution type, the number of satellites used, and the horizontal and vertical precision computed by the receiver. Tap on this button to open the detailed [GNSS Status](#) screen.

The first button selects the type of slope that will be used between the catch point and hinge point from the following options:

- [**>Automatic Slope**]: selects the slope based on the current rover position. If the rover is above the hinge point, a cut slope is computed. If the rover is below the hinge point, a fill slope is computed.
- [**>Force CUT Slope**]: forces all computations to be based on a cut slope.
- [**>Force FILL Slope**]: forces all computations to be based on a fill slope.

The second button selects which information is displayed in the lower corner of the screen from the following options:

- [**>V Map**]: displays a cross-sectional view at the current station.
-

Note: When you tap a map view, an expanded view of the same map will fill the screen.

Note: The Vertical Map will show an X at the location of each previous shot. This can be useful in determining if the current terrain will never intersect the slope (no catch point).

- [**>H Map**]: displays an overhead view of the job.
- [**>N,E,Z**]: displays the coordinates computed from the last shot.

[**Occupy...**]: opens the [Occupy Data Points](#) screen where data can be collected for the current point.

[**Sideshot**]: allows you to store a sideshot measurement during stake out. This button opens a prompt for the sideshot point name and opens the GNSS [Occupy Data Points](#) screen. After you store the new point (or cancel) you will resume with the [Slope Staking](#) screen.

Results: displays the results computed from the last [**Shot**].

Obs. Slope: is the computed (observed) cut or fill slope based on the last shot and the corresponding hinge point.

Des. Slope: is the design cut or fill slope.

Cut / Fill: is the cut or fill required for the current rover location to be positioned on the design slope.

Toward CL / Away CL: is the computed horizontal distance that the rod must move either toward the centerline or away from it, respectively, before it is positioned at the catch point.

Note: The computed horizontal distance is based on the observed terrain computed from the last two shots. If only one

shot has been taken, it is assumed that the terrain is level when computing this value.

On Station / Back Sta / Ahead Sta: informs you if the rod is on the station being staked, or the distance it must move (parallel to the centerline) back or ahead to be on the correct station.

HD to HP: is the horizontal distance from the rod to the hinge point.

VD to HP: is the vertical distance from the rod to the hinge point.

HD to CL: is the horizontal distance from the rod to the centerline.

VD to CL: is the vertical distance from the rod to the centerline.

[GNSS Stakeout Menu Index](#)

Line and Offset

[Stakeout] [Line and Offset]

The instructions for the Line and Offset routine for GNSS similar to the optical method, except that the [**Backsight**] and [**Circle Zero**] buttons are replaced with a [**Setup HR**] button to configure rover antenna and the backsight information is replaced with rover antenna height information. See the optical Reference Manual for details.

[GNSS Stakeout Menu Index](#)

Curve and Offset

[Stakeout] [Curve and Offset]

The instructions for the Curve and Offset routine for GNSS are similar to the optical method, except that the [**Backsight**] and [**Circle Zero**] buttons are replaced with a [**Setup HR**] button to configure rover antenna and the backsight information is replaced with rover antenna height information. See the optical Reference Manual for details.

[GNSS Stakeout Menu Index](#)

Spiral and Offset

[Stakeout] [Spiral and Offset]

The instructions for the Spiral and Offset routine for GNSS are similar to the optical method, except that the [**Backsight**] and [**Circle Zero**] buttons are replaced with a [**Setup HR**] button to configure rover antenna and the backsight information is replaced with rover antenna height information. See the optical Reference Manual for details.

[GNSS Stakeout Menu Index](#)

Show Station and Offset

[Stakeout] [Show Station]

The Show Station and Offset routine allows you to position the rover anywhere near a polyline, a range of points that define a line, or an alignment to see where the rod is located in relation to the selected line.

The first screen of this routine is similar to the optical method, except that the [**Backsight**] button is replaced with a [**Setup HR**] button to configure rover antenna and the backsight information is replaced with rover antenna height information. See the optical Reference Manual for details.

[GNSS Stakeout Menu Index](#)

Show Station – Screen 2

Once the line is selected, the second screen is opened where information is displayed about the rod position and the selected line.

GNSS Status: displays the current solution type, the number of satellites used, and the horizontal and vertical precision computed by the receiver. Tap on this button to open the detailed [GNSS Status](#) screen.

[>**OCCUPYING**] / [>**ROVING**]: switches from ROVING to OCCUPYING mode. When ROVING, the receiver is in dynamic mode and will calculate your position as you move to the point. When OCCUPYING, the receiver is switched to static mode and will calculate the most precise position for the staked point.

[>**Results**] / [>**N,E,Z**]: displays either the results, or plane coordinates in the lower corner of the screen.

Station: is the station at the current rod position.

Offset Dist: is the perpendicular distance from the line to the rod.

Elev: is the elevation at the rod position.

Offset: displays if the rod is on the Left or Right of the line.

Segment: displays the type of line segment at the current station.

[< **Back**]: returns to the previous screen.

[**Store**]: stores a point for the current rod location.

[GNSS Stakeout Menu Index](#)

Store Offset Points

[**Stakeout**] [**Store Offset Points**]

The instructions for the [Store Offset Points](#) routine for GNSS are similar to the optical method, except that the [**Backsight**] button is replaced with a [**Setup HR**] button to configure rover antenna and the backsight information is replaced with rover antenna height information. See the optical Reference Manual for details.

[GNSS Stakeout Menu Index](#)

Where is Next Point

[Stakeout] [Where is Next Point]

The instructions for the Where is Next Point routine for GNSS are similar to the optical method, except that the [Baksight] button is replaced with a [Setup HR] button to configure rover antenna and the backsight information is replaced with rover antenna height information. See the optical Reference Manual for details.

[GNSS Stakeout Menu Index](#)

Inverse Menu

The Inverse Menu contains routines that compute the direction and distance between two objects. The following screens are available from the Inverse Menu:

[Inverse Point to Point](#)
[Inverse Point to Line](#)
[Inverse Point to Polyline](#)
[Inverse Point to Multiple Points](#)
[Inverse Point to Location / Point](#)

[Main Index](#)

Inverse Point to Point

[Inverse] [Point to Point]

The Inverse Point to Point screen will calculate the distance and direction between two existing points.

Begin Point: is the reference point used to compute the distance and direction to the End Point.

End Point: is the point whose relationship to the Begin Point is computed.

[**Select from Map...**]: allows you to quickly select both the Begin Point and End Point from a map view. The first point tapped is entered as the Begin Point and the second as the End Point.

[**Solve**]: will compute the distance and direction from the Begin Point to the End Point.

Results

Azimuth: is the azimuth from the Begin Point to the End Point.

Horz Dist: is the horizontal distance from the Begin Point to the End Point.

Vert Dist: is the vertical distance from the Begin Point to the End Point.

Slope Dist: is the slope distance from the Begin Point to the End Point.

North: is the change in the Y-coordinate from the Begin Point to the End Point.

East: is the change in the X-coordinate from the Begin Point to the End Point.

Elevation: is the change in elevation from the Begin Point to the End Point.

Grade: is the slope from the Begin Point to the End Point.

[Inverse Index](#)

Inverse Point to Line

[Inverse] [Point to Line]

The Inverse Point to Line screen computes the perpendicular offset distance and direction from a known point to a continuous line defined by two points or one point and a direction.

Inverse Point: is the known point that the offset information to a specified line is computed.

Begin Station: is the beginning station value that corresponds with the Start of Line, which is used to compute the inverse station in the results.

Start of Line: is the first point that defines the line from which the offset is computed.

[Point] / [Direction]: is the second point or known direction that defines the line from which the offset is computed.

Store Point: When checked, will store the coordinates for the point located on the specified line, tangent to the offset.

[Solve]: will compute the distance and direction of the offset from the known point perpendicular to the specified line.

Results

Inv. Station: is the station on the specified line where the perpendicular offset occurs, starting from the Begin Station.

Offset: is the horizontal distance of the perpendicular offset between the Inverse point and specified line.

Offset is: indicates if the Inverse point is located to the Right, Left, or on the specified line as you occupy Point 1 and face the second point or direction of the line.

Azimuth (pt to line): is the azimuth of the offset from the Inverse point toward the specified line.

North: is the Y-coordinate on the specified line, tangent to the perpendicular offset.

East: is the X-coordinate on the specified line, tangent to the perpendicular offset.

Elevation: is the elevation on the specified line, tangent to the perpendicular offset.

[Inverse Index](#)

Inverse Point to Polyline

[Inverse] [Point to Polyline]

The [Inverse Point to Polyline](#) screen computes the offset distance from a known point perpendicular to a polyline.

Inverse Point: is the known point that the offset to a polyline segment is computed.

Begin Station: is the starting station assigned to the beginning of the polyline, which is used to compute the Station in the results.

[Tap Polyline]: allows you to tap an existing polyline from a map view.

[Editor]: opens the [Polyline Editor](#) where a new polyline can be created or an existing polyline can be modified.

[Tap Points]: provides a map view where you can tap any existing points to create a temporary polyline.

[To/From]: provides point selection by entering point names.

Store Point: When checked, will store the first solution where a perpendicular offset intersects with a polyline using the

specified point name. If additional solutions are found, the following solutions will be stored using consecutive point names.

[**Solve**]: will compute the distance and direction of the offset from the known point perpendicular to the polyline.

Note: There is no solution if a perpendicular offset does not occur within the extents of any selected polyline segments.

Results

Station: is the station along the polyline where the offset occurs, starting from the Begin station.

Offset: is the horizontal distance of the offset.

Offset is: indicates if the Inverse Point is located to the right, left, or on the specified line as you occupy the beginning of the polyline and face the end.

Segment Type: shows if the segment is a line, arc, or spiral.

Beg. Pt: if applicable, this is the first point selected that defines a line.

End Pt: if applicable, this is the second point selected that defines a line.

[Inverse Index](#)

Inverse Point to Multiple Points

[**Inverse**] [**Multiple Points**]

The Inverse Point to Multiple Points screen will calculate the distance and direction from an existing point to one or more other points.

Inverse point: is the reference point used to compute the distance and direction to the other points.

[**Tap Points**]: provides a map view where you can tap multiple points.

[**To/From**]: provides selection of points by point name.

[**Solve**]: will compute the distance and direction from the Inverse point to all selected points.

Results

Azimuth: is the azimuth from the Inverse Point to the selected point.

Horz Dist: is the horizontal distance from the Inverse Point to the selected point.

Vert Dist: is the vertical distance from the Inverse Point to the selected point.

Slope Dist: is the slope distance from the Inverse Point to the selected point.

North: is the change in the Y-coordinate from the Inverse Point to the selected point.

East: is the change in the X-coordinate from the Inverse Point to the selected point.

[Inverse Index](#)

Inverse Point to Location / Point

[Inverse] [Location / Point]

The Inverse Point to Location / Point screen will calculate the distance and direction from any point or location to another point or location.

Begin: is the reference point or location used to compute the distance and direction to another point or location.

End: is the other point or location whose correlation to the Begin point or location is computed. Each location is defined by one of the following methods:

- **[Location]:** when selected, the coordinates for any location can be entered in the appropriate fields.
- **[Point]:** when selected, any existing point name can be entered in the appropriate field or selected from a map view
- **Store Pt.:** When checked, will store a point for the location(s) entered.
- **[Solve]:** will compute the distance and direction from the Begin point or location to the End point or location.

[Inverse Index](#)

Cogo Menu

The Cogo Menu contains all of the coordinate geometry routines used to perform computations from the existing job data. The following screens are available from the Cogo Menu:

[Point in Direction](#)

[Intersection](#)

[Offset Line](#)

[Offset Points](#)

[Station Offset](#)

[Corner Angle](#)

[Compute Area](#)

[Surface Area](#)

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[HD/VD to SD/ZA](#)

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[Add/Edit Line](#)

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Point in Direction

[Cogo] [Point in Direction]

The [Point in Direction](#) screen will calculate and store the position of a new point after providing a distance and direction from a known point.

From point: is the point name of the reference point used for locating the new point.

[Azimuth] / [Bearing]: is the direction from the reference point to the new point.

+/- **Angle:** is the angle added to the Azimuth / Bearing to modify the direction to the new point.

Note: To subtract an angle from the specified azimuth or bearing, enter a negative +/- Angle value.

Horiz. Dist: is the horizontal distance from the reference point to the new point.

Vert. Dist: is the vertical distance from the reference point to the new point.

Store point: When this is checked, the computed point will be stored with the name specified here.

[Solve]: will compute the location for, and optionally store the new point.

[COGO Index](#)

Intersection

[Cogo] [Intersection]

The Intersection screen computes, and optionally stores, the coordinates for the intersection of two lines, where the lines are tangent to existing points. Each line is independently defined by a known direction or a known length.

Point 1: is an existing point that is tangent to the first line.

Point 2: is an existing point that is tangent to the second line.

[Distance] / [Azm or Brg]: is the length or direction of the specific line tangent to the specified point.

Store I-Sect 1/2: These items are only available after solving the screen. Once solved, the computed intersections can be viewed from the Map card where you can decide which intersecting point(s) to store in the Input card.

[Store]: Stores the intersecting points checked above, which were computed after solving.

[Solve]: will compute the intersecting point(s) and open the Results card.

[COGO Index](#)

Offset Line

[Cogo] [Offset Line]

The Offset Line screen is used to store points or an alignment that is parallel to an existing set of points, a polyline, or an alignment, at a specified perpendicular offset.

Note: When storing points, the number of new points stored will equal the number of points in the selected polyline or point range. If the offset is from an alignment, the number of points stored will equal the number of nodes that occur in the horizontal portion of the alignment.

[Tap Line...]: allows you to tap an existing polyline or alignment that the offset will be computed from.

[To/From...]: allows you to enter a range of points that define the line where the offset will be computed from.

Offset: defines the offset distance and which side the offset occurs. The right or left side is referenced from the first point that defines the specified line.

Save to job as an alignment: when checked, the computed offset line will be saved as a new alignment under the name specified in the Description field.

Note: Spiral curves cannot be generated in a new offset alignment. If the original centerline contains any spiral curves, they will be treated as straight sections in the offset alignment that is created. The Offset Staking or Offset Points routine should be used to stake offsets from a spiral curve.

View / Save Alignment / Save Polyline: Choose what you want to do with the results of the offset line calculation.

Start At: When you are saving a polyline, enter is the first point name that will be used when storing the computed offset points. Additional points will automatically be assigned with the next consecutive point name, such as 8, 9, 10... or Offset, Offset2, Offset3...

Description / Code: Enter the description or the code for the new points to be generated by the routine.

[**Solve**]: computes and stores the new offset points and polyline.

[COGO Index](#)

Offset Points

[**Cogo**] [**Offset Points**]

The **Offset Points** screen is used to store points at a specified perpendicular offset to an existing polyline, alignment, or point range. Points can be stored that correspond with the nodes of an alignment, points of a polyline, and/or at a specified station interval.

[**Tap Line...**]: allows you to tap an existing polyline or alignment that the offset points will be computed from.

[**To/From...**]: allows you to enter a range of points that define the line where the offset will be computed from.

Offset: defines the offset distance and which side the offset occurs. The right or left side is referenced from the first point that defines the selected line.

Store Pts: When checked, will store the offset points that are computed based on the selected line and which of the two following checkboxes are checked.

Note: Leaving the Store Pts field unchecked and solving the screen will result in a map screen that displays the points that would be stored, but without actually storing anything to the job. This is useful for testing the routine before storing information.

Store Nodes: When checked, computes offset points that correspond to each node in the selected alignment (points where the horizontal or vertical alignment change), or that correspond to the existing points in a selected line or point range.

Sta. Intervals: When checked, computes offset points from the beginning of the selected line or point range, and at each specified station interval along the line or point range.

Description / Code: Enter the description or the code for the new points to be generated by the routine.

[**Solve**]: computes the offset points, and stores them if the Store Pts checkbox is checked.

[COGO Index](#)

Station Offset

[Cogo] [Station Offset]

The Station Offset screen will compute and optionally store a point at a specified station and offset to an existing polyline or alignment. The elevation for the stored point will always be set to the elevation of the first node of the polyline, or alignment.

Start Station: is the station for the first node of the selected line.

Station: is the station on the line where you want to compute an offset point from.

Offset: is the offset distance that is to the left (when L is selected) or right (when R is selected) from the selected line.

Store Pts: When checked, will store the computed offset point with the name specified in the corresponding field.

[**Tap Line...**]: opens a window where any polyline or alignment in the current job can be selected.

[**To/From...**]: opens a window where a new line can be defined by entering a range of points.

[**Solve**]: computes the location of the offset point and optionally stores the point.

[COGO Index](#)

Corner Angle

[Cogo] [Corner Angle]

The Corner Angle screen provides information on the horizontal angle created from three known points.

Backsight: is an end point of the angle to be solved.

Middle Point: is the corner point of the angle to be solved.

Foresight Point: is the other end point of the angle to be solved.

[**Select from Map...**]: Allows you to quickly select all of the above points from a map view. The first point tapped is entered in the Backsight field, the second in the Middle Point field and the third point tapped is entered in the End Point field.

[**Solve**]: will compute the following results that describe the angle defined by the three points provided.

Results

Angle left: is the horizontal angle created as you occupy the Middle Point, face the Backsight, and turn counterclockwise to the Foresight Point.

Angle right: is the horizontal angle created as you occupy the Middle Point, face the Backsight, and turn clockwise to the Foresight Point.

180 - right: is the angle that results from subtracting the angle right value from 180°.

HD to Beg.: is the horizontal distance between the Backsight and the Middle Point.

HD to End: is the horizontal distance between the Foresight Point and the Middle Point.

[COGO Index](#)

Compute Area

[Cogo] [Compute Area]

The Compute Area routine computes the area of a flat horizontal plane encompassed by a selected boundary.

[**Tap Line...**]: allows you to tap an existing polyline defining a boundary from a map view.

[**To/From...**]: provides selection of individual points to define a boundary.

[**Solve**]: will compute the details for the horizontal area of the selected boundary and display them in the Results screen.

Results

Area: is the area that the boundary encloses. If the boundary is not closed, the area is computed as if a line joined the two ends.

Length: is the length of the selected boundary.

Perimeter: is the length of the selected boundary, plus any additional length between the two ends of an open boundary.

[COGO Index](#)

Surface Area

[Cogo] [Surface Area]

The Surface Area routine computes the surface area of a best-fit flat plane within a selected boundary positioned at any incline. You can also optionally compute a volume when a thickness of the surface is provided.

Note: Boundaries containing curves are not supported.

[**Tap Line...**]: allows you to tap an existing polyline from a map view that defines the boundary of the surface.

[**To/From...**]: provides selection of individual points to define the boundary of the surface. The points must be selected in sequence around the boundary so no side of the boundary crosses another.

[**Solve**]: computes the area details within the selected boundary and displays them in the Results screen.

Results

Surface Area: is the area of the best-fit plane encompassed by the selected boundary. If the boundary is not closed, the area is computed as if a straight line joined the two ends.

Thickness: is the thickness entered on the previous screen used for calculating a volume.

Volume: is the computed volume (area of plane x thickness).

Perimeter: is the perimeter length of the selected boundary, plus any additional length between the two ends of an open boundary.

Angle of Plane: is the angle from the horizontal ground to the best-fit plane.

Residuals: Shows how well each point in the boundary fit within the computed best-fit plane. (A value of zero represents a perfect fit.)

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Triangle Solutions

[Cogo] [Triangle Solutions]

The Triangle Solutions screen will solve for the unknown parts of a triangle after providing three known parts.

Triangle Solution: is where you select the parts of the triangle that are known. You can select any of the following from the dropdown list:

- **Side-Side-Side:** The lengths of all three sides are known.
- **Angle-Side-Angle:** Two angles and the side between them are known.
- **Side-Angle-Angle:** Two angles and one side (that does not lie between those angles) are known.
- **Side-Angle-Side:** Two sides and the angle between them are known.
- **Side-Side-Angle:** Two sides and one angle (that is not between those sides) are known.

[Solve...] will solve for the unknown parts of the triangle.

Results

Side a / b / c: displays the length of each side.

Angle A / B / C: displays the corresponding angle.

Area: displays the area of the triangle in square feet and acres, or in square meters and hectares.

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Map Check

[Cogo] [Map Check]

The Map Check screen is used to manually enter boundaries from a map to check for closure and other information related to the boundary.

[Edit...]: opens the appropriate editor screen where you can edit the selected line or curve from the list.

[Delete]: deletes the selected line segment.

[Clear]: clears all line entries.

[Closure]: opens the Results page.

[Add Line...]: opens the [Add/Edit Line](#) screen where a new line can be added prior to the select segment.

[**Add Arc...**]: opens the [Add/Edit Curve](#) screen where a new curve can be added prior to the selected segment.

[**Add to Map...**]: opens the [Add to Map](#) screen where the map data entered in the list can be added to the current job as a polyline.

Results

Area: is the area that the boundary encloses. If the start and end points are in different locations, the area is computed as if a line joined these two points.

Length: is the length of the boundary from the first point to the last point.

Perimeter: is the length of the boundary from the first point to the last point, plus any additional length between the last point and the first point.

Error dist.: is the distance between the last point and the first point.

Error azm: is the direction from the last point to the first point.

Precision: is the ratio between the Error distance and Perimeter.

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Add / Edit Line


[**Cogo**] [**Map Check**] [**Add Line...**]

The [Add / Edit Line](#) screen is used to enter a new line to the list prior to the selected line segment.

[**Azimuth**] / [**Bearing**]: is the direction of the line.

Length: is the length of the line, in feet or meters.

: enters the line to the list.

: closes the screen without entering any new line data.

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[COGO Index](#)

Add / Edit Curve

[**Cogo**] [**Map Check**] [**Add Arc...**]

The [Add / Edit Curve](#) screen is used to enter a new curve to the list prior to the selected line segment.

[**Radius**]: The distance from the radius point to the curve.

[**Delta**]: The internal angle from center to tangent points.

[**Degree Arc**]: The internal angle equivalent to a 100-ft arc length.

[**Degree Chord**]: The internal angle equivalent to a 100-ft chord length.

[**Length**]: The arc length.

[**Chord**]: The chord length.

[**Tangent**]: The distance from the PC or PT to the PI.

[**Mid Ordinate**]: The distance between the curve and the chord at the center of the curve's length.

[**External**]: The minimum distance between the PI and the curve.

[**Azimuth**] / [**Bearing**] / [**Chord Azimuth**] / [**Chord Bearing**]: Azimuth / Bearing defines the direction of the curve, tangent at the PC. Chord Azimuth / Chord Bearing defines the direction of the chord, PC to PT

Turn: defines if the curve turns to the Left or Right while viewing the curve from the PC Point.

✔ : appends the curve to the list.

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Add to Map

[Cogo] [Map Check] [Add to Map...]

The Add to Map screen is used to add the existing line and curve data to the current job as a polyline.

Description: is the name that will be assigned to the new polyline that will be added to the project.

[**Location**]: can be used to manually enter the coordinates for the first point of the polyline.

[**Point**]: can be used to define the starting location of the first point of the polyline by an existing point.

Store Points: is the first point name that will be used for the new points that are needed to add the figure to the current job. All additional points will be incremented from this point.

✔ : adds the figure to the job at the specified location.

✘ : closes the screen without adding any new data to the job.

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Subdivide Area

[Cogo] [Subdivide Area]

The Subdivide Area routine will take a boundary with one open side and compute the location of a line that will enclose the boundary with a specified area using the Hinge Method or the Parallel Method.

The Hinge Method computes the location of the side of a boundary that can pivot on a fixed point.

The Parallel Method computes the location of one side of a four-sided boundary where the computed side is parallel to a stationary side of the boundary.

The top-left field is used to enter the desired area of the specified boundary. In the next field, select the units entered from the dropdown list.

Hinge: solves the boundary using the Hinge Method when selected.

Parallel: solves the boundary using the Parallel Method when selected.

[**Tap Polyline...**]: allows you to tap an existing polyline from a map view to define the fixed sides of the boundary.

Note: a boundary has two fixed sides and one side defined by a direction when using the Hinge Method. It has one fixed side and two sides defined by a direction when using the Parallel Method.

[**Editor...**]: opens the [Polyline Editor](#) where a new polyline can be created or an existing polyline can be modified.

[**Tap Points...**]: provides a map view where you can tap any existing points to define the fixed sides of the boundary.

[**To/From...**]: provides point selection by entering point names.

Store Pt 1 / 2: When checked, will store a point at the location of the end point(s) of the computed boundary line.

[**Azimuth**] / [**Bearing**]: defines the direction of the boundary sides with lengths that are not yet known.

Results

Point 1 / 2: Displays the coordinate of the end points of the computed boundary line.

Total Area: is the total area of the boundary.

Plot Area: is the area enclosed by the pre-defined fixed boundary lines.

Difference: is the difference between the Total Area and the Plot Area.

[COGO Index](#)

Subdivide Lot

[**Cogo**] [**Subdivide Lot**]

The Subdivide Lot routine will take a closed lot boundary and compute the location of a line that will subdivide the lot into two parcels. You can divide the lot by a percentage of the total area, or by entering a specific area for the subdivided lot.

Select Line: tap to select an existing polyline to define the lot boundary. This routine works with a closed polyline for the subdivision calculation. If you select an open polyline, the routine will temporarily close it by connecting the last point to the first point of the line.

Percent / Area Units: select percent to subdivide the lot using a percentage of the total area. Select area units to subdivide the lot into a parcel with a specified area.

Azimuth / Bearing: Enter the azimuth or bearing of the dividing line between the two new parcels in the original lot.

Reverse: tap to flip the orientation of the azimuth line which will apply the subdivided area to the other portion of the lot.

Store: tap to store the results of the area subdivision. You will be prompted for:

- **Point 1:** enter a name and description or code for the first point of the subdivision line.
- **Point 2:** enter a name and description or code for the second point of the subdivision line.
- **Store subdivision as line:** check this if you want to create a new polyline for the subdivision portion of the original lot. Enter a description for the new polyline.
- **Store remainder as line:** check this if you want to create a new polyline for the remainder portion of the original lot. Enter a description for the new polyline.

Note: If it is impossible to subdivide the area with the selected parameters, then the map view will indicate there is no solution, and you can not store the results.

[COGO Index](#)

HD/VD to SD/ZA

[Cogo] [HD/VD to SD/ZA]

The HD/VD to SD/ZA screen will convert a vertical and horizontal distance to an equivalent slope distance and zenith angle.

Horz Dist: is the horizontal distance from the occupy point to the foresight point.

Vert Dist: is the vertical distance from the occupy point to the foresight point.

HI: is the distance that the total station is above the ground.

HR: is the length of the rod.

[**Earth Curvature and Refraction**]: Set the earth curvature and refraction correction coefficient. Select [**None**] to turn earth curvature and refraction correction off for all observations from this station setup.

[**Solve**]: computes the equivalent slope distance and zenith angle from the data entered.

Results

Zenith: is the computed zenith angle from the occupy point to the foresight point.

Slope Dist: is the computed slope distance from the occupy point to the foresight point.

[COGO Index](#)

SD/ZA to HD/VD

[Cogo] [SD/ZA to HD/VD]

The SD/ZA to HD/VD screen will convert a slope distance and zenith angle to an equivalent horizontal distance and vertical distance.

Slope Dist: is the slope distance to be converted.

Zenith: is the zenith angle to be converted.

HI: is the distance that the total station is above the ground.

HR: is the length of the rod.

[Earth Curvature and Refraction]: Set the earth curvature and refraction correction coefficient. Select **[None]** to turn earth curvature and refraction correction off for all observations from this station setup.

[COGO Index](#)

AU Conversion

[Cogo] [AU Conversion]

The AU Conversion (Architectural Units Conversion) screen will convert distances with fractional inches to decimal distances.

If the job is configured for International Feet or US Survey Feet, it is assumed that the distance entered in this screen is in the same units as the job. If the job is configured for meters, it is assumed that the distance entered in this screen is in International Feet. See Input Shortcuts in the User's Manual for more information on entering architectural units.

[Convert] / [Use]: will perform the conversion. If this screen is accessed from the Quick Pick list when the cursor was in a distance field, this button will be labeled **[Use]** and will copy the converted distance to the corresponding distance field.

[COGO Index](#)

Average Points

[Cogo] [Average Points]


The Average Points routine will compute the average location from any number of existing points.

Note: This routine will compute an average coordinate from the selected individual points. If you wish to compute an average coordinate from multiple observations, you should select **[Compute Average]** when prompted by the Point Exists Screen.

The first screen is used to select the points you want to use for computing the average.

[To/From]: opens the Select Points screen where you can specify the points you want to include.

[Tap Points]: opens a map view where you can tap on the points you want to include.

: The power button opens a list of alternative methods to select the points to average, or view a list of points already selected.

The *Select by distance* option opens a screen where you can select multiple points by first selecting any point as the *Radius Point* and then specifying a *Distance* from that point. The radius point and any other points within the specified

distance to it will be included in the average computation.

[**Next >**]: opens the next screen.

Average Points – Screen 2

The second screen is used to view the coordinates of the average point, optionally adjust the data used to compute the average and optionally save the point.

The lower portion of the screen displays all the selected points that are being used to compute the average location. If any points' residual values exceed your tolerances, you can uncheck that point and a new average is computed that excludes that point.

Result: Displays the average coordinates of all the selected points. These coordinates are automatically updated when changes are made in the lower portion of the screen (without the need to tap [*Solve*]).

Use Elevation from Point: When checked, and if storing the point, the elevation for the computed point will be the elevation of the point selected here. When unchecked, the average elevation of all the selected points will be displayed and used if storing the average point.

Store Point: When checked, the average location computed will be saved to the point specified in the associated field after solving. If unchecked, nothing is saved when solving.

[< **Back**]: Returns to the previous screen.

[**Solve**]: If the *Store Point* box is checked, this will save a new point with the computed average coordinates, otherwise this simply closes the screen.

[COGO Index](#)

Curve Menu

The Curve Menu contains routines that will compute all aspects of a horizontal curve and assist in curve layout.

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Curve Solution

[Curve] [Curve Solution]

The [Curve Solution](#) screen provides detailed information on a curve when two parts of the curve are known.

The first known part of the curve is defined by one of the following:

- **Radius:** is the distance from the radius point to the curve.
- **Delta:** is the deflection angle.
- **Degree Arc:** is the deflection angle that results in a 100-ft. arc length.
- **Degree Chord:** is the deflection angle that results in a 100-ft. chord length.

The second known part of the curve is defined by one of the following:

- **Delta:** is the deflection angle.
- **Length:** is the arc length.
- **Chord:** is the chord length.
- **Tangent:** is the distance from the PC or PT to the PI.
- **Mid Ordinate:** is the distance between the curve and the chord at the center of the curve's length.
- **External:** The minimum distance between the PI and the curve.

[Solve]: Computes the details for the horizontal curve.

[Layout...]: opens the [Horizontal Curve Layout](#) screen. where points can be created so the curve can be staked in the field.

[Traverse...]: opens the [Traverse on Curve](#) screen.

[Stake]: Tap to open the [Stake Curve and Offset](#) screen where you can define the PC point for the just solved curve, and stake it out.

Results:

Radius: is the distance from the radius point to the curve.

Length: is the arc length.

Chord: is the chord length.

Deg. Arc: is the deflection angle that results in a 100-ft. arc length.

Deg. Chord: is the deflection angle that results in a 100-ft. chord length.

Delta: is the deflection angle.

Tangent: is the distance from the PC or PT to the PI.

External: is the minimum distance between the PI and the curve.

Mid Ord.: is the distance between the curve and the chord at the center of the curve's length.

External: (not shown) The minimum distance between the PI and the curve.

Segment: is the area between the arc length and the chord.

Sector: is the area between the arc length and the two edge radii.

Fillet: is the area between the arc length and the tangents.

[Curve Index](#)

Known PI and Tangents

[Curve] [PI and Tangents]

The PI and Tangents screen is used to compute and store the PC, PT, and radius points when the PI point and the direction of both tangents are known, along with one other curve attribute.

PI Point: is the PI point.

[Azm PI->PC] / [Brg PI->PC]: is the direction of the tangent from the PI to the PC.

[Azm PI->PT] / [Brg PI->PT]: is the direction of the tangent from the PI to the PT.

The remaining curve attribute can be defined with one of the following selections:

- **Radius:** is the distance from the radius point to the curve.
- **Delta:** is the deflection angle.
- **Degree Arc:** is the deflection angle that results in a 100-ft. arc length.
- **Degree Chord:** is the deflection angle that results in a 100-ft. chord length.

Store PC: When checked, will store the computed PC point with the specified point name.

Store RP: When checked, will store the computed radius point with the specified point name.

Store PT: When checked, will store the computed PT point with the specified point name.

[**Solve**]: Computes the details for the horizontal curve.

[**Layout...**]: opens the [Horizontal Curve Layout](#) screen. where points can be created so the curve can be staked in the field.

[**Traverse...**]: opens the [Traverse on Curve](#) screen.

[**Stake**]: Tap to open the [Stake Curve and Offset](#) screen where you can define the PC point for the just solved curve, and stake it out.

Results

Radius: is the distance from the radius point to the curve.

Delta: is the deflection angle.

Tangent: is the distance from the PC or PT to the PI.

[Curve Index](#)

Three Point Curve

[Curve] [3 Point Curve]

The [Three Point Curve](#) screen will compute the details of a curve when three points of the curve are specified; the PC, PT and any other point on the curve; or the PC, PT and radius point.

First point: is the first point from the current job that defines the curve. The specified point can be either the PC or the Radius Point by selecting the appropriate radio button.

Note: The selection made for the first point determines the available choices in the remaining fields.

Pt. on Curve: is any point that lies on the curve between the PC and PT.

PC: is the point that defines the beginning of the curve (Point of Curvature).

PT: is the point that defines the end of the curve (Point of Tangency).

Store RP: When checked, the radius point will be computed and stored with the name specified here.

[**Solve**]: will compute the curve based on the selected points.

[**Traverse**]: opens the [Traverse on Curve](#), where the curve can be included in a traverse.

[**Layout**]: opens the [Curve Layout](#) screen, where the location of points on a curve can be computed at any station interval.

[**Stake**]: Tap to open the [Stake Curve and Offset](#) screen where you can define the PC point for the just solved curve, and stake it out.

Results

Radius: is the distance from the radius point to the curve.

Length: is the arc length.

Chord: is the chord length.

Delta: is the deflection angle.

Tangent: is the distance from the PC or PT to the PI.

Mid Ord.: is the distance between the curve and the chord at the center of the curve's length.

External: is the minimum distance between the PI and the curve.

Deg. Arc: is the deflection angle that results in a 100-ft. arc length.

Deg. Chord: is the deflection angle that results in a 100-ft. chord length.

Segment: is the area between the arc length and the chord.

Sector: is the area between the arc length and the two edge radii.

Fillet: is the area between the arc length and the tangents.

[Curve Index](#)

Compute Radius Point

[Curve] [Radius Point]

The Compute Radius Point screen is used to compute and optionally store the radius point for a curve when certain parts of the curve are known.

PC Point: is the point that defines the beginning of the curve (Point of Curvature).

PT Point: is the point that defines the end of the curve (Point of Tangency).

Turn: specifies if the curve turns to the Left or Right as you face the curve from the PC.

Arc: specifies if the arc is Small (less than 180°) or Large (greater than 180°).

The final part of the curve is defined by one of the following choices:

- Radius: is the distance from the radius point to the curve.
- Delta: is the deflection angle.
- Degree Arc: is the deflection angle that results in a 100-ft. arc length.
- Degree Chord: is the deflection angle that results in a 100-ft. chord length.

Store RP: When checked, the computed radius point will be stored with the name specified here.

[Solve]: computes the location of the radius point.

[Layout...]: opens the [Curve Layout](#) screen.

[Traverse...]: opens the [Traverse on Curve](#) screen.

[Stake]: Tap to open the [Stake Curve and Offset](#) screen where you can define the PC point for the just solved curve, and

stake it out.

Results

Radius: is the distance from the radius point to the curve.

Length: is the arc length.

Chord: is the chord length.

Deg. Arc: is the deflection angle that results in a 100-ft. arc length.

Deg. Chord: is the deflection angle that results in a 100-ft. chord length.

Delta: is the deflection angle.

Tangent: is the distance from the PC or PT to the PI.

External: is the minimum distance between the PI and the curve.

Mid Ord.: is the distance between the curve and the chord at the center of the curve's length.

Segment: is the area between the arc length and the chord.

Sector: is the area between the arc length and the two edge radii.

Fillet: is the area between the arc length and the tangents.

[Curve Index](#)

Line Tangent to Circles

[Curve] [Tangent to Circle]

Will compute the location of a line that is tangent to the specified sides of two specified circles.

Tangent Line: determines which sides of the circles the computed line will be tangent to as you occupy the 1st Radius Point and face the 2nd Radius Point.

1st / 2nd Radius Pt: defines the points around which the circles are computed.

Radius: defines the radius of the circles that are used to compute the Tangent Line.

Store Tan Pt: When checked, will store the computed tangent points.

[Solve]: computes the location of the tangent line and optionally stores the two tangent points.

Results

TP 1: displays the coordinates for the first tangent point.

TP 2: displays the coordinates for the second tangent point.

Azimuth: is the azimuth of the tangent line from the first tangent point to the second.

Distance: is the length of the tangent line.

[Curve Index](#)

Horizontal Curve Layout

[Curve] [Curve Layout]

The Curve Layout screen is used to assist in the layout of a horizontal curve by computing the direction and distance to points on the curve using a variety of methods.

Method : The method determines how the points on the curve are laid out. Each method is described below.

PC Deflection: provides deflection angles and distances to each station on the curve as if occupying the PC and backsighting the PI. The results are given in the following format:

- **Station:** is the current station on the curve.
- **Deflection:** is the angle to turn to the current station.
- **Long chord:** is the distance from the PC to the current station.
- **Short chord:** is the distance from the previous station to the current station.

PI Deflection: provides deflection angles and distances to each station on the curve as if occupying the PI and backsight the PC. The results are given in the following format:

- **Station:** is the current station on the curve.
- **Deflection:** is the angle to turn to the current station.
- **PI to Station:** is the distance from the PI to the current station.

Tangent Offset: provides perpendicular offset information from the tangent (the line from the PC to the PI) for each station on the curve. The results are given in the following format:

- **Station:** is the current station on the curve
- **Tan dist (TD):** is the distance on the tangent, from the PC to the PI, or the PI to the PT, where the perpendicular offset occurs.
- **Tan offset:** is the distance, perpendicular to the tangent, to the curve at the particular station.
- **Tan:** is the length of the tangent (the distance from the PC to the PI).
- **Tan - TD:** is the distance on the tangent, from the PI to the PC, or the PI to the PT, where the offset occurs

Chord Offset: provides perpendicular offset information from the chord (the line from the PC to the PT) for each station on the curve. PC deflection information is also provided. The results are given in the following format:

Station: is the current station on the curve.

- **Chord dist.:** is the distance on the long chord from the PC (toward the PT) where the perpendicular offset occurs.
- **Chord offset:** is the distance to the current station on the curve, perpendicular to the long chord.
- **PC Deflection:** is the angle to turn to the current station, as if occupying the PC and backsighting the PI.
- **Chord Length:** is the distance from the PC to the current station on the curve.

The first known part of the curve is defined by one of the following:

- **[Radius]:** is the distance from the radius point to the curve.
- **[Delta]:** is the deflection angle.
- **[Degree Arc]:** is the deflection angle that results in a 100-ft. arc length.
- **[Degree Chord]:** is the deflection angle that results in a 100-ft. chord length.

The second known part of the curve is defined by one of the following:

- **[Delta]**: is the deflection angle.
- **[Length]**: is the arc length.
- **[Chord]**: is the chord length.
- **[Tangent]**: is the distance from the PC or PT to the PI.
- **[Mid Ordinate]**: is the distance between the curve and the chord at the center of the curve's length.
- **[External]**: is the minimum distance between the PI and the curve.

PC Station: is the starting station assigned to the PC.

Interval: When checked, all necessary information for each station at the specified interval on the curve will be computed.

Start station: when not computing by interval (above), only the information for the particular station entered here is computed.

[Solve]: will solve and display all the details of the specified curve, without the layout information.

[Sta -]: decreases the current station by the station interval.

[Sta +]: increases the current station by the station interval.

[Layout]: will solve and display the layout information for all the stations of the specified curve.

[Stake]: Tap to open the [Stake Curve and Offset](#) screen where you can define the PC point for the just solved curve, and stake it out.

Results

Radius: is the distance from the radius point to the curve.

Length: is the arc length.

Chord: is the chord length.

Delta: is the deflection angle.

Tangent: is the distance from the PC or PT to the PI.

Mid Ord.: is the distance between the curve and the chord at the center of the curve's length.

External: is the minimum distance between the PI and the curve.

Deg. Arc: is the deflection angle that results in a 100-ft. arc length.

Deg. Chord: is the deflection angle that results in a 100-ft. chord length.

Segment: is the area between the arc length and the chord.

Sector: is the area between the arc length and the two edge radii.

Fillet: is the area between the arc length and the tangents.

[Curve Index](#)

Traverse on Curve

[Curve] [Trav. on Curve]

The Traverse on Curve screen will compute the PT and radius point for a curve when the tangent azimuth at a PC point is known.

The first known part of the curve is defined by one of the following:

- **[Radius]**: is the distance from the radius point to the curve.
- **[Delta]**: is the deflection angle.
- **[Degree Arc]**: is the deflection angle that results in a 100-ft. arc length.
- **[Degree Chord]**: is the deflection angle that results in a 100-ft. chord length.

The second known part of the curve is defined by one of the following:

- **[Delta]**: is the deflection angle.
- **[Length]**: is the arc length.
- **[Chord]**: is the chord length.
- **[Tangent]**: is the distance from the PC or PT to the PI.
- **[Mid Ordinate]**: is the distance between the curve and the chord at the center of the curve's length.
- **[External]**: is the minimum distance between the PI and the curve.

[PC Point]: is the point that defines the beginning of the curve (Point of Curvature).

[Azimuth] / [Bearing]: is the direction of the tangent at the beginning of the curve.

[Turn]: specifies if the curve turns to the Left or Right as you face the curve from the PC.

Store PT: When checked, will store the computed PT point with the specified point name.

[Store RP]: When checked, the computed radius point will be stored with the name specified here.

[Solve]: will compute and store the PT, and if desired, the radius point.

Results:

Radius: is the distance from the radius point to the curve.

Length: is the arc length.

Chord: is the chord length.

Delta: is the deflection angle.

Tangent: is the distance from the PC or PT to the PI.

Mid Ord.: is the distance between the curve and the chord at the center of the curve's length.

External: is the minimum distance between the PI and the curve.

Deg. Arc: is the deflection angle that results in a 100-ft. arc length.

Deg. Chord: is the deflection angle that results in a 100-ft. chord length.

Segment: is the area between the arc length and the chord.

Sector: is the area between the arc length and the two edge radii.

Fillet: is the area between the arc length and the tangents.

[Curve Index](#)

Parabolic Curve

[Curve] [Parabolic Curve]

The [Parabolic Curve](#) screen provides detailed information on a vertical parabolic curve when certain parts of the curve are known.

Known: The PVC or PVI radio button is selected to define which point on the curve is known.

One of the following options must be selected from the dropdown list:

- **Curve Length:** is selected when the length of the curve is known. When selected the following must also be specified:
- **Point On Curve:** is selected when the location of another point on the curve is known. When selected, the following must also be specified.
- **Hi/Lo Elevation:** is selected when the high or low point for the curve is known. When selected, the following must also be specified.

Note: When the begin and end grades are both positive or both negative, the high / low elevation will not be located between the PVC and PVT.

PVC / PVI Station: is the station for the specified point.

PVC / PVI Elevation: is the elevation for the specified point.

Begin Grade: is the grade at the tangent of the PVC.

End Grade: is the grade at the tangent of the PVT.

Curve length: is the length of the vertical curve (the horizontal distance between the PVC and PVT).

Hi/Lo Elevation: is the elevation of the curve at the location where the tangent is zero (the crest of the curve).

Station: is the station where the other point is located on the curve.

Elevation: is the elevation of the other point.

[Solve]: computes the details for the vertical curve.

[Layout]: opens the [Parabolic Layout](#) screen where you can solve for an elevation at a specified station, or solve for a station at a specified elevation.

Results

PVC sta.: is the station at the PVC.

PVI sta.: is the station at the PVI.

PVT sta.: is the station at the PVT.

Hi/Lo sta.: is the station where the vertical curve has a tangent equal to zero (the crest of the curve).

Elev.: is the elevation for the respective point.

[Curve Index](#)

Parabolic Layout

[Curve] [Parabolic Layout]

The Parabolic Layout screen allows you to compute an elevation at a specified station, or a station at a specified elevation.

Beg. Grade: is the percent grade at the PVC.

End Grade: is the percent grade at the PVT.

Curve Length: is the horizontal distance between the PVC and PVT.

PVC Station: is the starting station at the PVC.

PVC Elevation: is the elevation at the PVC.

Solve for: is where you select to solve for an unknown Elevation, or an unknown Station. The selection made here determines which of the following choices will be available.

Interval: When checked, the Current station can be incremented by the specified interval by using the Sta - and Sta + buttons and then re-computed with the Layout button.

Current station: is the station that will be solved for with the Layout button.

Elevation: is the known elevation for the location(s) on the parabolic curve where you want to compute the station(s).

[Solve]: computes the details of the vertical curve.

[Sta -]: decreases the Current station by the Interval.

[Sta +]: increases the Current station by the Interval.

[Layout]: computes either the elevation at the specified Current station or the station(s) at the specified Elevation.

Results

PVC sta.: is the station at the PVC.

PVI sta.: is the station at the PVI.

PVT sta.: is the station at the PVT.

Elev.: is the elevation for the respective point.

Hi/Lo sta.: is the station where the vertical curve has a tangent equal to zero (the crest of the curve).

[Curve Index](#)

Straight Grade

[Curve] [Straight Grade]

The [Straight Grade](#) screen will solve for the elevation at a specified station or a station at a specified elevation on a straight grade.

Begin Station: is the station where the straight grade begins.

Begin Elev: is the elevation at the Begin station.

Grade: is the percent slope.

Solve for: is where you select to solve for an Elevation or a Station. The choice made here determines which of the following selections are available.

End station: is the station where you want to compute the elevation.

Interval: When checked, the End station can be incremented by the specified interval by using the [Station-] and [Station+] buttons and then re-computed with the [Layout] button.

End Elevation: is the elevation at the point where you want to compute the station.

[Layout]: performs the computation and displays the results.

Results

Station: is the current station.

Elevation: is the elevation for the current station.

[Curve Index](#)

Spiral

[Curve] [Spiral]

The [Spiral](#) screen will compute the details of a spiral curve, given the spiral length and radius.

Spiral length: is the length of the spiral curve.

Radius: is the circular curve radius.

[Solve]: computes the details of the spiral curve.

[Layout...]: opens the [Spiral Layout](#) screen where the location of stations on the spiral curve can be computed.

[Traverse...]: opens the [Traverse on Spiral](#) screen.

[Stake]: Tap to open the [Stake Spiral and Offset](#) screen where you can define the start point for the just solved curve, and stake it out.

Results

X of Throw: is the distance along the tangent where a perpendicular line intersects with the radius point.

Y of Throw: is the minimum distance between the tangent and the extended circular curve.

X: is the distance from the TS to the SC along the tangent.

Y: is distance from the SC to the tangent.

Delta: is the angle between the tangent, and the line between the PI and SC.

[Curve Index](#)

Spiral Layout

[Curve] [Spiral]

The [Spiral Layout](#) screen is used to compute station locations on a spiral curve.

Radius: is the radius of the circular curve.

Spiral Length: is the length along the spiral curve from TS to SC.

TS station: is the station at the TS point.

Interval: When checked, is the spiral arc distance that is added or subtracted from the Current Station using the [Sta +] and [Sta -] buttons.

Current Station: is the station on the curve that is computed.

[Solve]: solves and displays the details for the specified spiral curve.

[Sta -]: decreases the Current Station by the specified Interval.

[Sta +]: increases the Current Station by the specified Interval.

[Layout]: computes the location of the Current Station.

Results

Station: is the current station.

Deflection: is the horizontal angle to the current station as if occupying the TS and backsighting the Spiral PI.

Long crd.: is the chord length from the TS to the current station.

Short crd.: is the chord length from the previous station to the current station.

[Curve Index](#)

Traverse on Spiral

[Curve] [Spiral]

The Traverse on Spiral screen is used to compute the location of, and optionally store the SC, or ST and spiral PI points.

Radius: is the radius of the circular curve.

Length: is the length along the spiral curve from TS to SC.

TS / CS Point: is the existing point associated with the TS or CS point.

[Azimuth] / [Bearing]: is the tangent direction at the TS or CS point.

TS->SC: specifies that the curve starts at the tangent to spiral and ends at the spiral to curve.

CS->ST: specifies that the curve starts at the curve to spiral and ends at the spiral to tangent.

Right / Left: specifies is the curve turns toward the right or left as you face the spiral from the TS or CS.

Store SC / ST: When checked, saves a point for the computed SC point.

Store PI: When checked, saves a point for the computed spiral PI.

Results

Tangent: the tangent direction entering the spiral at the TS or CS.

Tangent Out: the tangent direction exiting the spiral at the SC or ST.

X of Throw: is the distance along the tangent where a perpendicular line intersects with the radius point.

Y of Throw: is the minimum distance between the tangent and the extended circular curve.

X: is the distance from the TS to the SC along the tangent.

Y: is distance from the SC to the tangent.

Delta: is the angle between the tangent, and the line between the PI and SC.

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Roads Menu

The Roads Menu contains the routines used to perform road layout.

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[Road Stakeout Index](#)
[Road Slope Staking Index](#)
[Show Station Index](#)

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Manage Roads

[Roads] [Manage Roads]

The Manage Roads screen is used to load and unload road definitions in the current job. You can also edit currently loaded road definitions and export a road.

[Edit...]: Opens up the [Edit Road](#) screen where you can review and modify the properties of the selected road definition.

[Remove...]: Unloads the currently selected road from the job. The original file (.rd5/.xml/.rxl) is not deleted from the data collector. If needed, the road can be loaded back into the job using the [Add...] button.

[Add...]: Prompts you if you want to import a road from a file or create a new road starting with a Survey Pro alignment.

- If you choose to import a road from a file, you will be prompted to pick a RoadXML (*.RXL), old Survey Pro road files (.RD5), or a LandXML (*.XML). The LandXML file must contain a valid road definition. Once a road is loaded, the [Add...] button can be used again to load more roads.
- If you choose to create a new road, the [Edit Properties](#) screen prompts you to enter a name and pick an alignment for the road.

Note: When you first add the road, it is created in Survey Pro using a copy of the alignment specified in the file, or selected from the job when creating a new road. You only need to select the road alignment in the Edit Properties screen if you wish to change the road to use a different alignment. If you change the road to use an alignment from the Survey Pro job, the road alignment will be redefined with a new copy of the chosen alignment.

[Export...]: Export will open a file save screen where you can choose a destination to save the currently selected road in RoadXML (.RXL) format.

Edit Road

[Roads] [Manage Roads] [Edit]

The [Edit Road](#) screen has up to five cards used to review or modify road properties.

- [General](#)
- [Stations](#)
- [Templates](#)
- [Station Equations](#) - This card is only present when station equations are defined for the road.
- [Additional Points](#) - This card is only present when additional points are defined for the road.

Edit Road - General

[Roads] [Manage Roads] [Edit] [General]

The General card is used to review or modify road properties.

The name of the road and the point of beginning (POB) coordinate for the starting point are displayed. You can tap on the power menu next to the name of the road for the option to save the road alignment to the job alignments collection.

[Properties]: Opens up the [Edit Properties](#) screen for the road where you can modify the name, station interval, and alignment used to define the road.

[HAL]: Horizontal Alignment, displays a table showing all the elements of the alignment. Element types are start point, straight segments, spiral curves, arcs, and more. Each entry provides details on that element.

[VAL]: Vertical Alignment, displays a table showing all the elements of the alignment. Each element designates a change in alignment like when changing grades or entering a vertical curve. Each entry provides details on that element.

[Report]: Produces a report on the currently selected road. The report contains the coordinates for each template node at a given station.

H Map: Tapping the horizontal map will take you to a detail map view. The detail shows all the cross section templates along with the horizontal alignment. The controls at the bottom of the display control the station and the segment location for the information displayed across the top of the map. A red dot moves on the map showing the currently selected station template and segment.

- +: The plus button advances to the next template
- -: The minus button moves the selected station back to the previous template
- >>: Moves the selection one segment out or to the right
- <<: Moves the selection one segment in or towards the left

In addition to the usual map controls, the road preview map has one additional map control.



Advances the selection to the specified station, and updates the details at the top of the screen.

A template can also be selected by tapping on the map.

Across the top of the map, detailed information is provided about each station and template. Some of the information is abbreviated. Use the table below to see what the abbreviations mean.

- **PT:** Point of tangent (Curve to tangent)
- **VCE:** Vertical curve end
- **RE:** Road end
- **VCS:** Vertical curve start
- **RS:** Road start
- **VPI:** Vertical point of intersection
- **SC:** Transition curve
- **XS:** Regular sections
- **Hi:** Vertical curve high point
- **Lo:** Vertical curve low point
- **T:** Template assignment (any station with a template)
- **STEQ:** Station Equation

V Map: Tapping the vertical profile map will take you to a detail map view. The detail shows the selected station

template cross section view.

- +: The plus button advances to the next template
- -: The minus button moves the selected station back to the previous template
- >>: Moves the selection one segment out or to the right
- <<: Moves the selection one segment in or towards the left

Information about the currently selected station and segment is displayed at the top of the map.

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[Roads Menu Index](#)

Edit Road Properties

[Roads] [Manage Roads] [Edit] [General] [Properties]

The Edit Properties screen is used to edit the name, station interval, and alignment used for this road.

Name: Enter the name to use for this road.

Station Interval: Sets the interval to use when displaying templates on the road view.

Road Alignment: Select the alignment to use with this road.

Note: When you first add the road, it is created in Survey Pro using a copy of the alignment specified in the file, or selected from the job when creating a new road. You only need to select the road alignment in the Edit Properties screen if you wish to change the road to use a different alignment. If you change the road to use an alignment from the Survey Pro job, the road alignment will be redefined with a new copy of the chosen alignment.

[Edit Roads Index](#)
[Roads Menu Index](#)

Edit Road - View Stations

[Roads] [Manage Roads] [Edit] [Stations]

The Stations card is used to view the stations in the road by interval and node. You can add or delete the templates associated with any station.

[Add / Edit]: Opens the [Add / Edit Position](#) screen where you can create or modify a station position for the road.

[Delete]: Deletes the selected station position from the road.

[Template Left / Right]: Opens up the [Template Details](#) screen where you can review the dimensions of the template for the selected station position.

[Edit Roads Index](#)
[Roads Menu Index](#)

Add / Edit Position

[Roads] [Manage Roads] [Edit] [Stations] [Add / Edit]

The [Add / Edit Position](#) screen is used to create or modify a station position on the road.

Station: Station on the road for this position.

Left Template: Template to use for the left side at this station.

Right Template: Template to use for the Right side at this station.

[Edit Roads Index](#)
[Roads Menu Index](#)

Template Details

[Roads] [Manage Roads] [Edit] [Stations] [Detail]

The top map depicts the template from centerline to hinge points. The lower section provides details on the currently selected segment. Use the [<<] and [>>] buttons to select different segments on the template.

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[Roads Menu Index](#)

Edit Road - Template

[Roads] [Manage Roads] [Edit] [Templates]

The [Templates](#) card is used to manage the collection of templates to use with the road.

Template List: Shows all the templates loaded with this road.

[Add / Edit]: Opens up the [Add / Edit Template](#) screen.

[Delete]: Deletes the selected template.

[Edit Roads Index](#)
[Roads Menu Index](#)

Add / Edit Template

[Roads] [Manage Roads] [Edit] [Templates] [Add/Edit]

The [Add / Edit Template](#) card is used to modify the properties of a single template.

Name: Shows the name of the template.

Properties: Opens the [Template Properties](#) screen where you can change the name and the cut slope / fill slope behavior for the template.

Insert Segment: Opens the [Add Segment](#) screen where you set the properties for the template segment.

Edit Segment: Opens the [Edit Segment](#) screen where you set the properties for the template segment.

Remove Segment: Removes the selected segment from the template.

[Edit Roads Index](#)
[Roads Menu Index](#)

Template Properties

[Roads] [Manage Roads] [Edit] [Templates] [Add/Edit] [Properties]

The [Template Properties](#) screen is used to modify the properties of a template.

Name: Enter the name of the template

Use Cut Slope: Check this setting to use cut slope values. Enter the desired cut slope and cut ditch width values.

Use Fill Slope: Check this setting to use fill slope values. Enter the desired fill slope value.

[Edit Roads Index](#)
[Roads Menu Index](#)

Add / Edit Segment

[Roads] [Manage Roads] [Edit] [Templates] [Add/Edit] [Insert/Edit]

The [Add / Edit Segment](#) screen is used to modify the properties of a template segment.

Name: Enter the name of the segment

Horizontal Distance: Horizontal length of this segment

Vertical Offset: Any vertical offset (up or down) for this segment.

[Edit Roads Index](#)
[Roads Menu Index](#)

View Station Equations

[Roads] [Manage Roads] [Edit] [Station Equations]

This card displays a list of all the station equations in use for the alignment. The Back station is the point where the equation applied and the Ahead station is the station value to be used. Each record represents a station equation zone. The zone will be shown after the station in the road staking routines such as 1+00:2 for zone 2.

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[Roads Menu Index](#)

View Additional Points

[Roads] [Manage Roads] [Edit] [Additional Points]

This card displays individual locations along the road that are independent from the templates. These points often represent such things as signage or man hole covers.

[Create points from list]: Tap to create new points from the locations in the Additional Points list.

[Edit Roads Index](#)
[Roads Menu Index](#)

Road Stakeout

[Roads] [Road Stakeout]

The [Stake Road](#) screen is used to stake any segment of a road profile at any station.

[Drop Down List]: provides a list of roads currently imported into the job. Pick the road to stake.

[Tap Road...]: opens the [Tap on a Road](#) map where you can tap on any road in the job to select it.

Name: displays the name of the selected road.

Begin Station: displays the station assigned to the beginning of the road.

End Station: displays the final station in the road.

[Backsight...]: Opens the [Station Setup](#) screen.

[Next >]: takes you to the next Stake Road screen where a specific point on the road can be selected to stake.

[Road Stakeout Index](#)
[Roads Menu Index](#)

Stake Road - Screen 2

The second [Stake Road](#) screen displays a cross-sectional profile view of the road at the current station.



Station Interval: is the value that is added to the Station to Stake after the [Next] button is pressed.

[Next]: advances the Station to Stake by the Station Interval.

Note: If the Stake Corners option is selected in the [Stakeout Settings](#) screen, the [Next Station] button will also stop at any horizontal or vertical alignment node, and any changes in template.

Auto Adv.: Automatic Advancement. Check this control if you want to stake stations and nodes in a sequence. You can choose to go in sequence back and forth, where you stake every node at each station before moving to the next station, or you can choose to go in sequence up and down, where you stake each station at every node before moving to the next node.

[Config...]: Configure. Opens up the [Automatic Advancement](#) screen where you can configure the sequence for automatic advancement of staking location.

 , : These buttons are used to select the particular node, or an offset to it, from your road profile that you wish to stake. The segment name at the selected node is also displayed. If staking the centerline with an offset, the side of the road that the offset occurs is also displayed.

Offset: When checked, allows you to specify an offset distance from the current node. Offsets to a node maintain the elevation of the node.

Note: A *positive* value offset is applied at the specified distance from each node *away* from the centerline. A *negative* value offset is applied at the specified distance from each node *toward* the centerline until the point where the centerline is crossed and then the value is no longer valid.

Subgrade: When checked, allows you to specify a vertical offset from the actual node location. Positive values result in the stake location occurring below the selected node. Negative values result in the stake location occurring above the selected node.

[**Backsight...**]: Opens the [Station Setup](#) screen.

[< **Back**]: returns to the [previous](#) screen.

[**Next >**]: takes you to the [next](#) Stake Road screen where the direction and distance information to the stake point is displayed.

[Road Stakeout Index](#)

[Roads Menu Index](#)

Stake Road - Screen 3

The third Stake Road screen displays distance, direction, and other information about the point to be staked.

Station: displays the station where the stake point occurs and the type of line segment it falls on in the alignment.

Segment: displays the name of the segment tangent to the point to be staked; if the point is on the Left or Right side of the road; and the specified offset, if any.

Angle Right: is the horizontal angle from the backsight to the stake point.

Horz Dist: is the horizontal distance from the total station to the stake point.

Vert Dist: is the vertical distance from the total station to the stake point.

ZE to Rod: is the zenith angle from the total station to the stake point.

[**Circle Zero**]: is used to modify the circle on the total station so that the angle right reading will be zero when it is facing toward the design point, which can sometimes be easier than turning to an obscure angle value. When this button is tapped, the following actions will occur:

1. A new backsight circle value is computed, sent to the instrument and stored in the raw data
 2. The Angle Right value is changed to zero to reflect the change. The instrument now needs to be turned horizontally to zero to face the design point.
 3. To prevent errors, the backsight set up is invalidated when exiting the [Stakeout](#) dialog if this button has been used. A Circle zeroed on a design point is meaningless once the design point has been staked.
-

Note: The [**Circle Zero**] button is not available when using a robotic total station.

[< **Back**]: returns to the [previous](#) screen.

[**Stake >**]: opens the [final Stake Road](#) screen where the shots to the stake point are performed.

[Road Stakeout Index](#)

[Roads Menu Index](#)

Stake Road - Screen 4

The fourth and final [Stake Road](#) screen is used to perform the shots necessary to locate the design point. This screen is identical to the final [Offset Staking](#) screen.

[Road Stakeout Index](#)

[Roads Menu Index](#)

Road Slope Staking

[**Roads**] [**Slope Staking**]

The [Road Slope Staking](#) screen is used to locate the catch point of the road at any station.

[**Drop Down List**]: provides a list of roads currently imported into the job. Pick the road to stake.

[**Tap Road...**]: opens the [Tap on a Road](#) screen where you can tap on any road in the job to select it.

Name: displays the name of the selected road.

Begin Station: displays the station assigned to the beginning of the road.

End Station: displays the final station in the road.

Template: allows you to choose the road template to stake.

[**Backsight...**]: Opens the [Station Setup](#) screen.

[**Next >**]: takes you to the [next](#) Road Slope Staking screen where the slope staking parameters are set up.

[Road Slope Staking Index](#)

[Roads Menu Index](#)

Road Slope Staking - Screen 2

The second [Road Slope Staking](#) screen is used to set up some slope stake parameters prior to slope staking the road.

Station: is the station to be slope staked.

Station Interval: specifies how far to advance from the current station to the next station.

[**Next Station**]: advances the current station by the Station Interval.

Note: If the Stake Corners option is selected in the [Stakeout Settings](#) screen, the [**Next Station**] button will also stop at any horizontal or vertical alignment node, and any changes in template.

[**Backsight...**]: Opens the [Station Setup](#) screen.

[< **Back**]: returns to the [previous](#) screen.

H. Map Card

The [H. Map](#) card displays information about the horizontal details of the road at the current station.

Segment Type: displays the type of horizontal section at the current station.

Left / Right: is the description of the left and right templates that are being used at the current station.

V. Map Card

The [V. Map](#) card displays a graphic of the cross-sectional profile of the road at the current station. The hinge points and slopes are also displayed.

Slopes Card

The [Slopes](#) card is used to specify the cut and fill slopes that will be used when computing the location of the catch point. The default values are the slopes stored in the template for the section being staked. To override a default slope, check the appropriate box and key in the new slope. The new slope entered will always be used regardless of the values stored in the templates. Changes to slopes will be reflected in the [V. Map](#) card graphic.

Cut Slope: is the left and right slope, respectively, used when the terrain requires a cut (the hinge point is located below the terrain's surface).

Fill Slope: is the left and right slope, respectively, used when the terrain requires a fill (the hinge point is located above the terrain's surface).

Cut/Fill Hinge Points Cards: The [Fill Hinge Points](#) tab and the [Cut Hinge Points](#) tab are used to select the segment where you want the hinge point location to be computed from in situations requiring a fill or a cut respectively. (The hinge point will occur at the node of the selected segment furthest from the centerline.) The hinge point can also be defined at different segments for the left and right sides of the road.

Left / Right: is the specified left and right segment, respectively, to compute the hinge point from in a situation that requires a fill. Changes to these fields will be reflected in the [V. Map](#) card graphic.

[**Stake CP >**]: opens the next slope staking screen. The following slope staking screens are identical to non-road layout slope staking screens and are described starting [here](#).

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Road Station and Offset

[**Roads**] [**Show Station**]

The [Road Station and Offset](#) routine allows you to take a shot to a prism that is positioned anywhere on the road and compute the details of where that point is located in relation to the road. This information can then be compared to the

data from a grade sheet.

[**Drop Down List**]: provides a list of roads currently imported into the job. Pick the road to stake.

[**Tap Road...**]: opens the [Tap on a Road](#) screen where you can tap on any road in the job to select it.

Name: displays the name of the selected road.

Begin Station: displays the station assigned to the beginning of the road.

End Station: displays the final station in the road.

[**Backsight...**]: Opens the [Station Setup](#) screen.

[**Next >**]: takes you to the next [Road Station and Offset](#) screen where the measurements take place.

[Road Station Staking Index](#)

[Roads Menu Index](#)

Road Station and Offset - Screen 2

The second [Road Station and Offset](#) screen is used to take a shot to the prism and view the data from various cards.

Height of Rod: is the length of the rod.

EDM: This button can be toggled to various EDM modes. The options available depend on the total station being used. Consult the total station's documentation for more information on the EDM modes that it supports.

[**Shot**]: takes a shot to the prism.

[**< Back**]: returns to the previous screen.

[**Store...**]: stores the stake point.

Alignment Card

Station: displays the station at the rod position.

Template: displays the name of the template that is used at the rod position.

Segment: displays the name of the template's segment at the rod position.

Elev: displays the elevation at the rod position.

Offset Dist: displays the perpendicular offset from the centerline to the rod position.

Right of Line / Left of Line / On Line: displays if the rod position is to the right of the centerline, left of the centerline, or on the centerline, respectively.

Cross-Section Card

Station: displays the station at the rod position.

Template: displays the name of the template that is used at the rod position.

Segment: displays the name of the template's segment at the rod position.

Cut / Fill: is the necessary cut or fill that will bring the rod position even with the road's surface.

Cut / Fill to CL: is the necessary cut or fill that will bring the rod position to the same elevation as the centerline at the current station.

Cut / Fill to Edge: is the necessary cut or fill that will bring the rod position to the same elevation as the outer edge of the last segment at the current station.

Shot Data Card: Displays the angles and distance measured by the total station from the last shot.

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Adjust Menu

The Adjust Menu contains routines to perform a variety of adjustments.

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[Translate](#)

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Fix Station Setup Index

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Scale

[Adjust] [Scale]

The [Scale](#) screen will scale the distances of a range of points relative to a specified base point. This is useful to correct a survey where a scale factor was inadvertently applied during data collection.

[Tap Points...]: allows you to select points by tapping them from a map view.

[To/From...]: allows you to select points by typing in a point range.

Base point: The distances to all the selected points will be scaled relative to this point. (The coordinates for the base point will not change.)

Scale factor: is the scale factor that is applied to the distances from the base point to the selected points.

Include Elevation in Adjustment: When checked, the elevations to the selected points will also be adjusted by the

scale factor relative to the Base point.

[**Solve**]: will perform the adjustment on the selected points and change the coordinates accordingly.

Note: Before the results of the scale adjustment are applied, Survey Pro will automatically create a backup of the job prior to the adjustment, and add this to the .SurveyBackup file for the job.

[Adjust Menu Index](#)

Translate

[**Adjust**] [**Translate**]

The Translate screen will move a group of points horizontally and vertically by a specified distance and direction.

Note: Points that are translated with this routine will become key in point records. This will sever any connection these points have to their original measurement vectors. In general, you should only use the translate routine on points that have a key in source. If you wish to translate points that are derived from measurements, you should use the proper raw data editing technique to modify the location of these points, or you should use the **Fix Station Setup** routine from the **Adjust** menu.

[**Tap Points...**]: allows you to select points by tapping them from a map view.

[**To/From...**]: allows you to select points by typing in a point range.

Translate by Coordinates: When checked, all of the selected points will be adjusted in the same direction and distance as between a specified From point or location and a To point or location. When unchecked, the selected points will be adjusted by the specified direction and distance. The choice made here determines the options available below.

Note: The choice made above determines which fields will be available below.

[**Azimuth**] / [**Bearing**]: is the direction to move the selected points.

Horizontal Distance: is the horizontal distance that the selected points are moved.

Vertical Distance: is the vertical distance that the selected points are moved.

From: is where the first point or location is defined that is used to compute the direction and distance that the selected points are adjusted.

To: is where the last point or location is defined that is used to compute the direction and distance that the selected points are adjusted.

[**Point**] / [**Location**]: allows you to enter either a point name or location coordinates.

[**Solve**]: adjusts the selected points in the same direction or distance as defined from the *From* point to the *To* point, or by the direction and distance entered.

Note: Before the results of the translate adjustment are applied, Survey Pro will automatically create a backup of the job prior to the adjustment, and add this to the .SurveyBackup file for the job.

Rotate

[Adjust] [Rotate]

The Rotate screen will rotate selected points around a specified origin point.

Note: Points that are rotated with this routine will become key in point records. This will sever any connection these points have to their original measurement vectors. In general, you should only use the rotate routine on points that have a key in source. If you wish to translate points that are derived from measurements, you should use the proper raw data editing technique to modify the location of these points, or you should use the **Fix Station Setup** routine from the **Adjust** menu.

[Tap Points...]: allows you to select points by tapping them from a map view.

[To/From...]: allows you to select points by typing in a point range.

Rotation Point: The selected points will be rotated around the point specified here. (The coordinates for the rotation point will not change.)

Simple Angle: when selected, this allows you to enter the deflection angle to rotate the selected points.

Old and New Azimuths: when selected, this allows you to enter an old and new azimuth, which is used to compute the angle to rotate the selected points.

Note: The choice made from the two options above determines which fields will be available below.

Rotate: is the angle to rotate the selected points around the Rotation point.

[Old Azimuth] / [Old Bearing]: is a known direction between any two points in the current job before they are rotated.

[New Azimuth] / [New Bearing]: is the direction between the same two points specified above after the rotation.

[Solve]: will perform the rotation on the selected points and change the coordinates accordingly.

Note: Before the results of the rotation adjustment are applied, Survey Pro will automatically create a backup of the job prior to the adjustment, and add this to the .SurveyBackup file for the job.

Traverse Adjust

[Adjust] [Traverse Adjust]

The Traverse Adjust wizard is a series of screens that allow you to adjust a traverse for angular error and/or perform a compass rule adjustment on a closed or open traverse.

Choose Your Traverse: is used to select a traverse to adjust from the following options:

- [**Tap Polyline...**]: is used to tap an existing polyline from a map view.
- [**To/From...**]: provides selection of points by point name.

Select Traverse Type

- **Closed Loop Traverse:** Choose Closed Loop Traverse when you have a traverse that starts and ends on the same point. To collect observations for this traverse, begin with a setup on your first point, traverse around to other points in the loop, and finish by observing your beginning point with a new point number. If you wish to do angle adjustment, you must also observe the 'closing angle' by setting up on your beginning point, backsight the last new point, and turning the angle to the second point in the traverse loop. You can observe this additional point with a new point number or you can simply write the closing angle down and enter it into the edit field when prompted.
- **Closed to Known Point:** Choose Closed to Known Point when you have a traverse that starts on a point or location with known coordinate, and ends on a different point or location with known coordinate, when these two points are not intervisible. In this type of traverse adjustment, there is no way to adjust for angle error, you can only adjust distance misclosure using Compass Rule method. If you began your traverse with an assumed bearing, it is important to fix the bearing before applying the compass rule adjustment. You can fix your starting bearing using the [Fix Station Setup](#) routine.
- **Open Traverse:** Choose Open Traverse when you have a traverse that starts setup on a known point backsighting a second known point, and ends on a third known point foresighting a fourth known point. The difference between the bearing of the known starting and ending point pairs is used for angle adjustment. The difference in coordinate between the third known point and the last traverse setup new point is used for the compass rule adjustment.

Find Traverse: opens up the [Choose Traverse](#) screen where you can specify some conditions to automatically detect possible traverses to adjust.

Angle Adjust: When checked, will perform an angle adjustment on the closed loop traverse or the open traverse. An angle adjustment will apply the angular error equally among all of the angles of the traverse and recalculate the coordinates of the end points. Angle adjustment, when performed, is applied before compass rule coordinate adjustment takes place.

Compass Rule (Bowditch Adjustment): When checked, will perform a compass rule adjustment on the selected traverse. Compass rule adjustment will apply a horizontal coordinate shift at each station, proportional to the length of the traverse segment.

Adjust elevation: when selected, the elevations for the traverse points are also adjusted from the compass rule adjustment.

Note: Traverse adjustment will compute new coordinates for all of your station setup points in the traverse adjustment. These coordinates will be stored as key in grid points. When traverse adjust is complete, Survey Pro will recalculate the entire survey from the beginning of the file. This will automatically recalculate all sideshots in the survey that were taken from any of the adjusted traverse stations.

[Next >]: opens the next screen of the adjustment wizard.

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Traverse Adjust - Choose Traverse

The [Choose Traverse](#) screen is used to automatically detect the segments in the traverse. The user interface on this

screen depends on the type of traverse you are looking for.

For **Closed Loop Traverse**, you can define the traverse by its first and last point. The first point is the point used for your initial setup. The last point is the new point you stored when observing the first point with the closing observation. Alternatively, you can specify a horizontal distance tolerance and the program will attempt to determine our first and last point automatically.

For **Closed to Known Point**, you can define the traverse by picking the last point, or entering the known coordinate for the last point.

For **Open Traverse**, you can define the traverse by first picking the last point you observed and stored as a new point, and the known reference point this corresponds to. Then select the **Second Last Control Point**, which is the known control point you setup on before observing your last point.

[OK]: Tap OK to automatically detect possible traverse segments with the specified input.

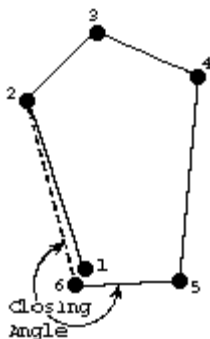
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Traverse Adjust - Angle Adjustment

If an angle adjustment is being performed for either closed loop or open traverse, this screen will appear next.

Closing Angle: is the closing angle for the traverse, which must be represented as an angle-right as shown below. For a closed traverse, you can enter the angle by hand if you wrote it down in a field book, or you can pick from the map if you observed the closing angle to a new point number. For an open traverse, the closing angle is calculated for you from your selection of the last and second to last points with the corresponding reference points.



[Next >]: opens the next screen of the adjustment wizard.

[Traverse Adjust Index](#)

[Adjust Menu Index](#)

Traverse Adjust - Compass Rule

If a compass rule adjustment is being performed, this screen will appear next.

Closed Loop Traverse: select this option if you are adjusting a closed traverse.

Close to Known Location: select this option if you are adjusting an open traverse and closing to a known point or location.

Open Traverse: select this option if you are adjusting an open traverse and closing to a known point or location.

[Location]: allows you to enter coordinates to define the closing location.

- **North:** is the Y-coordinate for the closing location.
- **East:** is the X-coordinate for the closing location.
- **Elev:** is the elevation for the closing location.

[Point]: allows you to select an existing point to define the closing location.

- **Point:** is the name of the existing point at the closing location.

[Next]: opens the next screen of the adjustment wizard.

[Traverse Adjust Index](#)

[Adjust Menu Index](#)

Traverse Adjust - Results

This screen displays the changes that will be made by the adjustment, where you can preview the results before the adjustment is applied.

The Results card lists the adjustment details in three main sections: the angle adjustment details; the compass rule adjustment details, and the point details for the adjusted stations where the before-and-after coordinates for each point are listed. The point details section will also show you a list of points that depend on each adjusted station point. These points will be recalculated when the adjustment is applied and the survey is recalculated.

Error dist: is the horizontal distance between the starting point and closing point.

Error azm: is the direction from the closing point to the starting point.

Precision: is the ratio of the error distance to the length.

Angular error: For a closed traverse, this is the difference between the sum of the observed internal angles and $(N-2) \cdot 180$ (where N is the number of segments in the closed figure). For an open traverse, this is the difference in bearing between your second to last and last measured points, and the corresponding second to last and last known points.

Length: is the sum of all the sides of the boundary.

Perimeter: is the length plus the error distance.

[Adjust]: if the results in the preview are acceptable tap this button to perform the adjustment.

The map card shows you a picture of what the adjustment will look like if you apply it. The blue line shows the original point locations in the traverse legs. The red line shows you how the adjusted points will move the traverse legs.

Note: Before the results of the traverse adjustment are applied, Survey Pro will automatically create a backup of the job prior to the adjustment, and add this to the .SurveyBackup file for the job.

[Traverse Adjust Index](#)

[Adjust Menu Index](#)

Fix Station Setup Pick Mode

[Adjust] [Fix Station Setup]

The fix station setup routine is the proper way to fix the orientation and position of a survey that was started from an optical total station setup using an assumed initial bearing and/or an assumed starting coordinate. You should use this routine instead of a regular rotate or translate operation because this routine will modify the raw data records for the starting station bearing and/or coordinate, which will in turn recalculate your survey from measurement vectors.

Note: If you wish to fix both the orientation and the starting coordinate, you should always do the rotation adjustment first, and then the translation adjustment.

Rotate to Known Azimuth/Bearing: Choose this option to fix the orientation of a survey that was started with an assumed bearing after you have collected two points with a known bearing between them. The result of this adjustment is that the backsight record from the original setup will be modified so that the measured bearing matches the known bearing between the two points.

[Rotate >]: Opens up the [Fix Station Setup Rotation](#) screen.

Translate to Known Point: Choose this option to fix the position of a survey that was started with an assumed coordinate after you have collected one point where the coordinate is known. The result of this adjustment is that the keyin record for the original station setup point will be modified to match the known grid coordinate values.

[Translate >]: Opens up the [Fix Station Setup Translation](#) screen.

[Fix Station Setup Index](#)

[Adjust Menu Index](#)

Fix Station Setup Rotation

This screen is used to modify the orientation of a station setup that was started on an assumed bearing. Before using this routine, measure two points in the job where the desired basis of bearings is known between the points.

Point A: select a measured point that is the first of two points where the desired bearing is known between the points.

Point B: select a measured point that is the second of two points where the desired bearing is known between the points.

Note: Points A and B do not have to be measured from the original assumed setup, as long as they are connected to the original setup. You can traverse the total station any number of times before observing the points you wish to use for orientation. The original backsight bearing will be fixed and all of your connected measured points will be readjusted.

Azimuth from A to B: displays azimuth between points A and B.

Known direction from A to B: enter the known **Azimuth / Bearing** between points A and B. The assumed bearing of the initial station setup will be corrected by the difference between the measured azimuth and the entered known azimuth. The job azimuth between A and B will match the known azimuth between A and B when the adjustment is complete.

[Next >]: Calculates the adjustment values and advances you to the [Fix Station Setup Results](#) screen.

[Fix Station Setup Index](#)

Fix Station Setup Translation

This screen is used to modify the position of a station setup that was started on an assumed coordinate. Before using this routine, measure one point that has a known coordinate you want to translate to.

Note: If you wish to fix both the orientation and the starting coordinate, you should always do the rotation adjustment first, and then the translation adjustment.

Pick a measured point: select a measured point that you wish to use fixed known coordinates for. This point does not have to be measured from the original setup, as long as it is connected to the original setup. You can traverse the total station any number of times before observing the point you wish to use for a fixed coordinate. The original assumed keyin coordinate for the station setup will be fixed and all of your connected measured points will be readjusted.

Pick a point with known coordinates: enter a point with known coordinates that corresponds to the measured point above. The key in coordinate record of the assumed initial setup point will be corrected by the difference between the measured point and the know point, such that both points will be in the same location when the adjustment is complete.

[Next >]: Calculates the adjustment values and advances you to the [Fix Station Setup Results](#) screen.

[Fix Station Setup Index](#)

[Adjust Menu Index](#)

Fix Station Setup Results

This screen is used to preview the results of a [Fix Station Setup](#) action (translate or rotate) before applying the adjustment.

Results: shows a preview of the results of the adjustment. This preview will show the difference between the measured and known bearings when doing a **Rotation** fix. This preview will show the difference between the measured and known coordinate when doing a **Translate** fix.

Adjust: Applies the adjustment to station setup record bearing for a **Rotation** fix, or to the key in point record for a **Translate** fix. The survey is then recalculated from measurement vectors.

[Fix Station Setup Index](#)

[Adjust Menu Index](#)

DTM Menu

The DTM Menu contains routines to manage digital terrain models.

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Manage DTMs

[DTM] [Manage DTMs]

The [Manage DTMs](#) screen is used to manage all digital terrain models loaded in the job. Digital Terrain Models are loaded from their source files into the current job file. This means that you only need to load the surface from the source file once, and then you can use it from any of the Survey Pro routines that utilize DTMs. If you are no longer using the DTM in your survey, you can unload it

[Import]: opens up a file dialog where you can choose a DTM file to load into the current job. The supported DTM formats are:

- ***.XML** LandXML format file. A LandXML file may contain more than one DTM surface. When you choose this file format, you will see an additional screen prompting you to select the surfaces from the LandXML file. You can import any or all of the surfaces in the LandXML file, and each one will be loaded as a separate DTM in your Survey Pro job. LandXML files have specified units, so this format will automatically be imported into your job using the correct units.
- ***.TTM** Trimble TIN Model format file. This compact and efficient format can be exported from Spectra

Precision Survey Office. Each TTM file contains a single surface. There are no additional settings for importing *.TTM format, and this format will automatically be imported into your job using the correct units.

- ***.DXF:** Drawing Exchange Format (DXF) files with a DTM surface. Because a .DXF file does not specify distance units, when you choose this file format you will be prompted to specify the units used in the file. The default choice will always be the current units of your job.
- ***.DTM** Spectra Precision Foresight DTM format file. Because a .DTM file does not specify distance units, when you choose this file format you will be prompted to specify the units used in the file. The default choice will always be the current units of your job.

Warning: If importing a DXF or DTM file where the distance units in the source file are different than the distance units for the current job, the imported coordinates will be converted to the current job's distance units when they are imported. This is normally the desired result, but it can cause a problem if the distance units for the imported data or the current job were set incorrectly. This situation can most commonly occur when working with International Feet and US Survey Feet, where the conversion from one to the other is not always obvious.

Usually the difference between International Feet and US Survey Feet is negligible (2 parts per million), but when dealing with State Plane or UTM mapping plane coordinates, which are often very large in magnitude, the difference can be considerable if the coordinates are converted from one format to the other.

[Create]: Opens up the [Create DTM](#) screen where you can generate a DTM from points and layers in your job.

[Remove]: Removes the selected surface from the collection of DTMs loaded in this job. You can add this DTM back to the job at any time by tapping **[Import]** or **[Create]**.

[Edit]: Opens up the [Edit DTM](#) screen where you can modify the parameters used to generate a DTM surface from points in the current job. This feature only applies to DTM surfaces generated from job points.

[Export DTM]: opens up a file dialog prompting you to save the DTM file as a LandXML output file. Choose a destination directory and filename, then tap OK to export the selected DTM as a LandXML file with a DTM surface.

[Rename]: Rename the selected DTM. This renames the DTM in the Survey Pro job file. It does not rename the original source file.

[View DTM 2D]: opens up the [View DTM 2D](#) screen where you can select a DTM and generate a quick 2D preview map showing the triangles and boundary of the terrain model.

[View DTM 3D]: opens up the [View DTM 3D](#) screen where you can select a DTM and analyze the 3D view of the terrain model.

[Manage DTM Index](#)

[DTM Menu Index](#)

Create / Edit DTM

The [Create DTM](#) screen is used to create or edit a DTM from a selection of points in the job.

DTM Source: Choose a layer to generate a DTM with all points on the selected layer, or choose to pick specific points for the DTM.

Select Layer: If using a single layer for the DTM source, select a job layer, and all of the points on that layer will be used for the DTM.

[Manage Points]: Opens the [Manage DTM Points](#) screen where you can create a selection of points to generate the DTM.

Note: When you create a DTM by layer, all points on that layer will be included in the DTM. If you add more points to the layer, the DTM will be updated with the new points the next time it is loaded, which includes live updates with every stakeout point. It is important that you do not store as staked points on the same layer as your DTM, because this will modify the surface as you are staking it.

Use Boundary: check this box if you wish to specify a line to bound the DTM. If this box is checked, Survey Pro will generate a surface using all the points that are inside this closed polyline. If this box is unchecked, Survey Pro will generate a surface with the outer boundary defined by the extent of the points selected. If you select an open line for a boundary, the DTM generation will assume a closed boundary connecting the open endpoints to form the closing side of the figure.

Breaklines: opens up a prompt where you can choose lines in the job to use as breaklines. When breaklines are specified, the DTM algorithm will force TIN nodes at the breaklines.

Tap **OK** to create the DTM with the selected points, and Survey Pro will create a surface model and load it into the job. You can now use this DTM surface like any other in Survey Pro.

[Manage DTM Index](#)


[DTM Menu Index](#)

Manage DTM Points

The [Manage DTM Points](#) screen is used to build a selection of points to generate the DTM.

Add more DTM Points: Use the standard point selection tools to build up a selection of points. Each time you make a selection, the selected points are appended to the collection of managed points.

Managed Points: Displays the number of points selected for the DTM surface. The collection of points is shown in the list below.

 : Removes the point highlighted in the list from the collection of points.

[Clear List]: Removes all points from the collection of managed points.

[Manage DTM Index](#)

[DTM Menu Index](#)

Stake DTM

[DTM] [Stake DTM]

The [Stake DTM](#) routine allows you to stake an area and get cut/fill information between the point being staked and a reference DTM surface at the same horizontal coordinates.

Surface: Choose one of the DTM surfaces loaded in the job as the surface to stake. Tap the power button next to the

surface drop down to see a preview of the DTM on your horizontal survey map, or to open the [Manage DTM](#) screen

With Centerline: When checked, you can see offset and station information from the selected centerline to the stake point in the [DTM Shot screen](#).

[**Choose a Centerline...**]: will open the [Select Line](#) screen where you can select a polyline or alignment as a centerline for the DTM staking.

Add Vertical Offset: When checked, enter a vertical offset to the surface. Stakeout cut fill will be relative to the DTM surface plus the vertical offset. This can be used to stake sub grades of the design surface.

HR: (in optical mode) is the rod.

 : opens the [Smart Target](#) options in optical mode.

[**Backsight...**]: (in optical mode) opens the [Station Setup](#) screen.

Rover: (in GNSS mode) shows the rover antenna height settings.

Setup HR: (in optical mode) opens up the [Receiver Antenna](#) setup screen.

[**Next >**]: opens the [next screen](#).

[Stake DTM Index](#)

[DTM Menu Index](#)

Select Line

The [Select Line](#) screen is used to select a particular polyline or alignment that defines a centerline. Separate overhead and side views are displayed for the selected polyline.

Simply select the desired line and tap .

[Stake DTM Index](#)




[DTM Menu Index](#)

Stake DTM – Screen 2









[DTM] [Stake DTM] [Next >]

The second [Stake DTM](#) screen displays all relevant information for the current rod position and a graphic that shows the reference DTM surface and its corners. Once a shot is taken, the rod location and the occupied TIN triangle are displayed.

DTM staking is a map based view. You can control the DTM view with the map menu buttons:

-  : zooms to the extents of the job.
-  : zooms to the extents of the surface.
-  : (in optical mode)toggles follow me mode. When on, the map will automatically recenter if your rod position

moves too close to the edge.

-  : (in GNSS mode) toggles follow me mode to automatically recenter the map.
-  : zooms in one level at the current 3D viewing angle.
-  : zooms out one level.
-  : toggles zoom window, where you can select an area to zoom in on.
-  : opens up a screen to select a point, then zoom to the selected point.
-  : toggles drawing of DTM triangles on and off in the map.
-  : opens up the [Map Display Options](#) screen where you can control how the map draws.
-  : opens up the [Display Results](#) screen where you can configure what information you want displayed on the map with each DTM staking observation.

Note: If the DTM and Cut or Fill fields are blank after taking an observation, it indicates the rod is outside the reference DTM boundary.

HR: (in optical mode) is the height of the rod.

EDM: (in optical mode) This button can be toggled to shoot in various EDM modes. The options available depend on the total station being used. Consult the total station's documentation for more information on the EDM modes that it supports.

[Shot...]: (in optical mode) triggers the total station to take a shot to the prism in optical mode.

[Store]: (in optical mode) will store a stake point for the last stakeout observation. You will be prompted for the point name and description or code, plus any additional metadata you have enabled for prompting in the stakeout settings.

[Roving / Occupying >]: (in GNSS mode) toggles the GNSS receiver between dynamic (walking around) and static (standing still taking an observation) mode. You can store points without going into Occupying mode, however these points will be a result of a single epoch observation. If you want a more precise observation, level the pole over the point, and toggle to **[Occupying]** mode and occupy the point for some duration.

[Accept]: (in GNSS mode) when in occupying mode, tap **[Accept]** to finish the static occupation and store the point. When in Roving mode, tap **[Accept]** to store a stakeout point with a single epoch observation.

[< Back]: returns to the first [Stake DTM](#) screen.

[Stake DTM Index](#)



[DTM Menu Index](#)

Display Results

[DTM] [Stakeout] 

The [Display Results](#) screen is used to customize the information you want to display as results after each DTM staking observation. The selected fields will be displayed on the map with the results of each DTM staking observation.

Check the items in the list that you wish to display.

-  : moves the selected item up in display order.
-  : moves the selected item down in display order.

[Defaults]: resets the display settings to the default values and order.

[DTM Stakeout](#)

[DTM Menu Index](#)

View DTM 2D

[DTM] [View DTM]

The [View DTM 2D](#) screen is used to show a quick preview map of the DTM showing the triangles and boundary of the terrain model.

Surface: Choose the DTM surface from the list of surfaces loaded in this job.

You can click on the surface to open a preview map of the DTM. You can use the power button to the right of the surface list to access more DTM functions:

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[DTM Menu Index](#)

View DTM 3D

[DTM] [View DTM]








The [View DTM](#) screen is used to show a 3D view of a DTM that is loaded into the Survey Pro job.

Surface: Choose the DTM surface from the list of surfaces loaded in this job.




You can click the power button to the right of the surface list to access more DTM functions:

- **Preview DTM:** Shows a horizontal map of the DTM overlaid on the map of your job points.
- **Manage DTM:** opens up the [Manage DTM](#) screen.

The DTM can be viewed from any angle in a 3D view. You can control the DTM view with the map menu buttons:

-  : zooms to the extents of the surface using the current 3D viewing angle.
-  : zooms in one level at the current 3D viewing angle.
-  : zooms out one level at the current 3D viewing angle.
-  : toggles zoom window, where you can select an area of the current 3D viewing angle to zoom in on.
-  : toggles the screen to 3D pan mode, where swiping on the screen will rotate and tilt the 3D viewing angle
-  : toggles the screen to pan mode, where swiping on the screen will move the surface preserving the current 3D viewing angle.
-  : resets the 3D viewing angle of the window to an overhead perspective, at the current zoom level and

orientation.

-  : resets the 3D viewing angle of the window to horizon perspective, at the current zoom level and orientation.
-  : increases the vertical exaggeration by one level.
-  : decreases the vertical exaggeration by one level.

[Manage DTM Index](#)

[DTM Menu Index](#)

Calculate DTM Volumes

[DTM] [Calc DTM Volumes]

The [Calc DTM Volumes](#) screen allows you to calculate the volume of a DTM surface relative to a datum elevation or another surface.

Surface: choose the surface you wish to calculate the volume for.

You can click the power button to the right of the surface list to access more DTM functions:

Compare to Datum: Choose this option if you want to calculate the volume between the surface and a single elevation. The volume will be calculated between the surface and the elevation you specify.

Datum: select the elevation datum for volume calculation

Compare to DTM: Choose this option if you wish to calculate the volume between two surfaces. The volume will be calculated between the two surfaces where they overlap.

Surface: Choose the other surface for volume calculation.

Note: The volume calculated for the surface may be positive, negative, or even 0. In the results, Survey Pro will display the total volume along with the calculated fill and cut volume. The total volume will be the fill volume minus the cut volume.

[Solve]: solves the volume calculation and displays the values on the Results screen.

[DTM Menu Index](#)

Miscellaneous Screens Menu

The following screens are only available via a Quick Pick or a power button. They are not available directly from any menu item.

[Spectra Precision Central](#)

[Past Results](#)

[Create Points](#)

[Edit Description List](#)

[Trimble Slant HR -> HR](#)

[Convert Slant HI -> HI](#)

[Quick Pick Editor](#)

[Select Points](#)

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[Edit Smart Targets](#)

[Terminal Window](#)

[eLevel Bubble](#)

[Program SIM](#)

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Spectra Precision Central



, Central

The Central Sign In screen is used to configure your Spectra Precision Central cloud account.

Username: Enter the user name assigned to your Central account. Username is not case sensitive

Organization: Enter the Organization ID for your Central account. The Organization ID is required in order to sign in. The Organization ID is not case sensitive.

Password: Enter your password to access your Central account. The password is case sensitive.

When logged in, the Central screen will show updates on current and connection activities.


[**Sign in**] Once your sign in information has been entered, tap this button to sign in to your account

[**Sync Now**] Tap this button to synchronize your data with your Central account. This button is only active once you have signed in. See settings for other synchronization settings.

Past Results

Past Results (where applicable)

When the Past Results option is used to enter a value in a specific field that was computed previously within the software.

Select the line that contains the value that you want to use and tap .

The selected value will then be entered in the field associated with that power button.

[Miscellaneous Index](#)

Create Points Screen

[Job] [Edit Alignments] Create Point

The Create Points screen is used to store points that coincide with specific locations on an alignment.

Alignment Nodes: When checked, will store points at locations where a change occurs on an alignment, for example where a straight section and a curved section meet.

Sta. Intervals: When checked, will store a point at the specified station interval along an alignment.

Start Point Name: is the name for the first point that will be stored from this screen.

Description / Code: Enter the description or the code for the new points to be generated by the routine.

Start Location: is the location for the first point, which is the reference location used to compute the locations of the remaining points. The default location is the POB defined from the Edit Alignment screen.

[Miscellaneous Index](#)

Edit Description List

(From any **Description** field), **Edit Description List...**

The Edit Description List screen is used to modify the contents of the drop-down description list, which is optionally displayed next to any **Description** field. You can also save the list to a file.

[**Edit**]: Opens the selected description in a screen where you can modify it.

[**Insert**]: Opens a screen where you can add a new description.


[**Delete**]: Deletes the selected description.

[**Clear**]: Deletes all the descriptions in the list.

[**Save**]: Saves the list to the current description text file. This is only available when the list only contains the descriptions in the current non-code description file.

[**Save As...**]: Saves the contents of the list to a new description text file.

Trimble Slant HR -> HR


 (From any **HR** field), **Trimble Slant HR -> HR**

This option only applies when using a Trimble Traverse Kit that allows the measurement of a Slant HR instead of the usual HR.

When this option is selected, it will convert a Slant HR entered in an HR field to a standard HR. This must be performed each time a new Slant HR is entered in the HR field.

Consult the documentation that came with the Trimble Traverse Kit for more information on correctly measuring a Slant HR.

Convert Slant HI -> HI


 (From any **HI** field), **Convert Slant HI to HI**


This option is only available when using a Trimble total station that supports a Slant HI instead of the usual HI, such as a Trimble S6.

When this option is selected, it will convert a Slant HI entered in an HI field to a standard HI. This must be performed each time a new Slant HI is entered in an HI field.

Consult the documentation that came with the Trimble Total Station from more information on correctly measuring a Slant HI.

Quick Pick Editor

, **Edit Quick Pick** (located at bottom of list)

The Quick Pick Editor is used to customize the list of routines available from the  Quick Pick button.

Menu Items: Is a dropdown list containing the menu items you would normally see in the Main Menu. Selecting a menu item from this list will display all of the routines from that menu item that can be included in the Quick Pick list. Routines listed in bold are already in the Quick Pick list.

[**Add -->**]: will add the routine selected in the left column to the bottom of the Quick Pick list, which can then be moved elsewhere in the list.

[**Defaults**]: will revert the Quick Pick list back to the defaults. A prompt will first ask you if you are sure before the changes occur.

Quick Picks: is the list of routines available from the current Quick Pick list.

[**Move Up**]: will move the routine selected in the right column up one level toward the top of the list.

[<-- **Remove**]: will remove the selected routine from the current Quick Pick list.

[**Move Down**]: will move the routine selected in the right column down one level (toward the bottom of the list).

[Miscellaneous Index](#)

Select Points

From any screen that contains a [**To/From...**] button.

The Select Point(s) screen is used to define a simple list of points or a list of points that define a line that can include curves depending on where the screen is accessed from.

Examples of how to enter different lists of points are displayed in the lower portion of the screen.

Point Range: is the area where you enter your point list using the same format as shown in the examples.

Note: Spaces in point lists are ignored. They are only used in the examples for clarity.

Once the list is entered, tap  to return to the previous screen.

The examples for entering curves are explained in detail as follows:

- **7 (8) 9**

The first example, defines a curve that passes through Points 7, 8 and 9, respectively.

- **7 (8, L) 9**

The second example defines a curve where Point 8 is the radius point and the curve begins to the Left (from the point of view of the radius point), turning from Point 7 to Point 9.


Note: When defining a curve with a radius point, the other two points must be the same distance from the radius point for a solution.

- **7 (100, L, L) 9**

The third example describes a curve with a radius of 100, using the same units as the job, that begins at Point 7, turning to the Left (from the point of view of the radius point), creating a Large arc ($> 180^\circ$), and ending at Point 9.

[Miscellaneous Index](#)

Map Display Options

From the Map View, tap 

The Map Display Options screen is used to configure the information that is displayed in the Map View.

Show Points: will show a dot for each point in view.

Smart Point Labels: displays only certain point labels (name and description or code) when many points are grouped

together to reduce clutter.

Names: will show the point name for each point that is in view.

Descriptions: will show the point description for each point in view.

Codes: will display the codes for each point in view.

Elevations: will display the elevation for each point in view.

Show Lines: will display all the polylines in view.

Show Basemaps: will display any visible basemaps in view.

Show Coordinate: will display the measured coordinate when using the map with real time updates, such as GNSS receiver or robotic total station.

Show DTMs: will display the horizontal extents of any active DTMs.

Show Only This Layer: will toggle display between showing all visible layers or just the selected layer.

[**Manage Grid Lines...**]: opens the [Manage Grid Lines](#) screen where the display of map grid lines can be configured.

[**Manage DTMs...**]: opens the [Manage DTMs](#) screen where the DTM layers can be configured.

[**Manage Layers...**]: opens the [Manage Layers](#) screen where the layers can be configured.

[**Manage Basemaps...**]: opens the [Manage Basemaps](#) screen where basemaps can be added to the current job.

Save as Default Display Options: When checked, will save the selections made to this screen as the default selections.

[Miscellaneous Index](#)

Manage Grid Lines

The [Manage Grid Lines](#) screen is used to configure the map to display grid lines at your chosen interval and direction. You can display grid lines on your map for visual reference. You can also use the snap to function to create points at grid line intersections.

Use Grid Lines: will toggle display of grid lines on the map.

[**Azimuth/Bearing**]: set the orientation of the grid lines on the map. Use 0 to have grid lines oriented north / south.



: set the grid line spacing in the direction of the grid line axis.





: set the grid line spacing in the direction perpendicular to the grid line axis.

Origin: set the point or location for the grid line origin.


[Miscellaneous Index](#)


Map View


Many screens in Survey Pro have a map view. Map views have a common set of controls, described below:


 from the command bar, or  from various screens


Tip: You can pan around your map by dragging your finger or stylus across the screen.


 **Zoom Extents Button:** will change the scale of the screen so that all the points in the current job will fit on the screen.


 **Zoom In Button:** will zoom the current screen in by approximately 25%.


 **Zoom Out Button:** will zoom the current screen out by approximately 25%.


 **Zoom Window Button:** allows you to drag a box across the screen. When your finger or stylus leaves the screen, the map will zoom to the box that was drawn.

 **Zoom To Point Button:** prompts you for a point name and then the map view will be centered to the specified point with the point label displayed in red.


 **Turn To Point Button:** Tap this button and then tap a point in the map view to automatically turn the total station to the selected point. This is only available when a robotic total station is selected and Remote Control is active in the [Instrument Settings](#).

 **Increase Vertical Scale:** is only available when viewing a vertical profile. Each time it is tapped, the vertical scale of the view is increased.

 **Decrease Vertical Scale:** is only available when viewing a vertical profile. Each time it is tapped, the vertical scale of the view is decreased.

 **Zoom Preview Button:** will display only the points that are currently in use.

 **Map Display Options:** opens the [Map Display Options](#) screen, described below.

 **Manage Basemaps:** opens the [Manage Basemaps](#) screen, described below (only available from the main map view, accessed from the command bar button).

 **Snap To:** opens the [Snap To](#) functions, described below.

The main map and survey routine maps can function as an active map, where you can perform COGO and survey functions directly from the map. Tap and hold on the map to bring up a context menu where you can pick [Active Map](#) functions.


The main map can function as an active survey map, where you can measure and store points directly from the map. Tap and hold on the main map to bring up a context menu where you can toggle the map to enter [Survey Map](#) functions.

Active Map View

The main map as well as any map on a survey routine will also function as an active map, which allows you to perform several actions directly from the map. Tap and hold on the map to bring up a context menu of available actions. The actions available will depend on what you have selected at the tap and hold location:

- **Create Point:** Opens up the [New Point](#) screen where you can create a new point at the selected (2D) location.
- **Edit Point:** Opens up the [Edit Point](#) screen where you can edit the description, layer, and feature of the selected point
- **Attach note:** Opens up the [Raw Data Note](#) screen where you can add an additional note to this point.
- **Point to Point:** Select a second point to perform an [Inverse Point to Point](#).
- **Point to Location:** Select a location from the map to perform an [Inverse Point to Location](#).
- **Point to Line:** (when a point is selected) Select a line to perform an [Inverse Point to Polyline](#), or select two additional points to perform an [Inverse Point to Line](#).
- **Corner Angle:** Select a middle point and then an end point to perform a [Corner Angle](#) calculation.
- **Point to Line:** (when a line is selected) Select a point to perform an [Inverse Point to Polyline](#).
- **Line to Location:** Select a location to perform an [Inverse Location to Polyline](#).
- **Location to Point:** Select a point to perform an [Inverse Point to Location](#).
- **Location to Location:** Select a second location to perform an [Inverse Location to Location](#).
- **Location to Line:** Select a line to perform an [Inverse Location to Polyline](#).
- **Stake to Point:** Opens up the [Stake Point](#) screen (Optical mode), the [Remote Staking](#) screen (robotic mode), or the [GNSS Stake Point](#) screen (GNSS mode) where the selected point can be staked.
- **Stake to Line:** (when a point is selected) Select a second point to define the line, then opens the [Stake to Line Optical](#) screen (optical mode), or the [Stake to Line GNSS](#) screen (GNSS mode).
- **Stake to Line:** (when a line is selected) Opens the [Stake to Line Optical](#) screen (optical mode), or the [Stake to Line GNSS](#) screen (GNSS mode).
- **Stake DTM:** Opens up the [Stake DTM screen](#) ready to stake the selected DTM.
- **Stake to Location:** Opens up the [Stake Location](#) screen (optical mode), the [Remote Staking](#) screen (robotic mode), or the [GNSS Stake Point](#) screen (GNSS mode) where the selected location can be staked.
- **Set / Clear User Zoom Extent:** Tap **Set** to make the current view the zoom extents area. Tap **Clear** to remove the set zoom extents area and return to using the view of all points as the zoom extents. You will see a red outline around the current user zoom extents when it is set. You can still zoom in and out, as well as pan around to any location on the map when there is a user set zoom extents area.
- **Set / Clear Follow Me:** Tap **Set** to enable the follow me feature where your location will remain in the center of the map as you move around. Tap **Clear** to disable the Follow Me feature. When the Follow Me feature is active, you will see a grey crosshair centered on your location on the map.
- **Show Results:** Opens up a results view of all of the active map results generated for this instance of the map view.
- **Clear Selection:** Clears the active map results from the map view, and resets the selection of points and/or lines in the active map.

You can customize which items appear on the context menu in the settings using the [Active Map Context Menu](#) settings card.

Any active map also supports the Snap To function for selecting points and locations from the map. You can toggle snap to mode by opening up the snap to tool bar with the  **Snap To button**. When you select a location with a Snap To function, Survey Pro creates a temporary point, unless a point already exists at the exact snap to location. You can use this temporary point like other points in Survey Pro. Any temporary points created using a Snap To function will be cleaned up when you are finished with the map.

When Snap To mode is active, you can select from any of the following snap options:



Snap to nearby point.



Snap to the midpoint of the selected line segment.



Snap to the nearest of the begin point or the end point of the selected line segment.



Snap to the intersection of two straight line segments. You cannot snap to the intersection of line segments that are curves or spirals.



Snap to the point of intersection (PI) of the selected curve segment.



Snap to the radius point (RP) of the selected curve segment.



Snap to nearest point on the selected straight line or curve segment.



Remove all of the Snap To temporary points created on this map.

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Survey Map View

The main map can also be placed into survey mode, which allows you to collect points directly from the map. Tap and hold on the main map to bring up the context menu that allows you to toggle between map view and survey map mode. The controls on the active survey map are:



Topo Observation: Takes a tracking mode observation and stores the point with the point name, description or code.



Observation: Starts a standard mode observation, and when the observation is accepted, prompts you for all of the surveying prompts you have selected on the [Surveying Settings](#) card of the [Job Settings](#).



Height of Rod: Opens up a height of rod (optical mode) or height of GNSS antenna (GNSS mode) prompt, where you can change the current HR.



Station Setup: (optical mode) Opens up the [Station Setup](#) screen where you can check or modify the current instrument setup.



GNSS Status: (GNSS mode) Opens up the [GNSS Status](#) screen.


Pt: Enter the point name for the next survey point to store.

Description / Code: Enter the description or the code for the new point.

Enter Key: Triggers a Topo Observation or a standard observation, depending on the **Survey Map Use Enter Button for Topo** setting on the [Surveying Settings](#) card of the [Job Settings](#).

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Manage Basemaps

From the [Map View](#), tap 

The [Manage Basemaps](#) screen is used to select the basemaps to display in the map view for the current job.

The main portion of the screen lists the names of all the basemaps that have been added to the current job. The other columns display if each basemap is visible and the number of elements in a vector basemaps.

Note: You can toggle the visibility of a basemap by tapping on the **Visible** column of the basemap list.

[**Add...**]: allows you to select additional basemaps for the current job.

[**Edit...**]: opens the [Edit Basemap](#) screen, described below, where you can preview or edit the selected basemap. (Raster basemaps cannot be edited.)

[**Remove...**]: removes the selected basemap from the list. (The source file will not be removed.)

[**Orient**]: opens the [Orient Basemap](#) wizard where you can calculate a shift and rotation of DXF basemaps to the job file.


[**Import**]: opens the [Import Preview](#) screen where you can select points to import from a basemap and preview the selection before importing into the job.

[**Move Up**]: will move the selected basemap up one level in the list. (Consult the User's manual for information on how to manage basemaps.)

[**Move Down**]: will move the selected basemap down one level in the list.

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Edit Basemaps

From the [Map View](#), tap , [**Edit...**]

The [Edit Basemaps](#) screen is used to preview the selected basemap and, if it is a DXF basemap, you can set the file units, modify the visibility and selectability of specific layers, and toggle the orientation of the DXF basemap on and off.

Layers Card (DXF basemaps only)

The [Layers](#) card is used to control the visibility and object selectability of specific layers of a DXF basemap. The [Layers](#) card contains four columns:

- **Layer:** Shows the name of each individual layer in the DXF file.
- **Visibility:** Displays the state of the layer visibility. You can toggle the state by tapping on the **Visibility** column. There are three states:

Selectable - the layer is visible on the map, and objects on this layer can be selected in the active map.

Shown - the layer is visible but objects on this layer cannot be selected in the active map.

Hidden - the layer is not visible and objects on this layer cannot be selected on the active map.

- **Points:** Displays a count of point objects on the DXF layer.
- **Lines:** Displays a count of line objects on the DXF layer.

Hide All: Sets the **Visibility** state of all layers to hidden.

Show All: Sets the **Visibility** state of all layers to shown.

Selectable All: Sets the **Visibility** state of all layers to selectable.

General Card (DXF basemaps only)

The General card is used to set the units of the DXF basemap.

Distance Units: Set the distance units of the DXF basemap. The map will be converted from these units to job units for display and object selection.

Preview Card

The Preview card shows a preview of how the selected basemap will look in the map view

Orientation Card (DXF basemaps only)

The Orientation card allows you to toggle the DXF orientation on or off.

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Basemap Orientation Wizard

[**Manage Basemaps**] [**Orient**]

This wizard is used to calculate a shift and rotation of a DXF basemap to the job file coordinates.

Choose two points from the job, then choose two matching locations from the DXF basemap.

[**Accept**]: Applies the transformation to the display of the map in the map control.

Note: The orientation of the DXF basemap applies only a shift and rotation from the DXF coordinates to the job coordinates. The DXF coordinates are not scaled.

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Import Preview

[**Manage Basemaps**] [**Import**]

The Import Preview screen is used to select points from a basemap, preview the selection, and then import points into the current job

The types of points imported from the basemap will be specified at the top of the screen in a series of two letter codes. Tap the [**Settings**] button to configure how to import points from the file.

[**Settings**]: Opens a screen where you can choose how to generate points from the basemap import. Choices are:

- Points (PT)
- Line intersections (LI)
- Segment end points (SE)
- Segment mid points (SM)
- Curve tangent intersection points (PI)
- Curve radius points (RP)




The [Settings](#) screen can also be used to set if you want to create layers for the new points in the job using the layer definition in the source file.

[Selection]: opens up a map where you can select a region of the basemap where you want to create import points. Activate the selection box and define an area by dragging the box over the map. You can tap the **[Selection]** button again to select additional points. Selections will be additive.


[Import]: imports the selected points into the job.

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Smart Targets

Tap a  power button next to a  (indicating a *prism* Smart Target is currently selected) or  (indicating a *reflectorless* Smart Target is currently selected). This item is available from any screen where the rod height can be adjusted.

Smart Targets provide a convenient way to work with different prisms and/or target types on the same job. See the User's Manual for more information.

Quickly change to any available user-configured smart target by tapping it from the upper portion of the list. The active Smart Target is marked with a .

Manage Smart Targets...: Opens the [Manage Smart Targets](#) screen where a custom target can be configured.

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Manage Smart Targets

, **Manage Smart Targets**

The [Manage Smart Targets](#) screen is used to edit existing custom targets or configure a new custom target type.

The upper portion of the screen lists all the custom targets that are currently available. To select a target, tap it from this list. The selected target can then be edited, deleted, or activated.


[Add]: Opens the [Edit Smart Target](#) screen where a new custom target can be created.

[Edit]: Opens the [Edit Smart Target](#) screen where the selected Smart Target can be modified.

[Delete]: Deletes the selected Smart Target.

Note: If the selected Smart Target is the current fixed backsight target, you cannot edit or delete this target.

[Activate]: Activates the selected Smart Target. The active smart target is marked with the  symbol.

Note: It is not necessary to access the [Manage Smart Targets](#) screen to activate a different Smart Target. You can quickly activate a Smart Target by tapping  next to any HR field and then tap the desired Smart Target from the list that appears.

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Edit Smart Targets

, **Manage Smart Targets**, **[Add]** or **[Edit]**

The [Edit Smart Target](#) screen is used to edit an existing Smart Target or create a new one.

Name: is the desired name for the Smart Target.

Target Type: defines the type of target as being a Prism, Reflectorless, Long Range, which increases the EDM power, or On Instrument, which uses whichever EDM settings are configured on the total station (for Leica total stations only).

HR: is the default HR for the Smart Target.

Add Offset to HR: when checked, the offset entered will always automatically be added to the HR entered for the Smart Target.

Prism Constant: is the prism constant for the Smart Target.

Note: If a prism constant is entered for a Smart Target while a prism constant is also set in the total station, the prism constant will be applied twice, resulting in incorrect distance measurements for every shot. Be sure the prism constant is set to zero in the total station if entering a value for a Smart Target, or vice-versa.

Use RMT: Check this box when using a remote target and specify the ID used by the prism in the associated box. (This option is only available when using a total station and prism that supports target IDs.)

Using Active Prism: Check this option when using an active prism. (This option is only available when using a total station that supports active prisms.)

Note: In order to perform automatic repetitions when using active prisms, active prisms must be set up over both the backsight and foresight.

Terminal Window

, **Terminal Window**

The [Terminal Window](#) is used to send commands to some GNSS receivers. This is an advanced feature and should be used with caution. Refer to the receiver's manual for how to format commands.

Status (Red/Green Arrows): Shows the current communication with the receiver. A red arrow indicates data received from the receiver. A green arrow indicates data sent to the receiver.

Command: Entry field for command to be sent to the receiver.

[**Send**]: Tap the green arrow to send the command in entry field to the receiver.

[**Script File...**]: This will load a script file of commands and send them to the receiver.

Note: All data sent to or received from the receiver will be written to the .survey file as a note.

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eLevel Bubble

eLevel Bubble

The eLevel Bubble screen is used to view the level bubble on the measurement device. This screen is also used to open the eLevel Bubble calibration routine.

Calibrate: Opens up the eLevel Bubble Calibration screen.

eLevel Bubble Calibration

Expires in: indicates when the current eLevel bubble calibration expires. By default, eLevel Bubble calibrations are good for 30 days.

Calibration Method is used to select the calibration method:

- **Auto-Null:** is used to calibration the device's level bubble relative to some physical level bubble. This is usually accomplished by leveling the pole using the physical bubble, and then performing an Auto Null calibration to set the device's level bubble at this reference. Note, if your physical level bubble is not calibrated properly, your eLevel bubble will have the same errors.
- **Rotate:** is used to calibrate the device's level bubble relative to absolute gravity. This is the preferred calibration method because it does not depend on the correctness of the physical level bubble, and you will always end up with the device calibrated to the plumb line as defined by gravity.

Start: begins the selected calibration method. You will be informed when the calibration is complete with a message.

Days to Expire: is used to set the maximum amount of time that this calibration will be used. Default is 30 days.

Note: the eLevel bubble is sensitive to temperature, and therefore the calibration needs to be completed at a temperature that is +/- 20 degrees C from the operating temperature.

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Program SIM

Program SIM

The Program SIM screen is used to read and set the stored phone number for the SIM card in the receiver. Use this routine as a way to check the stored number in the SIM card, or to update the stored number in the SIM card.

Note: The stored number in the SIM card should be the same as the actual number associated with the SIM card on the carrier network. However, it is possible to set any number you want in the stored number memory of the SIM card, and this number may not actually be the same number as the SIM card will have on the carrier network.

Read: Reads the stored number from the SIM card memory.

Write: Writes a new number to the SIM card memory. There is no check that this matches the real phone number of the SIM card on the carrier network.

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Appendix Menu

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Transverse Mercator Zones

Central Meridians for State Plane Coordinates

E = East

W = West

C = Central

State	Zone	Central Meridian
Alabama	E	85 50
	W	87 30
Alaska	2	142 00
	3	146 00
	4	150 00
	5	154 00
	6	158 00
	7	162 00
	8	166 00
	9	170 00
Arizona	E	110 10
	C	111 55
	W	113 45
Delaware		75 25
Florida	E	81 00
	W	82 00
Georgia	E	82 10
	W	84 10
Hawaii	1	155 30
	2	156 40
	3	158 00
	4	159 30
	5	160 10
Idaho	E	112 10
	C	14 00

	W	115 45
Illinois	E	88 20
	W	90 10
Indiana	E	85 40
	W	87 05
Maine	E	68 30
	W	70 10
Michigan (1934)	E	83 40
	C	85 45
	W	88 45
Mississippi	E	88 50
	W	90 20
Missouri	E	90 30
	C	92 30
	W	94 30
Nevada	E	115 35
	C	116 40
	W	118 35
New Hampshire		71 40
New Jersey		74 40
New Mexico	E	104 20
	C	106 15
	W	107 50
New York	E	74 20
	C	76 35
	W	107 50
Vermont		72 30
Wyoming	1	105 10
	2	107 20
	3	108 45
	4	110 05

Lambert Zones

Central Meridian and Zone Constants for State Plane Coordinates

N = North
S = South
C = Central
NC = North Central

SC = South Central
M = Mainland
I = Island
O = Offshore

State	Zone	Central Meridian	Zone Constant
Arkansas	N	92 00	0.581899
	S	92 00	0.559691
California	1	122 00	0.653884
	2	122 00	0.630468
	3	120 30	0.612232
	4	119 00	0.596587
	5	118 00	0.570012
	6	116 15	0.549518
	7	118 20	0.561243
Colorado	N	105 30	0.646133
	C	105 30	0.630690
	S	105 30	0.613378
Florida	N	84 30	0.502526
Iowa	N	93 30	0.677745
	S	93 30	0.658701
Kansas	N	98 00	0.632715
	S	98 30	0.614528
Kentucky	N	84 15	0.622067
	S	85 45	0.606462
Louisiana	N	92 30	0.528701
	S	91 20	0.500013
	O	91 20	0.454007
Maryland		77 00	0.627634
Massachusetts	N	71 30	0.671729
	I	70 30	0.661095
Michigan	N	87 00	0.722790
	C	84 20	0.706407
	S	84 20	0.680529
Minnesota	N	93 06	0.741220
	C	94 15	0.723388
	S	84 20	0.700928
Montana	N	109 30	0.746452
	C	109 30	0.733354

	S	109 30	0.714901
Nebraska	N	100 00	0.673451
	S	99 30	0.656076
New York (Long Island)		74 00	0.654082
North Carolina		79 00	0.577171
North Dakota	N	100 30	0.744133
	S	100 30	0.729383
Ohio	N	82 30	0.656950
	S	82 30	0.634520
Oklahoma	N	98 00	0.590147
	S	98 00	0.567617
Oregon	N	120 30	0.709186
	S	120 30	0.684147
Pennsylvania	N	77 45	0.661540
	S	77 45	0.648793
South Carolina	N	81 00	0.564497
	S	8100	0.544652
South Dakota	N	100 00	0.707738
	S	100 20	0.689852
Tennessee		86 00	0.585440
Texas	N	101 30	0.579536
	NC	97 30	0.545394
	C	100 20	0.515059
	SC	99 00	0.489913
	S	98 30	0.454007
Utah	N	111 30	0.659355
	C	111 30	0.640579
	S	111 30	0.612687
Virginia	N	78 30	0.624118
	S	78 30	0.606925
Washington	N	120 50	0.744520
	S	120 30	0.726396
West Virginia	N	79 30	0.637773
	S	81 00	0.618195
Wisconsin	N	90 00	0.721371
	C	90 00	0.705577
	S	90 00	0.687103

