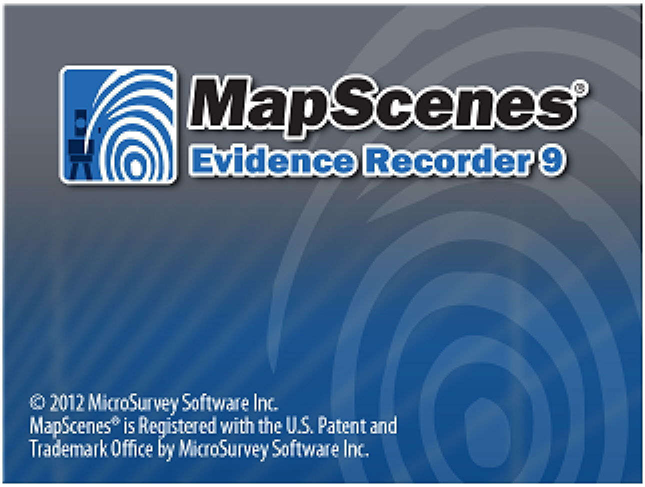

MapScenes Evidence Recorder 9 v9.0.0 (3/13/2012)

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- A searchable "Helpdesk" section with general user instructions and information about the Software.
- A link to allow end users of the Software to download any bug fixes, error corrections or other updates to the Software that MICROSURVEY may make available through the Site.
- "Contact MICROSURVEY" electronic response capability. MICROSURVEY will use reasonable commercial efforts to respond within two (2) business days to a customer inquiry received via this system. Answers to such inquires will be added to the FAQ's, as appropriate.

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f. **Notices.** All notices under this Agreement shall be in writing, and shall be deemed given when personally delivered, when received if by nationally recognized courier, or three days after being sent by postage prepaid, certified or registered Canadian Mail, as applicable, to MICROSURVEY at MICROSURVEY's address as set forth herein or to Licensee at the address that Licensee provided upon entering into this Agreement, or such other address as a party last provided to the other by written notice.

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Technical Support

MicroSurvey Software Technical Support is available to help you get the most out of your MicroSurvey program. The following information explains how to prepare for your call so that your inquiry can be answered promptly and accurately.

Please prepare yourself before you call for Technical Support

Take a few minutes before you place your call to check the printed documentation and the online help files to see if the answer is already at your disposal. Our Web site on the Internet can also save time. Please check it for assistance if you can. Please have the following information available if requested: Hardware model, version of the program, and your Technical Support Number.

Please make sure that you have all the steps you completed prior to your problem and can explain them to the technical support representative. We may ask that you forward a copy of your data to us if we cannot find the problem immediately.

MicroSurvey offers a 90-day complimentary support period to all of our registered users, starting the date of purchase. Introductory support is available weekdays between 8:00 am and 5:00 pm (Pacific Time) excluding holidays.

Yearly Support

For clients who have had their original 90-day complimentary support period expire and feel that they will need on going support over the next year, we have a Yearly Support Contact option available. This gives you the ability to contact us for technical support, as much as you require, and you pay a flat fee once a year. This option is not to be used in place of training but is to assist you on the occasions when you really need it. The charge for the Yearly Support Contract is to be billed and paid for prior to the support commencing. This rate is subject to change, call for current rates.

Electronic Support

MicroSurvey maintains and provides at no charge, our Internet Web site at the following address: www.mapscenes.com

This web site has sections on frequently asked questions, Technical Notes, Technical Specifications, and as required, free updates and program fixes, along with a lot of other helpful information.

Training

MicroSurvey Software Inc. can provide training to you, in your office or in a classroom situation (where facilities and numbers allow. MicroSurvey has training staff that will travel to almost anywhere and provide you with the professional skills you require to operate your MicroSurvey program. Please feel free to call and ask for a quotation or inquire about potential classroom situations. Your local dealer may also be able to setup or arrange a training session for you. Contact our head office for more information about training.

MicroSurvey Contact Information

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Support Helpdesk: www.microsurvey.com/helpdesk

General Information E-Mail: info@microsurvey.com

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Getting Started

Introduction

MapScenes Evidence Recorder is designed for the Crime Scene or Accident Reconstruction Professional to provide unequaled simplicity and on-scene mapping performance, seamlessly integrated with MapScenes desktop software.

An easy to use interface helps new and advanced users to quickly access all the tools they need to complete their scenes accurately and as efficient as possible.

A graphical interface is the heart of the product; it helps the user see in real time their scene being created. You can quickly visually inspect the data you've gathered and be confident that you have all you need before leaving the scene.

Superior instrument support is what Evidence Recorder is all about. Drivers are available for connection to all major total station manufacturers, including new reflectorless and robotic instruments.

Once you've completed your scene, you can download it directly into our MapScenes desktop program. Literally, you can have a drawing including all your measurements, points, lines, and symbols in a matter of seconds.

Hardware Requirements

Evidence Recorder 9 may be installed on the following Windows CE, PocketPC, and Windows Mobile devices. We recommend that you purchase a compact flash sleeve for some of the devices and store your program and data files on the compact flash card. Some devices will lose data if you forget to charge the device for a few days. It is well worth the investment to have secure data!

Evidence Recorder 9 may also be installed on any Desktop, Laptop, or Tablet PC running Windows XP SP3, Windows Vista SP2, or Windows 7.

- **Juniper Systems Allegro CX** - Evidence Recorder installs to C_Drive by default which is secure.
- **Juniper Systems Allegro MX** - Evidence Recorder installs to secure RAM by default.
- **Juniper Systems Archer** - Evidence Recorder installs to secure RAM by default.
- **MicroSurvey Tracker, Tracker Xtreme** - Evidence Recorder installs to SystemCF by default which is secure.
- **Nautiz X7** - Evidence Recorder installs to secure RAM by default.

- **Compaq iPAQ Pocket PC H4100/3600/3700/3800/3900** series or newer - Evidence Recorder installs to volatile RAM by default which is not secure; you should install the program to a storage card. 64 MB of RAM required.
- **Compaq iPAQ Pocket PC H3210 and H3215** - Evidence Recorder installs to volatile RAM by default which is not secure; you should install the program to a storage card.
- **HP iPAQ (Windows Mobile 2003 / 2003SE)** - Evidence Recorder installs to volatile RAM by default which is not secure; you should install the program to a storage card.
- **HP iPAQ (Windows Mobile 5 / 6)** - Evidence Recorder installs to secure RAM by default; a storage card is not necessary for persistent storage.
- **Sokkia SHC250** - Evidence Recorder installs to secure RAM by default.
- **Sokkia SHC2500** - Evidence Recorder installs to the SystemCF by default which is secure.
- **Sokkia SRX (onboard)** - Evidence Recorder must be installed to ROMDisk which is secure.
- **Symbol PDT 8100 Pocket PC** - Evidence Recorder installs to volatile RAM by default which is not secure; you should install the program to a storage card.
- **TDS Nomad** - Evidence Recorder installs to secure RAM by default.
- **TDS Ranger (Windows Mobile 2003SE)** - Evidence Recorder installs to volatile RAM by default which is not secure; you should install the program to Disk.
- **TDS Ranger (Windows Mobile 5)** - Evidence Recorder installs to secure RAM by default.
- **TDS Recon (Pocket PC)** - Evidence Recorder installs to volatile RAM by default which is not secure; you should install the program to Built-in Storage.
- **TDS Recon (Windows Mobile 5 / 6)** - Evidence Recorder installs to secure RAM by default.
- **Topcon FC-250** - Evidence Recorder installs to secure RAM by default.
- **Trimble TSC2** - Evidence Recorder installs to secure RAM by default.

Call MapScenes at 1-800-668-3312 or check our web site at www.mapscenes.com if your device is not listed here.

Installing Evidence Recorder

If you purchased a new data collector with Evidence Recorder 9 from MapScenes then Evidence Recorder comes pre-loaded on it.

If you are installing Evidence Recorder yourself onto an existing data collector, the first thing is to confirm that your hardware is supported by Evidence Recorder 9. If you're reading this topic then you probably already know if Evidence Recorder will run on your data collector. If you're not sure, you can refer to the hardware requirements topic or call our technical support department.

To install onto your data collector you need to make sure you have a Microsoft ActiveSync or Windows Mobile Device Center connection established between your computer and your data collector.

There are two ways that you can install Evidence Recorder onto your device: it can be installed from the CD that came with your purchase, or it can be downloaded from our website at www.mapscenes.com.

Starting Evidence Recorder

During install, shortcuts are created and will be located in either your Start Menu, or Start Menu | Programs, or directly on your desktop. Simply press the shortcut to start the program.

Auto Repair

Upon startup Evidence Recorder checks the registry for corruption, and also checks to make sure important system files are where they need to be for Evidence Recorder to run properly. If it detects any problems, it will automatically fix them for you.

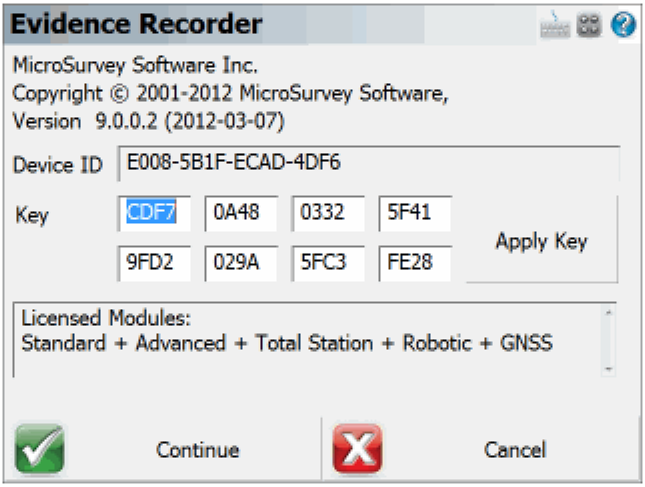
Hard Reset or Battery Drain

In these scenarios with other software, you would usually have to re-install your software. However, because Evidence Recorder can repair itself all you need to do is use the File Explorer or My Computer program on your data collector to browse to where Evidence Recorder is installed and find the programs folder. In there, if you run the "splash" program it will automatically fix all problems and re-install your shortcuts for you.

The splash program will be an executable file and it will include the word "splash" in it. For example on the Archer, the file is called **SplashPPC.exe**.

Registration & Demo Mode

When you start Evidence Recorder for the first time you will see the registration screen which will list the machine ID. This ID is unique for each device that Evidence Recorder is installed on.



Activation

To activate Evidence Recorder you need access to the Internet. With your purchase you should have received a GUID (Serial Number) that you will need along with the Device ID generated by Evidence Recorder.

A typical serial number will look something like the following:

D9C83164-FB0E-4713-B457-CE593EFEA296

A typical device id will look something like the following:

F008-F38C-4421-B482

Step 1

From a computer that has access to the internet, please visit the following web page:

www.microsurvey.com/register

Follow the instructions on the Evidence Recorder registration pages.

NOTE: Your serial number is valid for only one activation.

Step 2

Using the Key generated by the online registration system, enter the key values into Evidence Recorder.

When done, press the Apply Key. You will see the words "Activation Key Valid" and it will list the modules that were registered. The **Run Demo Mode** button will also change to say **Continue**.

More Help or Purchase

HELP: For online help, click here.

To purchase Evidence Recorder 9 please call MapScenes at 1-800-668-3312.

Available Modules

There are several modules available for use on a data collector and they're as follows:

- **Standard** - Real-time Automated Linework, COGO Calculations, Traverse Closure and Adjustments, ASCII/DXF Import/Export, MicroSurvey Transfer, and more!
- **Total Station** - Adds non-robotic total station control.
- **GNSS** - adds RTK GNSS (GPS and Glonass) control, Coordinate Calculator, Helmerts' Transformations.
- **Advanced** - adds Surface Modeling, Roading, LandXML, GIS Attribute Collection, Predetermined Area Calculations
- **Robotic** - adds Robotic Total Station control.

Run Demo Mode

To run Evidence Recorder in demo mode press the **Run Demo Mode** button.

In Demo mode, Evidence Recorder is limited to storing only 30 points each time it is run, but otherwise it is fully functional.

Retrieve Lost Key Codes (passwords)

The key code that was generated for a serial number can be accessed from the online registration page (www.microsurvey.com/register). Just enter the serial number you which to retrieve the key code for and the key code and the device id it is assigned to will be displayed.

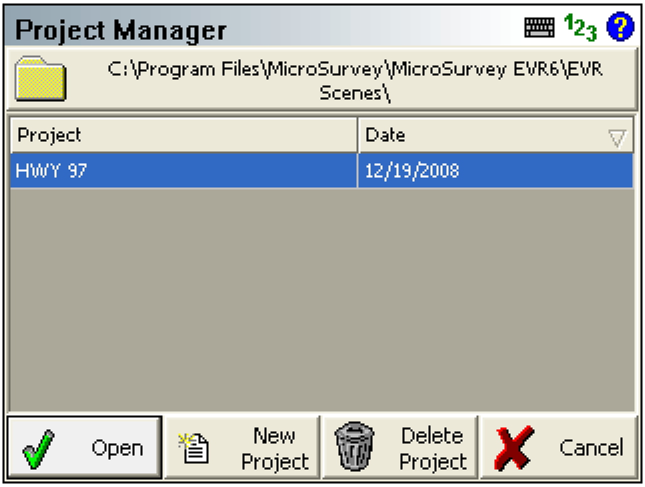
Technical Support

If you need help with Evidence Recorder please contact Technical Support.

Project Manager

Main Menu | Project Manager

The Project Manager is used to create, open, or delete projects currently residing in your data collector. When you start Evidence Recorder this is always the first screen you will see.



By default the project manager will display the contents of the ...\MicroSurvey EVR9\Scenes\ directory, which is the default location for all projects that you create. You can sort the list by project name or date by tapping on the column's header.

Scenes Folder

Press this button to specify a different project folder than the default. The default is...\MicroSurvey EVR9\Scenes\. Once you set the directory it is written to the msurvey.ini file so it is used for all subsequent projects.

Open Project

To open an existing project, simply select it in the list and press the **Open** button.

New Project

To create a new project, simply press the **New** button. You will then see the new project screen which will allow you to enter a name, , choose your automap library and set the units for the project.

Delete Project

To delete a project you first need to select it in the list and then press the **Delete** button. You will be asked to confirm that you really want to delete the project.

> **Notes:**
> • You can not delete a project that is currently open.
> • Projects that have been deleted can not be restored.

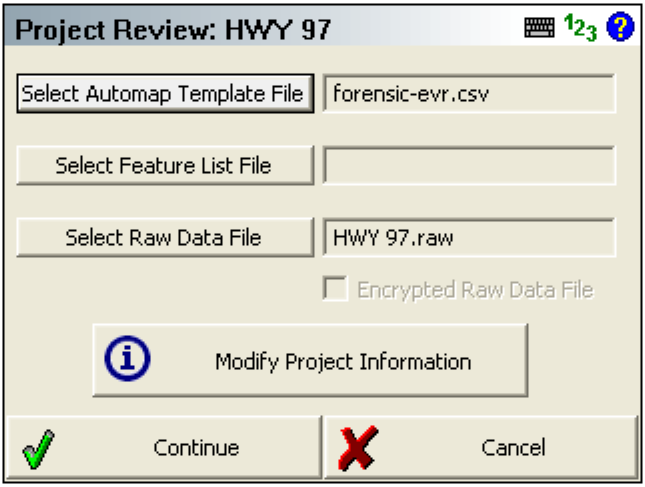
Exit

To exit from the project manager press the **Exit** button.

Project Review

When you create a new or open an existing Evidence Recorder project you will always see the Project Review screen.

For most projects all you need to select is the Automap Library Template File that you want to use.



Select Automap Template File

This indicates the Automap Library Template that will be loaded into the project. You can change it by pressing the button and either choosing a different template library or creating a new blank library. Automap files contain pre-defined descriptions that can be used in Evidence Recorder. The template library that you select will be copied into the project's folder with a name of yourprojectname_automap.csv, and any changes that you make to the Automap Library will affect only the project library, not the template library.

Select Feature List File

Use this to select a feature list that you want to use with the project, for collecting GIS point attributes.

Select Raw Data File

This indicates the name of the raw file that is going to be used. You can select a different one by pressing the button and either creating a new raw file or choosing the one to open.

The Encrypted option indicates whether or not this raw file is encrypted. You can only change this option when creating a new project; once set, this option can not be undone. Encrypting the raw file ensures that users can not accidentally or intentionally edit their raw files with a text editor or other software.

Note:
At this time, no other applications besides Evidence Recorder 4 (or newer) and MapScenes 2008 (or newer) can read an encrypted raw file. Previous versions of Evidence Recorder and MapScenes will not be able to read Evidence Recorder encrypted raw files.

Modify Project Information

This option will take you directly to the Project Information screen, where you can enter notes about the project. Please see the Project Information topic for further information.

Evidence Recorder Project Files

Every Evidence Recorder project will contain usually 7 files, but may contain more depending on what files you've exported or copied to the directory. Typically you will see that the file names will begin with the name of your project.

Filename.cdx	This is the index for the database file.
Filename.dbf	This is the database file that contains your coordinate information.
Filename.ini	This file contains information pertinent to your project.
Filename.raw or Filename.rae	This is the raw file that contains your observations. If the raw file is encrypted it will have a .rae extension. Note you can have more than one raw file.
Filename_figures.dbf	This is the database for your figures in your project.
Filename_figures.cdx	This is the index file for the figures database.
Filename_automap.csv	This is the Automap Library for your project.

When you create a new project, the project name that you use will become the "folder" for your project files. By default, your project will be stored in the ...\MicroSurvey EVR9\Scenes\ directory.

Note:
After creating a new project, do not later rename the folder containing your project's files or the actual files, doing so will cause Evidence Recorder to not recognize the folder as a valid project and you will not be able to open it.

Automatic Save

There are a few things to keep in mind when manually entering data in Evidence Recorder:

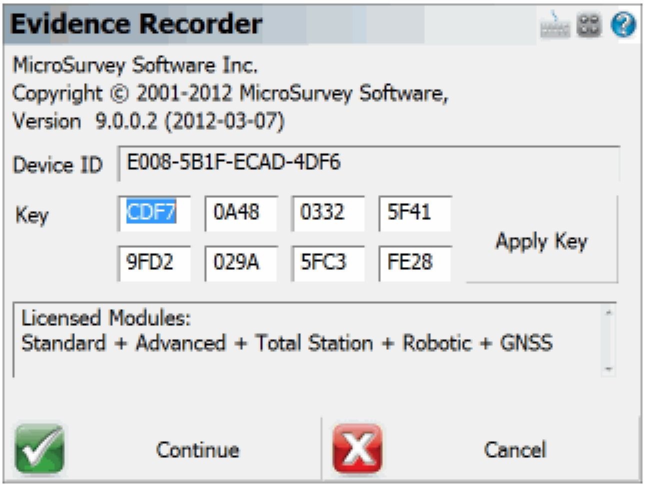
All stored data is automatically saved. There is no need for a Save function. Always close the program by going to the Main Menu and choose the Exit button to prevent loss of measurement data.

Input fields that are left blank are stored as undefined. For example, if you enter only a horizontal coordinate for a point and leave the elevation field blank, we do not automatically set the elevation as 0.000. The elevation remains undefined.

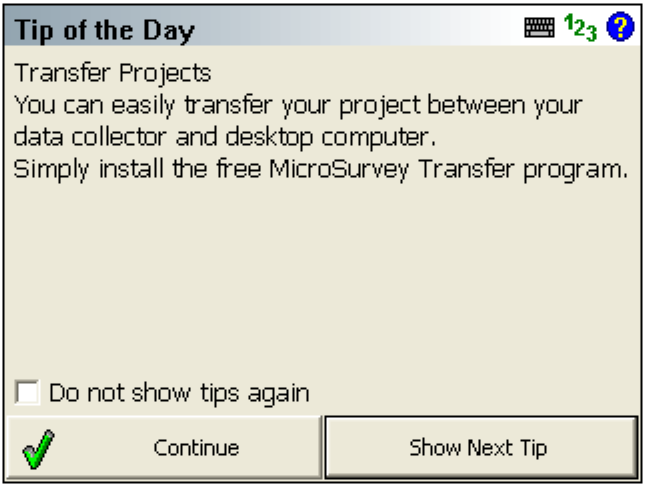
Quick Start: Open Existing Project

Start Evidence Recorder by running the icon contained either in your Start Menu or on the Desktop of your data collector.

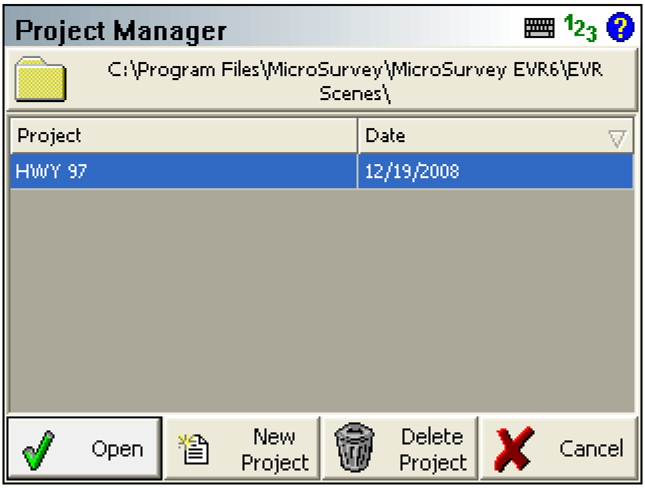
If you start Evidence Recorder in demo mode, the first screen you will see is the About screen, where you can enter a registration code to license your copy of Evidence Recorder. Press the **Run Demo Mode** button if you see this screen.



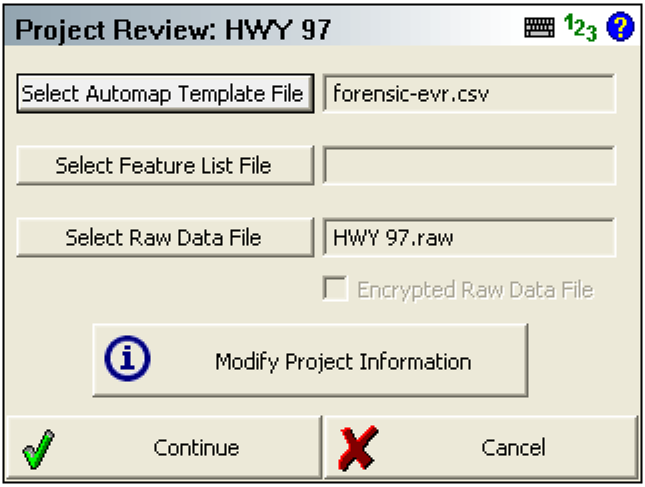
The next screen (which you may or may not see) is the Tip Of the Day screen, which contains a different helpful tip whenever you start Evidence Recorder. Press the **Continue** button if you see this screen.



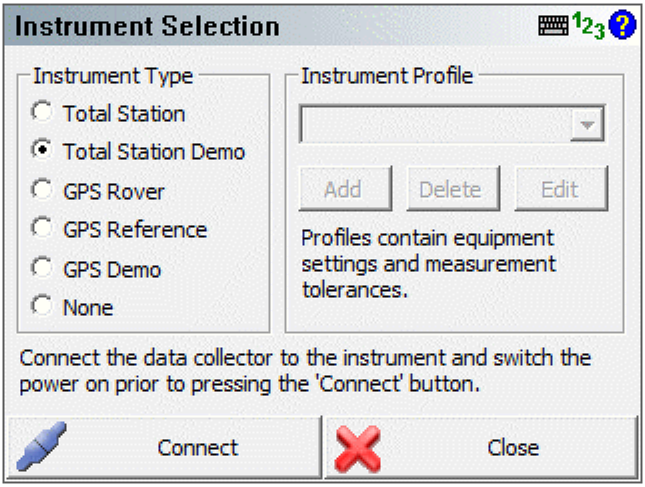
By default a project named HWY 97 is installed. For this example let's open it by highlighting it and pressing the **Open** button. You can also double tap the file name which will also open it.



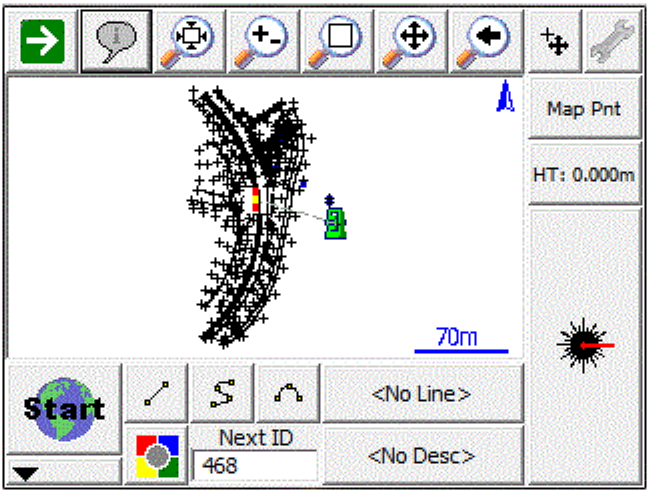
You will then have to review the project files and decide what you want to load. Evidence Recorder checks in the project's msurvey.ini file to determine which files should be opened. Press **Continue**.



You are then prompted to select the instrument that you want to connect to. Let's set it to Total Station Demo and press **Connect** to continue. (Note, you will not see this screen if Evidence Recorder is running onboard your instrument.)



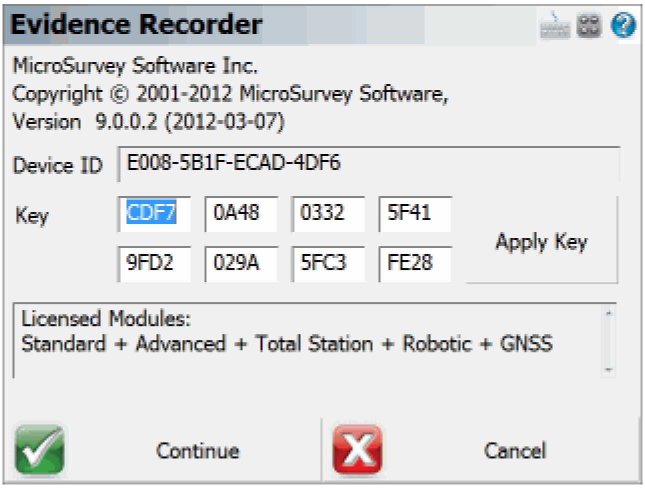
The Map screen will then be displayed. You should now see your project, here is what the HWY 97 project should look like:



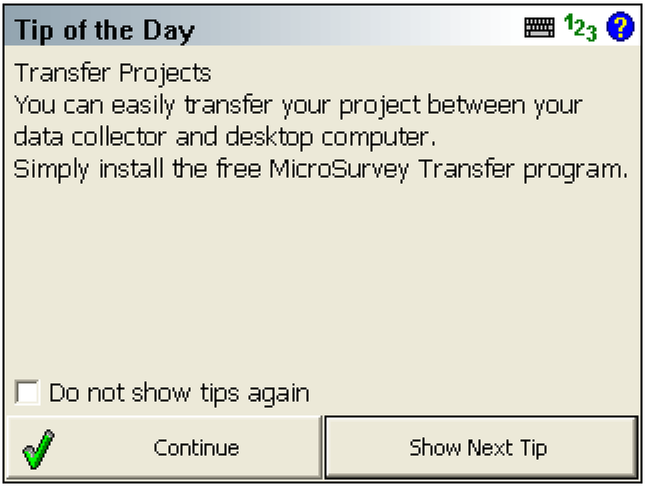
Quick Start: New Project

Start Evidence Recorder by running the icon contained either in your Start Menu or on the Desktop of your data collector.

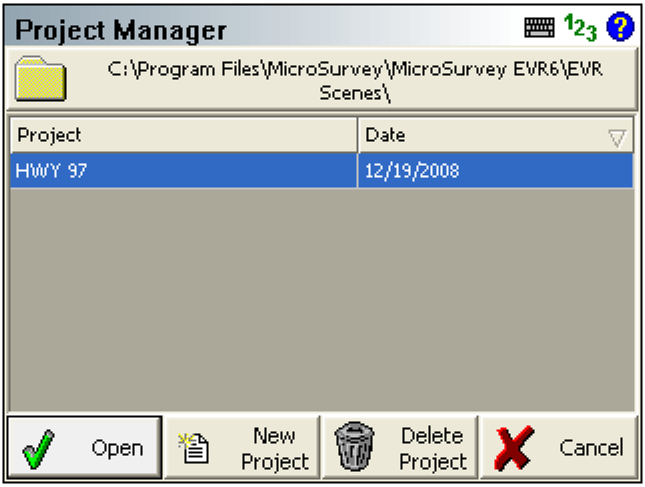
When you start Evidence Recorder in demo mode the first screen is the About screen, where you can enter a registration code to license your copy of Evidence Recorder. Press the **Run Demo Mode** button if you see this screen.



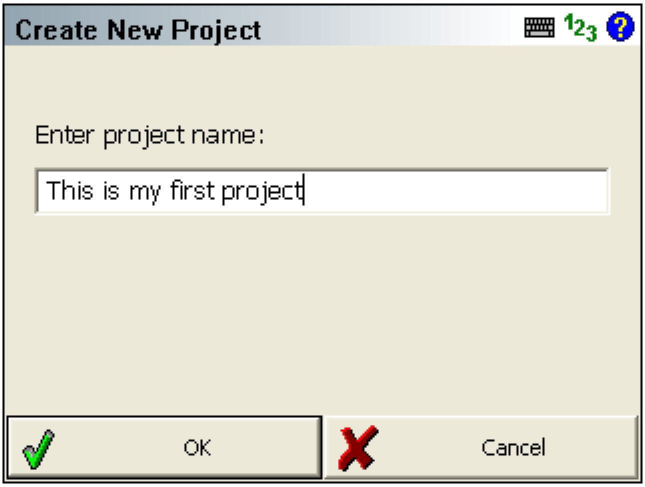
The next screen (which you may or may not see) is the Tip Of the Day screen, which contains a different helpful tip whenever you start Evidence Recorder. Press the **Continue** button if you see this screen.



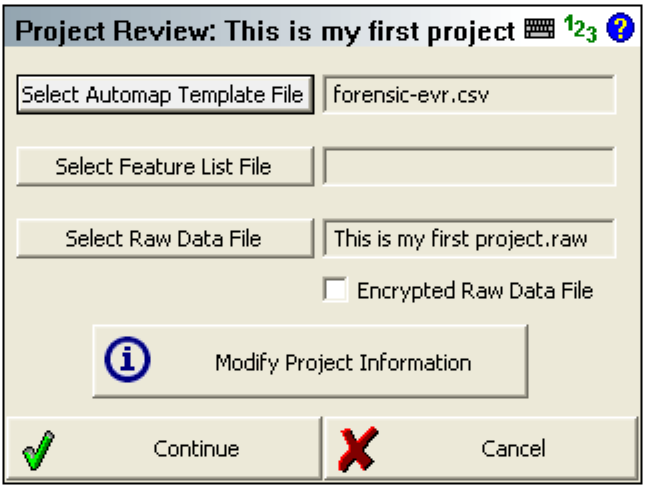
Press the **New** button to create a new project.



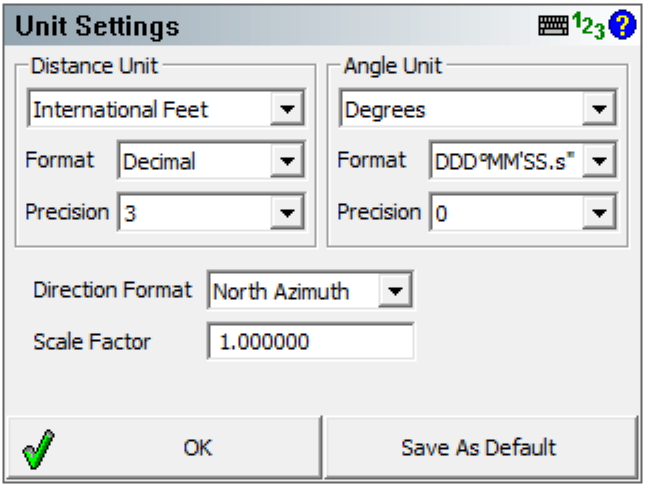
You will then have to enter a name for your new project, then press **OK** to continue.



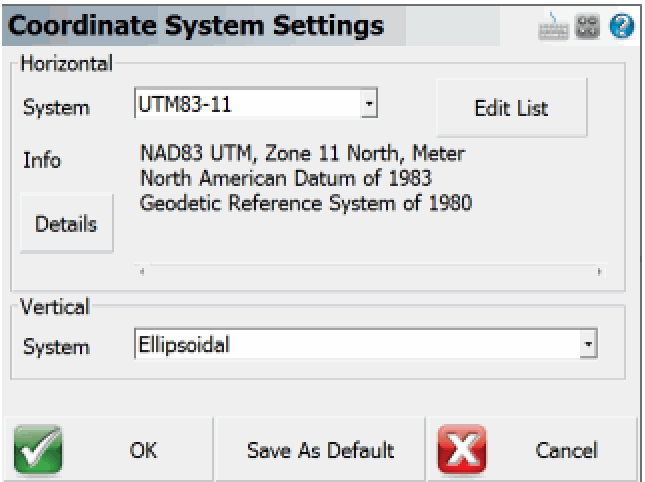
You will now see the Project Review screen. This is where you can specify which Automap Library Template File, Feature List File, and Raw File to use, whether you want your raw file to be encrypted, or enter project information. Press **Continue**.



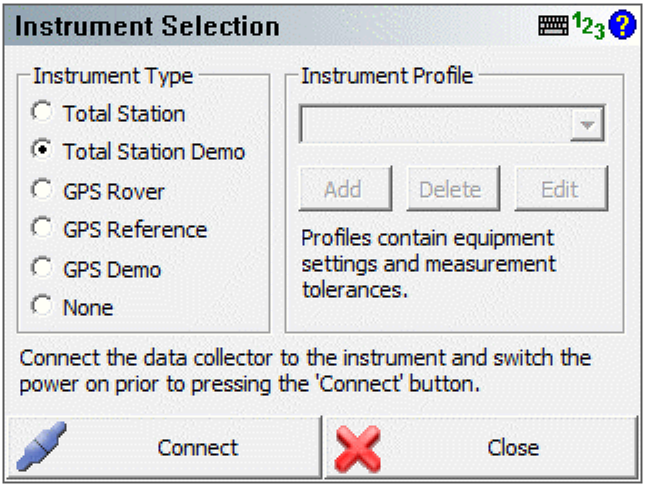
Now the Unit Settings screen will appear allowing you to specify the units for your project. Set them as desired, then press the **Save As Default Settings** button to remember these settings for all subsequent new projects, then press **OK**.



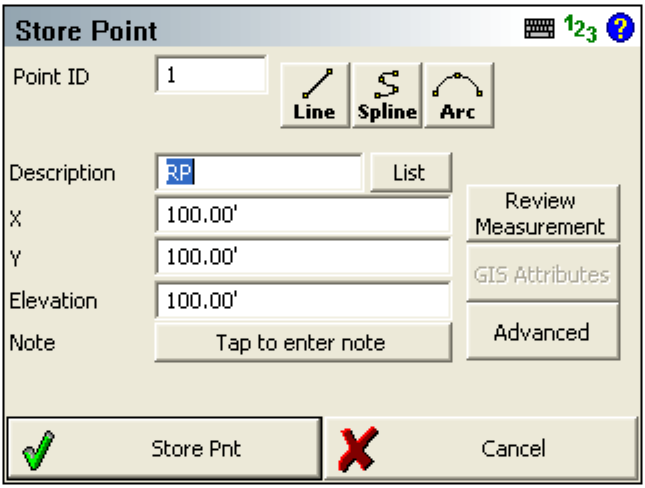
You will then be asked "Would you like to define a coordinate system now?" This will be used for Transformations and GPS Localizations. Press **No** to skip over this, or **Yes** to see the Coordinate Settings screen if you need to select a coordinate system.



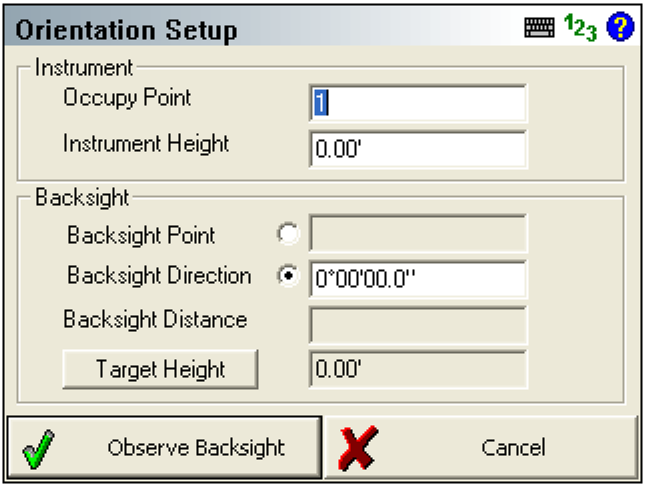
You will then see the Instrument Selection screen where you are prompted to select the instrument that you want to connect to. Let's set it to Total Station Demo and press **Connect** to continue. (Note, you will not see this screen if Evidence Recorder is running onboard your instrument.)



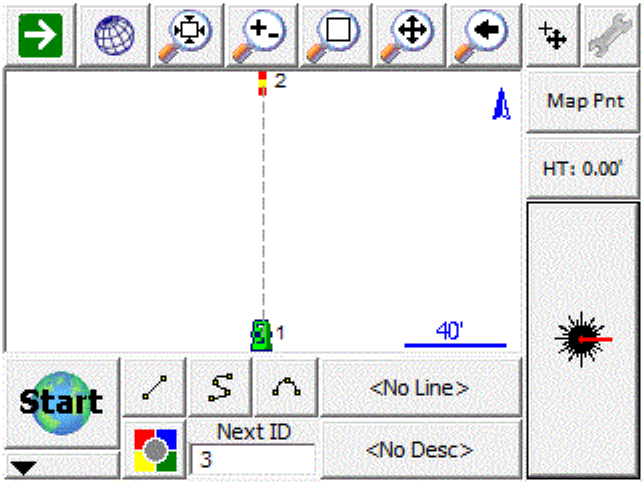
If you selected Total Station or Total Station Demo, you will then see a message asking "**Would you like to create a new reference point which will be used to occupy the instrument?**" Press **Yes** if you would like to which will open the Store / Edit Points screen. The default coordinates that are displayed are retrieved from the msurvey.ini file found in the programs directory, and if you change these coordinates they will be remembered for next time. Selecting **No** will take you to the main interface.



If you chose to create a reference point in the step above, you will be asked **"Would you like to occupy the reference point you just created?"** Press **Yes** if you would like to do so which will open the Setup Occupy Point screen for measuring your backsight. Selecting **No** will take you to the main interface.



Once you complete the setup routine and have measured your backsight,you will see your setup and backsight positions in the map view.



Common Evidence Recorder Buttons

The Evidence Recorder interface has a consistent structure and to use it effectively the user needs to become familiar with several commonly used buttons.

 Clicking on this button will open up the keypad.

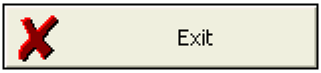
 Clicking on this button will open up the Windows Start Menu. Available on Pocket PC and Windows Mobile devices only.

 Clicking on this button will open up the RPN Calculator.

 Clicking on this button will open up the help page for whatever topic you are currently at. The help page will open up in an Internet Explorer window.

This button will take you back to the main menu.

This button will take you back to the map screen.

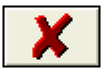


This button will save your project and close Evidence Recorder.

This button will accept the changes you've made and will return you to the previous screen.

This button will close the current screen and return you to the previous screen without saving any changes.

This button will take you to the next step in an operation.



Pressing this will close the currently open toolbar and return you to the previous screen.

Pressing this will open the Point Chooser toolbar.

Data Entry (Extended Edit Fields)

Throughout Evidence Recorder you will see edit fields for entering various values. These types of fields are called Extended Edit Fields, and can be used not only for typing values, but can also launch related commands such as the keypad, calculator, point chooser, inverse tool, etc. This type of functionality is unique to Evidence Recorder.

You can control how these Extended Edit Fields will be triggered by changing the "Extended Edit Boxes" option in the Options screen to require a single tap, a double tap, or to disable them so that you can only type values into them.

Text Entry

For most text entry fields in the program, tapping in it will open up the keypad.

On PocketPC and Windows Mobile devices you can select which keypad to display by changing the "SIP Type" option in the Options screen.

Points

When you see an extended edit field for a point id, tapping in it will open the point chooser toolbar.

Distance and Angles

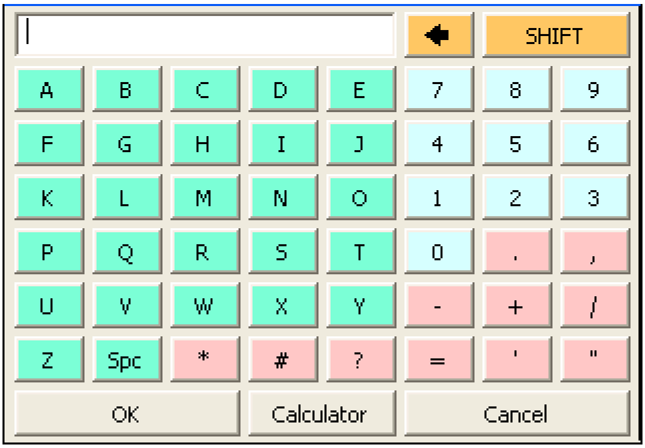
Tapping in other numeric fields such as those for directions and distances will open the RPN Calculator, and some distance fields will open the Inverse tool.

Multi-function Fields

Some fields will display a pop up menu if multiple functions can be opened from that field, just select the desired function from the list.

Keypad

The keypad can be opened from any extended edit entry field. This provides a method of easy text and numeric entry on devices that do not have a physical keypad but it can be used on any device.



Calculator

The RPN Scientific Calculator can be called up from the keypad by pressing the **Calculator** button. If you press the Calculator button, the value entered in the keypad entry field will be copied to the calculator's command line (Note, it must be a numeric value, alpha portions will be stripped off in the calculator) where it can be used for any calculations. When you are done with the calculator, pressing its OK button will return the result back into the keypad.

OK

Pressing the **OK** button will close the keypad, and set the entered value into the text field from which the keypad was opened.

Cancel

Pressing the **Cancel** button will close the keypad without setting anything into the text field from which the keypad was opened.

Keypad Settings

There are two important settings related to the keypad, which are both found in the Options screen.

SIP Type

Use this to specify which SIP keypad type you want to use, such as the full screen MicroSurvey alphanumeric keypad, the small PocketPC qwerty keypad, or the small PocketPC MicroSurvey numeric keypad. Not all SIP types are available on all data collectors.

Extended Edit Boxes

Use this to control how you want to bring up the selected keypad when tapping in an edit box: either with a single tap, a double tap, or off. Users of devices with a keyboard should leave this set to Single Click, and users of devices without a keyboard should set this to Double Click. Setting this to Off disables both the keypad and any other commands that may be started directly from the extended edit field, such as the Point Chooser or Inverse Tool, so that edit fields can only be used for typing values from your physical keypad.

Distance Entry & Recall

Distance Entry

You can customize Evidence Recorder to work with the direction input of your choice. See the Units & Scale topic for details.

The number you enter is assumed to be in the same units as your project, unless a unit modifier is specified (see below). So 5.25 would be interpreted as 5.25 feet, or 5.25 meters depending on your project's unit setting.

Distance Recall

You can recall the distance between two points, by inputting in the form: <firstID>..<otherID> Example: 26..84 will be recognized as the distance computed between points 26 and 84. The distance will be returned in whichever format your units settings is set to.

Unit Modifiers

Recognition of the unit symbols m, ', ft, usft, ftus are supported, and can be used to override the project's unit settings.

Meters

You can specify that a distance is in meters by entering "m" after the value, for example 100m means 100 Meters, even if your project is in Feet.

Feet (International or US Survey)

The ' symbol will be interpreted as either International Feet or US Survey Feet, whichever units the current project is in. For example, entering 1000' will match the feet units that your project is in, so it can mean either 1000 International Feet or 1000 US Survey Feet. If your project is in meters, then the ' symbol is interpreted as International Feet.

Fractional Feet

When entering distances in a fractional format, use a ' symbol or a space between the feet and inches values to separate them. An " symbol is not required. For example, you can enter 10'6 or 10 6 which both mean 10'6". You can enter fractional inches by placing a space between the whole and fractional inches, and using a / symbol in the fraction. For example, 10'6 1/2 or 10 6 1/2 both mean 10'6.5". You can also enter decimal values, such as 10.5' to mean 10'6" or 10'6.5 (or just 10 6.5) to mean 10'6 ½".

International Feet

You can specify that a distance is in International Feet by entering ”ft” after the value, for example 1000ft means 1000 International Feet.

US Survey Feet

You can specify that a distance is in US Survey Feet by entering ”usft” or ”ftus” after the value, for example 1000usft and 1000ftus both mean 1000 US Survey Feet.

Distance Entry Examples

Project Units:	International Feet	
Format:	Decimal	
User Entered Value:	**Interpreted As:**	**Result (always matches project units):**
1000.23	1000.23 in project units	1000.23'
1000.23'	1000.23 in project units	1000.23'
1000.23usft 1000.23 usft 1000.23ftus 1000.23 ftus	1000.23 US Survey Feet	1000.25'
20.117m 20.117 m	20.117 meters	66.00'
10000m 10000 m	10000 meters	32808.40'
10 6 10'6 10'6"	10 feet 6 inches	10.50'
10 6 1/2 10'6 1/2	10 feet 6.5 inches	10.54'

Project Units:	US Survey Feet	
Format:	Decimal	
User Entered Value:	**Interpreted As:**	**Result (always matches project units):**
1000.23	1000.23 in project units	1000.23'
1000.23'	1000.23 in project units	1000.23'
10000.23usft 10000.23 usft 10000.23ftus 10000.23 ftus	10000.23 US Survey Feet	10000.23'

10000.23ft 10000.23 ft	10000.23 International Feet	10000.21'
20.117m 20.117 m	20.117 meters	66.00'
10000m 10000 m	10000 meters	32808.33'
10 6 10'6 10'6"	10 feet 6 inches	10.50'
10 6 1/2 10'6 1/2	10 feet 6.5 inches	10.54'

Project Units:	Meters	
Format:	Decimal	
User Entered Value:	**Interpreted As:**	**Result (always matches project units):**
1000.23	1000.23 in project units	1000.23m
1000.23'	1000.23 International Feet	304.870m
10000.23usft 10000.23 usft 10000.23ftus 10000.23 ftus	10000.23 US Survey Feet	3048.076m
10000.23ft 10000.23 ft	10000.23 International Feet	3048.070m
20.117m 20.117 m	20.117 meters	20.117m
10'6	10 feet 6 inches	3.200m
10'6 1/2	10 feet 6 1/2 inches	3.213m
10 6	Not allowed, must enter units for feet such as 10ft 6, or 10usft 6.	
10 6 1/2	Not allowed, must enter units for feet such as 10ft 6 ½, or 10usft 6 ½ .	

Using Math Operations

You can use the RPN Calculator to further manipulate distance values. For example, if you want to find the distance halfway between points 1 and 2, enter 1..2 into the distance field to recall that distance. Then double tap on that extended edit field to pull that recalled distance into the calculator, where you can divide the distance by 2 (or perform any other calculations with it). Then press the "**Use**" button in the calculator to copy the result back into the field you started from.

Note: You can not perform advanced distance recall functions that include math operators directly in a distance field. For example, 3..4+2 is not a valid entry. All math operations must be done using the RPN calculator. Please refer to the Calculator section for more information on performing specific math operations.

Direction Entry & Recall

Direction Entry

You can customize Evidence Recorder to work with the direction input of your choice. See the Units & Scale Settings topic for details.

To enter an angle using the format selected in your units settings, simply enter the angle. For example, 120.4530 means 120°45'30" if your project is in Degrees/Minutes/Seconds, 120°45.3' if your project is in Degrees/Minutes, or 120.453° if your project is in decimal degrees.

Direction Recall

You can recall the direction between two points, by inputting in the form: <firstID>..<otherID> Example: 26..84 will be recognized as the direction computed between points 26 and 84. The angle will be returned in whichever format your units settings is set to.

Unit Modifiers

You can always override your project's units setting by entering the bearing with the cardinal quadrant indicated before or after the angle. If there is no quadrant specified, then the input angle will be interpreted as an Azimuth.

Decimal Degrees

You can always specify that an angle is in decimal degrees by entering "d" after the value, for example 45.5083d means 45.5083° or 45°30'30".

Degrees, Decimal Minutes

You can always specify that an angle is in degrees and decimal minutes by entering "dm" after the value, for example 45.305dm means 45°30.5' or 45°30'30".

Degrees, Minutes, Decimal Seconds

You can always specify that an angle is in degrees, minutes, and decimal seconds by entering "dms" after the value, for example 45.3030dms means 45°30'30".

Bearings

To enter a bearing, use the cardinal quadrant letters (N, E, S, and W) before or after the angle. For example: NE60.4530, 60.4530NE, or N60.4530E means NE 60°45'30” if your project is in DMS, NE 60°45.3' if your project is in DM, or NE 60.453° if your project is in decimal degrees. It does not matter if you have spaces between the quadrant designation and the angle. You can also separate the degrees, minutes, and seconds values with a space. For example, N 60 45 30 E or N60.4530E both mean NE 60°45'30". You can of course also use any of the "d", "dm", or "dms" (or "g" or "r", see below) designators with a bearing entry, such as NE45.305dm to mean N 45°30'30" E.

Gons (Gradients)

You can specify that an angle is in Gons/Gradients by entering "g" after the value, for example 100g means 100 Gradients (equals 90 degrees).

Radians

You can specify that an angle is in Radians by entering "r" after the value, for example 1.57r and means 1.57 Radians (approximately 90 degrees).

Direction Entry Examples

Angle Units:	Degrees	
Format:	DDD°MM'SS.s"	
Format:	Azimuth	
User Entered Value:	**Interpreted As:**	**Result (always matches project units):**
90.5016	90 degrees, 50 minutes, 16 seconds	90°50'16"
NE45.3030 NE 45.3030 N45.3030E N 45.3030 E 45.3030NE 45.3030 NE	North East quadrant, 45 degrees, 30 minutes, 30 seconds	45°30'30"
SE45.3030 SE 45.3030 S45.3030E S 45.3030 E 45.3030SE 45.3030 SE	South East quadrant, 45 degrees, 30 minutes, 30 seconds	134°29'30"
SW45.3030 SW 45.3030 S45.3030W S 45.303 W 45.3030SW 45.3030 SW	South West quadrant, 45 degrees, 30 minutes, 30 seconds	225°30'30"
90.5016dm 90.5016 dm	90 degrees, 50.16 minutes	90°50'10"
90.5016d 90.5016 d	90.5016 degrees	90°30'06"
100g 100 g	100 gradians	90°00'00"
100.2345g	100.2345 gradians	90°12'40"

100.2345 g		
3.141593r 3.141593 r	3.141593 radians	180°00'00"

Angle Units:	Degrees	
Format:	DDD°MM'SS.s"	
Format:	Bearing	
User Entered Value:	**Interpreted As:**	**Result (always matches project units):**
90.5016	90 degrees, 50 minutes, 16 seconds azimuth	S89°09'44"E
NE45.3030 NE 45.3030 N45.3030E N 45.3030 E 45.3030NE 45.3030 NE	North East quadrant, 45 degrees, 30 minutes, 30 seconds	N45°30'30"E
SE45.3030 SE 45.3030 S45.3030E S 45.3030 E 45.3030SE 45.3030 SE	South East quadrant, 45 degrees, 30 minutes, 30 seconds	S45°30'30"E
SW45.3030 SW 45.3030 S45.3030W S 45.303 W 45.3030SW 45.3030 SW	South West quadrant, 45 degrees, 30 minutes, 30 seconds	S45°30'30"W
90.5016dm 90.5016 dm	90 degrees, 50.16 minutes azimuth	S89°09'50"E

90.5016d 90.5016 d	90.5016 degrees azimuth	S89°29'54"E
100g 100 g	100 gradians	S90°00'00"E
100.2345g 100.2345 g	100.2345 gradians	S89°47'20"E
3.141593r 3.141593 r	3.141593 radians	S0°00'00"W

Using Math Operations

You can then use the calculator to further manipulate the angle. For example, if you want to determine 1..2 then add 90 degrees, enter 1..2 to recall that angle. Then double tap in the extended edit field to pull that recalled angle into the calculator, where you can add 90 to it (or perform any other calculations with it).

Note: You can not perform advanced direction recall functions that include math operators directly in a direction field. For example, 1..2+90 is not a valid entry. All math operations must be done using the RPN calculator. Please refer to the Calculator section for more information on performing specific math operations.

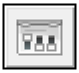
POINTS / LINES / DESCRIPTIONS

Points

Evidence Recorder projects typically are comprised of points that have been imported, calculated or measured. These points are always stored in a file made up of the project name and will have an extension of DBF. DBF files can be viewed using a DBF reader or with Microsoft Excel.

Point Labels

In the drawing area you will always see a node or dot that marks the coordinate location of the point. For each point you can control what is displayed on the screen such as the points number, elevation, description and note. To control the visibility of the labels, use the Options button on the Display Toolbar.



Point Toolbar

At any time you can tap on an existing point to open the Point Toolbar. This toolbar will contain common functions that are done with points. Please refer to the point toolbar topic for more information.

Editing Single Points

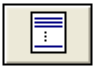
To edit a point you can tap on it which will open the Point Toolbar. Press the Edit button to open the Review / Edit Points screen.

Working with Multiple Points

If you need to search, list, or edit multiple points at the same time you will use the Coordinate Database Editor. Please see the Coordinate Database topic for more information.

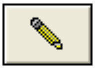
Point Toolbar

When you tap on an existing point in the drawing you will see the point toolbar appear near the bottom of your screen. The point toolbar contains functions that are frequently used on points in your project. Following is an explanation of what each button will do.



Points List

This will display the list of all points in your current project and you can sort the list by tapping on any of the column headings. When you find the point you want simply tap it and press the ok button.



Draw Figure

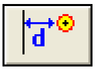
Use this to draw a line between points or use it to continue an existing figure you've already started.

New Point

This will open the store and edit dialog and allow you to enter coordinates for a new point.

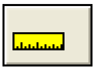
Edit Point

Use this to edit the coordinate value for the selected point.



Offset

This will open the Offset Tool.



Inverse Tool

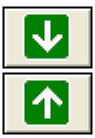
Use this to measure the inverse between points.

Zoom to Point

This button when pressed for the first time will force the point to be centered on the screen. Subsequently, if you keep pressing it, it will continue to zoom in on the point.

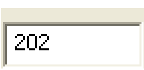
Stake Point

Pressing this will help you stake the point that is currently selected and take you to the Stake Points screen.



Select Point

Use these two buttons to scroll up and down numerically through the points in your database.



Point ID

This displays the point id of the point you've currently selected.

Select Point Toolbar

The point chooser is a mechanism that is called by routines requiring a point number entry. You access it by selecting the point chooser icon next to point number fields, or by double-tapping in an extended edit point number field.

When select it you will see the point chooser toolbar open up towards the bottom of your screen.

Point ID

You can either type the Point ID into this field if you know what it is, or when you tap on a point in the map screen its point ID will be displayed here.

Quick Select

If Quick Select is turned on, then as soon as you tap on a point in the map screen you will be automatically returned to the routine you were selecting the point for. If Quick Select is turned off, then after you tap on a point in the map screen, the coordinate data of that point will be displayed, and you must press the Select button to get back to the previous routine.

Select

Pressing this will take you and your selected point back to the routine you were selecting the point for.

List

Use this to open a grid displaying all the points in your project database. From this list you can click on a point and when you press the OK button it will be inserted into the Point ID field.

New

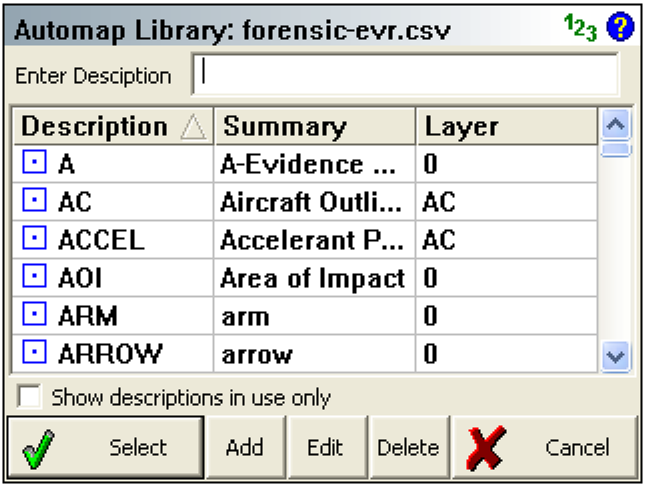
Use this to open the Store / Edit Points screen. This will enable you to create a new point.

Cancel

Pressing this will take you back to the routine you were selecting the point for, without selecting the selected Point.

AutoMap Library

The AutoMap Library editor allows the user complete control over the visibility of points and lines based on the descriptions used to code the points. It also allows you to set attributes for the descriptions such as point and line colour.



Enter Description

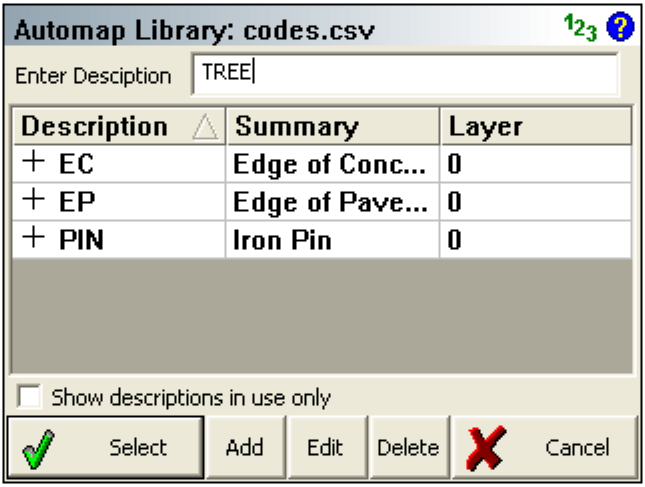
Use this field to auto scroll to description in your list. For example, typing the letters EV will scroll down to the EVID description. If you type a unique description and press enter, you will be prompted for whether you want to add it into the AutoMap Library or not.

Show descriptions in use only

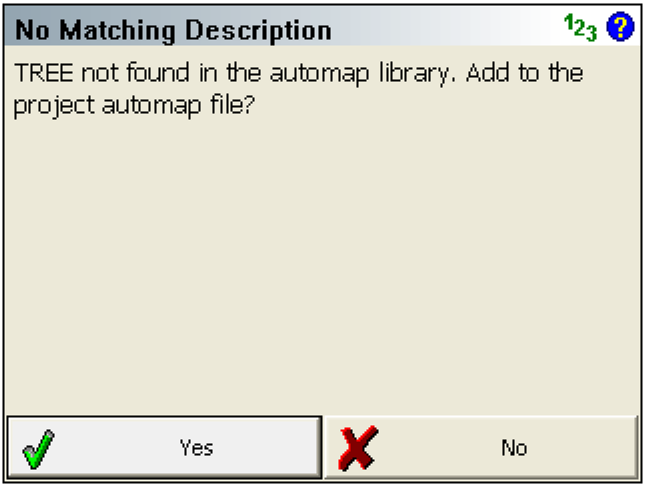
Use this to display only the descriptions found in your AutoMap Library that are used in the current project.

Adding Descriptions to the Library in Evidence Recorder

While you're working you can add descriptions to the AutoMap Library on the fly. When you enter a description that isn't in the library you will be prompted with a message asking you if you want to add it to your project's AutoMap Library file.



Note: This prompt can be turned off so Evidence Recorder always uses the new descriptions without adding them into the AutoMap Library file. To do this you need to make sure you have the **"Prompt New Descriptions"** toggle turned off in the Options menu.

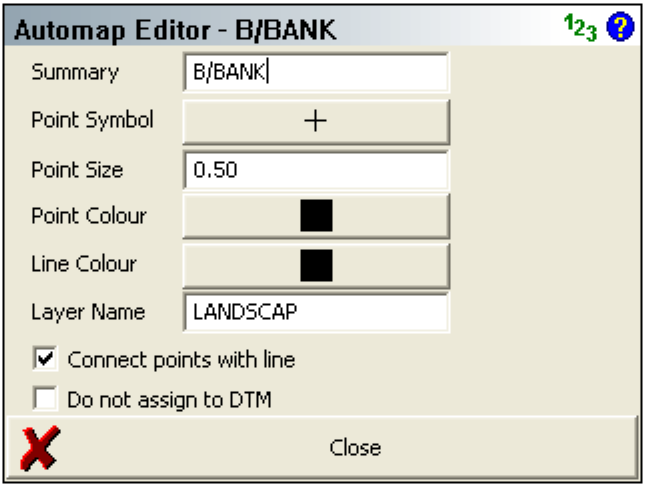


If you answer **Yes**, then the description will be added into the project's AutoMap Library file (not to the AutoMap Template file).

If you answer **No**, then the description will be used without adding it into the AutoMap Library. If you do not add it to the AutoMap Library, then you will not be able to set options such as defining the layer and colour of points and lines with this description.

Editing Descriptions in the Library in Evidence Recorder

The AutoMap Library editor allows you to edit properties for each description in the library. Pressing the Edit button will bring up the menu shown below for the selected entry:



These properties are stored in the library in specific columns. Please refer to the topic below about editing the library for more information.

Summary

You can use this field to summarize your description. For example, a description IP may have a summary Iron Pin.

Point Symbol

You can define a marker for a point. These markers are not automatically transferred back to the desktop and are not similar to CAD blocks or parts. They are simply point nodes that will be displayed in the map view to help distinguish different points on the screen. There are 27 different marker types. The symbol for each description is also shown on the AutoMap Library screen.

Point Size

This allows you to change the size of the marker. You will find that using a number of 1 is a good starting point. Adjust from there as needed.

Point Colour

This allows you to set the colour of the markers. You can choose from a list of 255 colours.

Line Colour

This allows you to change the colour of lines in your drawing.

Layer Name

This specifies the layer that will be used for lines and points with this description.

Connect Points With Line

If this is checked, when you select the description from the topo toolbar on the main display, the connect lines toggle will be turned on automatically. Use this for descriptions that typically are connected by lines such as an edge of road or ditch center line.

Do not assign to DTM

This is very useful for the creation of real-time surface models. If you toggle this ON, then these points will not be included in any DTM created with Evidence Recorder. Use this for descriptions that are not at ground level.

Deleting Descriptions from the Library from Evidence Recorder

The AutoMap Editor allows you to delete descriptions from the library. Pressing the Delete button will prompt you to make sure that you want to delete the selected entry. This will delete that entry from the project's AutoMap Library file, it does not affect the AutoMap Template file.

Editing an Existing Library outside of Evidence Recorder

The AutoMap Library is a very powerful feature in Evidence Recorder. When combined with our desktop products, your downloaded files can literally be imported, layers and symbols placed in seconds. For this topic we will concentrate on helping you work with and edit the AutoMap library using Evidence Recorder.

The Evidence Recorder AutoMap library is a comma delimited file that can be edited with MapScenes, with a text editor like Microsoft Notepad, or with a spreadsheet application like Microsoft Excel. Since not every Evidence Recorder user owns our desktop software we will discuss editing the file with Excel.

The first row in the file is reserved for the column header. Some of the columns are reserved for our desktop products, but the following columns are used in Evidence Recorder.

Column A = Description (String value)

Column B = Summary of Description (String value)

Column L = Connect Points with Line (1=Yes, 0=No)

Column M = Layer Name (String value)

Column O = Line Colour (Number 0-255)

Column Q = Line or Spline (0=Line, 1=Spline) *** This works in conjunction with Column L.

Column U = Marker Type (Number 0-26)

Column V = Marker Size (Number 0-10)

Column W = Marker Colour (Number 0-255)

Column X = Exclude from DTM (1=Yes/Exclude, 0=No/Include)

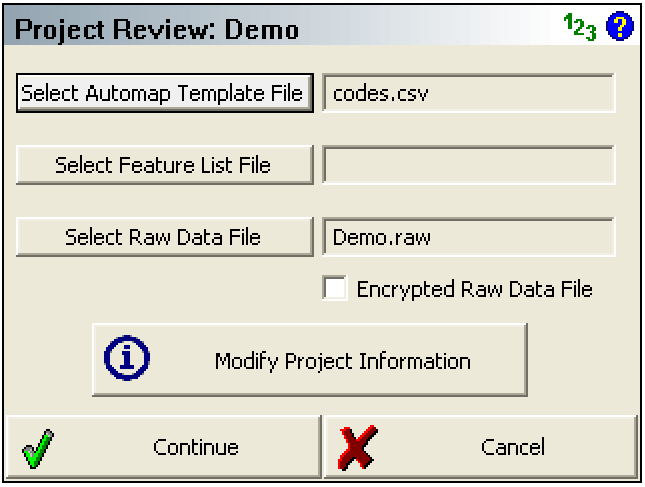
Column AF = Zone Number (Numeric Value)

Create New Library outside of Evidence Recorder

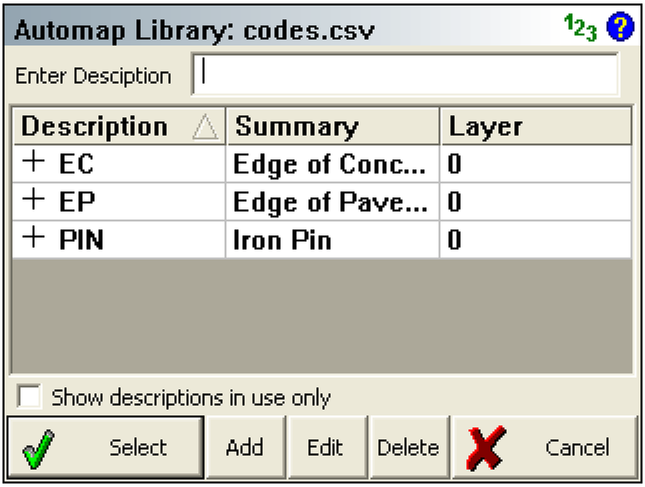
You can easily start a new library from scratch simply by creating a simple text file. In the first row add a header followed by your descriptions and summaries. You have to separate the values with a command and when you're done save the file with an extension of .CSV - an example filename might be CODES.CSV.

```
DESCRIPTION,SUMMARY
PIN,Iron Pin,
EC,Edge of Concrete,
EP,Edge of Pavement,
```

You can then copy the file to your ...\MicroSurvey EVR9\Scenes\ directory. When you create a new project or open an exiting one, make sure to select it as the AutoMap Template File.



Then when you open your AutoMap library you will see your codes listed alphabetically.



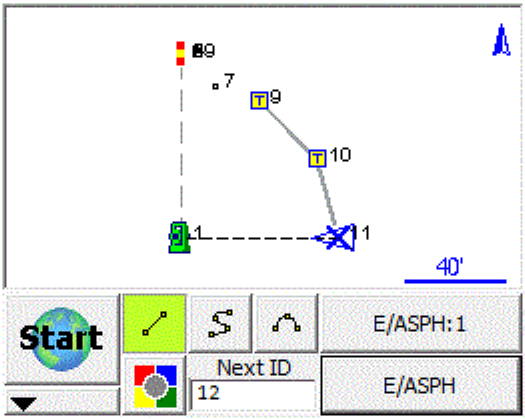
Active Linework

Evidence Recorder has Code-Free linework control in the field to eliminate the need to remember line codes. To activate linework on the fly while surveying, you simply choose the description you want and start taking shots! For MapScenes desktop users, line connectivity codes setup in the desktop Automap library will be used by Evidence Recorder . For more information see the Draw Option Defaults section.

Evidence Recorder uses the concept of Figures for handling of linework. Some software packages refer to these as "Chains".

At the bottom of the Evidence Recorder interface, you will see the Active Lines List button on the second row. When a new project is started, it will display **[<No Line>]** as the current, active line.

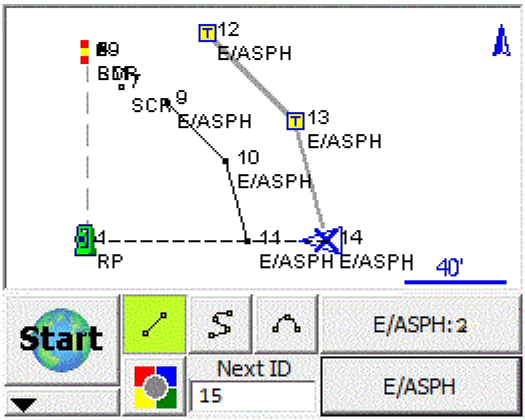
When a new line figure is about to be started, **[<Start line>]** will by displayed on the button. After the first point for a new line has been measured, the active line will be created, made current and displayed.



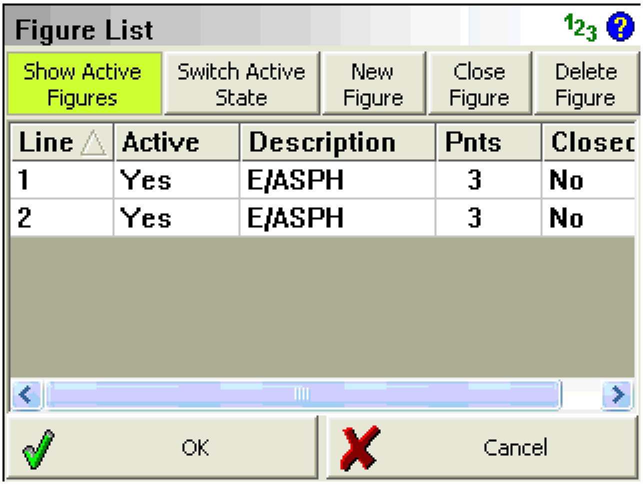
In the example shown, notice E/ASPH:1 on the button. This is the current Active Line. E/ASPH is the point description and 1 is the group number (added automatically). Since this is the first figure in the map, it is assigned group 1.

A Figure is a continuous series of Line, Curve and/or Arc segments. The Figure is identified by Point Description and a group number. Whenever a new line is started, a new Figure is created and added to the Active Lines list with an automatically assigned group number. The group number will increment by one when a previously used point description is used for a subsequent line. (Notice there are two E/ASPH lines in the example)

Furthermore, all linework in Evidence Recorder is handled in 3D.



When you press the E/ASPH:2 Active Line button you will see a list of the figures in your project.



See Also ...

- Automap Library

Figures

Tangents, arcs and curvy lines in Evidence Recorder are also called figures. Figures are created automatically for you as soon as you connect points in the drawing.

Figures can be created while you survey in realtime using our active linework or you can manually create the figure using the pencil tool.

Evidence Recorder Figures

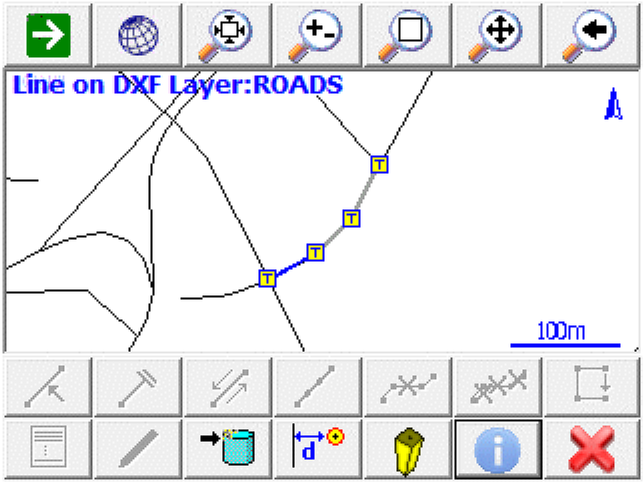
When you click on a figure the Line Toolbar will appear. You will also see bold text in the drawing area indicating what you selected.

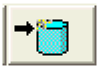
DXF Linework

When you import a DXF drawing you will see all the linework that exists in the drawing. When you select a DXF line or arc you will see the Line Toolbar but everything will be greyed out except for the stake and perpendicular distance buttons. If you press the stake button or perpendicular offset to point button, they will open up their respective toolbars.

When you click on a DXF entity you will see bold text in the drawing area indicating that you picked a DXF line or arc, and it will display which layer it is on.

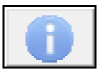
You can control the visibility of DXF layers through the Layers Manager screen.





Coordinate DXF Data

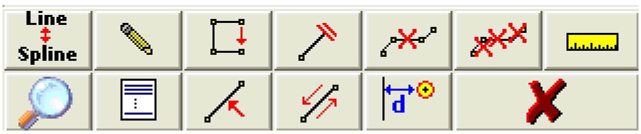
You can add coordinates to the DXF entity by pressing the Coordinate DXF Data button.



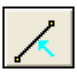
Information

You will see the inverse information based on the DXF entity you picked by pressing the Information button

Line Toolbar

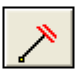


When you tap on an existing line or arc you will see the line toolbar appear near the bottom of your screen. The line toolbar contains functions that are frequently used on line or arcs in your project. Following is an explanation of what each button will do.



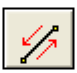
Set Figure Current

Use this to make the current line or arc current in the Active Line List.



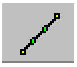
End Figure

Use this to mark a line as complete or finished.



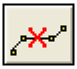
Reverse Figure Direction

Use this to switch the direction of a figure so you can append to the opposite end.



Partition Line / Arc

You can partition (split) a figure or DXF line into smaller segments using this command.

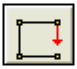


Delete Figure Segment

Use this to delete a segment from a figure.

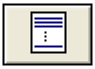
Delete Entire Figure

Use the delete an entire figure.



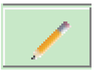
Close Figure

Use this to close a figure so it finishes at the same point it started at.



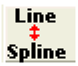
Open Figure List

Use this to display the Active Line List.



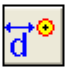
Draw Tool

Use this to draw lines, points, and connect line work between existing points. This will open the Draw Tool.



Convert Line to Spline

This will turn an existing figure that is comprised of straight lines into a curvy line, and vice-versa.



Offset Tool

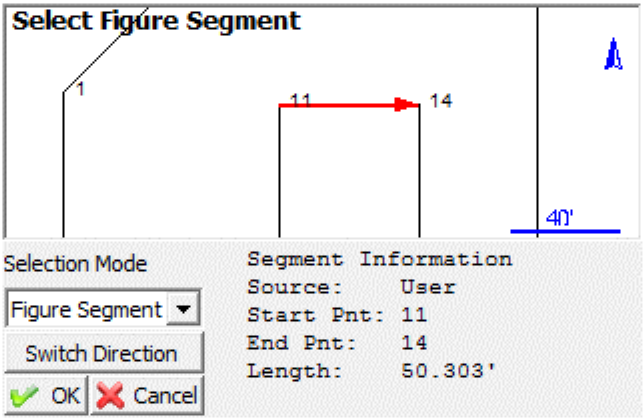
Use this to open the offset tool.

Information

This will display the inverse information of the segment you have selected, as well as the perimeter and area if it is part of a closed figure.

Select Line Toolbar

Various commands will use this toolbar to help you select a line.



Whichever Selection Mode you use, the selected line will be highlighted in red in the map screen along with a direction indicator. If necessary, you can press the **Switch Direction** button to reverse the start and end of the selected line. Press OK to accept the selected line and proceed to the next step.

Selection Mode: Figure/DXF

Pick this mode to select an existing figure or DXF entity by selecting the desired figure from the map screen. You can select any of the following:

- Figures containing lines and/or arcs (but not curvey splines)
- DXF lines, arcs, and/or polylines (but not splines, splined polylines, or fitted polylines)

Selection Mode: Figure Segment

Pick this mode to select an individual line or arc segment from a complex figure, by selecting the desired segment from the map screen. You can select any of the following:

- a line or arc segment from a Figure (but not a curvey segment)
- (line or arc segments from a DXF polyline cannot be selected)

Selection Mode: Define Points

Pick this mode to select points in your project to define a line or arc. You can define the following line types:

- Straight Line: select a Start Point and End Point
- Arc (CW): select a Start of Curve Point, Radial Point, and End of Curve Point

- Arc (CCW): select a Start of Curve Point, Radial Point, and End of Curve Point
- Arc (3Pnt): select a Start of Curve Point, Point on Curve, and End of Curve Point.

Switch Direction

The line direction will reverse, and the arrowhead shown in the map screen will show the current "forward" direction of the line.

OK

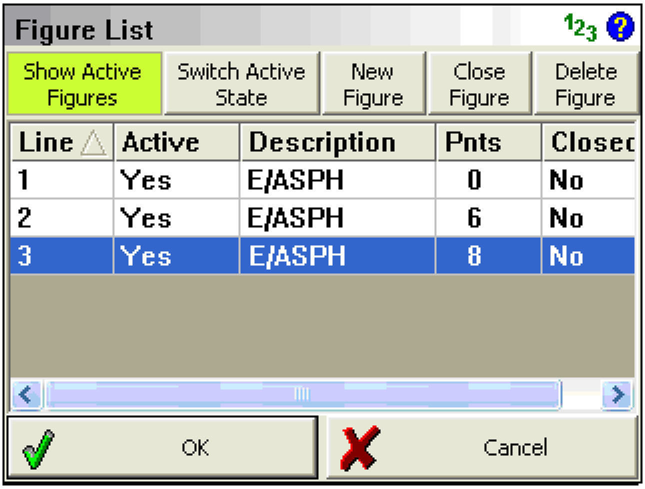
The highlighted line will be selected, and you will be returned to the appropriate command.

Cancel

You will return to the previous screen without selecting anything.

Figure List

The figure list contains a listing of all figures in your project.



Line Column

This is the group id assigned to the figure. Refer to the Active Linework topic for more information.

Active Column

If the figure is active, you will see the work **YES**. To make a figure not active, press the Switch Active State button.

Description Column

This is the name of your figure which will usually match the description of the first point that the figure is connected to.

Points Column

This is the total number of points that the figure is connected to.

Closed Column

If you closed the figure you will see the word **Yes**.

Show Active Figures

When this is selected (default setting) all of your active figures will be listed. You can select a figure that you would like to work on simply by selecting it in the list and pressing the OK button. If this is turned off, then all the figures in the project will be displayed.

Switch Active State

Use this to change the status of a figure to "finished". When this is done, it will no longer be displayed in the figure list of the Show Active Figures button is on. Once a figure is switched to a not active state, nothing can be added to it.

Figures that are not active, can be made active again simply by selecting the figure you want to use and pressing the Switch State button.

New Figure

Use this to create a new figure in the figure list.

Close Figure

Use this to close a figure so it will close back to the starting point.

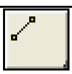
Delete Figure

Use this to delete a figure that you have highlighted in the list. You can delete figures that are flagged as active, or not active. Review the delete figures topic for more info on deleting.

Using Active Figures

Active Linework Options

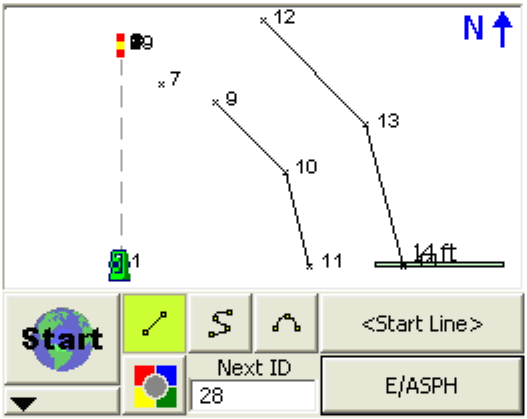
We have 3 Draw Options for Active Linework, selected from buttons that appear beside the Description and Active Lines drop down lists:

	Draw Lines button = Connect points with straight lines

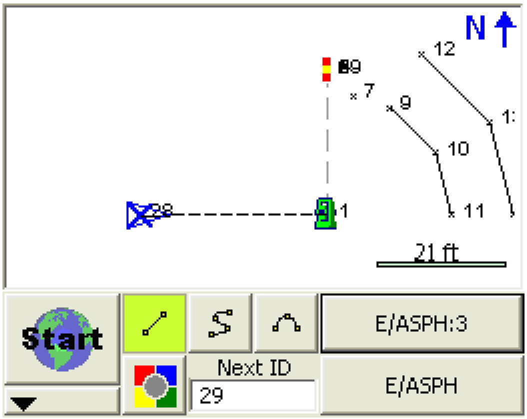
	Draw Curvy Lines button = Connect Points with a best-fit curvy line.
	Draw 3-Point Arc button = Fit an arc through three measured points

Start the first Line in a Project

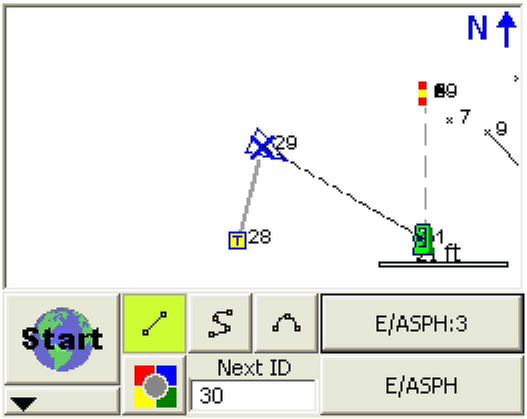
To start the first line in a new project, choose the desired point Description from the Description List and select the desired draw option before you start taking measurements. The Active Lines list will display <Start line> as shown. At this point, the next point measured will be the first point of a new Active Line using the E/ASPH Description. Use the measure button to measure the starting point for the new line.



After the shot to the first point for the new line is complete, the line will be added to the Active Lines list, identified by the current point description and an automatically assigned group number: E/ASPH:3. The group number is three, because this is the third figure using the description E/ASPH.



After the second point for this line has been recorded, the first segment will be created. From this point forward, simply continue taking shots to add to the now current Active Line: E/ASPH:3



Note the insertion of ":3", this is the group number. Re-use of the Description E/ASPH for a new line series in the current project will automatically increment the group number by one. This allows you track and store multiple active lines of the same description without the need for multiple entries in your AutoMap Library. For example, E/ASPH2, E/ASPH3, E/ASPH4…9 can now be replaced with a single E/ASPH entry.

Stop adding to a Line

If you wish to stop adding to the current line, simply deselect the current draw option (Line, Curvy line) before taking any more shots. After turning off the draw option, <No line> will display in the Active Lines list button.

Start a subsequent New Line

Much like the first line in the project, just select the desired description from the list and select the desired draw option before shooting the first point for the new line.

The key to note is the display of <Start line> in the Active Lines list. Once the first point for the new line has been measured, the Active Lines list will set and display the new line as current.

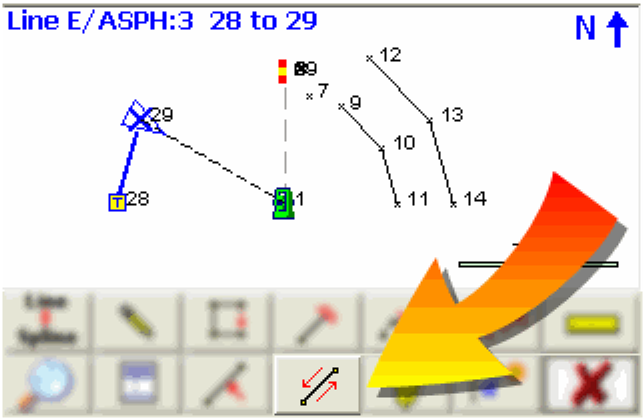
Change Description within an Active Line

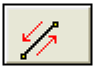
You may change the description within one ongoing line. Simply choose a different description and continue taking shots. The ID of the Active Line will not change.

Figure Direction Marker

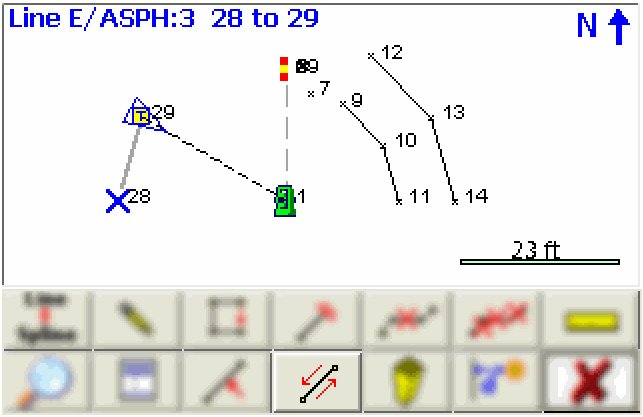
The current line in the map is always defined by a bold outline and a blue X at the end of the line. The blue X indicates the line direction so you know what end of the line the next measurement will be connected to.

You can see that the blue X is on point 29. After you take your next shot, it will be automatically connected to this point.





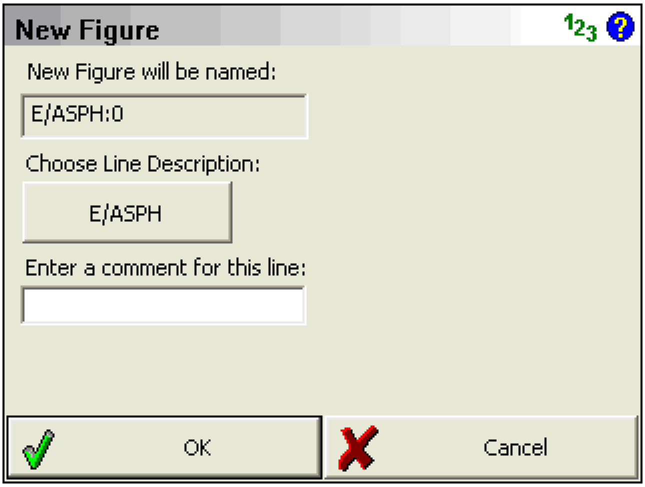
Once you select the figure, you will see the line toolbar. On this toolbar, select this button to reverse the direction. After you switch the direction, you will see the blue "X" move to the opposite end of the figure.



New Figure

Pre-selection of Line Descriptions

A list of Active Lines (Figures) may be pre-specified to aid in planning for a complicated project. Use the **New Figure** button on the Active Line List screen to specify a Line Description before taking any shots.

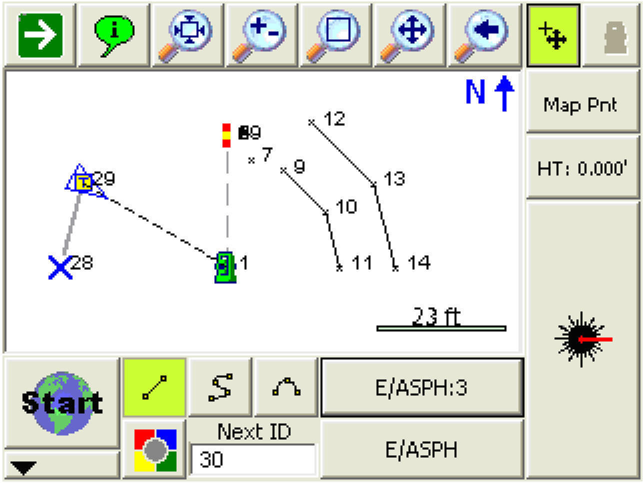


You have the opportunity to use a manually entered comment with this method but the new line will be linked to the selected Line Description. The comment will appear in the Active Lines list to aid correct selection of the line.

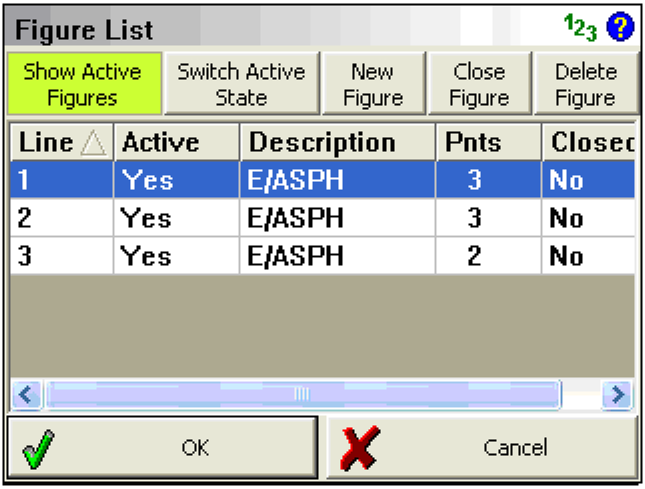
Switching Active Figures

You may work on several figures at once. As described, ongoing figures are listed in the Figure List.

You will notice that in this project there are three figures.



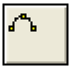
To change the current line, simply select the active line button which will open the Select Figure from List screen. In this example it is the "E/ASPH:3" button.



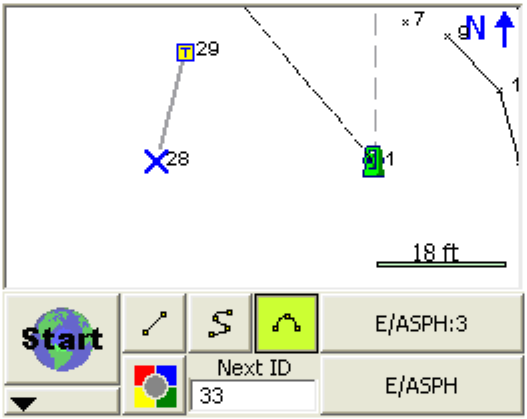
Select the desired figure from the list and continue taking shots to add to the selected line. All settings are stored for each line so there is no need to reselect the Description or draw option.

3-Point Arcs

To draw a three point arc on an ongoing Line, select the Draw 3-Point Arc button before shooting the second of the three points that will define the arc (POC). (Note that this is not the radius point). After measuring to the 2nd point, a dashed line will appear to illustrate that a 3-Point arc is in progress. Shoot the 3rd point and the arc will appear. The current draw option will change from Draw 3-Pt Arc to Draw Line after the third shot and the arc is complete.

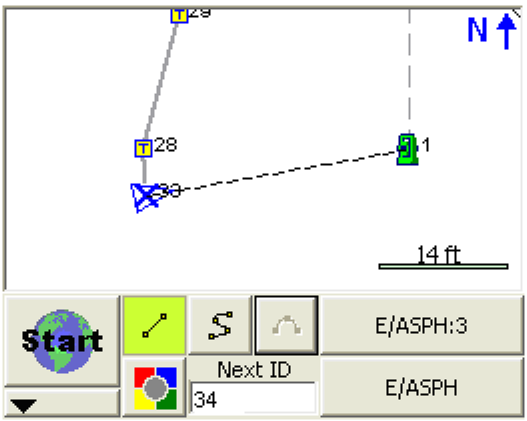


We are going to connect a three point arc to the E/ASPH:3 figure. Since we are shooting the mid point of the arc, you need to turn on the three point arc toggle.

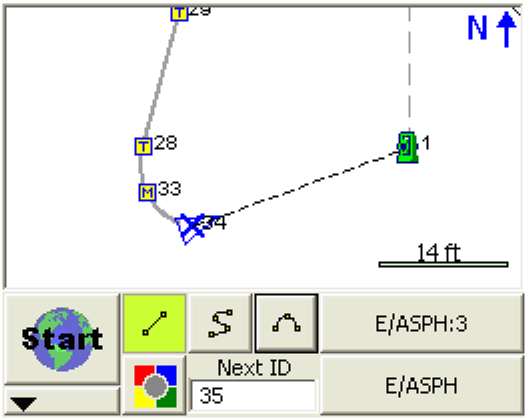


After you take the measurement, you will see the mid point drawn on the screen.

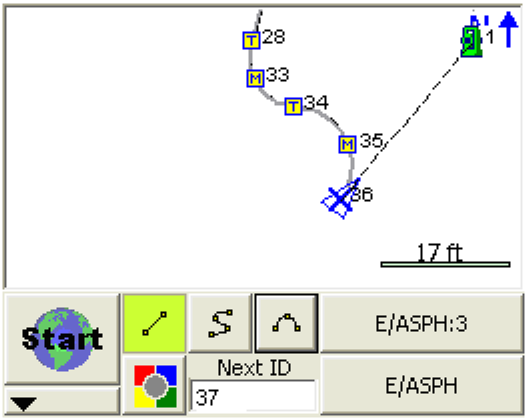
Since compound curves are not allowed, you will see that the three point arc toggle is disabled. Once you take a shot to define the end of the arc, it will become enabled again.



Once you finish measuring the third shot, you will see the arc drawn in the map.



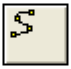
Multiple three point arcs can be connected in series as shown below.



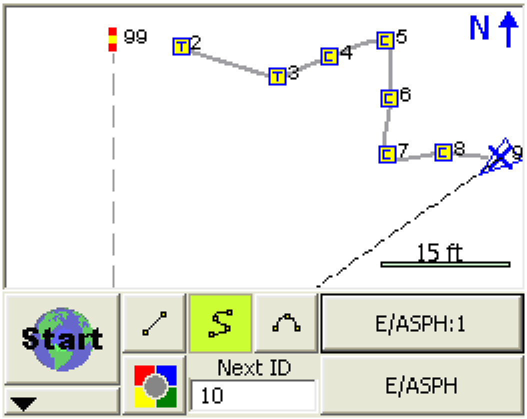
Splines (Curvy) Figures

Figures can contain splines. Splines are "best fit arcs" that are forced to go through the points that define the figure.

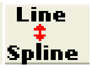
Splines can be attached to straight or three point arc segments.



To draw a spline, simply choose the spline toggle.



Changing Active Lines to Curvy Lines



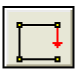
Any Active Line series (figure) can be changed from a series of straight segments to a best-fit curvy line. Select the figure in the drawing to open the line toolbar. On the toolbar press the **Line-Spline** button which will convert the line to a curvy line. If the line is already a curvy line, it will convert it to straight tangents between the points.

Note that any 3 point arcs or straight line segments will be lost when you use this function.

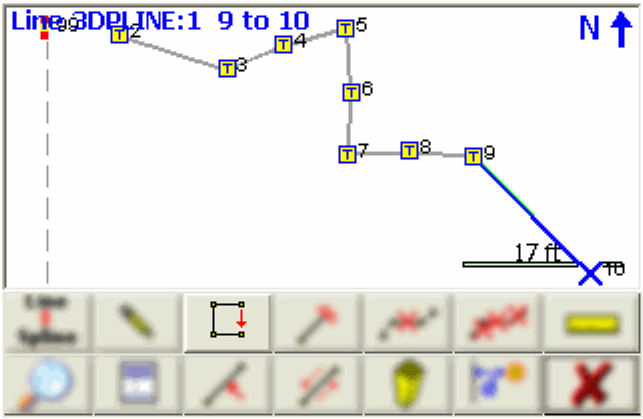
Complex Figure

Figures that contain straight segments, arcs and spline segments are said to be a complex figure.

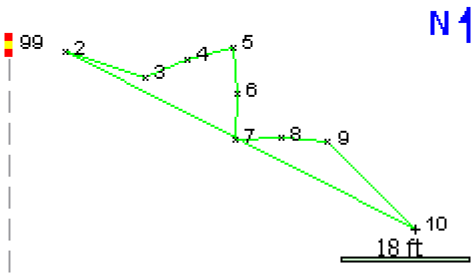
Closing Figures



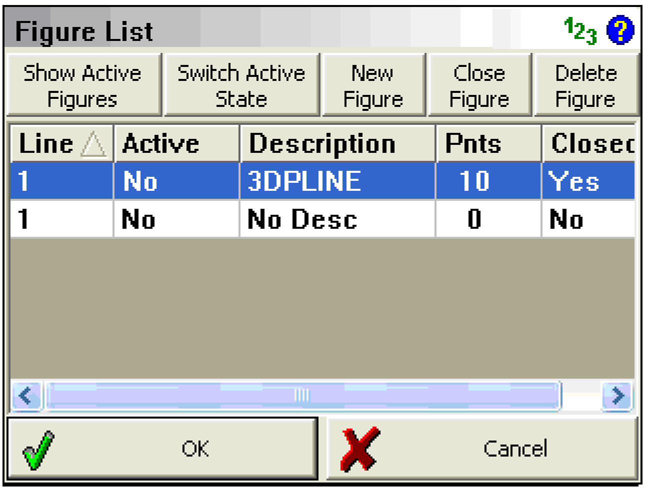
To make a closed figure with an Active Line, select the **Close Current Line** button on the line toolbar. This will draw a line from the last point to the first point shot in the figure. The Line will be removed from the Active Lines list as it is now considered complete.



You will see that the figure now is closed back to the original start point.

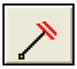


In the active lines list, if you turn off the **Show Active Figures** you will see that the 3DPLINE figure is flagged as Active = NO and Closed = YES.



Alternatively, you can also close a figure in the Figure List screen by using the **Close Figure** button.

End (complete) a Figure



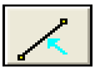
To mark a line as complete or finished, use the End Current Line button on the line toolbar. This will remove the line from the Active Lines list so that no more segments or arcs can be added.

This works similar to closing a figure, but differs in that the figure will not be forced to close back on to the original start point.

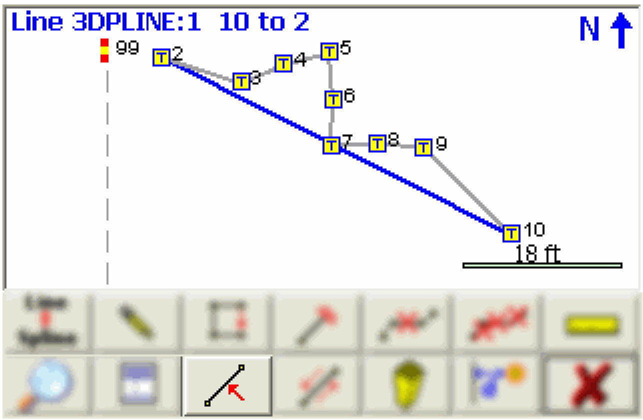
Re-Activating Figures

When a figure has been marked as complete, you can activate it again as follows:

From the Line Toolbar

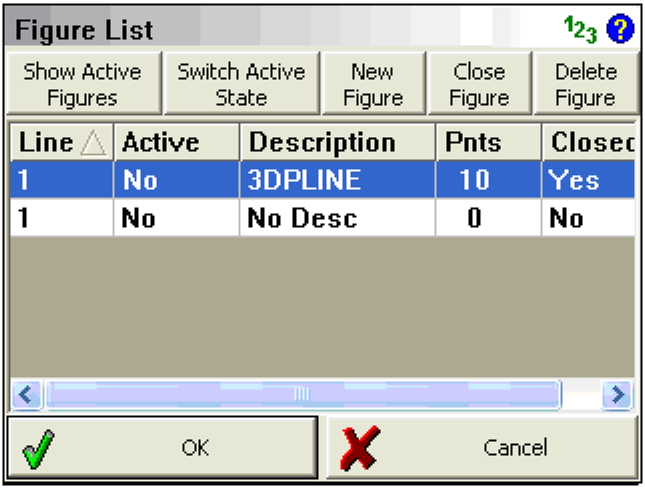


You can visually pick on the map view the figure that you would like to re-activate. On the line toolbar, select the activate button which will make the selected figure active.



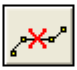
From the Figure List

You can also open the active lines list and if you turn off the **Show Active Figures** button you will see the figures that are marked as not active. Simply select the figure you want and press the **Switch Active State** button which will set it to active.

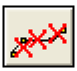


Deleting Figures

To delete linework in your project simply select the figure you want to delete. When you select the figure, the line toolbar will open.



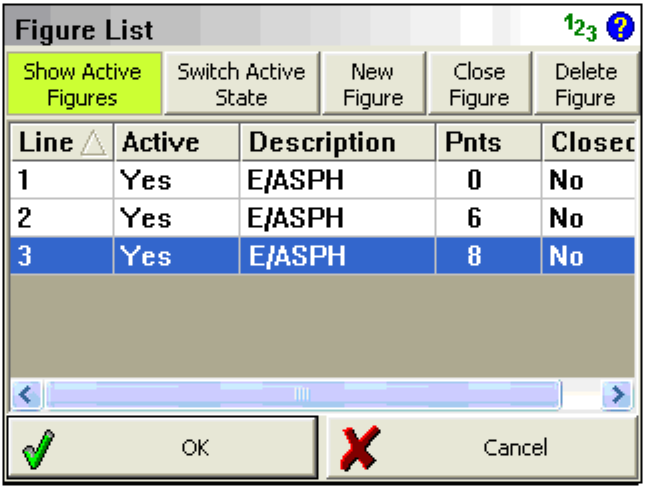
Use this button on the line toolbar to delete an individual segment between two points or a three point arc.



Use this to delete the entire figure that you have selected.

> **Notes:**
> Splines: Spline sections are considered to be one entity so using the delete entire figure, or delete segment, each will do the same thing. The entire spline will be deleted.
> If a segment or arc is deleted from the middle of a figure, the figure will be broken into two pieces. Each new figure will be assigned a new group number. Closed or ended figures will be re-activated and added to the Active Lines list.

You can also delete a figure by selecting it in the active lines list, then pressing the Delete Figure button.

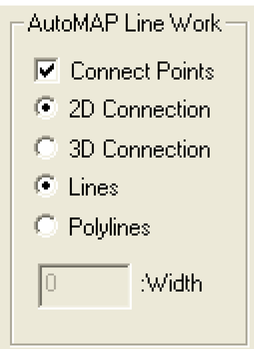


Draw Option Defaults

To setup draw option defaults you need to own a copy of MapScenes. From within MapScenes you can use the Automap editor to set default draw settings for each Description in the MapScenes Auto-Map Library. When this library is copied to your collector, selecting a Description will choose the correct Evidence Recorder Draw option for Active Linework in Evidence Recorder.

Lines

Choose the following in your desktop Automap library editor to set the draw default for Evidence Recorder to Lines.

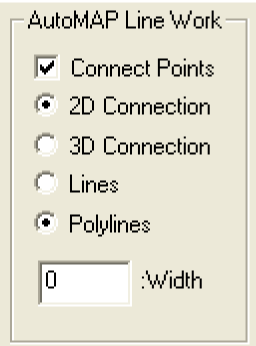


In Evidence Recorder when the description is selected, the line toggle will be automatically turned on.

As shown below, the line toggle has been automatically turned on when the E/ASPH description was selected from the list.

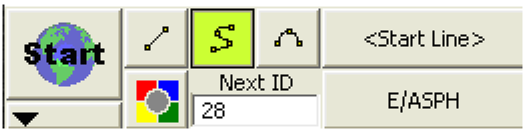
Curvy Lines

Choose the following to set the draw default for Evidence Recorder to Curvy Lines



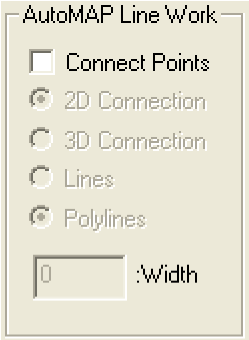
In Evidence Recorder when the description is selected, the curvey toggle will be automatically turned on.

As shown below, the curvy toggle has been automatically turned on when the E/ASPH description was selected from the list.



None

Choose the following to set the draw default for Evidence Recorder to None



As shown below, when the HUB description was selected, all line connectivity toggles are turned off.

Notes:
The 2D Connection and 3D Connection settings do not affect Evidence Recorder, we only make use of these settings as defaults in MapScenes. All Evidence Recorder figures are 3D. With Evidence Recorder data imported to MapScenes, there is no need to process Automap connections as Evidence Recorder figures are drawn automatically. For more details on the AutoMap Library, see your MapScenes Help System.

Drawing Tool

Main Menu | Survey Tools | Drawing Tool

Line Toolbar | Pencil button

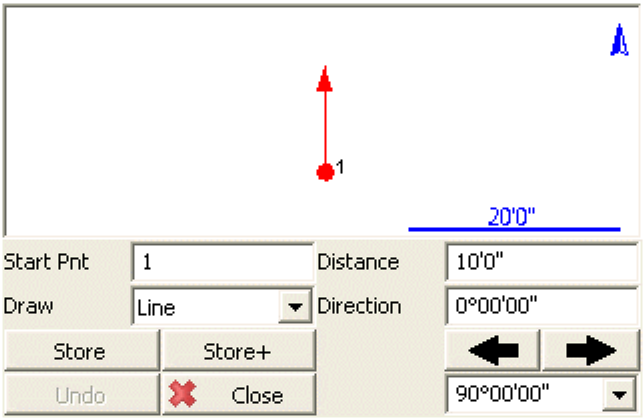
Point Toolbar | Pencil button

This tool allows you to quickly draw a plan such as a pad or a building footprint into your project, and is typically used to recreate plans from a paper hard-copy. You can use this to either calculate new points, or to connect existing points that are already in your project.

You must have at least one point in your project before you can start, to define the starting position for your plan. If a point does not yet exist (for example if this is the first command you run in a new project), you will be prompted to store a new point before you can proceed.

Line Mode

Use the Line draw mode to add straight line segments to your figure.



Start Point

Specify the start point for the new segment.

For starting a new plan, this should be set to an existing point in your project, typically a corner that you will begin drawing the plan from.

As you continue adding subsequent points/segments to your plan, you will see the Start Point field automatically advance for you.

Distance

Specify the length of the line segment you wish to draw.

Direction

Specify the direction (Azimuth or Bearing) of the line segment you wish to draw. The easiest way to do this is to use the right/left arrow buttons, which will increment/decrement the direction value by the amount shown in the pulldown list below the arrows. You can select a common angle from the choices in the list (90, 45, or 30 degrees), or you can type any value if you need to increment it by some other amount.

Store

After you have defined the segment to add, press this to store the new point and line segment into your project.

Store+

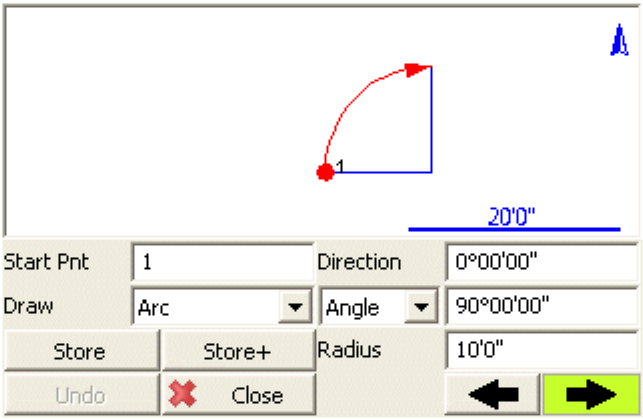
This does the same as the Store button, but you will see the Store/Edit Point screen. Use this to confirm or view the coordinates, or to specify a description.

Point by Line Mode

This is the same as the Line mode, except that when you press Store or Store+ it will only store the point, without drawing the line segment.

Arc Mode

Use the Arc draw mode to add arc segments to your figure.



Start Point

Specify the start point for the new segment.

For starting a new plan, this should be set to an existing point in your project, typically a corner that you will begin drawing the plan from.

As you continue adding subsequent points/segments to your plan, you will see the Start Point field automatically advance for you.

Direction

Specify the direction (Azimuth or Bearing) of the **tangent in** to the arc segment you wish to draw. This will default to either the direction of the previous line segment or the tangent out of the previous arc segment, so as long as your arc is tangential to the previous segment you will not need to change this value.

Angle / Chord Length / Arc Length

Specify one of the three available methods to define your arc:

- Angle: Enter the interior delta angle of the arc.
- Chord: Enter the chord length of the arc.

- Arc: Enter the arc length of the arc.

Radius

Specify the radius to define your arc.

Clockwise / Counter-Clockwise Arrows

Use the Right/Left arrow buttons to define whether the arc rotates clockwise or counter-clockwise.

Store

After you have defined the segment to add, press this to store the new end and radial points, and draw the arc segment into your project.

Store+

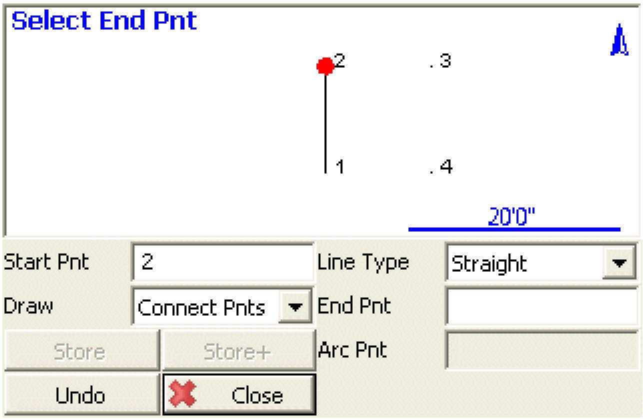
This does the same as the Store button, but you will see the Store/Edit Point screen. Use this to confirm or view the coordinates, or to specify a description.

Point by Arc Mode

This is the same as the Arc mode, except that when you press Store or Store+ it will only store the points, without drawing the arc segment.

Connect Points Mode

This mode lets you draw lines/arcs by connecting points that already exist in your project.



Start Point

Specify the start point for the new segment.

For starting a new plan, this should be set to an existing point in your project, typically a corner that you will begin drawing the plan from.

As you continue connecting subsequent points to your plan, you will see the Start Point field automatically advance for you.

Line Type

Specify one of the five available methods to define your next figure segment:

- Straight: this will draw a straight line between the specified Start Point and End Point.
- Arc (CW): this will draw a clockwise arc between the specified Start Point and End Point, with the specified Radial Point.
- Arc (CCW): this will draw a counter-clockwise arc between the specified Start Point and End Point, with the specified Radial Point.
- Arc (3Pnt): this will draw an arc (clockwise or counter-clockwise) between the specified Start Point and End Point, going through the specified intermediate Arc Point (any point directly on the arc, does not need to be the midpoint).
- Spline: this will draw a curvey line between the specified Start Point and End Point.

Store / Store+

The Store and Store+ buttons are disabled for this mode, because new points are not being calculated for your project. The line or arc segment will be automatically drawn into your project after you specify its parameters.

Undo

Press the **Undo** button to Undo the last segment you computed, removing both the point and/or the line segment (as appropriate) from your project. You can undo multiple steps.

Note, there is no Redo function.

Close

Press the **Close** button to exit from the Draw Plan command, and you will be returned to the map screen.

Smart Tags

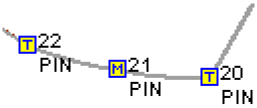
When you select an existing or create a figure in your drawing you will see smart tags appear on the points that make up the figure.

Smart Tag "T"

The T smart tag define points connected to straight line segments.

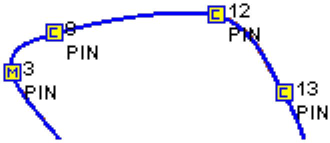
Smart Tag "M"

The M smart tag defines the mid point of an arc.



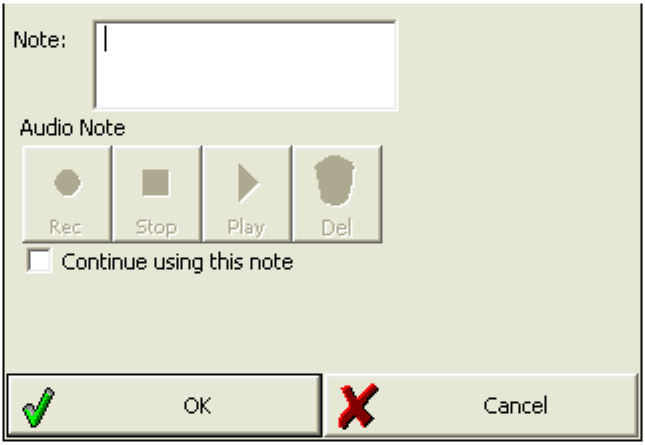
Smart Tag "C"

The C smart tag define points connected by a curvy line type.



Notes

Use this to enter or record audio notes for your points. You can access the notes screen by pressing the **Notes** button on the Store / Edit Points screen.



Text Notes

You can type a note up to 32 characters in length and it will be stored in the project's DBF file. You can not enter more than this limit into the Note field.

When the file is imported into MapScenes, the note will appear in its own field, or can be appended to the point's description field.

Continue using this note: Use this if you want to use the note you just entered automatically for future points that are stored.

Audio Notes

Use this function to record and playback audio notes that are related to stored points. These notes will be transferred to MapScenes desktop software for playback in the office.

The notes will be stored in your project directory and will be automatically named for you. Example, if you recorded a note for point 2, a file would be created pnt2.wav. The file that is created is a standard windows WAV file that can be played by most audio players.

MapScenesdesktop software will automatically link to any audio note you recorded. This allows you to easily see which points have audio notes.

Recording and Playback Controls

Circle = record

Square = stop

Triangle = playback

Trash = delete

Note that not all handheld devices support audio notes. You must have a record and playback functionality, which for some units requires optional accessories.

To Store an Audio Note:

1. Tap the red circle to activate recording. Speak into your microphone to record the desired information. "This post is bent" etc.
2. Press the square button to stop the recording
3. To confirm your note, press the playback arrow, now green on color displays, and listen to your note

To replace an Audio Note with a new note:

1. Delete the existing audio note. You will be prompted to confirm the deletion.
2. Record a new audio note.

Photo Notes (Nautiz X7 Only)

Use this function to record photo notes for a point. **This option is only available on the Nautiz X7 data collector.** If you are using a Nautiz X7 data collector you will see two buttons for recording and deleting pictures.

Camera

The Camera button is used to take a picture. When you press it, it will start the onboard camera software and allow you to snap a picture. The picture will be saved in you current project with the filename **[point number].jpg**. The image quality and settings will be determined by the camera setup for the device. If the Camera button is greyed out, it means that a photo note already exists for this point, and you must delete it first if you would like to replace it. The photos will be automatically imported into your MapScenes desktop software for viewing in the office.

Delete Picture

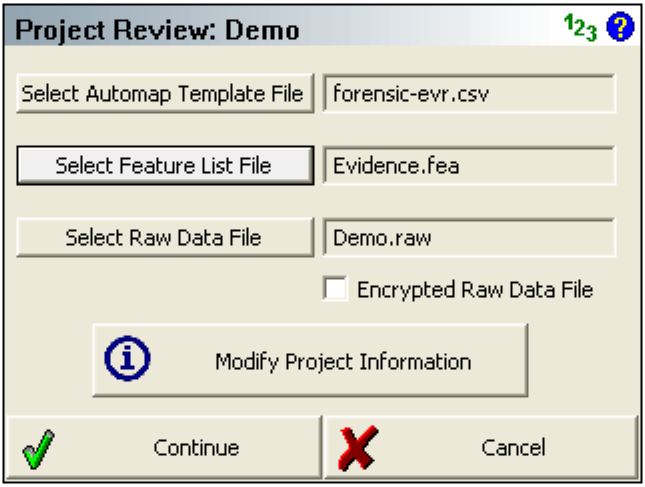
The Delete Picture button will delete the photo stored for the point.

Feature List

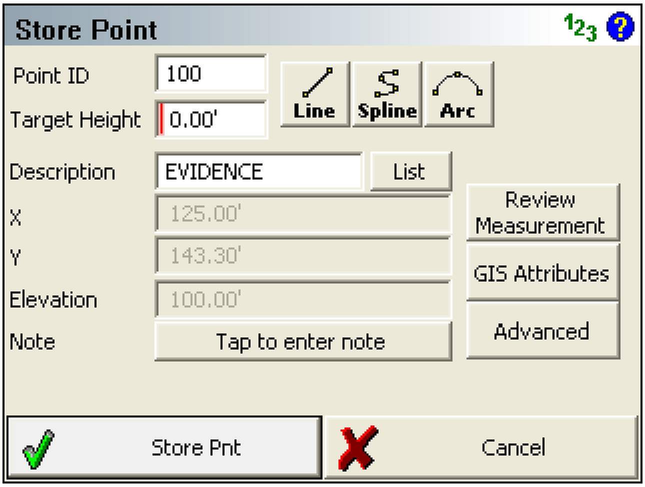
A feature list is a tool built into Evidence Recorder so you can collect attribute data for your points. Feature files allow you to define what data needs to be collected about a point's attributes. You can define mandatory fields, default values, true/false items and select from list options. First you need to create a feature list file using the Feature List Editor which can be installed from your Evidence Recorder CD. Please refer to the help menu in the editor for more information on how to create an effective feature file.

Feature files have a **FEA** extension and they should be copied to your ...\MicroSurvey EVR9\Scenes\ directory. There is no limitation to the number of feature files that can be stored on your data collector. Once you have created your file and copied it to ...\MicroSurvey EVR9\Scenes\ you can open it when you get to the Review Files Screen.

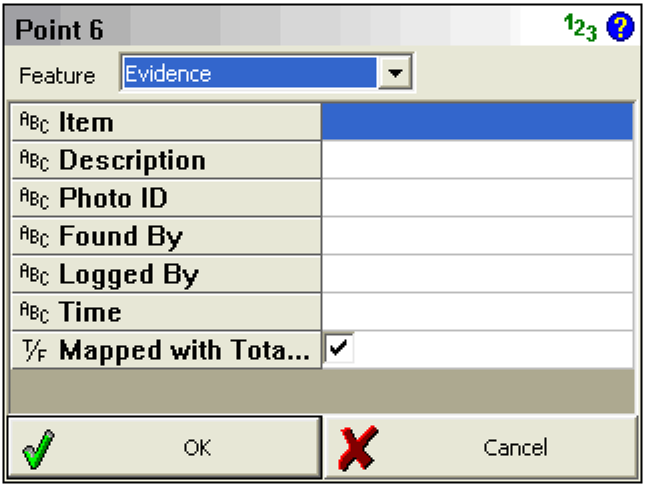
In this example we will open a Feature List File named Sample.FEA.



To collect attribute data for a point, you have to press the **GIS Attributes** button on the store and edit dialog.



When you store a point during a measurement or edit one afterwards, you will see that you can select the **GIS Attributes** button. When you press this button, it will look at the point's description and check to see if you have a feature defined that matches. If it does, it will open up that feature for you automatically, in our example you will see that the Power Pole feature was opened.



As you can see, feature files help you collect consistent and accurate notes about a point you measured.

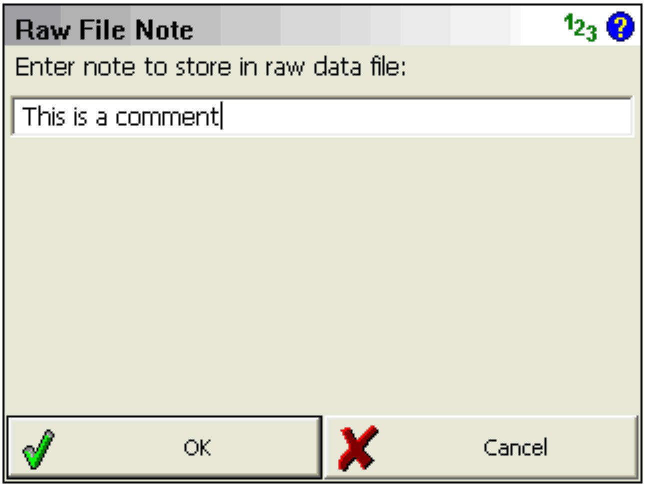
When you store the point, a file will be created in the project directory. The file will have the same name as the feature and will have a DBF extension. In our example, the file would be named EVIDENCE.DBF. Each point will be appended to the same database file.

The DBF database file can be opened with Microsoft Excel.

Raw File Comment

Shortcut Key - X

At any time you can enter a note that will be recorded to the raw file. Simply press the X key on your keyboard device which will open the Enter Comment dialog. Enter a comment that you want appended to the end of your raw file. You are limited to 99 characters.



If you view your raw file your comments will appear as shown in the following example.

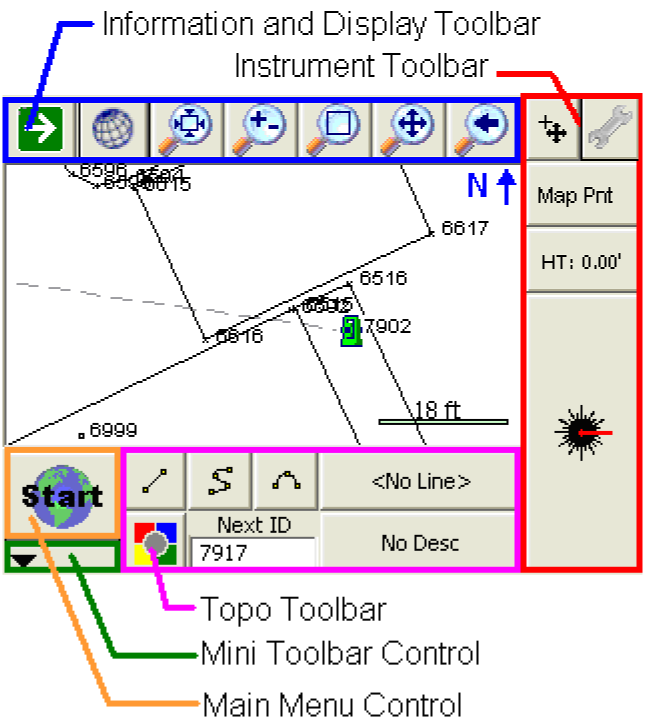
```
--This is a comment
```

You can also enter comments into the raw file by using the Raw File Viewer.

MAIN INTERFACE

Main Interface

The Evidence Recorder interface is separated into various toolbars which contain common functions or tools that the user will use most often.



[Display Toolbar](#)

[Instrument Toolbar](#)

[Topo Toolbar](#)

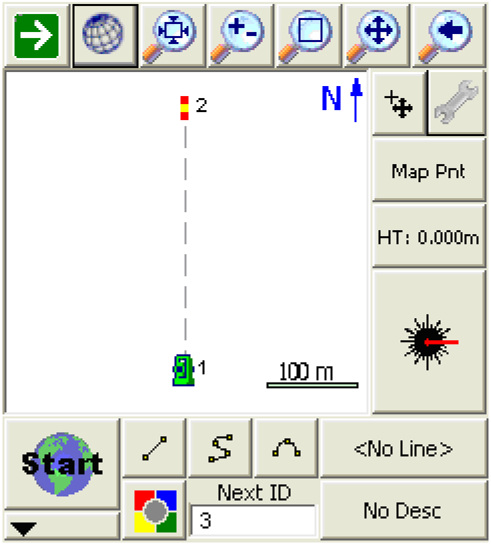
[Mini Toolbar button](#)

[Main Menu button](#)

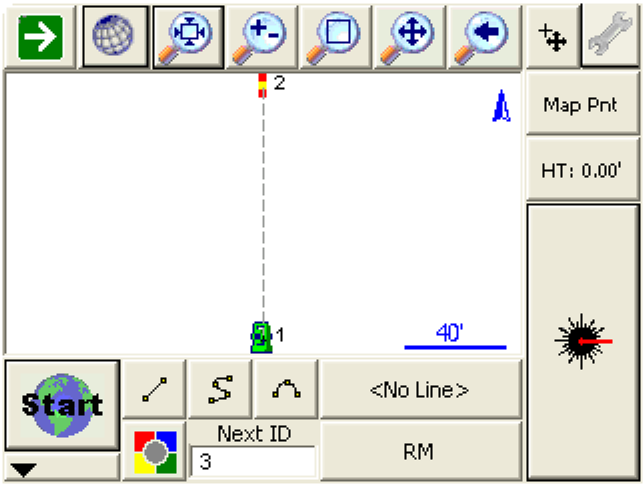
Two Versions of the User Interface

There are two versions of the user interface depending on which handheld device you're using. Some devices have a landscape screen orientation, and have the advantage of a physical keyboard. Others have a portrait screen orientation, and utilize a virtual on-screen keyboard. Note that the function of both versions is essentially the same.

Portrait Display

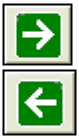


Landscape Display



Display Toolbar

The display toolbar, located at the top of the map screen, is used to zoom, pan, change 3d perspectives, and for displaying information.

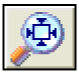


Next, Previous

These switch to the next or previous set of buttons.

Observation

This opens or closes the Observation Toolbar. Many different functions in Evidence Recorder will display information in this toolbar, such as when you select a point on the screen, the point's coordinates are displayed in this toolbar.



Zoom Extents

This is a zoom extents which will zoom to the extents of your project.

Dynamic Zoom

This is a dynamic zoom. When enabled, drag from top to bottom of the screen to zoom out, or bottom to top of the screen to zoom in. Or, when enabled, you can also use the arrow keys on your keypad to zoom in and out in the map.

Zoom Window

This is a zoom window. When enabled, drag on the map screen to define a zoom window.

Dynamic Pan

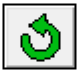
This is a dynamic pan. When enabled, you can drag across your map screen to pan around your project. Or, when enabled, you can use the toggle or arrow keys on your keypad to pan around.

Zoom Previous

You can use this to zoom back up to 10 previous views. This includes zoom and pan changes.

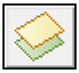
World Button

It is used by the staking commands to hide unrelated points and lines in your map during stakeout.



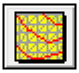
3D View

This opens the 3D View Toolbar.



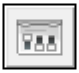
Layers Manager

This opens the Layers Manager for managing visibility of layers in your database, DXF Layers, and Raster Images.



Surface Manager

This opens the Surface Manager for importing and displaying DTM surface models (TIN, TGRID, or Contours) and for computing Volume Calculations.



Options

This opens the Options screen, and will automatically expand the Point Labels section for quickly turning on or off the ID, description, and elevation labels for your points.

Help

This opens the Help topic for the current toolbar(s) visible on your screen. If there are multiple toolbars visible, you are prompted to select the help file based on the position of the toolbar: Top, Side, or Bottom Toolbar. The help file will open up in your default web browser such as Internet Explorer .

Observation Toolbar

Display Toolbar | Observation Results button

 You can access the Observation Toolbar by tapping on this icon in the Display Toolbar.

Total Station Observations

Total Station users can toggle through the following information:

- Horizontal Angle (HA), Vertical Angle (ZA), and Slope Distance (SD)
- Horizontal Angle (HA), Horizontal Distance (HD), and Vertical Distance (VD)
- Northing (N), Easting (E), and Elevation (H)

If using a conventional (non-robotic) total station, the observations displayed in the toolbar will be from the last measurement taken with Evidence Recorder.

If using a robotic total station, the observations displayed in the toolbar will continually update in real time.

GPS Observations

GPS users can toggle through the following information:

- Latitude (Lat), Longitude (Lon), and Geodetic Height (h)
- Northing (N), Easting (E), Orthometric Height (H)
- Standard Deviation Horizontal (SD H), Standard Deviation Vertical (SD V), and Dilution of Precision (PDOP).
- Velocity (SOG) and Heading (COG) of the GPS receiver as well as current UTC Time.

If using GPS, the observations displayed in the toolbar will continually update in real time.

Display Size +/-

By tapping on the **+** and **-** buttons on the screen you can increase or decrease the displayed font size/text for easier viewing.

Page Toggle

The **Page** button allows you to swap between pages changing the displayed observation information.

Topo Toolbar

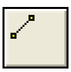
The topo toolbar is used to help automate linework as well as show you the description and next point number for your shot. Just like previous versions of Evidence Recorder you can control your linework by tuning on and off the line, arc and curvy toggles. There is also a user-programmable button that can be customized to start any command.

Main Menu Button

This button takes you into the Main Menu.

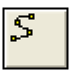
Mini Toolbar Button

This button opens the Mini Toolbar.



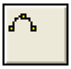
Draw Lines Button

This is used to toggle on and off the draw lines function. When turned on as you shoot your points in the drawing they will be connected with a line.



Draw Curvy Lines Button

This is used to toggle on and off the draw curvy lines button. This function will draw a best-fit curve through your points as you shoot them.

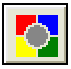


Draw 3-Point Arc Button

3-Point arcs can be started using the same method as for a Line or Curvy Line.

However, to switch to 3-Point arc within an ongoing Line, select the Draw 3-Point Arc button before shooting the second of the three points that will define the arc (POC). (Note that this is not the radius point). After measuring to the 2nd point, a dashed line will appear to illustrate that a 3-Point arc is in progress. Shoot the 3rd point and the arc will appear. The current draw option will change from Draw 3-Pt Arc to Draw Line after the third shot and the arc is complete.

Compound 3-point arcs are supported. Simply re-select the 3-Point Arc button before measuring the next POC.



User Defined Button

This button can be customized to start any command. By default it opens the Coordinate Database, but this can be changed in the Keyboard Shortcuts settings.

Next ID Field

This field displays the point number that will be assigned to your next shot. You can change it at any time prior to recording your shot. In a new project this field will always start at 1. If you open an existing project, then we scan the raw file for the last sideshot or store point and if we find one, we'll set the point number accordingly. For example, if the last sideshot in the raw file was to point 58, then the next time the project is setup we will set the next id to 59.

Active Line List Button

Much like the first line in the project, just select the desired description from the list and select the desired draw option before shooting the first point for the new line. When you press the button a screen will appear listing all your active lines. Selecting one of them and pressing the OK button will make it the current line.

The key to note is the display of <Start line> in the Active Lines list. Once the first point for the new line has been measured, the Active Lines list will set and display the new line as current.

To change the current line, simply select the desired line from the Active Lines list and continue taking shots to add to the selected line. All settings are stored for each line so there is no need to re-select the Description or draw option.

Description Selection Button

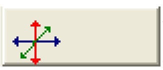
Use this button to set the current description that will be used when you shoot your points. When you press the description button you will see a screen listing all the descriptions read in from your AutoMap Library. Select the description you want to use and press the OK button. You can type in the letters of the description which will automatically scroll to the descriptions matching your entry.

3D View Toolbar

The 3D View toolbar is used to help you view your project in a 3D perspective. You can also define a virtual grid that will displayed in the drawing and can be turned on and off.

To turn this feature on select the 3D View button on the Display toolbar. When you do this the 3D View Toolbar will appear at the bottom of your screen. The buttons on the toolbar are described below.

3D View



When this is turned on you will be able to rotate your project in a 3D perspective. This tool is handy when used in conjunction with surfaces or vertical projections. To return to plan view, close the 3D View toolbar and press the Zoom Extents button. It can also help you find points that have incorrect elevations.

Center on Point

Use this to center the view on the selected point.This will not change your current view rotation or zoom depth.

Hz Grid

Use this to turn on a horizontal grid that will be displayed in your drawing. You can set the grid spacing in the settings.

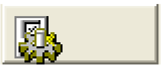
Vert Grid

Use this when using the Vertical Projection tool to turn on a vertical grid that will be displayed in your drawing. You can set the grid spacing in the settings.

Planar View

Use this when using the Vertical Projection tool to set the view perpendicular to the vertical plane, so that the wall or other projected plane is displayed face-on in the map view.

Grid Settings



Use this to set parameters that affect the grid spacing and origin. You can select the grid origin using a point chooser and specify lengths for the sides. You can also specify the interval for each axis.

Mini Toolbar

The mini toolbar control is found directly beneath the Main Menu button on the Topo Toolbar. It is used to help you maximize your screen space by allowing you to control which toolbars you need to keep active in the main interface. When you press the mini toolbar control you will see the mini toolbar appear toward the bottom of the main interface.

Δ

Use this to display the full topo toolbar.

Menu

Use this to display the main menu.

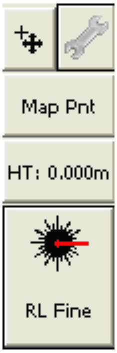
Controls

Use this show or hide the display toolbar.

Instrument

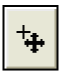
Use this to show or hide the instrument toolbar.

Instrument Toolbar



When you use Evidence Recorder in either manual or total station mode, you will see the instrument toolbar beside the map area.

This toolbar allows you to control your instrument settings, EDM modes, measurement modes and target heights.



Auto-Center

This toggles the auto-center feature on or off. If turned on, whenever you take a measurement, the map screen will always re-center on the measured point.

Instrument Settings

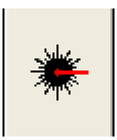
This opens the instrument settings screen where you can control specific settings for your total station such as EDM settings, Tolerance setting and Instrument Connection/Disconnection.

Measurement Mode

This opens the Measurement Modes screen where you can select what type of measurement you want to take. The current measurement mode is always displayed on this button - for example if you're using the distance offset mode it will display "Dist Off".

Target Height

This opens the Target Heights screen where you can change the current target height. The current target height is always displayed on this button.



Measure Button

This triggers your total station to take a measurement.

If you are using a robotic total station, please see the Robotic Instrument Toolbar topic.

If you are using GPS, please see the GPS Toolbar topic.

Robotic Instrument Toolbar

When you use Evidence Recorder in robotic total station mode, you will see the robotic instrument toolbar in the map area. Like the Instrument Toolbar, this toolbar allows you to control your instrument settings, EDM modes, measurement modes, and target heights. It also lets you search and lock onto the prism.

Lock Button

Evidence Recorder uses a button to trigger the instrument to search for the prism and lock onto it. You can also use this button to turn the lock off.

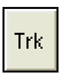
The button when not locked on a prism will display a **No Lock** status with a un locked icon. To search for the prism, simply press the No Lock button.

After you have pressed the No Lock button you will see a **Search** icon on the button while the instrument searches for your prism.

When Evidence Recorder finds a prism and locks onto it, the button will display a **Lock** icon. To stop the instrument from tracking, you can press the Lock button again to set it to a No Lock status.

If you're using multiple prisms and you want to force Evidence Recorder to look for another one when you're locked onto a prism, double tapping the Lock button will force it to search for the next available prism.

Also during a search you can cancel the current search by pressing the Stop Search button on the search progress toolbar.



Cursor Tracking

This turns the cursor tracking feature on or off. If turned on, the current position of the target will be displayed on the screen in real time. You can only use this feature once you have specified an instrument setup using the Setup Occupy Point command.

Note: The cursor tracking position will use a coarse measurement to plot your posi- tion. When you are stationary, the cursor is a hollow triangle pointing towards the instrument. When you are moving, the cursor is a solid triangle pointing in the direction of travel.

Instrument Settings

This opens the Instrument Settings Toolbar. On this toolbar you can control specific settings for your total station such as EDM modes.

Measurement Mode

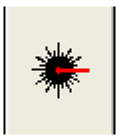
This button will open the Select Measurement Mode screen, From here you can select what type of measurement you will be using. When you choose your mode, this button will display the mode you're using. For example, if you're using the Distance Offset mode, the button will display "Dist Off".

Target Height

This is the target height button and it controls the target heights used by Evidence Recorder. The current target height is always displayed on this button.

EDM Mode

This opens the EDM Settings screen where you can toggle between all available EDM modes. The current EDM mode is always displayed on this button.



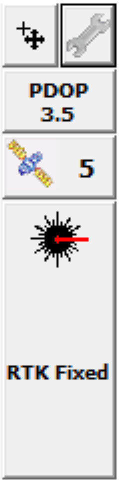
Measure Button

Use this to trigger your total station to take a measurement.

If you are using a conventional non-robotic total station, please see the Instrument Toolbar topic.

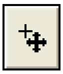
If you are using GPS, please see the GPS Toolbar topic.

GPS Toolbar



Once the user has selected a GPS receiver and communication has been established, the GPS toolbar will appear on the main interface.

NOTE: You will only see the GPS toolbar if you selected GPS Reference, GPS Rover, or GPS Demo as your instrument type. If you have selected a GPS Profile but are not yet connected to the receiver, most of these buttons will be disabled.



Auto-Center

Single-tapping this button will re-center the display on the current position of your receiver.

Double-tapping this button will set the system into an auto-pan mode where the display will always be centered on the current position. When active, single-tapping this button once more will disable the auto-pan mode.

GPS Settings

If you press this button while you are connected to a receiver, you will see the GPS Settings screen. At any time this button can be used to adjust or stop your GPS survey.

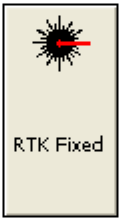
If you press this button without being connected to a receiver, you will see the Instrument Selection screen where you can edit your GPS profiles or connect to your receiver.

DOP Values

This displays the current DOP (Dilution of Precision) values. Pressing this button will cycle through the PDOP, HDOP and VDOP. The PDOP is the default setting as this is most often used to ascertain the quality of the satellite geometry.

Satellite Plot/Satellite List

This shows the total number of satellites the receiver is currently using in its solution. Press this to view a sky plot of the current SVs visible to the rover, or to access the Satellite List.



Measure

This is the measure button.

This button also indicates the current solution type. This tells the user if the solution is Fixed, Float, WAAS, DGPS or Autonomous. This button will also indicate to the user if the corrections from the reference station have been discontinued by denoting "No Link".

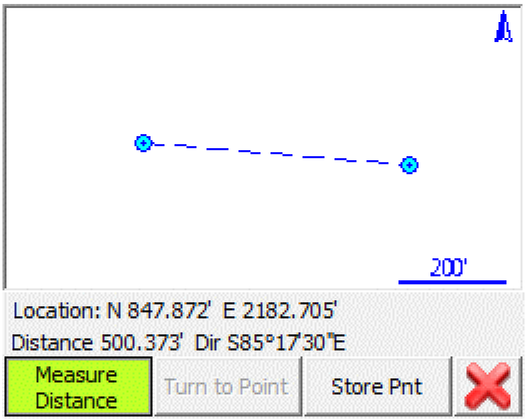
Please refer to the GPS Measurement topic for more information.

If you are using a conventional non-robotic total station, please see the Instrument Toolbar topic.

If you are using a robotic total station, please see the Robotic Instrument Toolbar topic.

Map Select Toolbar

When you tap on an empty spot in the map view, the selected point will be highlighted with a blue dot and the Map Select toolbar will appear along the bottom of the screen, showing the coordinate of the selected point.



Note, this toolbar functionality can be enabled or disabled via the Map Position Select checkbox in the Options screen.

Measure Distance

When this is toggled on, subsequent taps will cause the blue dot to move to the new location, a second blue dot will appear at the previous location, and a dashed line will follow the entire path of the selected points. The total distance and the direction of the last segment will be displayed. To reset the measured distance, toggle this mode off then back on again.

Turn to Point

If you are using a motorized total station and have occupied a point in the project, this will cause your instrument to turn to the selected point (as indicated by the blue dot in the map).

Store Point

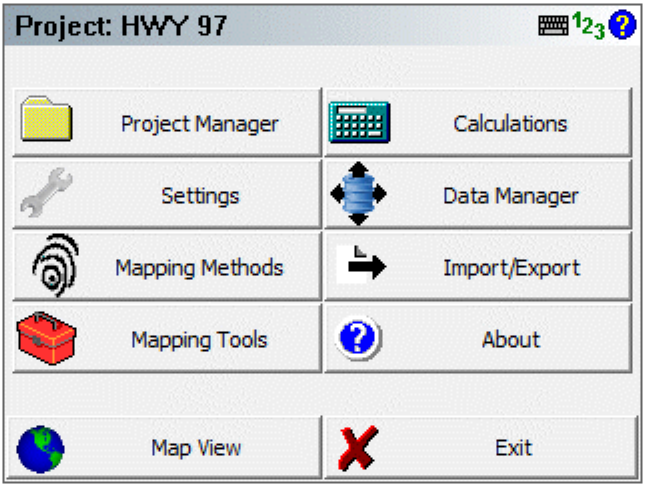
This will open the Store Point dialog with the coordinates entered for the selected point, so you can store it into your project database.

Main Menu

Main Menu

Main Menu

On the main interface of Evidence Recorder you will see the Evidence Recorder **Start** icon which will always activate the main menu or display the previously viewed sub-menu. When the button is pressed you will see the main menu screen:



On the main menu, pressing any of the buttons will take you to its sub-menu.

From any sub-menu, pressing the **Menu Home** button will return you to this menu.

The **Map View** button will close the main menu and take you back to the map view.

The **Exit** button will close Evidence Recorder.

Project Manager

Selecting this will allow you to create, open or delete projects. Please see the Project Manager topic for more information.

Settings

Select this to check or change settings for Evidence Recorder. Please see the Settings Menu topic for more information.

MappingMethods

Select this to select measurement modes such as occupying a point, checking a point, or measuring an offset. Please see the MappingMethods Menu topic for more information.

Mapping Tools

Select this to execute tools such as manually storing new points, deleting/undoing the previously measured point, or viewing the raw file. Please see the MappingTools Menu topic for more information.

Calculations

Select this to use our calculating functions such as COGO and inversing. Please see the Calculations Menu topic for more information.

Data Manager

Use this to manage your points, DXF files, and surfaces. Please see the Data Manager Menu topic for more information.

Import/Export

Select this to import or export ASCII files, and to export DXF, XML, and other files. Please see the Import/Export Menu topic for more information.

Please note, additional file types can be imported from the *Surfaces* and the *Map Data Layers* commands, both located in the *Data Manager menu*.

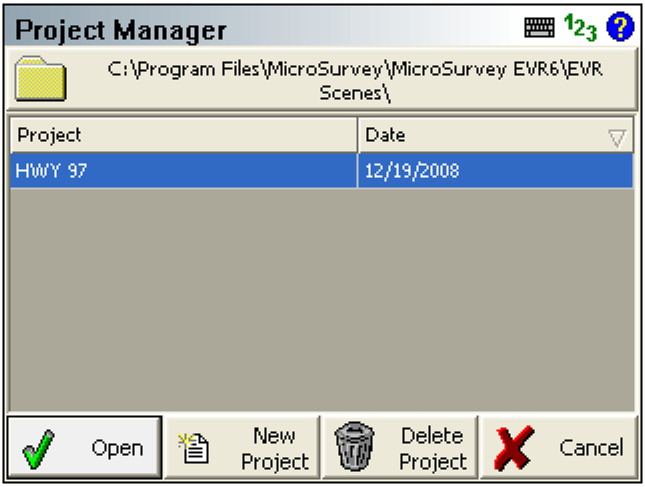
About

Select this to see what build and which modules you have registered for Evidence Recorder. Please see the About Menu topic for more information.

Project Manager

Main Menu | Project Manager

The Project Manager is used to create, open, or delete projects currently residing in your data collector. When you start Evidence Recorder this is always the first screen you will see.



By default the project manager will display the contents of the ...\MicroSurvey EVR9\Scenes\ directory, which is the default location for all projects that you create. You can sort the list by project name or date by tapping on the column's header.

Scenes Folder

Press this button to specify a different project folder than the default. The default is...\MicroSurvey EVR9\Scenes\. Once you set the directory it is written to the msurvey.ini file so it is used for all subsequent projects.

Open Project

To open an existing project, simply select it in the list and press the **Open** button.

New Project

To create a new project, simply press the **New** button. You will then see the new project screen which will allow you to enter a name, , choose your automap library and set the units for the project.

Delete Project

To delete a project you first need to select it in the list and then press the **Delete** button. You will be asked to confirm that you really want to delete the project.

Notes:
- You can not delete a project that is currently open.
- Projects that have been deleted can not be restored.

Exit

To exit from the project manager press the **Exit** button.

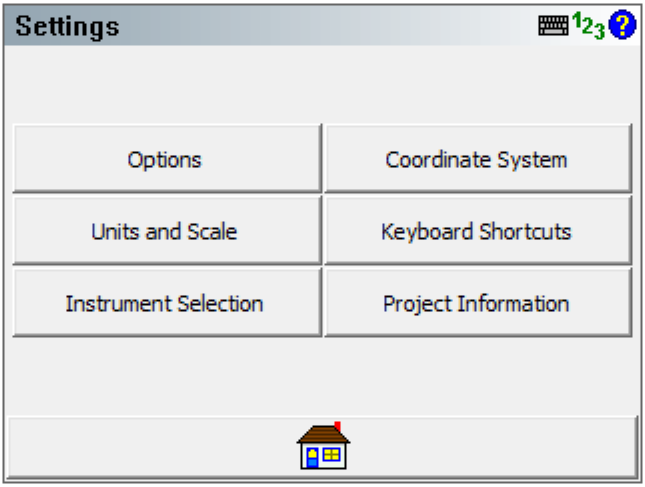
Settings Menu

Settings Menu

Main Menu | Settings

The settings menu is used to setup and review settings that have been set for your current project. You can also specify default settings for new projects that are created.

Most of these settings are stored in a file named msurvey.ini which can be found in the ...\MicroSurvey EVR9\Programs\ directory. It is recommended that once you have defined your settings, that you make a backup of this msurvey.ini file.



Options

Use this to set or change settings that affect Evidence Recorder's functionality. Please see the Options topic for more information.

Units

Use this to set or change the units, bearings, distances and scale settings for your project. Please see the Units Settings topic for more information.

Instrument Selection

Use this to set the type of equipment that will be used with Evidence Recorder. If you're not connecting to anything, you can specify that you would like to enter your measurements manually. Please see the Instrument Selection topic for more information. (Note, you will not see this option if Evidence Recorder is running onboard your instrument.)

Coordinate System

Use this to define the coordinate system for your project. Please see the Coordinate System Settings topic for more information.

Keyboard Shortcuts

Use this to define shortcuts to Evidence Recorder commands and assign them to your keys. Please see the Keyboard Shortcuts topic for more information.

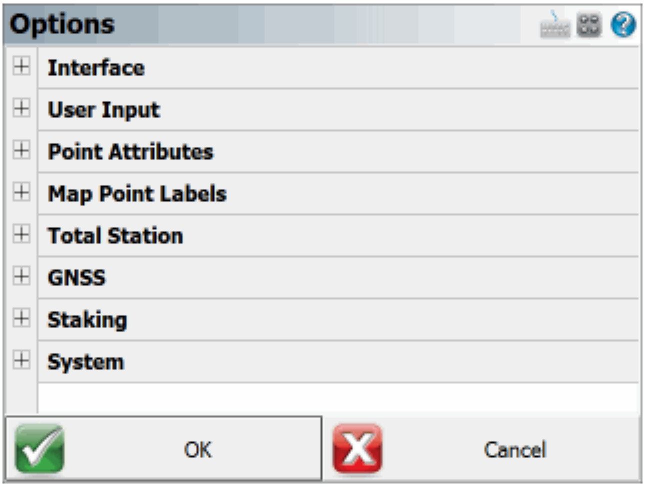
Project Information

Use this to enter and save information about your project. Please see the Project Information topic for more information.

Options

Main Menu | Settings | Options

The options screen helps you set settings that affect the look and feel of Evidence Recorder.



Press the [+] buttons along the left to expand (show) each section, and the [-] buttons to collapse (hide) it.

- Interface Options
- User Input Options
- Point Attributes Options
- Map Point Labels Options

- Total Station Options
- GPS Options
- Staking Options
- System Options

Interface Options

Monochrome Optimized

Use this to specify whether the main interface should display in full color, or in a way more suitable to monochrome screens.

Enable Full Screen

Use this to run Evidence Recorder in a full-screen mode (PocketPC devices only). This is required for proper operation on devices running the Windows Mobile operating system that have a landscape display.

Map Color

Use this to force the background color for the main drawing area to be white or black

Map Orientation

Using this will force the map screen to be oriented to the north or south. This is needed for coordinate systems that are referenced south, such as in South Africa. This is different from South Azimuth directions, as used in Hawaii.

Map Resolution

This option determines the number of segments that will displayed in an arc on the screen. Reducing this number increases program speed; increasing this number slows down graphics display, but improves the quality of arcs and curvy lines displayed on the screen.

Text Size (Info/Grid)

Use this to force the text shown in the Information screens (such as the Observation toolbar and the COGO History screen) and grid screens (such as the Project Manager and Angle Offset shots) to use a small or large sized text.

Show Scale Bar

Use this to turn the scale bar shown on the main map screen on or off.

User Input Options

Extended Edit Boxes

Use this to control how you want to bring up the selected keypad when tapping in an edit box: either with a single tap, a double tap, or off. Users of devices with a keyboard should leave this set to Double Click, and users of devices without a keyboard should set this to Single Click. Setting this to Off disables both the keypad and any other commands that may be started directly from the edit field, such as the Point Chooser or Inverse Tool, so that edit fields can only be used for typing values from your physical keypad.

Menu Shortcuts

This will enable menu shortcuts so if you have a keyboard device you can press letter and number keys to navigate around the program.

Instrument Toolbar

You can define if the instrument toolbar is located on either the Right or Left Side of your map screen.

Map Position Select

If this is turned on, tapping a blank part of the map screen will display the Map Toolbar.

Map Point Select

If this is turned on, then tapping on a point from the map screen will select it and open the Point Toolbar.

Map Line Select

If this is turned on, then tapping on a line from the map screen will select it and open the Line Toolbar.

SIP Type

Use this to specify which SIP keypad type you want to use, such as the full-screen MicroSurvey alphanumeric keypad (all devices), the small PocketPC qwerty keypad (PocketPC and Windows Mobile devices only), or the small MicroSurvey numeric keypad (PocketPC and Windows Mobile devices only).

Point Attributes Options

Coordinate Order

Use this to control the display of coordinate values in Evidence Recorder. Options are NEH, ENH, XYZ and will affect any area of the program where coordinates are displayed.

This option also affects whether the ASCII Import and ASCII Export commands use a N,E or E,N (X,Y) file format.

**Important note: The imported format only affects display of the coordinates and the ASCII file itself. The internally stored point database, or raw file stored will always be stored as N,E,Z.

Alpha-Numeric IDs

When this is enabled you will be allowed to enter alpha-numeric point IDs such as 21a, AB3, EV2. If this isn't turned on, then Evidence Recorder will not accept anything but integer numbers. Alpha numeric input of point IDs can contain up to 31 characters. **Note:** Alpha-Numeric ID's are only supported in the MapScenes 2008 or newer desktop software. Previous versions of MapScenes do not support it.

Point ID Range - Minimum

Use this to force Evidence Recorder to limit the point numbers that are used to a specific range; here you would specify the minimum range value. If you try to use a point number that is less than this value, you will see a message that will ask you to select a different point number. **Note:** If you have the Alpha-Numeric IDs toggle turned on, then any values specified here are ignored.

Point ID Range - Maximum

Use this to force Evidence Recorder to limit the point numbers that are used to a specific range; here you would specify the maximum range value. If you try to use a point number that is greater than this value, you will see a message that will ask you to select a different point number. **Note:** If you have the Alpha-Numeric IDs toggle turned on, then any values specified here are ignored.

Alphanumeric Point ID's can have a maximum length of 31 characters.

New Description Prompt

This controls how Evidence Recorder deals with descriptions that don't match anything in your Automap library. If this is on, when you enter a description that isn't in the Automap library you will see a warning message asking you if you want to add it.

If it is off, any description that doesn't have a match in the Automap library will be automatically added to your project's Automap library.

Time Stamp Saved Points

This tells Evidence Recorder to write a timestamp into the raw file whenever a point is stored.

Map Point Labels Options

Show ID

This is used to show or hide the point number labels for your points.

Show Description

This is used to show or hide the point description labels for your points.

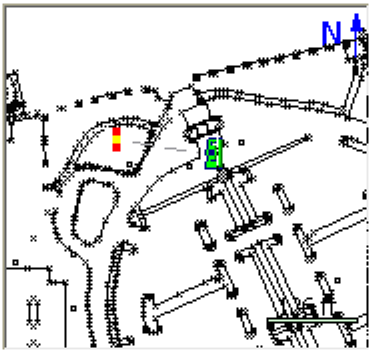
Show Elevation

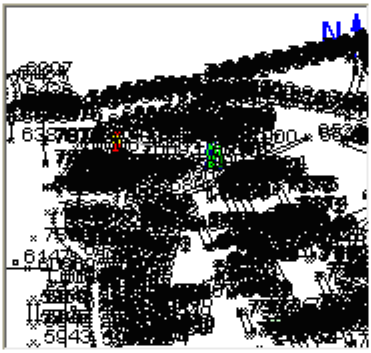
This is used to show or hide the point elevation labels for your points.

Level of Detail

The Level of Detail filter, when turned off, will force Evidence Recorder to show the point labels all the time, independent of your zoom level. If it is turned on, Evidence Recorder uses an algorithm to determine if displaying the point labels is necessary.

This is demonstrated in the following two images, the first has LOD turned on and the second has LOD turned off.





With LOD on, as soon as you zoom in to a reasonable level, the labels will appear automatically. Under normal circumstances you will keep the LOD feature active.

Total Station Options

Default Measure Mode

This specifies which measure mode Evidence Recorder will default to, either Sideshot or Sideshot (Auto).

Quick Measure Modes

When this is turned on, when you press the Measure button in routines such as the Horizontal Angle Offset or Resections screens, it will force the instrument to take a measurement instantly. If this is turned off, then pressing the Measure button will take you back to the map screen where you have to press the measure button on the instrument toolbar to take a measurement.

If you're using a robotic instrument you will probably want to keep this turned off.

GPS Options

EP+ Records

When this is used the standard EP record type specified by the RW5 format will be slightly different. The main difference is that when turned on, the standard deviations for the X, Y, and Z components will be stored. Setting this to on is only required if you want to use Evidence Recorder with the OmniStar GPS service.

Auto Start Statistics

If this is turned on, during a measurement if the tolerances are met the store point screen will appear automatically. If this is off, then the user is required to press continue to get to the store point screen.

Auto Start Store

If this is turned on, the user will not see the store point screen. It is a fast way to store your GPS points and is useful when used in conjunction with the Auto Start Statistics option.

Correction Timeout

GPS data sent from a reference base had a time stamp of the start of the transmission associated with the positions being broadcast. When the rover processes the data, the time stamp is compared to the current time to ensure that there wasn't a big delay in receiving the position. Large time gaps can deteriorate the position quality at the rover. You can adjust the "time check" comparison value by adjusting the correction timeout value. Sometimes you have to increase this setting if you are far from your reference receiver, or are experiencing transmission interference. You can use any value between 0 and 20 seconds.

Staking Options

Note: You can also access these options directly from the staking toolbar.

Tolerance

This is the error tolerance that the staking command will use. When your staking "move by" distances are equal to or less than this amount, your direction to a point will be indicated in green text in the Observation Toolbar at the top left hand corner of the screen. Green text will be displayed to notify you that you're meeting your tolerance; if you do not meet the tolerance, the text will switch to red. For example if you set this tolerance to 0.03m, you will see in the example below that my distance to the point does not meet the tolerance, so you see that text in red. Once you have arrived at your position, the next will turn green.

Orientation Reference (Total Station & GNSS)

The user can set an orientation preference for either total station or GNSS layout. Depending on the equipment currently in use, Evidence Recorder will automatically use the defined orientation.

Orientation Reference = North

With the North orientation, North is the reference direction. The "move by" distances are standard cardinal directions.

> **North**: This is the distance you need to move North.
>
> **South**: This is the distance you need to move South.
>
> **East**: This is the distance you need to move East.
>
> **West**: This is the distance you need to move West.
>
> **Cut**: This is the amount you have to go down from the current rod position to the stake point's elevation.
>
> **Fill**: This is the amount you have to go up from the current rod position to the stake point's elevation.

Orientation Reference = Instrument

With the staking reference set to Instrument the map view will be twisted so the instrument is centered towards the top of your screen. The "move by" distances are with respect to the rod position looking towards the instrument. This view is useful when using a robotic instrument.

> **In**: This is the distance you need to move towards the instrument.
>
> **Out**: This is the distance you need to move away from the instrument.
>
> **Right**: Facing the instrument, move right by this amount.
>
> **Left**: Facing the instrument, move left by this amount.
>
> **Cut**: This is the amount you have to go down from the current rod position to the stake point's elevation.
>
> **Fill**: This is the amount you have to go up from the current rod position to the stake point's elevation.

Orientation Reference = Prism

With the staking reference set to Prism the map view will be twisted so the prism is centered towards the top of your screen. The "move by" distances are with respect to the instrument man looking at the prism. This view is handy when using a non-robotic instrument.

> **In**: This is the distance you need to move towards the instrument.
>
> **Out**: This is the distance you need to move away from the instrument.
>
> **Right**: Facing the prism, move right by this amount.
>
> **Left**: Facing the prism, move left by this amount.

Cut: This is the amount you have to go down from the current rod position to the stake point's elevation.

Fill: This is the amount you have to go up from the current rod position to the stake point's elevation.

Orientation Reference = User Point

With the User Point orientation, you can use an existing point in your project as the reference. The view will be twisted so that the selected point is centered towards the top of your screen.

In: This is the distance you need to move towards your user reference point.

Out: This is the distance you need to move away from your user reference point.

Right: Facing your user reference point, move right by this amount.

Left: Facing your user reference point, move left by this amount.

Cut: This is the amount you have to go down from the current rod position to the stake point's elevation.

Fill: This is the amount you have to go up from the current rod position to the stake point's elevation.

User Point

If you are using the "User Point" Orientation Reference (see above) then use this to specify which point ID you want to use for the reference point. If you are not using the "User Point" orientation then this does not have any effect.

Store Staked Points

By default this is checked. What will happen is when you store a staked position using the store button on the stake toolbar you will be prompted with a screen allowing you to assign a point number and description to the new point that will be created.

The point description will default to the current description from the Automap Library, as shown on your topo toolbar. If you choose a different description from the library, then it will be retained for all consecutive stakeout points.

Furthermore, when this feature is turned on it will use the value in the Add Id field to determine the point number for the recorded staked position. For example if you staked point 19 and you have an Attached User Id = 1000, then Evidence Recorder will automatically use 1019 as a point number. This can be changed by the user.

Attached User ID

Use this to add a value to the point number you’re currently staking. For example if the point your staking is point 8, and this field is set to 1000. In the raw file it will show that you staked point 1008 and will also store the staked position as point 1008 in the project database.

Turn Instrument Mode

If you have a motorized instrument, including robotics, you can control how Evidence Recorder turns the instrument during stakeouts. If you want Evidence Recorder to compute the horizontal and vertical angle needed to stake your point, use the **3D (HA + VA)** option. If all you want is the horizontal angle to be turned, and the vertical left alone, select the **2D (HA)** option.

Robotic Staking

If you're using a robotic instrument and this is turned on, if you stake a point Evidence Recorder will go into a dynamic staking mode. Using this mode will not force the instrument to turn to the stake point. It will go into a tracking mode and will dynamically tell you how far you're away from the stake point.

Fade Staked-Out Points

Place a check mark in this box if you would like to see out points displayed differently to out points. A out point will appear as a slightly greyed out inverted triangle. This is for you to make quick assessments of what has been done and what remains to be finished.

Display Point Screen

Place a check mark in this box if you would like to see the Point screen displayed. This screen will always be displayed if there are values in the Design Point Offset fields. This was done to ensure that you never a point with a forgotten (and wrong) offset.

Display Result Screen

Place a check mark in this box if you would like to see the Result screen displayed after out a point. This screen will always be displayed if the out point exceeds the tolerances.

Store Point

Place a check mark in this box if you would like the out point to be stored along with the raw data. If no check mark is in this box then only the raw data is stored, and the Store Point dialog will not be displayed.

Show Staked-Stored Points

Place a check mark in this box if you would like to see the out point displayed on map. We provide you with the choice so that you can quickly see which points you have already out.

Use List

Place a check mark in this box if you would to use the list instead of out from the Points database. If you use a list, you will never have a measured point presented as a new point to out.

Find Next Nearest

Place a check mark in this box if you would like to search in the Points database (i.e. not in the list) for the nearest point from the current position, and present it as the next point to be out.

System Options

Language Resource

This is used for multi-language support. If you have installed a non-English version of Evidence Recorder, then set this option to your Language Resource file, for example "ResESM.dll" for Spanish (Mexico).

Tip of the Day & Application Tips

When turned on, a "Tip of the Day" will be displayed when Evidence Recorder is started, and tooltips will be displayed when you hover over any button.

Turning this off will hide the "Tip of the Day" dialog and will disable tooltips on buttons.

Communication Trace File

When turned on it will create a test file displaying information about the shot data going back and forth from Evidence Recorder and your instrument. It can be used to diagnose communication problems and should only be used in this situation. The text file will be named **tracets.txt** or **tracegps.txt**and will be located in your ...\MicroSurvey EVR9\Programs\ directory on your device.

Bluetooth Persist On

By default Evidence Recorder always disconnects existing Bluetooth connections and also turns the power off for the Bluetooth radio in your data collector when you exit the program. The main reason we do this is to conserve battery power.

Some users prefer that power to the Bluetooth radio remains on no matter what. In this case, disable this feature. The default is OFF.

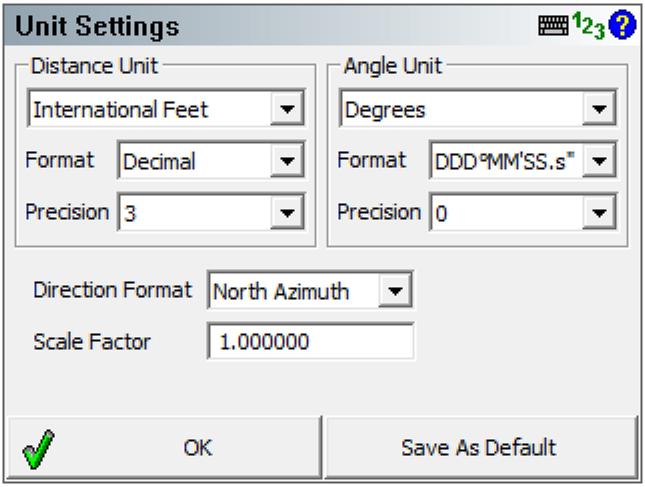
Unit Settings

Main Menu | Settings | Units

The units and scale menu allows you to specify settings for your project. Some of these settings are recorded in the raw file and the project's ini file, as well as recorded in the msurvey.ini file.

Notes:

• The Distance Unit (Meters or Feet) and Angle Unit (Degrees, Radians, or Gons) can only be set when creating a new project. After a project has been created, these will remain greyed-out and cannot be changed.



You can set these settings as defaults for new projects by pressing the **Save as Default Settings** button. The default settings can also be set in the Options screen.

Note: the actual precision on distances and angles returned from your instrument may be limited to less than the precision you select here. Selecting a higher precision here will not increase the precision of values queried from your instrument.

Distance Unit

Choose the distance unit that you will be using: Meters, International Feet, or US Survey Feet. All distances will be displayed in the selected format. All distances will be recorded to the raw file in decimal format. Database coordinates are always stored with 6 decimal places, and rounded to the desired precision for display.

Meters

If you choose Meters as your distance unit, you can also specify the number of decimal places to display within Evidence Recorder, from 0 to 6.

International Feet / US Survey Feet

If you choose International Feet or US Survey Feet, then you can specify to use either a decimal format with a precision from 0 to 6, or a Fractional format with feet and inches.

If you use the **decimal** format, distances will be displayed in decimal feet, such as 10.5' to indicate 10.5 feet or 10feet-6inches.

If you use the **fractional** format, distances will be displayed in feet and fractional inches, such as 10'6 1/2" to indicate 10feet-6.5inches or 10.54166667 feet.

Angle Unit

Choose the angular unit that you will be using: Degrees, Gons/Gradients, or Radians. All angular values written into the raw file will be recorded in the selected format.

Degrees

If you select Degrees, then you can also select which format to use, either DDD°MM'SS.s" for degrees-minutes-decimal seconds, DDD°MM.m' for degrees-decimal minutes, or DDD.d° for decimal degrees. You can also specify the number of decimal places to use, from 0 to 8.

Gons (Gradients)

If you select Gons (Gradients) then you can also specify the number of decimal places to use, from 0 to 8.

Radians

If you select Radians then you can also specify the number of decimal places to use, from 0 to 8.

Direction Format

Choose the direction format that you will be using: North Azimuth, South Azimuth, or Bearings. When entering a direction, you can always override this setting by entering the angle with the cardinal quadrant indicated before or after the angle. If there is no quadrant specified, then the input angle will be interpreted as an Azimuth.

Scale Factor

You can use a scale factor to adjust ground distances to grid distances.

Distances measured with a total station will be recorded in the raw file with the unscaled, true measured slope distance. This scale factor is applied to the computation of coordinates only.

Distances entered using the Traverse/Intersect tool (COGO) will be scaled by the scale factor.

Distances calculated using the Inverse tool, or recalled using the pt..pt format will be scaled by the inverse of this scale factor. The result will be the inversed grid distance times the inverse of the scale factor, so that the ground distance is returned.

This Scale Factor does not affect any GPS measurements. Please see the GPS Local Transformation topic for information on using a GPS Scale Factor.

Save As Default

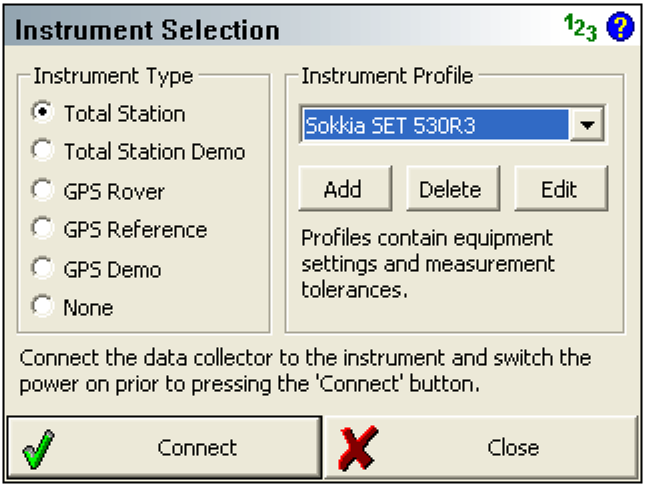
Use this to permanently write the current settings to the msurvey.ini file. When you create a new project, it will use these settings. The default settings can also be set in the Options screen.

Instrument Selection

Main Menu | Settings | Instrument Selection

The Instrument Selection screen allows you to choose the type of equipment you will be connecting to Evidence Recorder. An Instrument Profile can be created for each different instrument you will be working with, to make changing between different hardware a breeze. Once you have setup a profile for each different instrument you will be using, switching between them is a simple matter of selecting the appropriate profile and pressing **Connect**.

Note, this screen is not available if Evidence Recorder is running onboard your instrument.



For all future projects you create with Evidence Recorder, when you create a new or open an existing project you will see the Instrument Selection screen with the profiles you have already created. It will default to the last Profile you used, so if you are using the same instrument just press Connect. If you are using different equipment, just select the appropriate Instrument Type and Profile (or add a new profile if one does not yet exist for it), then press **Connect**.

Your profiles are stored in the file ...\MicroSurvey EVR9\Programs\MSURVEY.INI so once you have configured one data collector, you can simply copy this file onto your other data collectors to make the profiles available on them. This file should also be backed up for easy recovery.

Total Station

When you select Total Station mode, you will be able to Add, Delete, or Edit a profile to setup parameters for connecting to your conventional and robotic total stations, as well as laser devices. See the Total Station Configuration topic for more details about configuration for your total station.

For more information on connecting to your instrument please refer to the Conventional Total Station and Robotic Total Station topics.

Total Station Demo

If you choose this you will have to manually enter your shots. Manually entered shots are recorded in the raw file and points are computed based on the values you enter. A profile is not needed for this mode, just press Connect to begin using the Total Station Demo mode.

GPS Rover / GPS Reference

When you set it to GPS Rover or GPS Reference you will be able to Add, Delete, or Edit a profile for your rover or reference receiver. When you edit a GPS Rover or GPS Reference profile, you will see the Configure Rover or Configure Reference screens. For more information about using Evidence Recorder for GPS surveying, you should review the Starting GPS topic.

If you have not purchased the GPS module for Evidence Recorder, then you will not have access to the GPS commands and you will see a "Requires GPS module license" message.

GPS Demo

When you set it to GPS Demo you will be able to Edit and Connect to a profile for a simulated rover receiver. When you edit the RTK Demo profile, you will see the Configure Rover screen. Feel free to play with the Tolerance Mode settings, but please do not change the Model and Communications settings. For more information about using Evidence Recorder for GPS surveying, you should review the Starting GPS topic.

The GPS Demo will simulate connecting Evidence Recorder to a GPS Rover receiver. The coordinates in the GPS Demo are located outside our office in Westbank, British Columbia, Canada, so to use the GPS Demo mode you need to set your Coordinate System Settings to UTM Zones, NAD83, UTM83-11, Ellipsoidal.

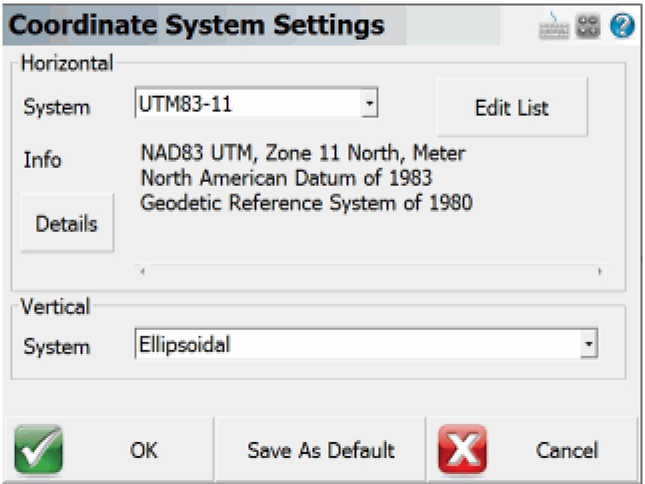
None

Use this option if you're not connecting anything to Evidence Recorder and also don't need to manually enter any shot information. With this mode, the instrument toolbar will not be displayed in the map screen.

Coordinate System Settings

Main Menu | Settings | Coordinate System

The datum settings are used to transform GPS derived curvilinear coordinates (latitude, longitude and ellipsoidal height) into Cartesian coordinates (northing/y, easting/x, and ellipsoid or orthometric height) for presentation on the drawing window and data storage.



Horizontal Group

This is where you define the coordinate system for your project.

Edit List

The Edit List button is used to select predefined or user defined coordinate systems. When pressed, the Coordinate System List dialog will appear.

Details

This will allow the user to see a summary of all the parameters being used by the selected coordinate system. The following information will be listed:

1. What projection and parameters are being used?
2. What datum transformation method and parameters are being used?
3. What ellipsoid and parameters are being used? See section 4 for more details.

Vertical Group

This is where you define the vertical system for your proejct.

The default is ellipsoid. If needed you can copy geoid seperation files into the Evidence Recorder mapping directory. Any new files you copy to the mapping directory can be selected here.

Save As Defaults

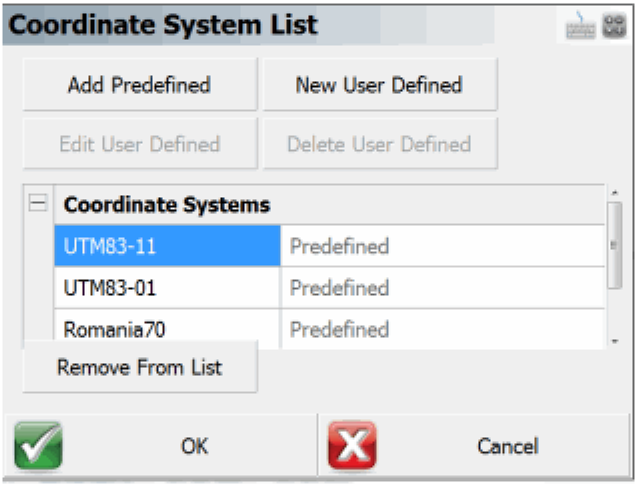
Saves the Horizontal and Vertical systems to the msurvey.ini file as defaults to be used for all new projects.

Select Horizontal Coordinate System

Evidence Recorder ships with a default coordinate system definition of UTM Nad 83 zone 11. You can change this at any time.

The Coordinate System List dialog is where the user can select an existing coordinate system or create a new user defined coordinate system and add them to a favourites list.

This list allows the user to define the coordinate systems he or she uses most often for easy access from the Coordinate System Settings screen.



Add Predefined

When this button is selected you can select an existing coordinate system. See the Add Predefined System section below for more details.

New User Defined

This allows the user to add a user defined coordinate system to the list. See the Add User Defined System section below for more details.

Edit User Defined

This allows the user to review and edit a user defined coordinate system. The user will need to select a custom defined coordinate system from the list, and press the Edit User Defined button. Doing so will display the Add / Edit Custom Coordinate System dialog.

Predefined coordinate systems are read only and can't be edited.

Delete User Defined

This will allow a user to delete a user defined coordinate system. You will need to confirm that you want to delete it from the database. There is no undo.

Predefined coordinate systems are read only and can't be deleted. They can however be removed from the favourites list by using the Remove From List button.

Remove From List

If the user selects either a User Defined or Predefined coordinate system and selects this button, the selected coordinate system will be removed from the coordinate system list. It isn't deleted or removed from the CS-MAP database.

OK Button

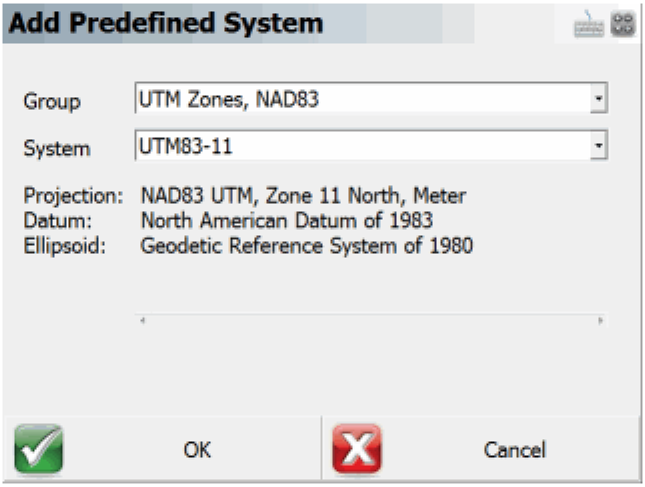
This will save the coordinate system favourites list to the msurvey.ini file.

Cancel Button

This will exit the dialog and not save anything. The user should be automatically returned to the Coordinate System Settings dialog.

Add Predefined System

When the Add Predefined button is selected the user will be able to select an existing coordinate system from the CS-MAP database.



Group and System Options

Coordinate systems are grouped into countries. Select the country that you are surveying in and then choose the coordinate system in the System drop down list.

Info Section

The Info section displays the same information as the current version.

Ok Button

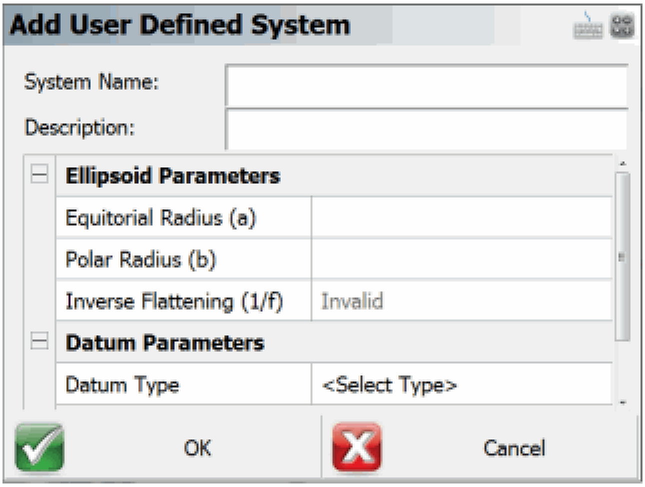
This will add the selected coordinate system to the favourites list.

Cancel Button

This will cancel without saving. User returned back to the Select Coordinate System dialog.

Add / Edit User Defined System

From this dialog you will either create a brand new coordinate system or edit an existing one you previously saved.



System Name and Description

Enter a name for your coordinate system and optionally enter a meaningful name that helps describe it. The system name must have colon in the name.

Ellipsoid Parameters

To define the ellipsoid for the coordinate system you must enter the known equatorial and polar radiuses for the ellipsoid. The Inverse Flattening is not editable and will be computed automatically and can be used a check.

- Equatorial Radius (a)
- Polar Radius (b)

- Inverse Flattening (1/f) - Always a read only value, automatically computed from the two ellipsoid radiuses.

Datum Parameters

There are 7 datum types to select from:

- Three Parameter
- Four Parameter
- Six Parameter
- Seven Parameter
- Bursa / Wolf
- DMA Molodensky
- None

If none is selected then no transformation parameters will be applied to the coordinate system transformation.

If a datum other than none is selected then the user will be able to enter the following parameters:

- Delta X (m)
- Delta Y (m)
- Delta Z (m)
- X Rotation (“)
- Y Rotation (“)
- Z Rotation (“)
- Scale (PPM)

Projection Parameters

The user can select one of nineteen projections.

- Lambert Conformal Conic (One Standard Parallels)
- Lambert Conformal Conic (Two Standard Parallels
- Transverse Mercator or Gauss Kruger
- Universal Transverse Mercator
- Albers Equal Area Conic
- Rectified Skew Orthomorphic, Azimuth at Projection Center

- Mercator Cylindrical Projection with Standard Parallel
- Mercator Cylindrical Projection with Scale Reduction
- Lambert Azimuthal Equal Area
- Lambert Azimuthal Equidistant
- Miller Cylindrical
- Oblique Sterographic
- Polar Sterographic
- Sinusoidal Projection, Optionally Interrupted
- Equidistant Cylindrical
- Cassini
- Robinson Cylindrical
- Bonne Pseidoconical
- Krovac Oblique Conformal Conic, Czechoslovokia

Typical projection parameters for most cases are:

- Scale Factor
- Central Meridian
- Origin Latitude
- Origin Longitude
- False Northing
- False Easting

Ok Button

This will save the user defined parameters to the CS-MAP coordinate system database files (coordsys, datum and ellipsoid)

Cancel Button

This will cancel the current operation and nothing will be saved.

Automatic Backup

Whenever you add or edit a user defined coordinate system, Evidence Recorder will automatically create and save your parameters to a file named **user-coordsys-backup.csmap** to the mapping directory.

This backup file stores your user defined coordinate systems. If you accidentally remove or overwrite your user defined coordinate systems, you can re-import them from this backup file using the Import User Defined Coordinate System command.

Localization (Site Calibration)

Further coordinate transformations can be accomplished with the use of the Local Transformation function of Evidence Recorder. For localizing on a user defined coordinate system, see the GPS Site Calibration section below.

These settings are stored in your project's .ini file, allowing you to easily use different coordinate systems for different projects.

Additional Grid Shift Files and Geoids

Additional grid shift files or geoids can be downloaded from the MicroSurvey helpdesk.

World Geoid models we support can be found here.

World grid shift files we support can be found here.

Older Evidence Recorder Mapping Files

Many of the horizontal datums and vertical geoid models require the use of "grid" files for coordinate computations. A desktop application has been provided with Evidence Recorder to extract user defined areas from the original files to create smaller more manageable files for the data collector.

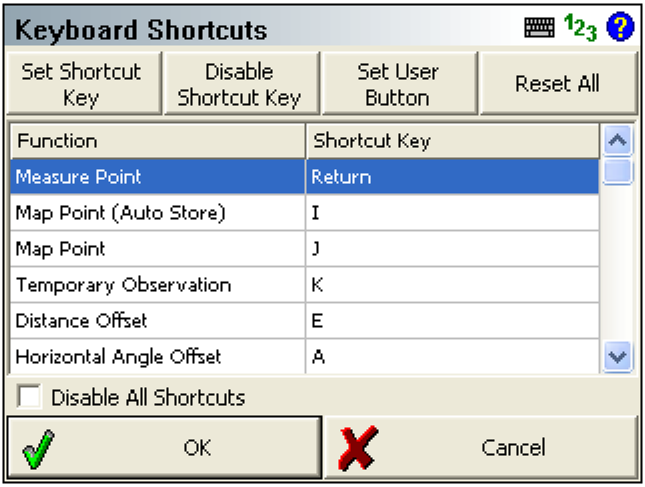
See the topic on Datum Grid Editor for more information.

Keyboard Shortcuts

Main Menu | Settings | Keyboard Shortcuts

You can now assign command shortcuts to keys on your data collector. This has been added to support our new keyboard layout on the newer Trackers but it also works with any device that has a keyboard.

The defaults for the shortcut keys are based on the MicroSurvey Tracker custom keyboard layout, but you can assign any key you want to the list of available commands. The shortcut definitions are stored in the msurvey.ini file so they're portable to your other data collectors if you've defined a custom layout.



Another great feature is that the EDM mode for the current instrument you have selected can have shortcut keys assigned to them. For example if you refer to the list above, you would press the 1 key to set your EDM mode on the instrument to IR Standard.

The shortcut keys will only function from the map screen.

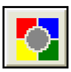
Set Shortcut Key

Use this to assign a command to a key on your keyboard. Highlight the command you want to modify, press the **Set Shortcut Key** button, then press the button on your keyboard to map the command to it. You new key map will automatically be saved to the msurvey.ini file.

Disable Shortcut Key

Use this to disable individual shortcuts.

Set User Button

Use this to set the currently selected command to the User Button found on the main interface. The command currently set with the user button is indicated in the Function list with the same icon.

Reset All

This resets all the shortcuts to the factory defaults and all customized settings will be lost.

Disable All Shortcuts

This is a toggle that controls if the shortcut keys are disabled or enabled.

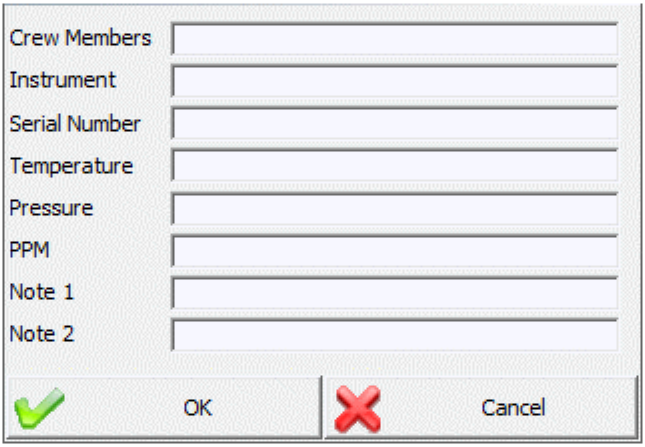
Default Shortcut Keys

Function	Shortcut Key
Measure Point	Enter
Map Point (Auto Store)	I
Map Point	J
Temporary Observation	K
Distance offset	E
Horizontal Angle Offset	A
Resection	R
Set Target Heights	T
Occupy Point	O
Check Backsight	N
Check Point	Q
Stake Points	S
Inverse	B
Calculator	F
Automap Library	D
Figure List	L
Toggle GPS Coordinates	G
Store Points	W
Undo Last Saved Point	Disabled
Point Databse	P
Add Comment	X
Raw File Viewer	U
Menu Home	H
Map Data Layers	Backspace
SIP Enable/Disable	Disabled
EDM Mode 1	1
EDM Mode 2	2
EDM Mode 3	Disabled
EDM Mode 4	Disabled
EDM Mode 5	Disabled
EDM Mode 6	Disabled
EDM Mode 7	Disabled

EDM Mode 8	Disabled
Prism Search	Disabled
Prism Track	Disabled
Prism ATR	Disabled
Laser Pointer	Disabled
Guide Lights	Disabled
Robot Joystick	Disabled

Project Information

Main Menu | Settings | Project Information



Use this option to record job information about your project.

Tap **OK** to save your information to the raw file, or **Cancel** to exit without saving your changes. Each entry field can accept up to 64 characters.

This screen can also be accessed by pressing the "Modify Project Information" button located on the Project Review screen.

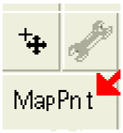
MAPPING METHODS MENU

Mapping Methods Menu

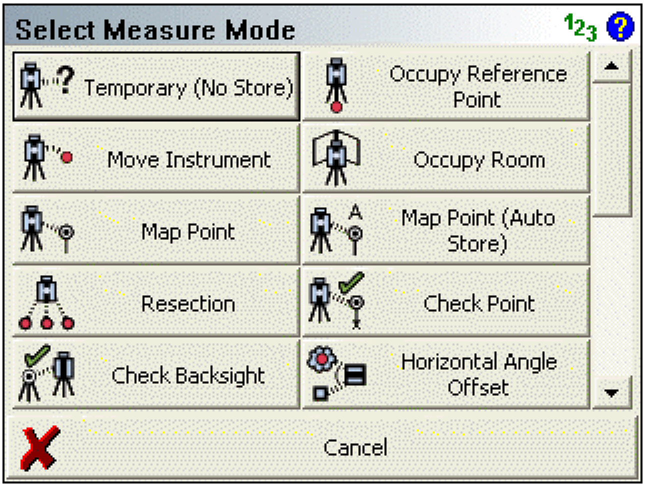
Main Menu | Mapping Methods

These are commands built into Evidence Recorder that will help you measure and map your points. The desired method must be selected before you begin a measurement.

For a faster way to get to this screen, you can also press the measure mode button which is located on the instrument toolbar.



Measure Mode Button



Use the vertical scroll bar along the side to access additional measurement modes if they cannot all fit on screen at the same time.

Note: Several of these modes will not be available until you have setup an occupy point and measured a backsight via the Occupy Reference Point, Occupy Room, or Resection commands. Most of these modes will also not be available if you are using GPS.

Temporary (No Store)

This will allow you to take a measurement without storing it. Please see the Temporary (No Store) topic for more information.

Occupy Reference Point

Use this to define an instrument setup. Please see the Occupy Reference Point topic for more information.

Move Instrument

This is a wizard that will help you establish a new reference point, and then will step you through moving your instrument. Please see the Move Instrument topic for more information.

Occupy Room

Use this to define an instrument setup so that one wall in the room becomes a baseline where one end of it is at 0,0. Please see the Occupy Room topic for more information.

Map Point

This mode allows you to measure a point. After the measurement, it will allow you to review your measurement data and allow you to make changes to the point id and description before it is stored. Please see the Map Point topic for more information.

Map Point (Auto Store)

This mode allows you to measure a point using the next available point id, and the description and line toggles specified on the main map screen. Using this is a very fast method for recording your measurements. Please see the Map Point (Auto Store) topic for more information.

Resection

This will start the multiple point resection routine to allow you to determine your current instrument position by measuring to known points. Please see the Resection topic for more information.

Reference Line

This will start the reference line routine. Please see the Reference Line topic for more information.

Check Point

Use this to display a check measurement to an existing point in your project. Please see the Check Shot topic for more information.

Check Backsight

Use this to compare your backsight to your previously measured values. Please see the Check Backsight topic for more information.

Horizontal Angle Offset

This will start the angle offset routine. Please see the Horizontal Angle Offset topic for more information.

Vertical Angle Offset

This will allow you to compute the height of an object. Please see the Vertical Angle Offset topic for more information.

Distance Offset

This will start the distance offset routine. Please see the Distance Offset topic for more information.

Manual Distance

This will record a HA and VA for a shot, but the user can manually enter the distance. Please see the Manual Distance topic for more information.

Manual Entry

This will allow you to manually enter in a shot including HA, VA and SD. Please see the Manual Entry topic for more information

Two Line Intersection

This allows you to measure two baselines and Evidence Recorder will compute the intersection point. Please see the Two Line Intersection topic for more information.

Line - Angle Offset

This allows you to measure two points to define a baseline, measure an angle, and Evidence Recorder will compute the intersection point. Please see the Line - Angle Offset topic for more information.

Line - Distance Offset

This allows you to measure two points to define a baseline, then manually enter measured distances. These distances will be used to compute a new point based on the baseline. Please see the Line - Distance Offset topic for more information.

Line - Perpendicular Point

This allows you to measure two points to define a baseline, then you can select an existing point which will be used to compute a perpendicular intersection. Please see the Line - Perpendicular Point topic for more information.

Trilateration

This will allow you to compute new points by observing their distances from two known existing points. Please see the Trilateration topic for more information.

Baseline Offset

This will allow you to compute points offset from a baseline. Please see the Baseline Offset topic for more information.

Vertical Scene Projection

This will allow you to compute points on a user defined vertical plane. Please see the Vertical Scene Projection topic for more information.

Point Scanning

Use this to activate Point Scanning with your motorized reflectorless instrument. Please see the Point Scanning topic for more information.

Temporary (No Store)

Main Menu | Mapping Methods | Temporary (No Store)

The temporary mode will allow you to take a measurement with your instrument without storing a point or recording anything to the raw file. It also doesn't require you to have established a setup. It is the same as pressing the measure button on the instrument where all it does is report back to you the HA, ZA, SD, HD and VD.

When in this mode you will see the word **Temp** on the measure mode button.

No Setup Established

If you haven't established a setup and you use the temp mode, when you press the measure button you will see the results of your measurement.

Setup Established

If you have an instrument setup established when you use the temp mode and press the measure button you will see the measurement information as well as calculated coordinates in the observation toolbar. The coordinates will be based on the current setup and the reading from the temporary shot.

> **Note:**
> When measuring in temp mode, nothing will be recorded in the RAW file.

Occupy Reference Point

Main Menu | Mapping Methods | Occupy Reference Point

Use this command to specify the instrument location and orientation. You will be asked to specify the point your instrument is occupying, an instrument height and if you will be assuming a backsight direction or sighting an exiting point. After you have established your setup and backsight, Evidence Recorder will graphically show you your setup points.

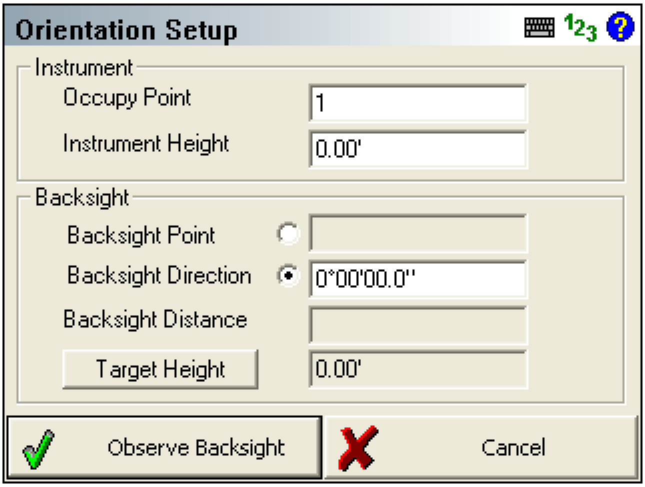
Occupied Point Location

Backsight Point Location

Backsight Method: Direction

With the backsight method set to Direction you will be able to specify the point you want to setup on and specify a backsight direction.

When you go to measure you have the option of recording an angle and distance to the backsight, or the option of just recording an angle. If a distance is measured to the backsight you will have the option of storing a point for the backsight after you press the measure button.



Occupy Point

Type in an existing point number, or double tap in this field to open the keypad or to select a point from the map. You will be able to create a new point, pick one from a list, or pick one from your drawing.

Instrument Height

Use this to enter your current instrument height.

Backsight Direction

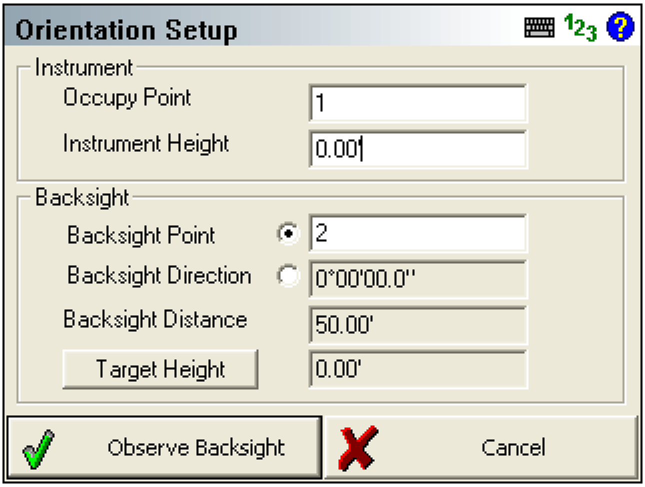
Use this to specify the direction that will be used by Evidence Recorder. You can enter an azimuth or a quadrant bearing.

Target Height

Use this to enter your current target height.

Backsight Method: Point

Use this method to specify the points that will be used for the current instrument location and backsight.



Occupy Point

Type in an existing point number, or double tap in this field to open the keypad or to select a point from the map. You will be able to create a new point, pick one from a list, or pick one from your drawing.

Instrument Height

Use this to enter your current instrument height.

Backsight Point

Type in an existing point number, or double tap in this field to open the keypad or to select a point from the map. You will be able to create a new point, pick one from a list, or pick one from your drawing.

Backsight Direction & Distance

When you enter in your points Evidence Recorder will display the inversed horizontal distance and direction between the points you entered.

Target Height

Use this to enter your current target height.

Measuring to the Backsight

Once you've established the backsight method, entered your points and instrument height you can move on to the next step by pressing the **Observe Backsight** button. You will be taken back to the map view where you will see the graphical position of your setup and backsight points. There are a few things you should take note of:

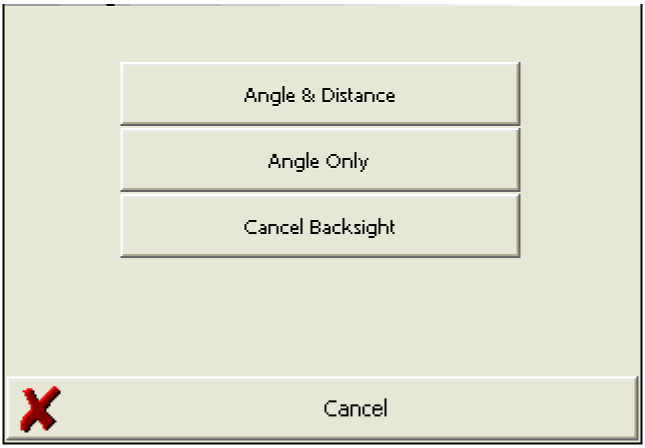
1. You can always tell what mode you're in by the "mode" text that appears near the top of your drawing. Since you're using the occupy point command you will see "Observe Backsight" near the top of the map area.
2. You have two measure modes available to you on the instrument toolbar. You can measure an angle and distance to the backsight, or measure only your current plate reading without measuring a distance. The two options are described in more detail in the Backsight Measure Mode topic.
3. You can cancel the setup by pressing the measure mode button and choosing "Cancel Backsight"
4. While in the backsight mode, you can use any of the controls from the information and display toolbar.
5. You can set the height of target by using the HT button on the instrument toolbar.
6. When you're ready to measure to the backsight, press the Measure button on the instrument toolbar.

Backsight Summary

After you have taken your measurement you will see a summary of your shot. From this screen you can choose to accept the shot or re-shoot it. You can also specify if you want the plate reading set to zero or a specific azimuth (if this is supported on your instrument). For more information see the Backsight Summary topic.

Backsight Measure Modes

Instrument Toolbar | Measurement Modes Button



When shooting to your backsight you have two options available and they can be accessed from the instrument toolbar using the measure mode button. The measure modes available are described as follows:

Angle & Distance

Specifying this will require you to measure a distance to the backsight either to a prism or reflectorlessly. It will also record the current plate reading on the instrument. Both the measure distance and plate reading will be used as the backsight reading in the raw file.

Angle Only

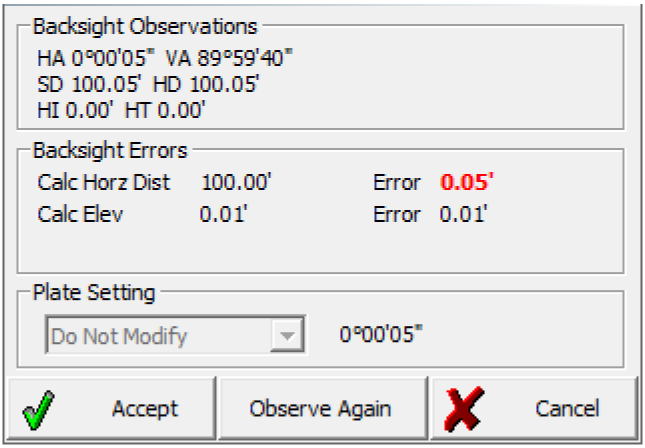
Specifying this will not require you to measure a distance to the backsight. All that will be recorded is the current plate reading on the instrument and this reading will be used as the backsight reading in the raw file.

Cancel Backsight

Use this to cancel your current backsight and occupy point command.

Backsight Summary

After you have taken your measurement you will see a summary of your shot. From this screen you can choose to accept the shot or re-shoot it. You can also specify if you want the plate reading set to zero or a specific azimuth.



Backsight Observations and Errors

If you specified the point backsight method you will see a comparison between what you measured and the theoretical inverse. If you used the measure angle only mode, or defined a backsight direction you will not see a comparison as there isn't enough information available to compute the inverse.

Plate Setting

Finishing the Setup Routine

Accept

Once you've reviewed your backsight information you can complete it by pressing the **Accept** button. This will write a record to the raw file and exit the setup routine.

If you specified the direction backsight method you will be prompted to "Store the point observed at the backsight?" Press **Yes** to store a point for the backsight, or **No** to complete the setup without creating a new point at the backsight.

Observe Again

If you're not satisfied with the results or made a mistake you can re-shoot the backsight by using this button. Doing so will take you back to the main display where you can take another shot on the backsight.

Occupy Point Raw Records

When you accept your occupy point, points will be stored in the database for the setup and backsight if applicable. Also, the following records will be written to the raw file:

```
SP,PN2,N 918.0848,E 1057.3576,EL0.0000,--
--Orientation
LS,HI5.000,HR5.000
OC,OP1,N 1000.0000,E 1000.0000,EL0.0000,--
BK,OP1,BP2,BS145.00000,BC0.00000
BR,OP1,BP2,AR145.00000,ZE90.00000,SD100.00000
-- Orientation Notes (several comment lines)
```

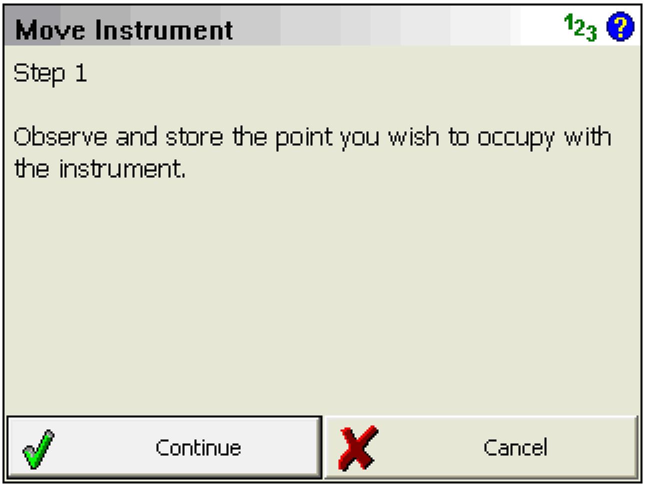
Move Instrument

Main Menu | Mapping Methods | Move Instrument

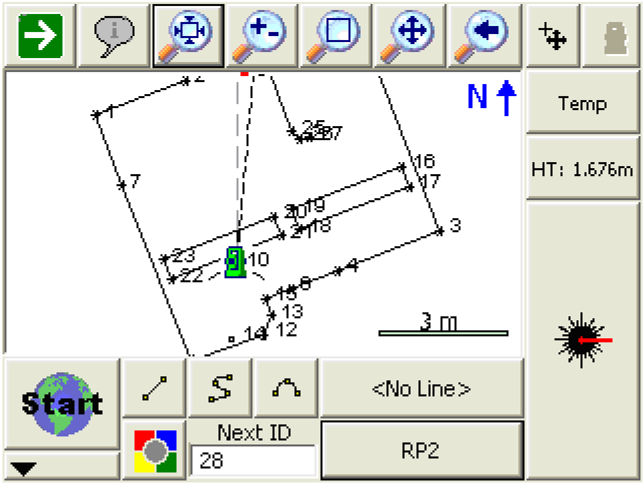
This is a wizard that will help you move your instrument to a new location in your scene. It steps you through the key procedures that need to be completed so you can successfully and accurately move your instrument.

Step 1 – Define new reference point

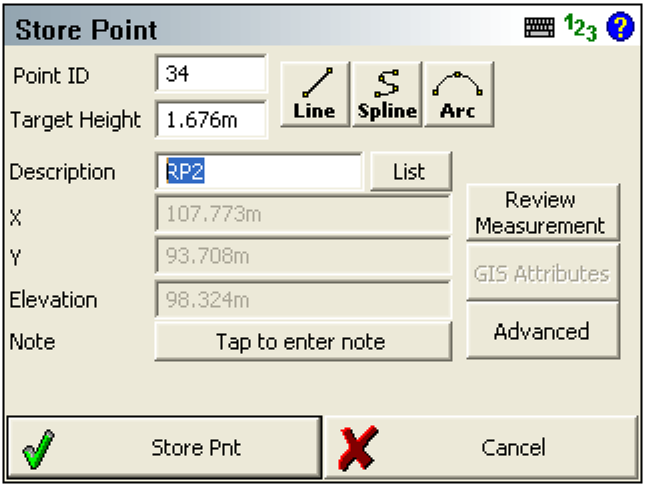
You need to establish the point you want to move your instrument to. You should mark the new reference point such that you can setup directly over top of it, such as placing a Pk-nail or a small paint mark on the ground.



Press **Continue** when ready. You can then sight your new point, and measure it's location.



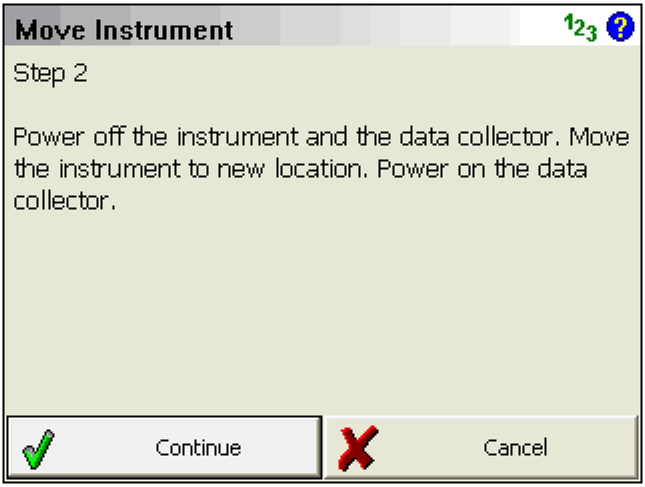
After you measure the point, you will be asked to store it. Choose the point number you want to use to identify the point and choose a description for it.



Press **Store Point** to complete this step.

Step 2 – Move Instrument

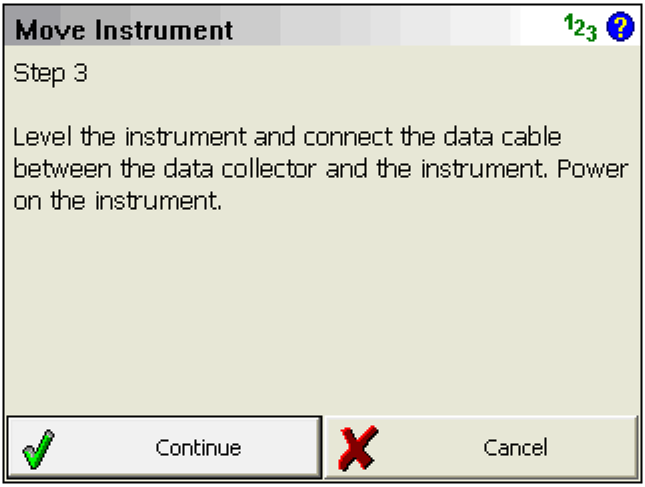
In step 2 all you do is move your instrument to the new location that was recorded in step 1.



Press **Continue**.

Step 3 – Connect to Instrument

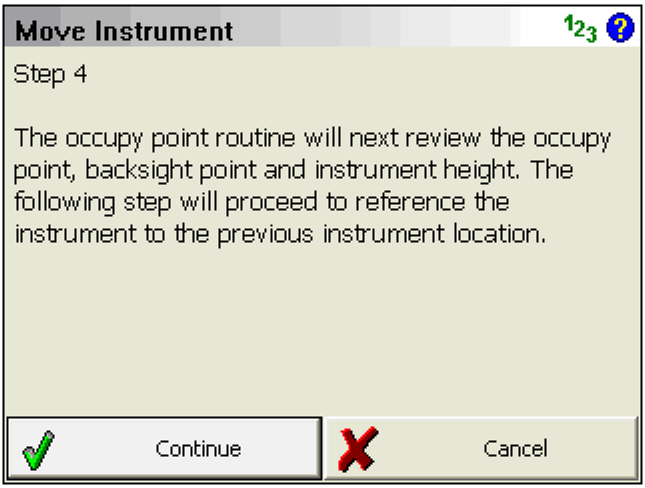
In Step 3, all you're doing is connecting to the instrument and powering everything back on.



Press **Continue**.

Step 4 – Complete Setup

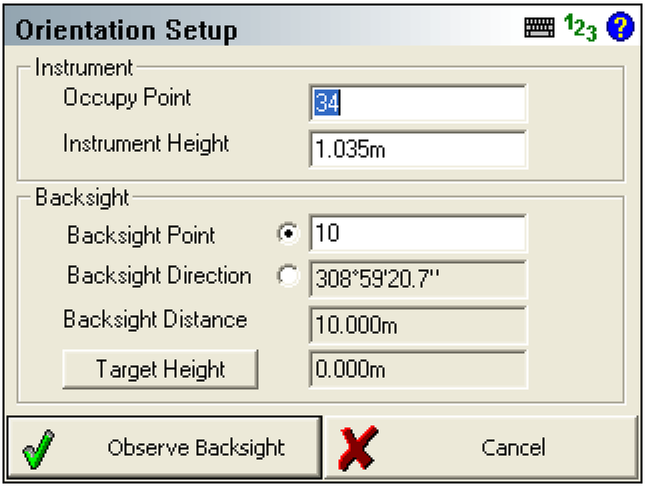
Once you've connected and moved on to step 4, you will be ready to backsight the point you were originally setup on.



Press **Continue**.

Evidence Recorder should automatically select the correct Occupy and Backsight points for you.

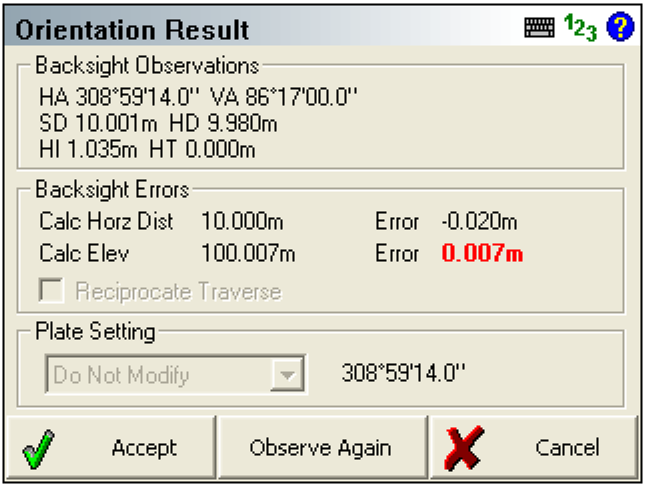
All you need to do is enter in your new instrument and target heights.



Press **Observe Backsight**.

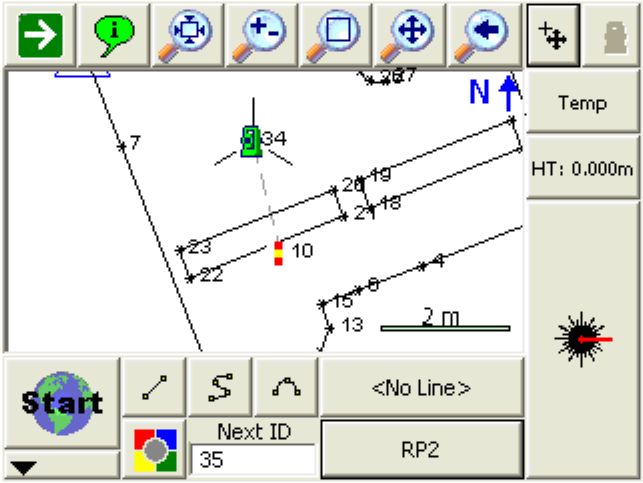
After you make a measurement to the backsight, you will see the reference measurement screen.

Confirm that you have the correct instrument and target heights. If you want to set a zero reading on the instrument, select the ”Set Zero” option in the Plate Setting pull-down menu.



Press **Accept** to finish.

You will now see your instrument icon on your new reference point (PN 34). The backsight icon should be located on the previous point you were setup on (PN 10).



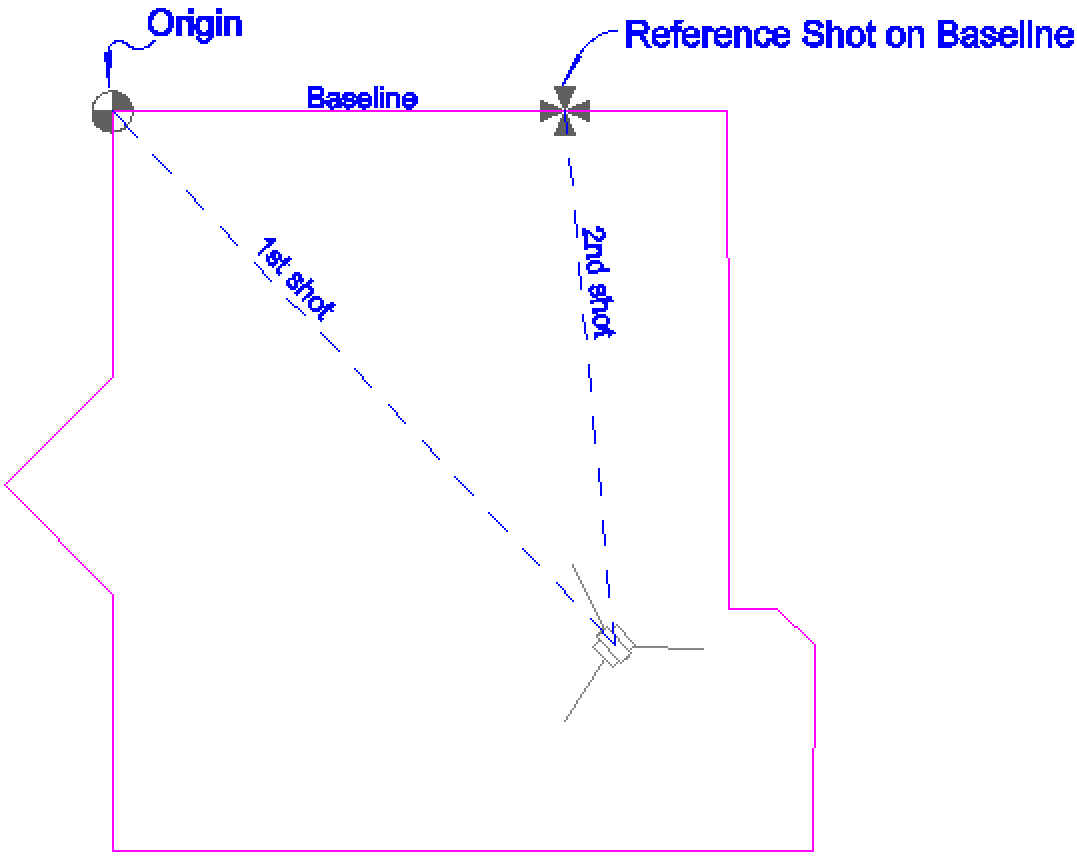
Occupy Room

Main Menu | Mapping Methods | Occupy Room

When setting up a total station in a room, in certain circumstances it is advantageous to define one of the room's walls as a baseline for the scene.

Using this method ensures that your room is square to your coordinate system. This makes the scene easier to work in Evidence Recorder and when imported into your desktop drawing program.

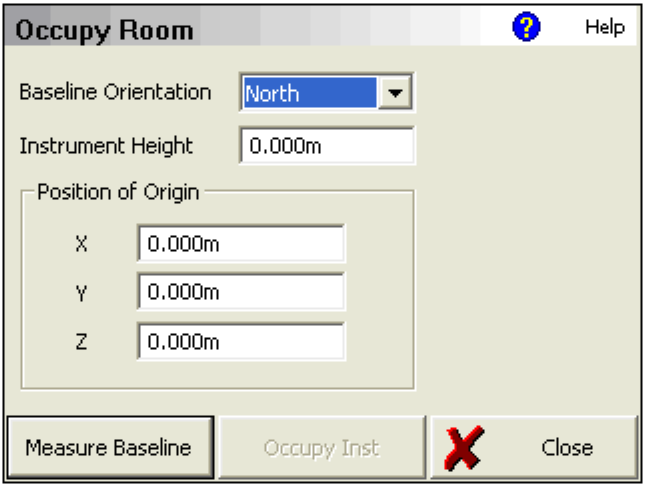
Another benefit to using this feature is that all points mapped with the total station will be referenced to the origin and baseline.



Function

Usually this feature will be used in a new project, but it could be used in an existing scene if needed. In this example we will begin by creating a new scene.

From the Map Screen, go to **Main Menu | Mapping Methods | Occupy Room**.

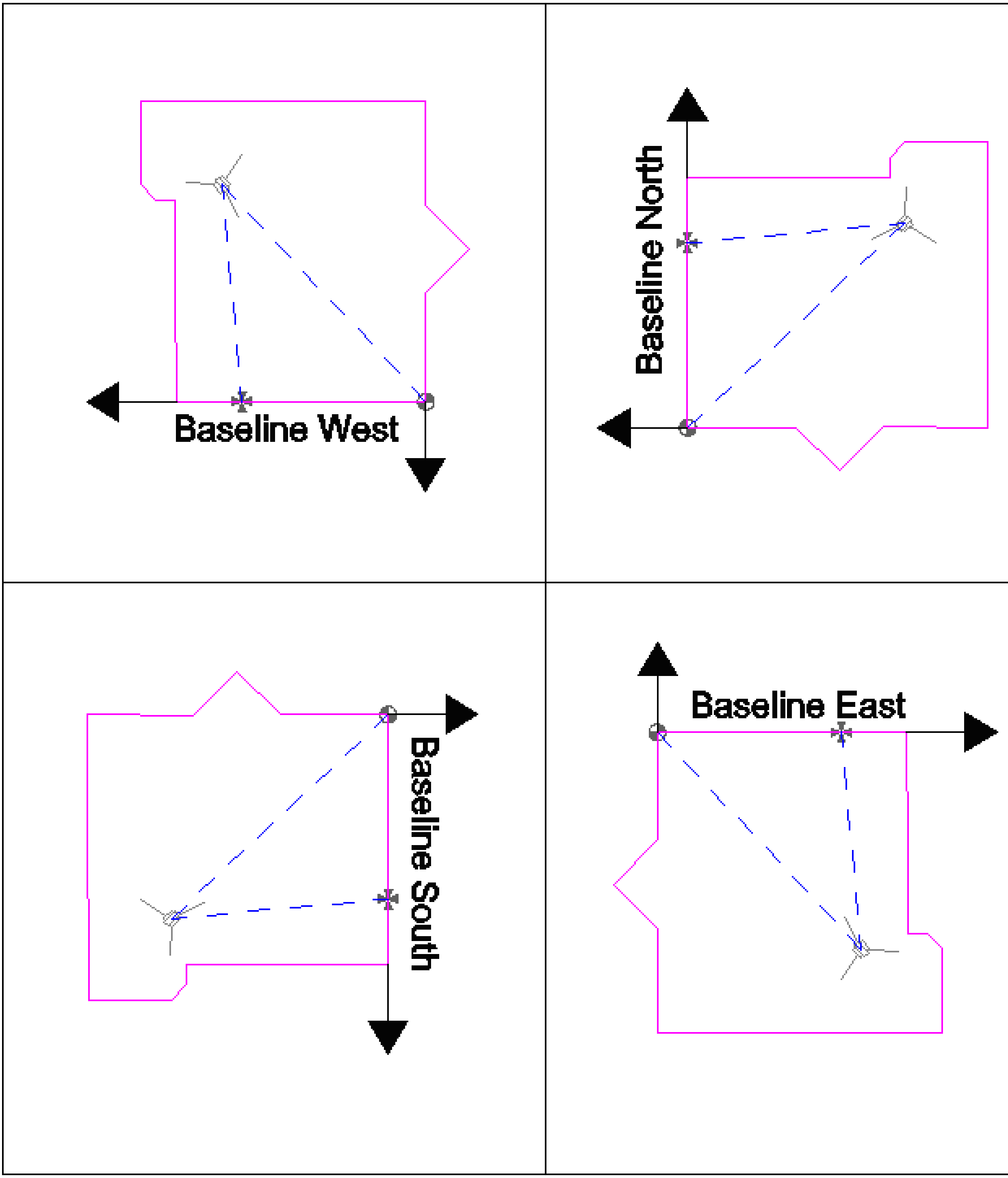


In the Occupy Room screen you need to specify the orientation of the baseline, your instrument height and the position that you want to use for the origin point.

Baseline Direction

This is the direction that you want the wall ”baseline” to face in your project. The direction that you use is totally up to you. You should pick a direction that will help you visually confirm that the points you're mapping are correct. If you refer to the image at the beginning of this document, the instrument was setup in the lower right corner of the room. From the instrument operator's perspective, it made sense to use a baseline set to East so the far wall would be horizontal along the X axis in the project. If you look at the image of the Tracker at the beginning of this topic, you will see that using this feature makes the room align with your scene's coordinate system.

In the examples below, the same origin coordinates and total station measurement were used. The only thing that was different, was the direction specified for the baseline.


Baseline West
Baseline North
Baseline South
Baseline East

Position of Origin

The default coordinates are 0, but any value could be used. The origin will be located and defined by your first measurement.

Usually you will want the bottom corner of the wall to be equal to the z value you define. Assuming you're using a reflectorless instrument, if you can't see the bottom corner directly with the instrument, you can measure up the wall and mark a point a known distance from the floor. Then sight this point with you instrument, but make sure you define the distance you measured as your new target height.

Otherwise, if no target height is specified, the location you measure at the corner will be the origin.

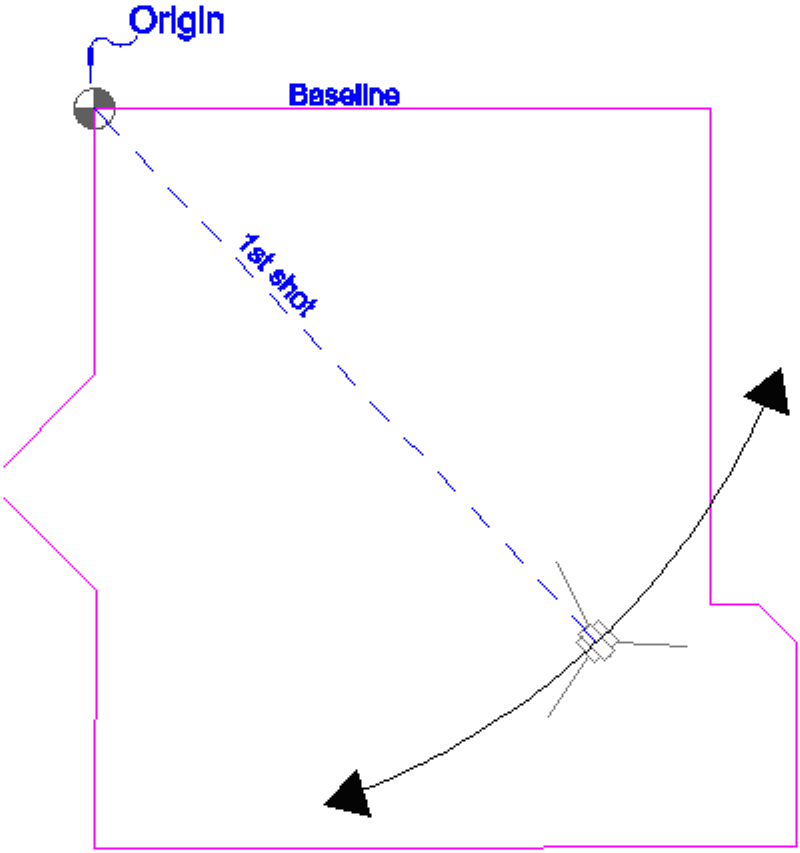
Measure Baseline

When you press this you will be required to measure two shots; one to define the origin and the other to define the location of the instrument in reference to the baseline.

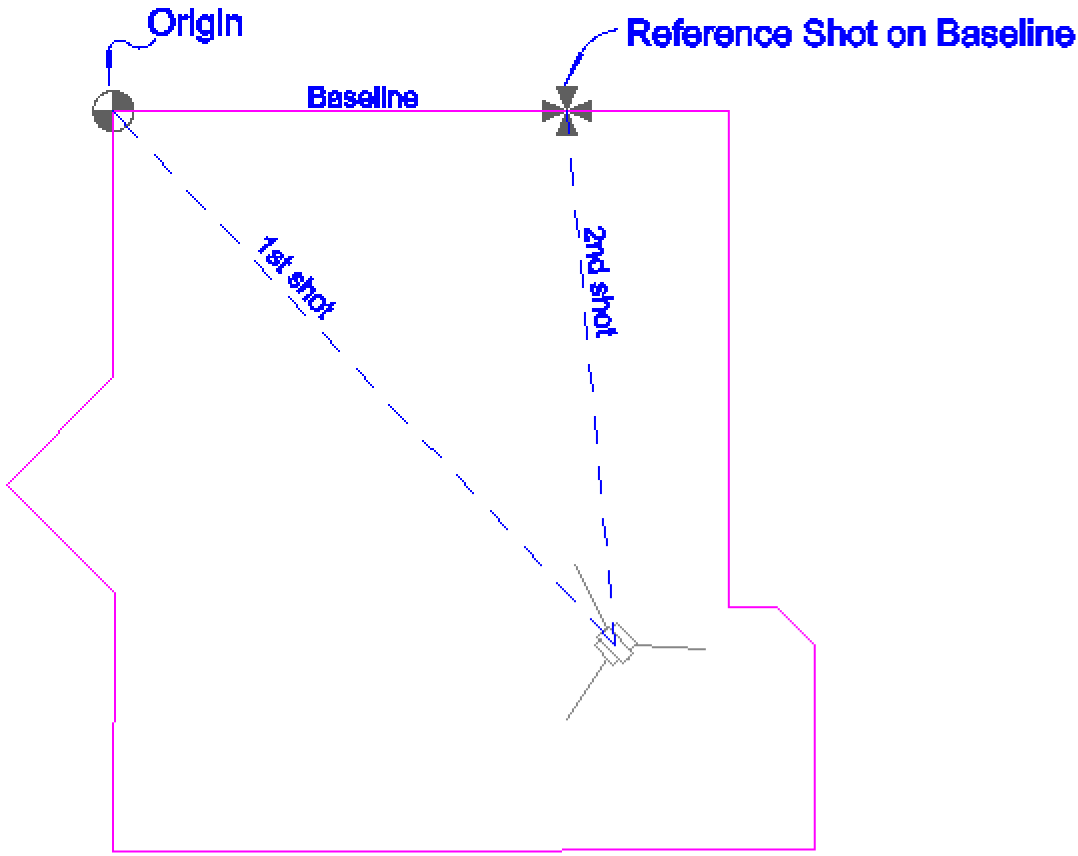
How it Works

Using the origin, and the baseline direction you specified, a ”baseline” is created.

Using the first shot, the instrument position can not be accurate calculated yet. The instrument isn't referenced to the baseline yet, and hinges around the origin point.



Then using the second shot, the total station location in the room can be accurately computed.



Store Reference (Occupy) Position

After you finish measuring the necessary measurement, you will be taken back to the Occupy Room screen.

You will now see that the Occupy Inst screen is enabled. Press this to accept your measurements and Evidence Recorder will store a new point for the reference point. Also, in the raw file Occupy point records will be recorded along with the measurements made on the wall.

```
--Occupy Room
--Baseline Direction: East
--N 0.0000,E 0.0000,EL0.0000,--Origin Pnt
--HI1.310,HR1.514,AR25.16100,ZE88.26290,SD7.0790,--Pnt for Origin
--HI1.310,HR1.514,AR63.18170,ZE88.26220,SD5.1750,--Pnt on Baseline
OC,OP1,N -5.1514,E 4.8516,EL0.0115,--RP
```

```
BK,OP1,BP0,BS316.42594,BC25.16100
LS,HI1.310,HR1.514
```

You are now ready to continue mapping your scene.

Map Point

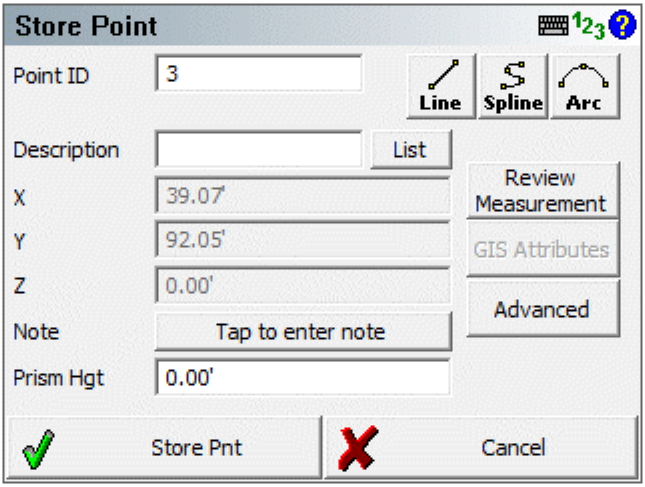
Main Menu | Mapping Methods | Map Point

If you like reviewing your shots prior to being stored in the database and raw file, then this is the mode you should use. When you press the measure button on the instrument toolbar, after the shot is measured you will see the store point screen prior to storing the point.

When you set this mode you will see the word **Map Pnt** on the measurement mode button.

When you take a shot using the measure button you will see the Store/Edit Point screen.

You can also confirm or change the Target Height used for this shot.



After reviewing the information you have three choices to make.

Store Pnt

Press this to store the coordinate in the database and create a sideshot record (SS) in the raw file.

```
SS,OP350,FP3,AR0.00000,ZE94.50090,SD13.2700,--<No Desc>
```

Cancel

Press this to cancel the shot and not store anything.

Note: For more information on the other buttons found on this screen please read the Store / Edit Points topic.

Map Point (Auto Store)

Main Menu | Mapping Methods | Map Point (Auto Store)

Use this when you have production in mind and you don't need to review your shots before they're recorded in the database and raw file. The measure mode allows you to press the measure button and it will store the point in the database and plot it in the drawing without asking you for any further information.

When in this mode you will see the words **Map Pnt (Auto)** on the measure mode button.

It will use the following settings from the main interface when storing the point:

Next Point Number ID

The current point ID on the topo toolbar will be assigned to the point.

Description

The current description on the topo toolbar will be assigned to the point.

Height of Target

The current HT on the instrument toolbar will be used to compute the elevation of the point.

> **Note:**
> When measuring in the Auto Store mode, a SS record will be recorded in the raw file.

Resection

Main Menu | Mapping Methods | Resection

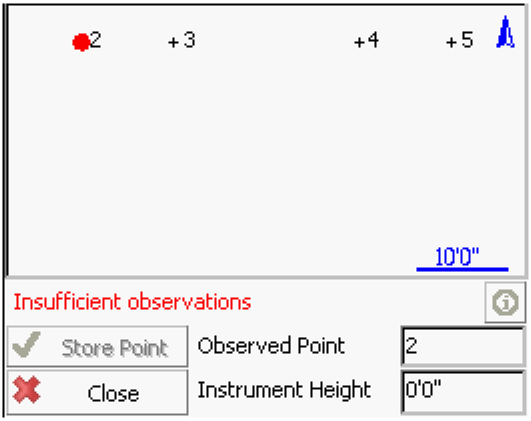
Evidence Recorder has a multi-point resection routine that can be used to compute a point for a setup. It will use a least squares solution to determine the coordinates from the measurements you make to your points.

- As a minimum you need to have two points to resect to.
- You can shoot the resection point in the direct or reverse face.
- You can take multiple shots to the same resection point.
- There is no limit to the amount of points you can resect to.
- When you store your resection point, an occupy record will be created for you automatically.

Specify the Resection Reference Points

First Shot

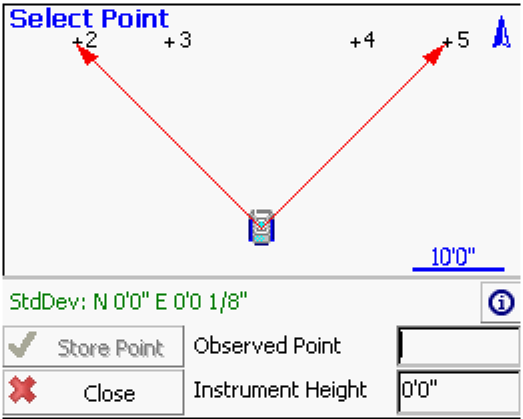
When you start the command you will see the reference point toolbar. Specify your instrument height and select a reference point to measure. After you select a point, you can press the measure button to record a shot.



Note: It is normal to see the "Insufficient observations" message until you have measured at least two reference points.

Second Shot

To record the second shot, simply select it from the map screen, then press the measure button. A minimum of two points are needed to compute a position for the instrument, but you can shoot more points if needed to increase the accuracy of the instrument position. The estimated accuracy of the instrument location will be displayed for you on the toolbar. If the estimated error is within your tolerances you can store the point.



Third or More Shots

If you have more points to reference to you can continue measuring them using the same process as you did when you shot the second point. As you record more points you should notice that the standard deviations for the northing and easting will begin to get smaller.

Standard Deviation

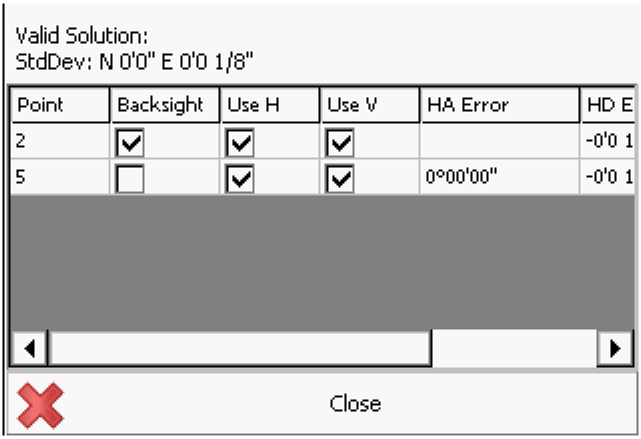
This is the computed precision for the overall geometry of the resection. Small errors indicate that the measured data "fits" very well with the geometry defined by the known points.

Large errors can indicate that bad measurements were recorded, either due to careless measurement practices such as not holding the prism pole straight or not carefully sighting the prism. Large errors can also happen if the geometry defined by the known points, is not "in the same place" as it was when the points were previously measured.

Please note that while the Standard Deviation relates to the quality of your resection, it is possible to have a low StdDev yet still have a high positional error. As such, it is important that you also look at the angle and distance errors shown in the Information screen when considering the overall accuracy of your resection.

Information (Horizontal and Vertical Filters)

You can enter this screen by pressing the Information button on the top right corner of the reference point toolbar. When you do, you will see a detailed summary of the measurements.



You can determine how each shot to the reference points should be used to compute the resection point. By default each observation you make will be used to compute both the horizontal and vertical position of the resection solution, but you can override this by setting the **Use H** and **Use V** options for each measurement.

Use H	Use V	Result
✓	✓	This shot will be used to compute both the horizontal and vertical position.
✓	✗	This shot will be used to compute only the horizontal position.
✗	✓	This shot will be used to compute only the vertical position.
✗	✗	The shot will be ignored in the computation.

You can also select which observation is to be your backsight point.

HA Error

The horizontal angle error is computed as follows. Using the computed resection point and the measured horizontal angle, a theoretical direction is computed to the reference point. This direction is then compared to the direction measured (plate reading) and the difference is noted in the HA Err column.

HD Error

The horizontal distance error is computed as follows. An inverse is made between the resection point and the reference point. This inversed distance is then compared to the measured distance and the difference is noted in the HD Err column.

VD Error

The vertical distance error is computed as follows. Using the resection elevation, and the observation to the reference point, a new elevation is computed for the reference point. This computed elevation is then compared to the reference point's original elevation and the difference is noted in the VD column.

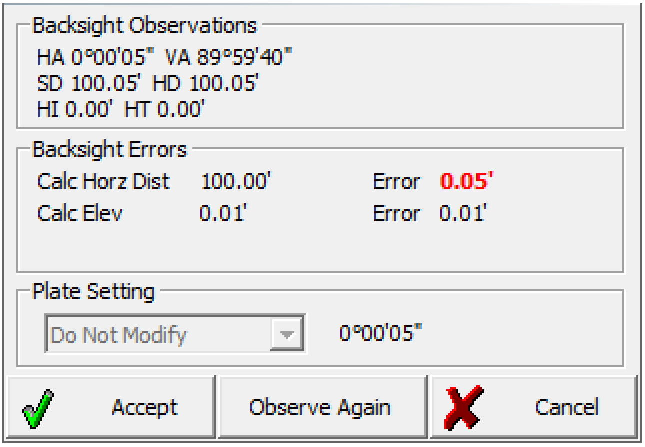
Resection Modes

At any time during the collection of your observations you can choose to shoot an **Angle & Distance** or **Angles Only** measurement. You can control this by pressing the measurement mode button on the instrument toolbar after you have started your resection.

Store the Resection Point

When you're satisfied with the resection point you can store its new position by pressing the **Store Pnt** button. This will then display the store / edit screen.

Finally you will see the backsight results screen.



The backsight point that will be stored will be based on which point you selected in the Information screen shown above, which by default is the first reference point you observed. You do not need to take another measurement to the backsight as it has the original measurement you made. At this point you can do the following:

- Confirm the instrument and target heights.
- Decide if you would like to sight it again and take another measurement.

Raw File Record

After your store you point, several records will be written to the raw file.

```
--Resection
SP,PN5000,N 1009.1534,E 1000.0000,EL100.3244,--
SP,PN6034,N 1006.1995,E 1002.8319,EL99.7321,--FS
SP,PN6035,N 1001.4706,E 1004.8775,EL99.7361,--FS
RS,PN5000,CR359.59590,ZE87.49010,SD9.1600
```

```
RS,PN6034,CR24.33000,ZE92.03450,SD6.8280
RS,PN6035,CR73.13080,ZE92.43050,SD5.1010
SP,PN6036,N 999.9998,E 999.9998,EL100.0011,--
OC,OP6036,N 999.9998,E 999.9998,EL100.0011,--
SP,PN5000,N 1009.1534,E 1000.0000,EL100.3244,--
BK,OP6036,BP5000,BS0.00039,BC0.00000
--Occupy Check
-- Observed Values: HA 0°00'00.0" VA 87°49'22.0" SD 9.160m HD 9.153m
-- Distance Calculated: 9.154m
-- Distance Error: -0.000m
-- BS Elevation: 100.324m
-- BS Elevation Error: 0.001m
```

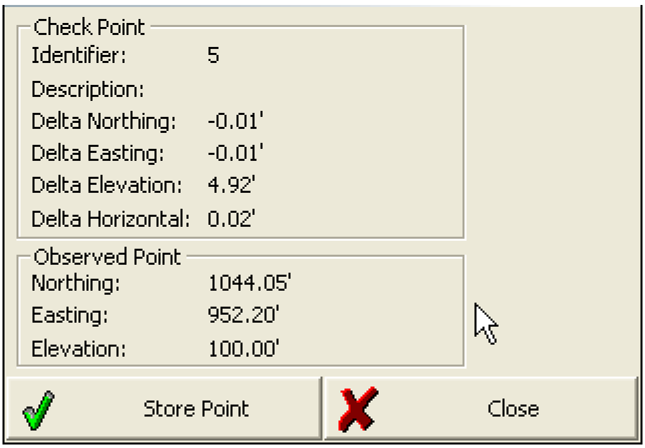
Check Point

Main Menu | Mapping Methods | Check Point

Use this to measure a check shot to an existing point. When you start the command you will see the point chooser appear where you can create a new point or pick an existing one from a list or from the screen. After you choose your point you will be ready to measure. You will note the measure mode will be set to **Check Pnt** and if you need to cancel the operation you can do it by pressing the measure mode button and choose to cancel it.

Check Point Summary

When you're ready to record the shot press the **Measure** button on the instrument toolbar. You will be presented with a screen that compares your measured values to the ones that were computed for the check shot point.



The deltas that are displayed are computed by subtracting the shot coordinates from the known coordinates. In other works if you add the deltas to the shot point coordinates you will end up at the known point.

Store Point

Pressing this will exit the function and write several notes to the raw file summarizing your check shot, and allow you to store the shot using the Store/Edit Point screen.

```
--Check Point
-- Check Point ID: 110
-- Check Point dNorthing: -4.59'
-- Check Point dEasting: -1.82'
-- Check Point dElevation: -4.96'
-- Check Point dHorizontal: 4.94'
-- Observed Values: HA 45°00'00.0" VA 90°00'00.0" SD 23.00' HR 5.00'
-- Observed Point Northing: 5016.26'
-- Observed Point Easting: 5016.26'
-- Observed Point Elevation: 95.00'
```

Close

This will exit the check shot function and not write anything to the raw file or storing a new point.

Check Backsight

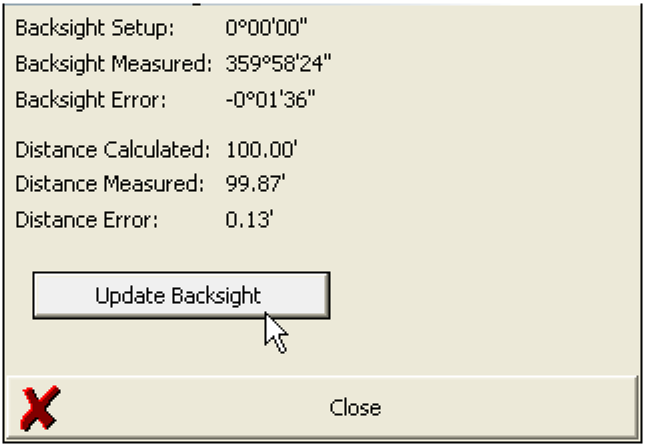
Main Menu | Mapping Methods | Check Backsight

Use this to check your backsight. Evidence Recorder will compare your newly measured value to the one that was stored for your current setup. You will be able to review difference and optionally update your current setup with the new shot to the backsight.

When you start the command you will be taken back to the map screen and the measure mode will be set to **Check BS.** You have two measure modes available when taking a check shot to your backsight. Please see the Backsight Measure Mode topic for more information.

Check Backsight Summary

When you're ready to record the shot press the **Measure** button on the instrument toolbar. You will be presented with a screen that compares your measured values to the ones that were stored for the current backsight.



Update Backsight

Pressing this will create a record in the raw file updating your setup and backsight record with the shot information from your check shot. Several notes will also be written to the raw file summarizing your shot. When you choose to update the backsight, a new OC and BK record is saved as well as the shot information. You will also see the word (Updated) which indicates that the user selected the Update button.

```
OC,OP5,N 763.8748,E 1000.0000,EL0.0000,--
SP,PN1,N 1000.0000,E 1000.0000,EL100.0000,--start
BK,OP5,BP1,BS0.00000,BC0.00000
LS,HI0.000,HR5.000
--Backsight Check (Updated)
-- Observed Values: HA 0°00'00.0" VA 90°00'00.0" SD 163.12'
-- Backsight Setup: 0°00'00"
-- Backsight Measured: 0°00'00"
-- Backsight Error: 0°00'00"
-- Distance Calculated: 236.13'
-- Distance Measured: 163.12'
-- Distance Error: 73.01'
```

Close

Pressing this will exit the function and write several notes to the raw file summarizing your check shot.

```
--Backsight Check (Not Updated)
-- Observed Values: HA 0°00'00.0" VA 90°00'00.0" SD 236.10'
-- Backsight Setup: 0°00'00"
-- Backsight Measured: 0°00'00"
-- Backsight Error: 0°00'00"
-- Distance Calculated: 236.13'
```

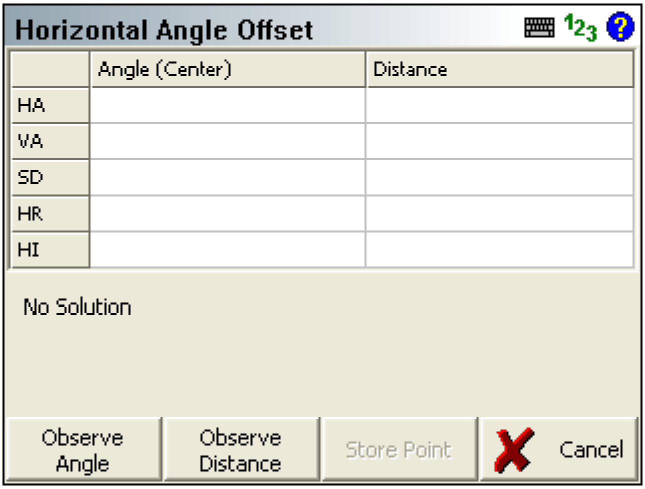
```
|-- Distance Measured: 236.10'
|-- Distance Error: 0.03'
```

Horizontal Angle Offset

Main Menu | Mapping Methods | Horizontal Angle Offset

Evidence Recorder includes a flexible angle offset routine. It allows you to shoot the angle and distance to a point that can not be occupied by the rod. An example of where you would use this is if you wanted to record the center of a large object, such as a tree.

When you choose the Horizontal Angle Offset measurement mode you will see the following screen.

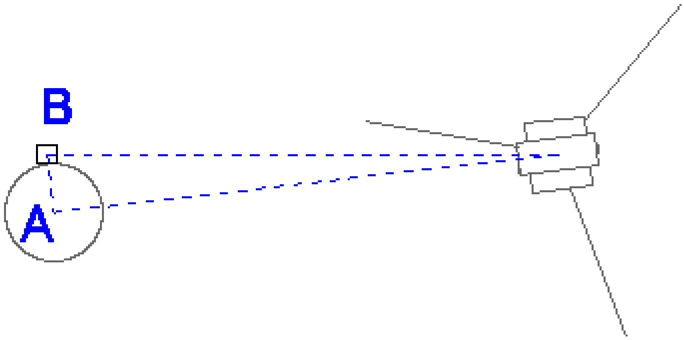


Two observations are required: one to record the angle to the center of the object, and a second to measure a distance perpendicular to the object's center.

On this screen you determine what order you will make these two measurements. All you need to do is press either the **Observe Angle** or **Observe Distance** button.

Note: You can increase the size of the text shown in the grid by setting the Text Size option in the Options screen.

Note: The Quick Measure Modes option in the Options screen will affect what happens when you press the Observe buttons when you are using the offset routines. If Quick Measure Modes is on, a measurement will automatically be taken. If it is off, the Observe button doesn't actually trigger your total station to take a measurement; it simply takes you to the map screen where you can press the  measure button once you are ready to take the measurement.



Angle (Center)

This will record the total station's horizontal angle. When measuring the angle, you should point the total station towards the center of the new point that will be created. This would be measurement "A" in the diagram shown above.

Note: You do not need to sight a prism to record the angle, simply sight the new point and press the **Observe Angle** button.

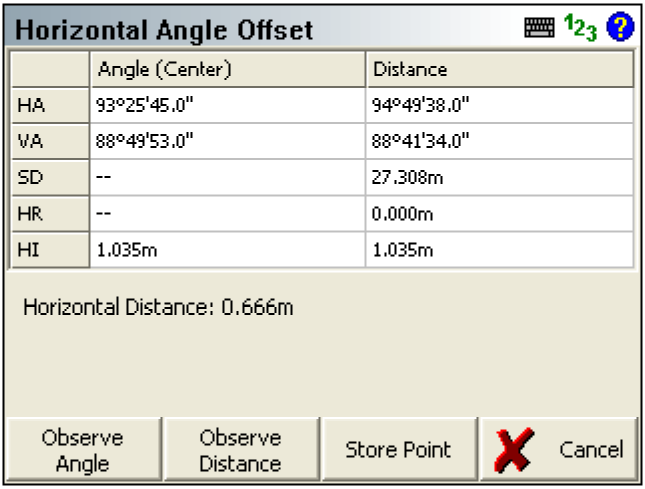
Distance

This will record a distance, measured to a prism which is located at the side of the object. You should try to locate the prism so that it is perpendicular to the center of the object and the line-of-sight from the total station. This is measurement "B" in the diagram shown above.

Note: The target height is important on this shot, because the new point will have the same elevation.

Storing the Shot

After you record your measurements you can store the new point by pressing the **Store Point** button.



After you store the point, you can continue using the offset command to record additional points, or exit it by pressing the **Cancel** button.

Raw File Record

In the raw file the OF records represent the measurements that were made and the SS record is derived using the two OF records

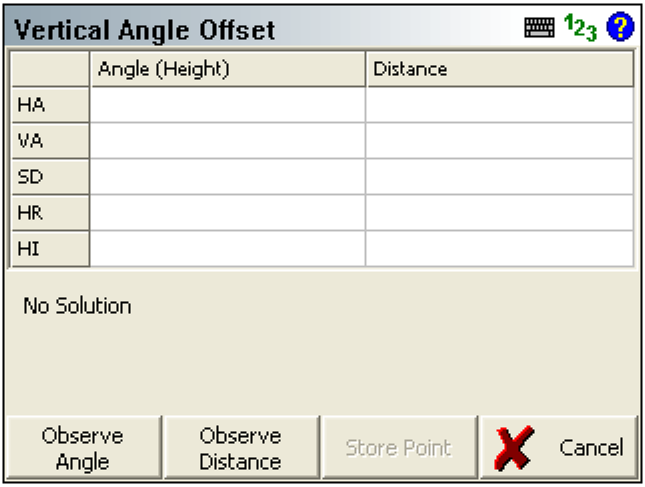
```
OF,AR94.49380,ZE88.41340,SD27.3163
OF,OL93.25450,--Right Angle Offset
SS,OP1,FP23,AR93.25450,ZE88.41340,SD27.3081,--ROAD
```

Vertical Angle Offset

Main Menu | Mapping Methods | Vertical Angle Offset

When you begin the vertical angle offset routine, you will see the following screen.

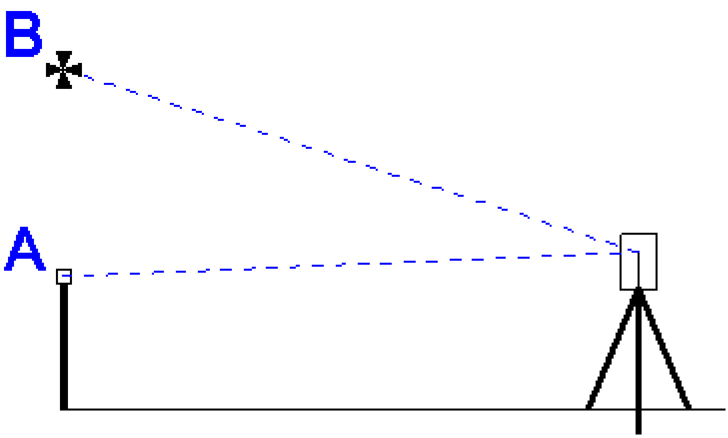
Two observations are required, one to record the top or bottom of the object, and a second to measure a distance that is directly underneath or above the new point.



On this screen you determine what order you will make these two measurements. All you need to do is press either the **Observe Angle** or **Observe Distance** button.

Note: You can increase the size of the text shown in the grid by setting the Text Size option in the Options screen.

Note: The Quick Measure Modes option in the Options screen will affect what happens when you press the Measure button when you are using the offset routines. If Quick Measure Modes is on, a measurement will automatically be taken. If it is off, the measure button doesn't actually trigger your total station to take a measurement; it simply takes you to the map screen where you can press the  measure button once you are ready to take the measurement.



For example if point "B" was the bottom of an underpass, you could measure it's height. Usually it is easier if you position the prism so it is directly beneath the point you want to shoot. You would then record a distance observation to this location which will also be the horizontal position for the new point. Then without turning your instrument, you could rotate the scope vertically so it is sighted on the bottom of the overpass. You could then record this observation which will be used to compute the elevation for the new point.

Once you've recorded these two measurements, you will be able to store the new position.

Storing the Shot

After you make your measurements, you will be able to store the new point. Press the **Store Point** button to store the point.

Raw File Record

In the raw file the OF records represent the measurements that were made. The SS record is the record that was used to compute the coordinate point for the angle offset and will be a compilation of your two shots.

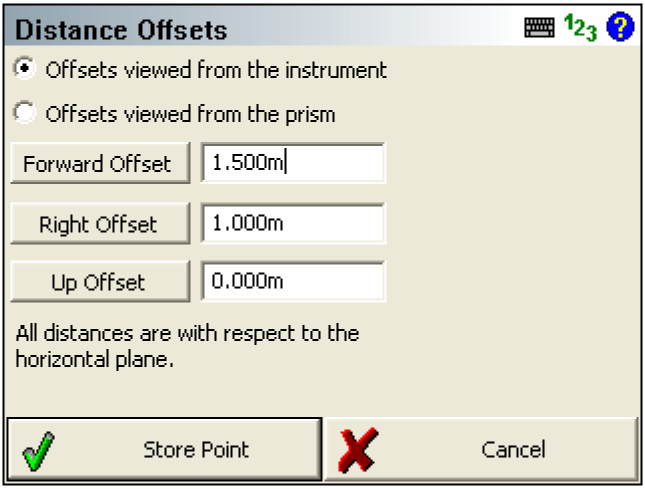
```
OF,AR52.53170,ZE91.12240,SD9.5616
OF,ZE91.12240,--Vert Angle Offset
SS,OP1,FP2,AR52.53170,ZE91.12240,SD9.5616,--<No Desc>
```

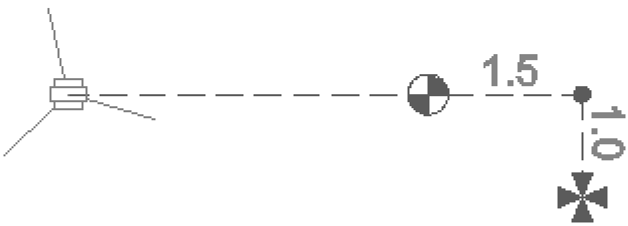
Distance Offset

Main Menu | Mapping Methods | Distance Offset

Evidence Recorder allows you to do a distance offset to specify an offset forward or backward along the line of sight, left or right, and vertically up or down.

When you choose distance offset command and take a measurement, you will see the following screen:





From this screen you can specify if the offsets are with respect to the instrument or prism.

- Offset buttons act as toggles, which allow you to easily define the direction the offset should be applied.
- A negative offset will automatically be converted to a positive value.
- The elevation of the point will be computed from your shot. This elevation will remain unchanged unless you specify a vertical offset.
- The distance is assumed to be horizontal.

Forward / Back Offset

Enter the offset distance from the shot position to the new position.

Right / Left Offset

Enter the perpendicular offset distance from the shot position to the new position.

Up / Down Offset

Enter the vertical offset distance from the shot position to the new position.

Store Point

After you have entered your offsets you can press the **Store Point** button to save the point

Raw Record

A sideshot (SS) record will be computed to represent the shot. The new SS record will use the original observation plus any offsets defined in the distance offset screen.

```
OF,AR55.00000,ZE90.00000,SD12.0000
OF,HD1.5000,--Horizontal Distance Offset
OF,LR1.0000,--Left / Right Offset
OF,VD0.0000,--Elevation Offset
SS,OP1,FP6028,AR59.14110,ZE90.00000,SD13.5370,--
```

Note: Offsets that are to the left, back or down will be stored in the raw file with a negative value.

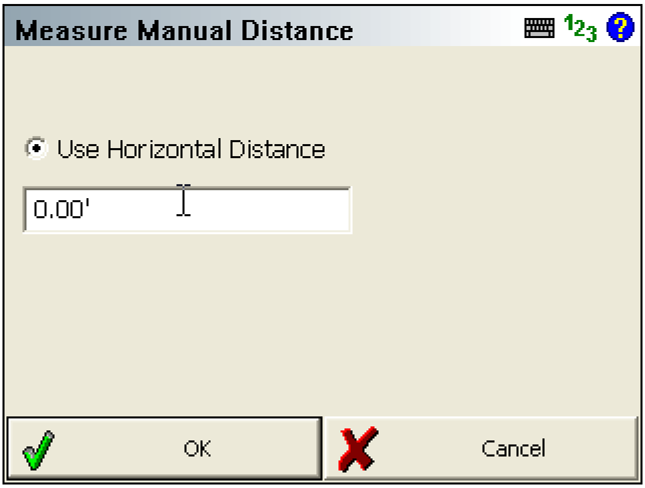
Manual Distance

Main Menu | Mapping Methods | Manual Distance

Use this mode to shoot an observation where only the horizontal and zenith angles will be measured with the instrument. You will be then prompted to enter the distance.

When you set the measurement mode to manual distance and press the measure button the horizontal and vertical angles will be read from your total station. Since this is only measuring angles, you do not need to have a prism to shoot to.

Following this you will see a screen allowing you to enter a horizontal distance.



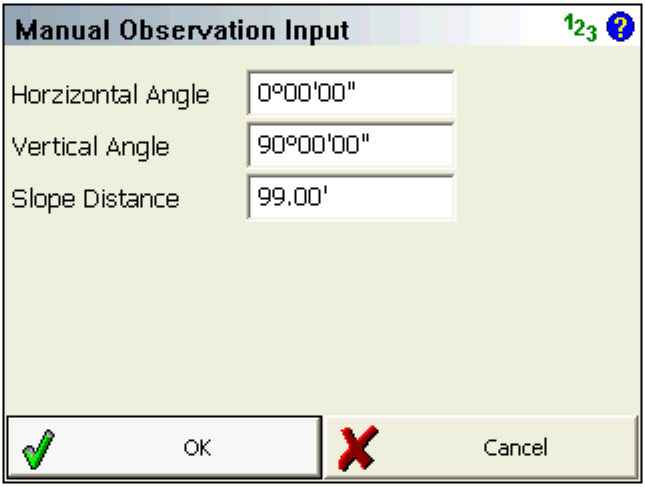
Press **OK** to save the point. You will now see the measurement info screen.

A regular sideshot record will be created in the raw file.

Manual Entry

Main Menu | Mapping Methods | Manual Entry

When you set the measurement mode to manual entry on the instrument toolbar you will be required to manually input your measurements. When you press the measure button you will see the following screen:



Press **OK** to Store the point.

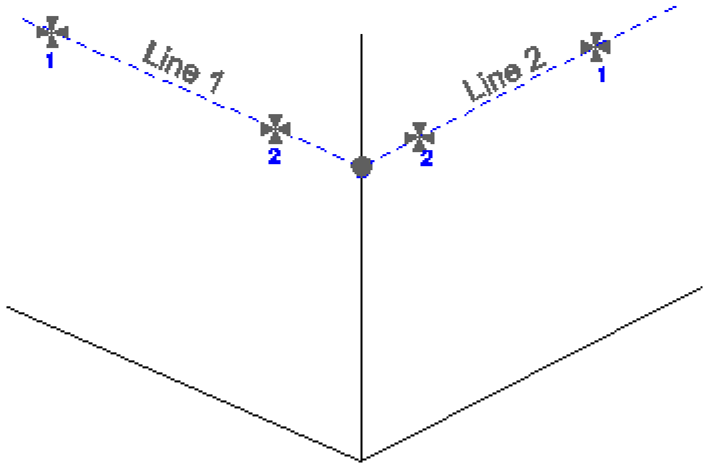
A normal sideshot record will be written to the raw file just as if you shot it with a total station.

Tip:
You can also use the Manual Entry mode for repeating your last shot. If you have previously taken a measurement, then the angle and distance values on this screen will default to those of your previous shot.

Two Line Intersection

Main Menu | Mapping Methods | Two Line Intersection

The two line intersection command is used to locate the corner of an object, whose corner can not be directly measured. Two intersecting lines will be defined by four measurements, two shots on each line. The intersection of these two lines will define the corner of the object. This routine is intended to be used with a reflectorless total station.



Measure Points

When you start the two line intersection command, you will see an empty list. Each row represents a measurement to a point on one of the two lines needed to compute the intersection.

Highlight the row that you would like to make a measurement for and simply press the **Measure** button to begin the measuring process.

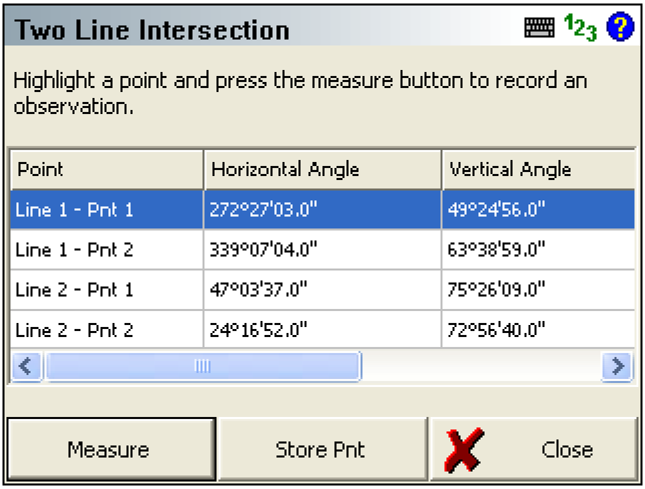
If you need to redo a measurement, simply highlight it in the list and press the measure button.

Notes:

1. You can shoot the points in any order you like, Evidence Recorder will determine what direction to go in to compute an intersection

2. The x and y values for the new point will be computed using the intersection of the two lines.

3. The two lines you define will rarely intersect at exactly the same point. The elevation of where the lines intersect will be averaged, and used as the z value for the new point.



Note: You can increase the size of the text shown in the grid by setting the Text Size option in the Options screen.

Store the Point

Once you've made measurements to the four points that will define the two intersection lines, you can press the Store Point button. This will store a point in the map screen, store a point in the database as well as record information to the raw file.

Raw File

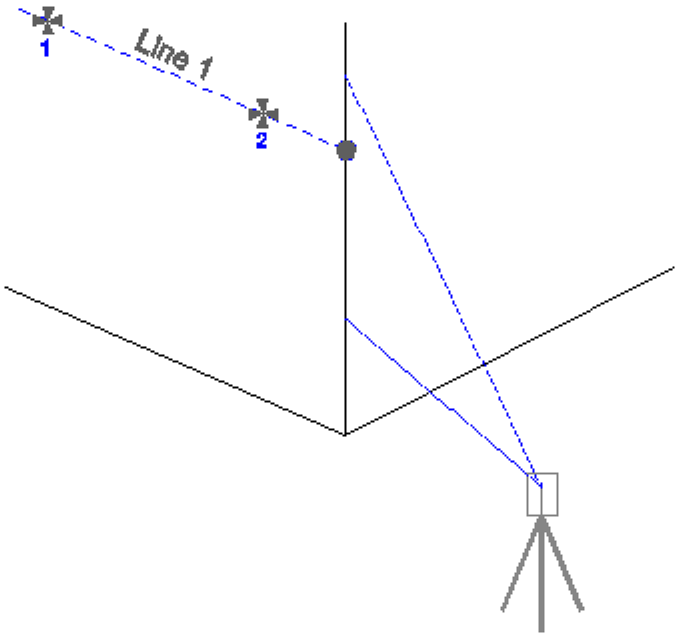
Everything about the intersection is stored in the raw file.

```
--Two Line Intersection
--HI1.340,HR0.000,AR280.55220,ZE81.15170,SD6.8350,--Pnt 1 of Line 1
--HI1.340,HR0.000,AR276.59380,ZE81.05590,SD6.4400,--Pnt 2 of Line 1
--HI1.340,HR0.000,AR287.18580,ZE81.13350,SD6.7960,--Pnt 1 of Line 2
--HI1.340,HR0.000,AR296.06280,ZE80.14520,SD6.0940,--Pnt 2 of Line 2
SP,PN3,N -0.0039,E -0.0060,EL0.5325,--
```

Line - Angle Offset

Main Menu | Mapping Methods | Line - Angle Offset

The line-angle offset command is used to define two points that will be used to establish a reference line then measure an angle that intersects this reference line, and Evidence Recorder will automatically compute the coordinate at the intersecting point.



An example of where you might use this is to locate the corner wall of a building. Simply shoot two points on one of the walls, then turn the instrument so it is pointing anywhere along the corner of the building. This command is intended to be used with reflectorless total stations.

Measure Points

When you start line angle offset command, you will see an empty list.

Highlight the row that you would like to make a measurement for and simply press the **Measure** button to begin the measuring process.

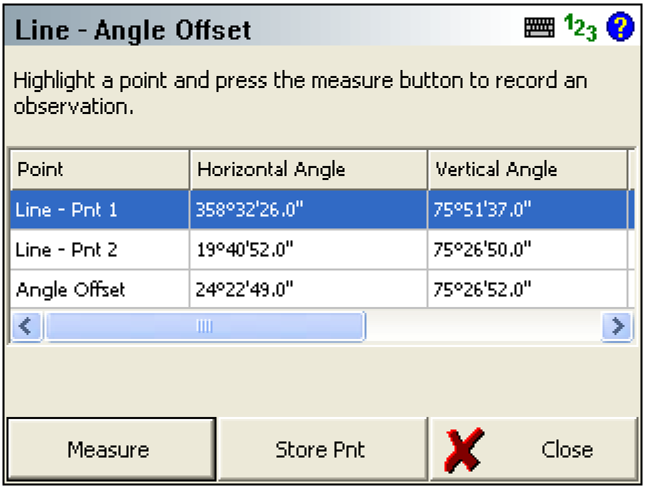
If you need to redo a measurement, simply highlight it in the list and press the measure button.

Notes:

1. You can shoot the points in any order you like, Evidence Recorder will determine what direction to go in to compute an intersection

2. The x and y values for the new point will be computed using the intersection of the line and the angle that was read.

3. The z value for the new point will be computed using the projected elevation along the reference line to the point where an intersection is computed.



Note: You can increase the size of the text shown in the grid by setting the Text Size option in the Options screen.

Store the Point

Once you've made your measurements that will be used to compute the intersection, you can press the **Store Point** button. This will store a point in the map screen, store a point in the database as well as record information to the raw file.

Raw File

Everything about the intersection is stored in the raw file.

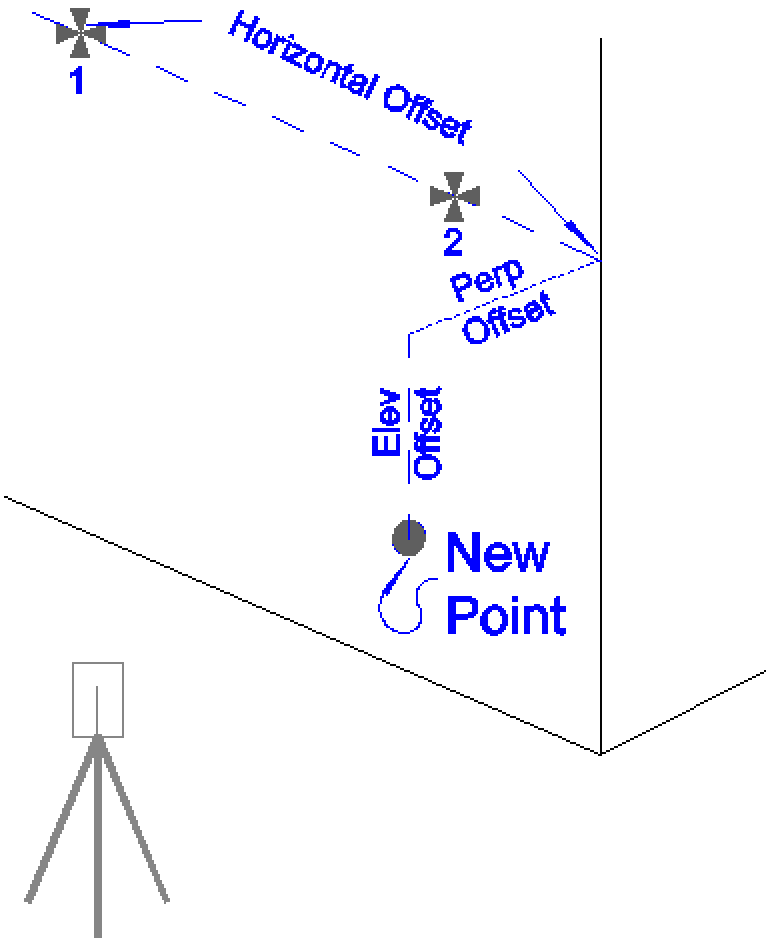
```
--Line - Angle Offset
--HI1.340,HR0.000,AR280.55530,ZE81.12550,SD6.8330,--Pnt 1 of Line
--HI1.340,HR0.000,AR277.37420,ZE80.47010,SD6.5020,--Pnt 2 of Line
--HI1.340,HR0.000,AR283.46460,ZE86.15500,--Angle Offset
SP,PN4,N -0.0050,E 0.0051,EL0.5761,--
```

Line - Distance Offset

Main Menu | Mapping Methods | Line - Distance Offset

The line distance offset command is used to define two points that will be used to establish a reference line. Once the reference line is established you can then specify offsets along the reference line to the new point.

This is a very powerful offsetting tool that can be used in a lot of different situations.



When you define your reference line, there are three types of offset that can be applied.

You can define a horizontal offset, a perpendicular offset and a vertical (elevation) offset. Each offset button is a toggle that allows you to toggle how the offset is to be applied in relation to the reference line.

When you define the offset direction, you can then enter in the value that you want to offset by.

If the horizontal offset remains set to zero, perpendicular or elevation offset will be applied in relation to point one on the reference line.

Offsets

Horizontal Offset

The horizontal offset can either be left or right of the first point on the reference line. From the total station's perspective, if the new point is to the right of point 1, then you would use the Horz Offset Right of Pnt 1. If it is to the left, then logically, it would be a left offset so you would use the Horz Offset Left of Pnt 1 setting.

Perpendicular Offset

The perpendicular offset is a horizontal distance applied perpendicular to the reference line. From the total station's perspective, when moving perpendicular from the reference line, if the new point ends up being closer to the total station, then you would set the perpendicular offset to Perp Offset Towards Inst. Alternatively, if the new point ends up being farther from the total station, then you would use the Perp Offset Away From Inst.

Elevation Offset

This is the vertical offset from the reference line to the new point. If the new point is above the reference line, then you would set this to Elev Offset Up. If the new point is below the reference line you would set it to Elev Offset Down.

Measure Points

When you start line angle offset command, you will see an empty list.

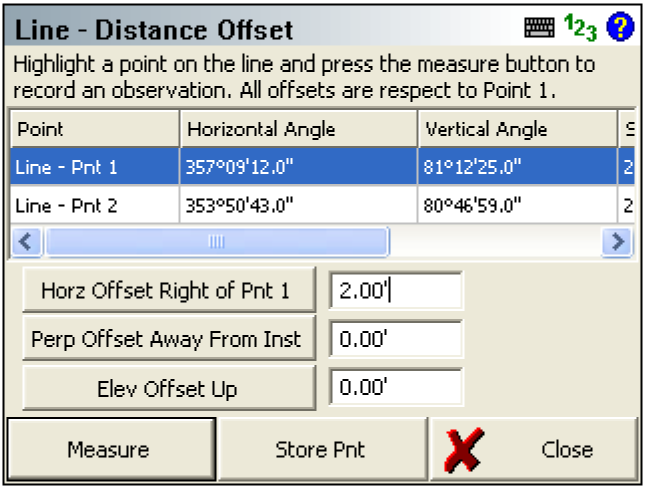
Highlight the row that you would like to make a measurement for and simply press the **Measure** button to begin the measuring process.

If you need to redo a measurement, simply highlight it in the list and press the measure button.

Notes:

1. The x and y values for the new point will be computed using the horizontal and perpendicular offsets defined by the user. These horizontal offset is referenced to point 1 on the reference line. The perpendicular offset is a perpendicular offset from the reference line.

2. The z value for the new point will be computed using the projected elevation along the reference line, plus or minus any elevation offsets defined by the user.



Note: You can increase the size of the text shown in the grid by setting the Text Size option in the Options screen.

Store the Point

Once you've made your measurements that will be used to compute the intersection, you can press the **Store Point** button. This will store a point in the map screen, store a point in the database as well as record information to the raw file.

Raw File

Everything about the intersection is stored in the raw file.

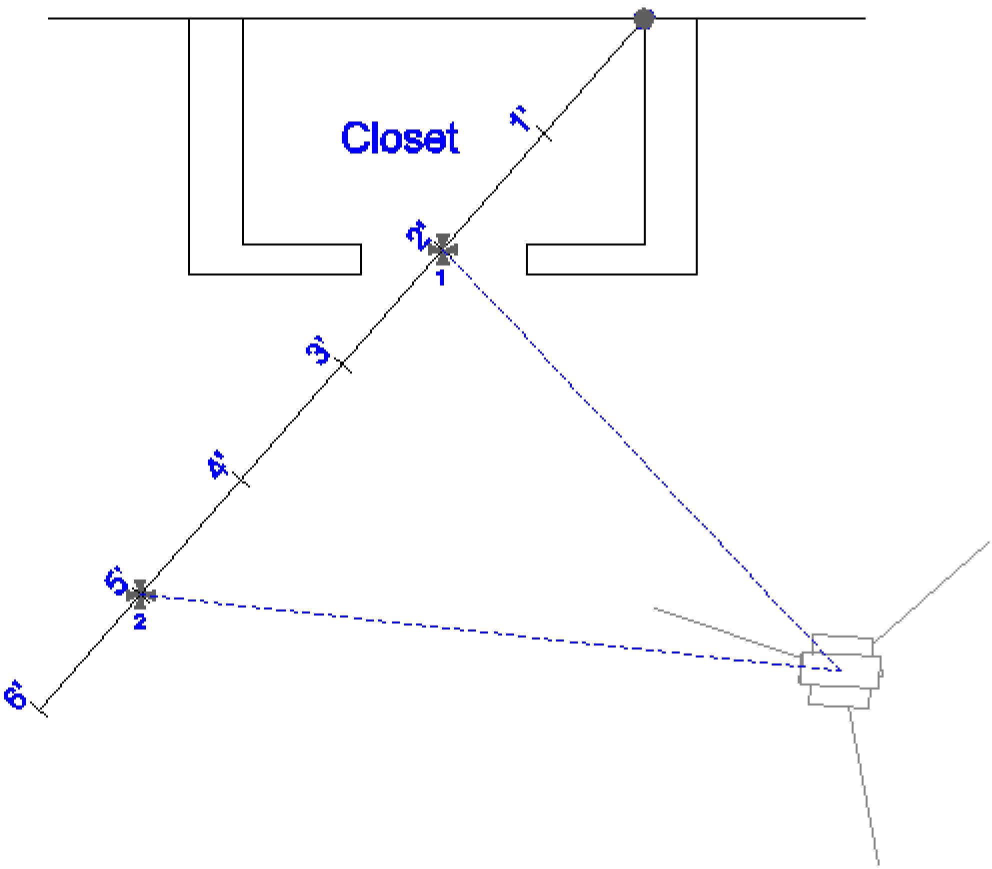
```
--Line - Distance Offset
--HI0.000,HR0.000,AR357.09120,ZE81.12250,SD22.4114,--Pnt 1 of Line
--HI0.000,HR0.000,AR353.50430,ZE80.46590,SD21.3255,--Pnt 2 of Line
--Horizontal Offset: 2.000
--Perpendicular Offset: 0.000
--Elevation Offset: 0.000
SP,PN1018,N 123.5558,E 100.2931,EL103.4035,--EV2
```

Example

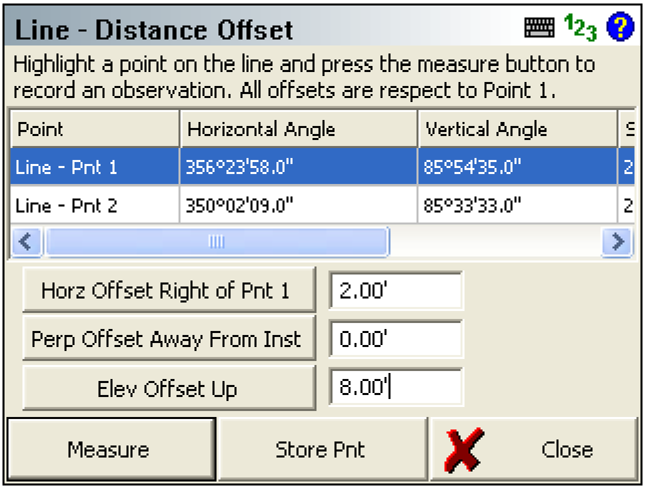
The top corner in a closet needs to be located, but it isn't visible from the total station.

So the user lays a hand tape on the floor, with the start of the tape located at the bottom corner of the closet, directly below the point that needs to be recorded. The direction of the tape is then laid out such that two measurements can be made on the tape.

Essentially, the tape now becomes the reference line. Two shots are taken, one at the 2 foot mark, and the other at the 5 foot mark.



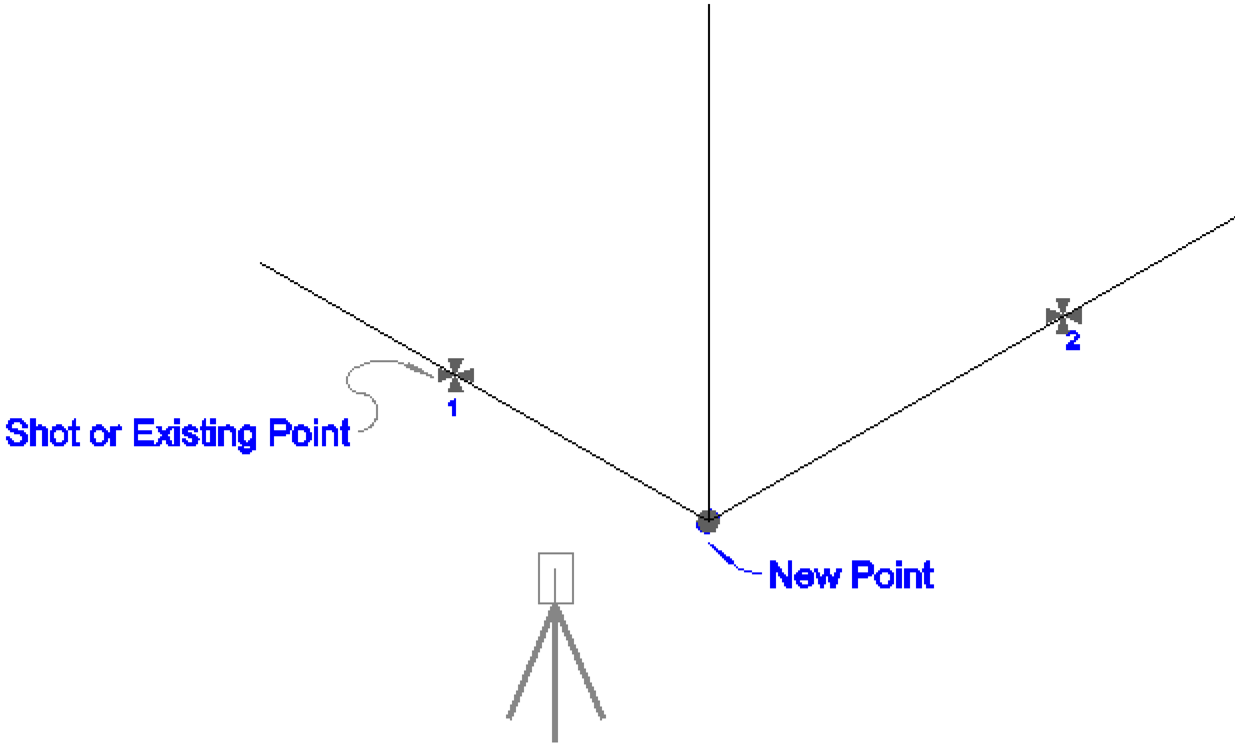
After you take your two measurements, all you need to define is the offset distances. In this example, the corner is two feet to the right of the first measurement (point 1), and 8' up from the floor. After you define the offset directions and offset amounts, you can press the **Store Pnt** button to store the new point.



Line - Perpendicular Point

Main Menu | Mapping Methods | Line - Perpendicular Point

This offset command is used to define two points that will be used to establish a reference line. Once the reference line is established, you can specify a point that will be used to compute a perpendicular intersection from the point to the reference line. The point can either be shot or you can select an existing point from your scene database or map.



An example of where you could use this is to pick up the corner of a building, whose corner can not be scene from the total station. You could take two shots on one wall to define the reference line, and then take another shot on the intersecting wall. A perpendicular intersection will be computed, which in this case would be the corner of the building.

Measure Points

When you start the command, you will see an empty list.

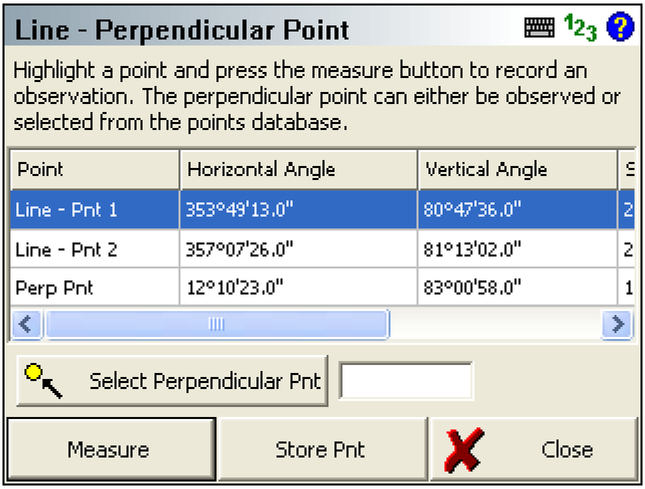
Highlight the row that you would like to make a measurement for and simply press the **Measure** button to begin the measuring process.

If you need to redo a measurement, simply highlight it in the list and press the measure button.

Notes:

1. The x and y values for the new point will be computed by computing a perpendicular intersection between the reference line and a point defined by the user.

2. The z value for the new point will be computed using the projected elevation along the reference line to the point where a perpendicular intersection occurs.



Note: You can increase the size of the text shown in the grid by setting the Text Size option in the Options screen.

Select Perpendicular Point

You can define the perpendicular point one of two ways. The first is to simply take a measurement that will define the perpendicular point. The shot is only used to make an intersection, a point isn't stored at the measurement location.

The other method is to choose an existing point that exists in your scene. Press the Select Perpendicular Pnt button to select a point.

Store the Point

Once you've made your measurements and defined a perpendicular point that will be used to compute the intersection, you can press the Store Point button. This will store a point in the map screen, store a point in the database as well as record information to the raw file.

Raw File

Everything about the intersection is stored in the raw file. In the following example, if you shot the perpendicular point you will see a third shot that records the measurement.

```
--Line - Perpendicular Point
--HI1.340,HR0.000,AR353.49130,ZE80.47360,SD21.3386,--Pnt 1 of Line
--HI1.340,HR0.000,AR357.07260,ZE81.13020,SD22.4245,--Pnt 2 of Line
--HI1.340,HR0.000,AR12.10230,ZE83.00580,SD19.8819,--Perpendicular Pnt
SP,PN6,N 123.3028,E 100.0209,EL104.7737,--RM
```

If the perpendicular point exists in your scene and you selected it using the point chooser, then you will see a store point recorded as a note. The last store point is the new point that was computed.

```
--Line - Perpendicular Point
--HI1.340,HR0.000,AR353.49520,ZE80.46560,SD21.3419,--Pnt 1 of Line
--HI1.340,HR0.000,AR357.07330,ZE81.12210,SD22.4147,--Pnt 2 of Line
--SP,PN7,N 119.2906,E 104.1611,EL103.7580,--Perpendicular Pnt
SP,PN8,N 123.3107,E 100.0504,EL104.7751,--SCR
```

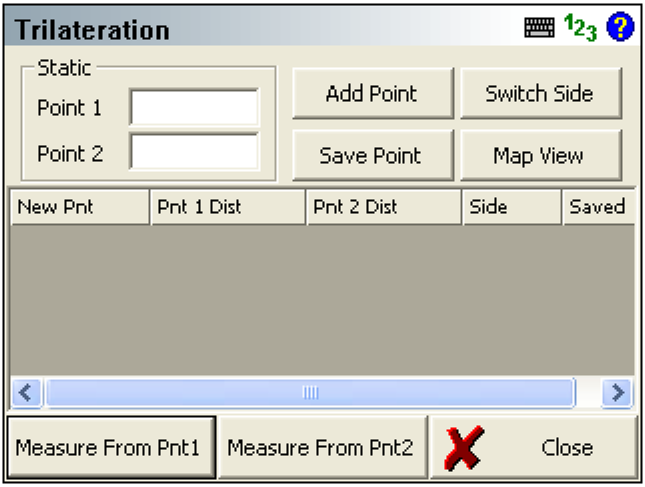
Trilateration

Main Menu | Mapping Methods | Trilateration

This routine allows you to trilaterate the position of new points by observing their distances from two known positions. The two known points will make up a baseline, from which a distance-distance intersection will be calculated to determine the position of each new point.

The primary use of this routine is for GPS users so they can locate inaccessible points. They can locate two points with GPS, and then use the Trilateration routine to locate the inaccessible points.

This routine can accept distances measured with the Leica Disto.

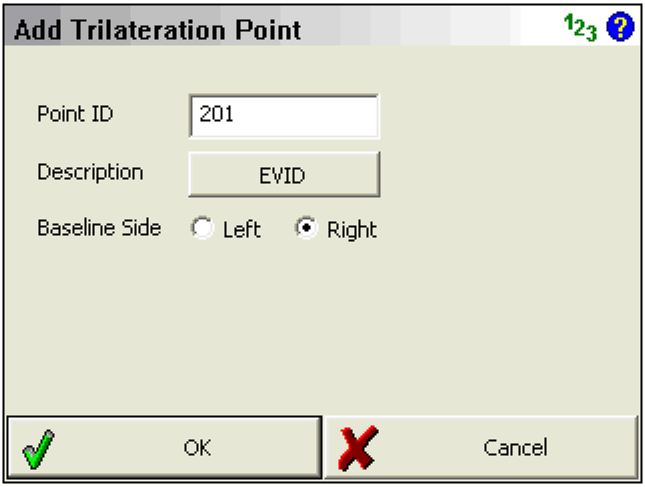


Static Points (Baseline)

Select your two baseline points, from which you will be observing the distances to the new points.

Add Point

Use this to add a new unknown point to solve for. When you press this, you will be prompted for the new point number and description, and whether it is on the left or right side of the baseline.



Save Point

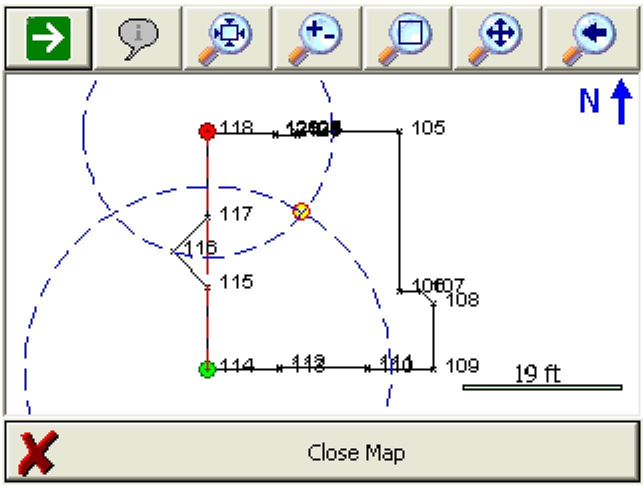
This saves the selected New Point into your project.

Switch Side

This toggles the selected New Point to the Left or Right side of the baseline.

Map View

This takes you to a map view showing your baseline, the distance measured from each point, and the calculated position of the new point.



If desired, you can press the World View button on the Display toolbar to hide unnecessary data.

Measure from Point 1

Press this to record the distance from Point 1 of your baseline to the selected New Point.

Measure from Point 2

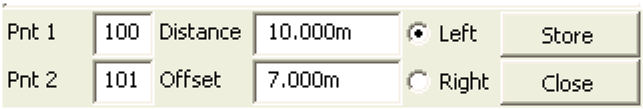
Press this to record the distance from Point 2 of your baseline to the selected New Point.

Baseline Offset

Main Menu | Mapping Methods | Baseline Offset

Overview

Use this function to define a baseline using two existing points, and calculate new points by using a distance and offset on the baseline.



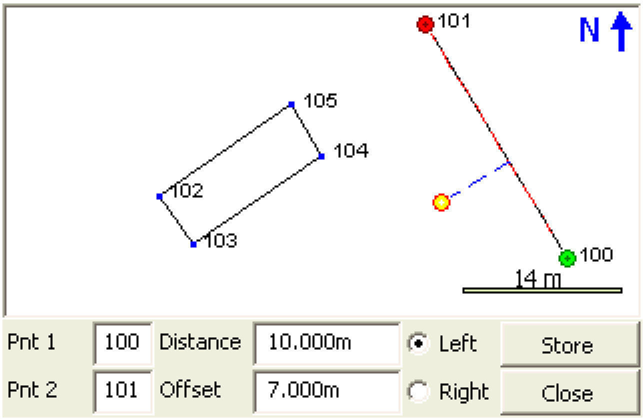
Define Baseline

You can manually type in the point numbers that define the baseline or pick the points from the map. The left/right side will be based on looking down the baseline from point 1 to point 2.

Entering a Distance and Offset

Once you've defined a baseline, you can manually enter a distance and offset and Evidence Recorder will compute a point for you. Simply type in the distance and offset values, and specify whether the offset is to the left or the right of the baseline.

You can also double tap within either the Distance or Offset fields to open up the calculator or the inverse command, or to measure the distance with a Leica Disto.

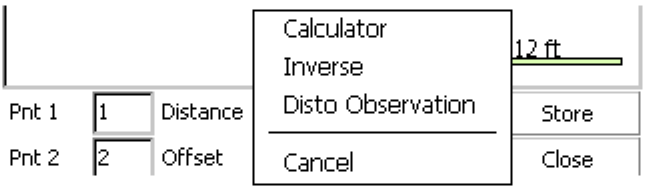


In this example, the baseline is from point 100 to point 101. You will see that an orange dot is displayed in the drawing at the location defined by the point 10m down the baseline and offset 7m to the left.

You can press the **Store** button to save the point using the Store / Edit Points command.

Disto Distances

If you have a Leica Disto, you can send distances back to the distance edit fields. Simply double tap the distance field.



Select "Disto Observation" which will then set Evidence Recorder in a "waiting" mode. Take the measurement with the Disto, press the Bluetooth icon on the Disto, and the measured distance will be accepted byEvidence Recorder and will appear in that distance field.

Vertical Scene Projection

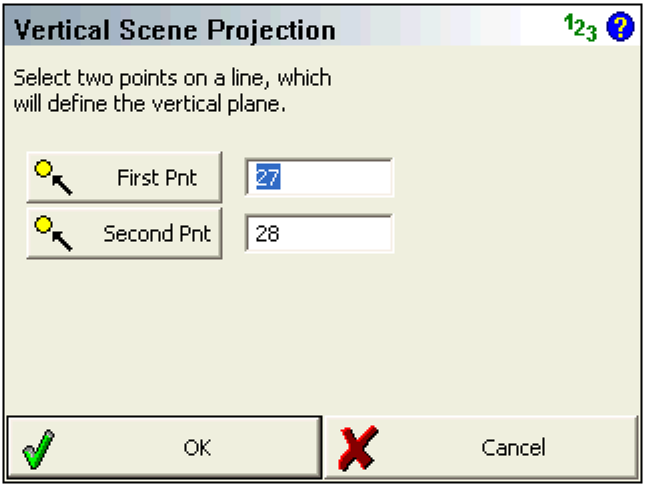
Main Menu | Mapping Methods | Vertical Scene Projection

This function is for locating multiple points on a vertical place defined by two previously measured points. The program will calculate the distance for each shot taken to an un-measurable position so that coordinates can be generated for the shot.

An example of how you could use this would be to shoot two corners of a wall to define a vertical plane. Then you could sight four corners for window on the second floor and Evidence Recorder will use the HA and VA values and compute the intersection with the vertical plane. Once the intersection is computed, the point will be stored.

Function

When the command is started you will see a screen that will allow you to specify the points that will form the baseline for the vertical plane.



Note: You need to measure and store the points that will be used to define the vertical mapping plane, prior to starting the Vertical Projection command.

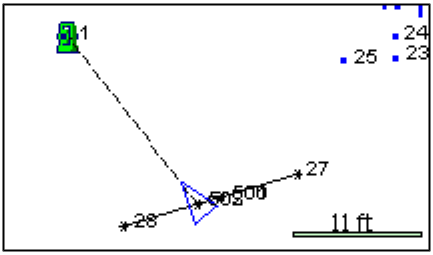
When ready to continue, press the **OK** button.

You will now be in the Vertical projection mode which will be indicated by the measurement mode button on the instrument toolbar. To begin calculating points on the vertical plane, you need to point the total station at the new point you want to create. To complete the shot, press the measure button, and then store the point.

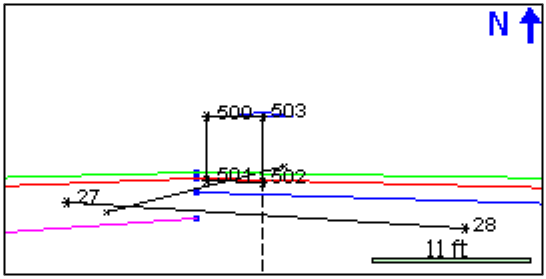
Note: You do not need to use a prism when measuring points on the vertical plane. Simply point the instrument at the point you want to create.

Since vertical planes represent 3D data, it is sometimes necessary to rotate your perspective of the project to help you see the point you're computing on the vertical plane.

Press the 3D View button on the display toolbar which will open the 3D toolbar. If you press the Planar View button, your scene will be rotated so it matches your perspective. For example, a vertical plane was defined by points 27 and 28. When the planar view option is used, you can see your work in a 3D perspective. You can now see the 4 measurements (points 500 – 503) that were made to record the position of a window on the vertical plane.

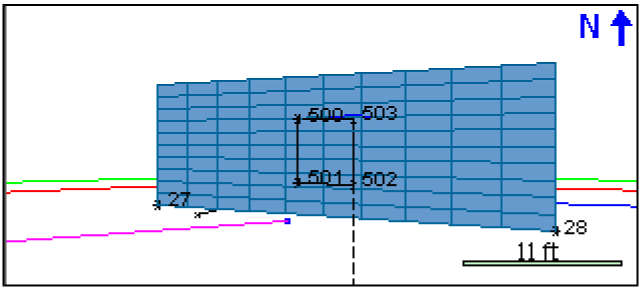


Plan View



3D Perspective

You can also hide objects that are behind the vertical plane from viewing by pressing the **Vert Grid** button. In the example below, you will see that after this is turned on, some of the line work is hidden from view.



To exit this routine, simply switch to a different measurement mode.

Raw File

Each point that is computed on the vertical plane will also have a computed sideshot stored in the raw file.

```
--VS,PA27,PB28
SS,OP1,FP503,AR142.24510,ZE78.37170,SD17.8888,--VERTICAL
```

For each shot you record you will see a note before the shot in the raw file indicating which points were used to define the vertical plane.

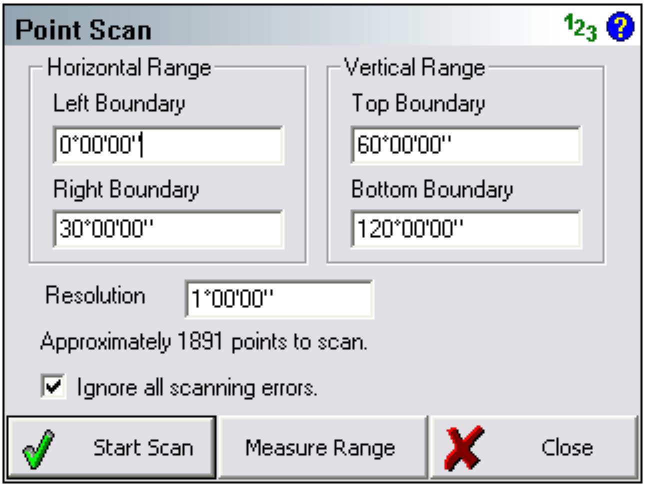
Special Notes

Vertical projection measurements will automatically be recognized by your MapScenes desktop software. Please refer to theMapScenes help file for more information regarding importing vertical projections.

Point Scanning

Main Menu | Mapping Methods | Point Scanning

Evidence Recorder supports point scanning which allows you to create a point cloud of data. To use this routine you need a reflectorless instrument that has servo motors.



To start, you will be asked to define a scan area by pressing the Measure Range button and pointing the instrument at the Bottom-Left and Top-Right corners of the area you want to confine the scanning to.

Once the scan area is defined, you can define the scan resolution by using an angular value. For example if you set it to 0°30'00", Evidence Recorder will create a pattern confined to the limits you defined, and scan at 30 minute intervals both horizontally and vertically. Once you've defined the scan area and resolution, Evidence Recorder will display an estimate of how many points will be stored.

You also can control how Evidence Recorder deals with measurement errors while scanning. If you turn on "**Ignore all scanning errors**", Evidence Recorder will ignore measurement errors and continue without interruption. If you don't turn this on, Evidence Recorder will stop and display a message allowing you to stop the scanning process, or continue on with the next measurement.

Press the **Start Scan** button to select the desired reflectorless EDM Mode and initiate scanning. Evidence Recorder will display an estimate of the time remaining for the scan to complete.

Points will be stored using the description defined in the map screen. The point number of the first point will be set to the "next available" id and will increment sequentially. The shots are stored in the raw file as sideshots so you have a record of the observations.

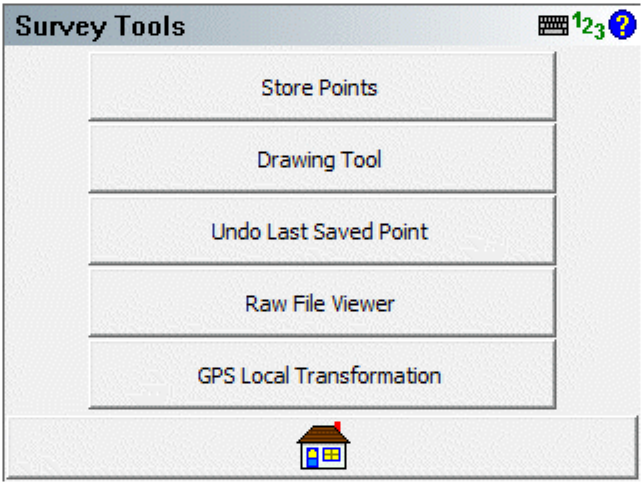
Upon completion, you will receive a summary showing the total number of successful measurements and errors received.

Mapping Tools Menu

Mapping Tools Menu

Main Menu | Mapping Tools

This menu contains functions pertaining to the data in your project.



Store Points

Use this to enter new coordinates into your scene's database. Please see the Store Points topic for more information.

Drawing Tool

This starts up the draw plan tool.

Undo Last Saved Point

Use this to "undo" up to ten of the last points that were saved. Please see the UndoLast Saved Point topic for more information.

Raw File Viewer

Use this to open a viewer that will display your current raw file. Please see the Raw File Viewer topic for more information.

GPS Local Transformation

Use this to specify transformation parameters that can be used to localize GPS data or to perform a transformation on your points collected with conventional survey methods. Please see the

Transformation Setup topic for more information.

Store / Edit Points

Main Menu | Mapping Tools | Store Points

This is a multi use function that is used by many parts of the program. Essentially any time a point needs to be stored or edited, it will done via the store point screen. Depending on what it is you're doing, certain parts of the dialog will be disabled or not editable. Following is an explanation of what you should expect.

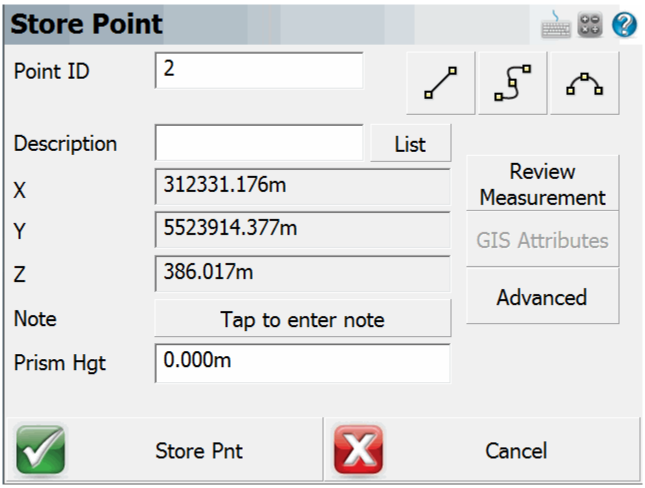
Measured or Calculated Points

Points that were measured or computed via any of our commands will automatically have their Survey Role set to **measured**. When these types of points are edited, only the description can be changed; the point id and coordinate values will be non editable. The reason we do this is so the coordinates don't accidentally get altered. You can check a point's survey role by pressing the Advanced button. You can override this by changing the survey role type to "null".

Certain commands in Evidence Recorder are allowed to ignore the measured survey role, such as the overwrite option that is triggered when you try to store a point using a point id that already exists in the project.

Manually Entered or Imported Points

Point that have been manually entered or imported from an ASCII file for example, will have their Survey Role set to **null**. Points that have a Survey Role set to null can be edited except for the point id.



Point ID

Enter in the point number you would like to assign to the point. Note that by default it will display the next available point number. If you're editing an existing point, this field will not be editable.

Line/Spline/Arc Buttons

This is used to toggle on and off the draw lines function. When turned on as you shoot your points in the drawing they will be connected with a line. This button can only be used if you're storing a point after a measurement.

This is used to toggle on and off the draw curvy lines button. This function will draw a best-fit curve through your points as you shoot them. This button can only be used if you're storing a point after a measurement.

3-Point arcs can be started using the same method as for a Line or Curvy Line. This button can only be used if you're storing a point after a measurement.

Description

This is where you can enter a description for your point. This field is associated with your Automap library so as soon as you start typing in descriptions, a list appears displaying descriptions that match what you've entered. Simply press your **Enter** Key to accept your entry. You can also have Evidence Recorder notify you when the description you've entered isn't in your Automap library. To do this you need to make sure you have the **"New Description Prompt "** toggle turned on in the Options menu.

List Button

Press this to open the AutoMap Library screen. You will be able to choose the description that will be assigned to the point.

X, Y, Elevation

Input your coordinate values in these fields when manually creating a new point using the add point function. If measuring a point, you can not manually enter or edit coordinates.

Note Button

Press this to enter a note or record an audio note for the point. See the Notes topic for more information.

Prism Hgt (Height) / GPS Hgt (Height)

When storing a point measured by a total station, you can set the Prism Height. When storing a point measured by a GPS receiver, you can set the true or measured Antenna Height.

Review Measurement Button

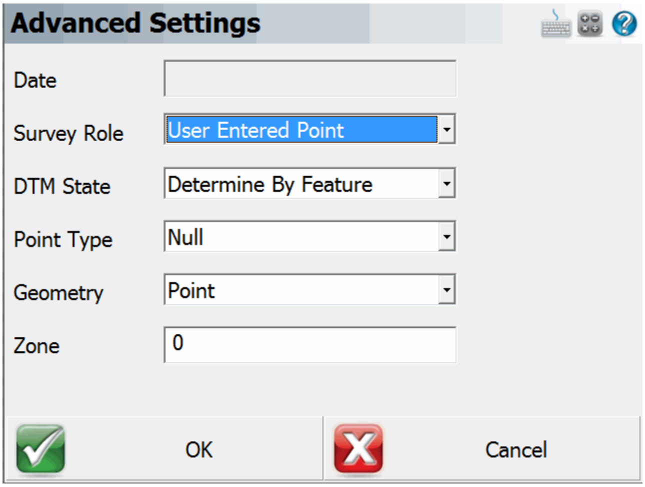
This button is available when you have taken a measurement, and can be used to review the distance and angles measured.

GIS Attributes Button

If you loaded a feature list, then this button will be enabled. It allows you to access the your feature list so you can edit feature attributes.

Advanced Button

Use this button to add or edit advanced tags to your point.



DTM Attribute: Use this to choose the DTM attribute that will be written to the database file. Ground is the default value, if you don't want the point used in Evidence Recorder's modeling commands, you can set the DTM value to Do not Include.

Survey Role: Use this to edit the survey role for the point. By default points that are measured will have a role of Measured. Points with a Measured role type are read only when they're viewed with the store and edit screen.

Point Type: Use this to enter a point type that will be written to the database file.

Geometry: Use this to enter a geometry type that will be written to the database file.

Zone: Use this to enter a zone number that will be written to the database file.

Drawing Tool

Main Menu | Survey Tools | Drawing Tool

Line Toolbar | Pencil button

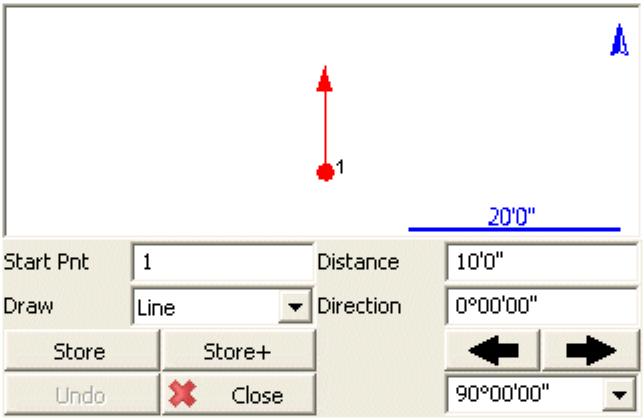
Point Toolbar | Pencil button

This tool allows you to quickly draw a plan such as a pad or a building footprint into your project, and is typically used to recreate plans from a paper hard-copy. You can use this to either calculate new points, or to connect existing points that are already in your project.

You must have at least one point in your project before you can start, to define the starting position for your plan. If a point does not yet exist (for example if this is the first command you run in a new project), you will be prompted to store a new point before you can proceed.

Line Mode

Use the Line draw mode to add straight line segments to your figure.



Start Point

Specify the start point for the new segment.

For starting a new plan, this should be set to an existing point in your project, typically a corner that you will begin drawing the plan from.

As you continue adding subsequent points/segments to your plan, you will see the Start Point field automatically advance for you.

Distance

Specify the length of the line segment you wish to draw.

Direction

Specify the direction (Azimuth or Bearing) of the line segment you wish to draw. The easiest way to do this is to use the right/left arrow buttons, which will increment/decrement the direction value by the amount shown in the pulldown list below the arrows. You can select a common angle from the choices in the list (90, 45, or 30 degrees), or you can type any value if you need to increment it by some other amount.

Store

After you have defined the segment to add, press this to store the new point and line segment into your project.

Store+

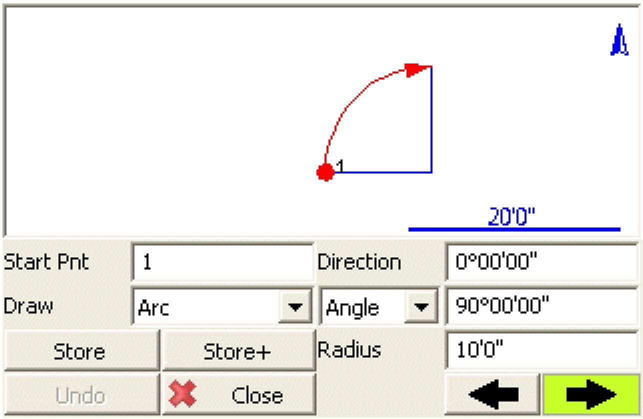
This does the same as the Store button, but you will see the Store/Edit Point screen. Use this to confirm or view the coordinates, or to specify a description.

Point by Line Mode

This is the same as the Line mode, except that when you press Store or Store+ it will only store the point, without drawing the line segment.

Arc Mode

Use the Arc draw mode to add arc segments to your figure.



Start Point

Specify the start point for the new segment.

For starting a new plan, this should be set to an existing point in your project, typically a corner that you will begin drawing the plan from.

As you continue adding subsequent points/segments to your plan, you will see the Start Point field automatically advance for you.

Direction

Specify the direction (Azimuth or Bearing) of the **tangent in** to the arc segment you wish to draw. This will default to either the direction of the previous line segment or the tangent out of the previous arc segment, so as long as your arc is tangential to the previous segment you will not need to change this value.

Angle / Chord Length / Arc Length

Specify one of the three available methods to define your arc:

- Angle: Enter the interior delta angle of the arc.
- Chord: Enter the chord length of the arc.
- Arc: Enter the arc length of the arc.

Radius

Specify the radius to define your arc.

Clockwise / Counter-Clockwise Arrows

Use the Right/Left arrow buttons to define whether the arc rotates clockwise or counter-clockwise.

Store

After you have defined the segment to add, press this to store the new end and radial points, and draw the arc segment into your project.

Store+

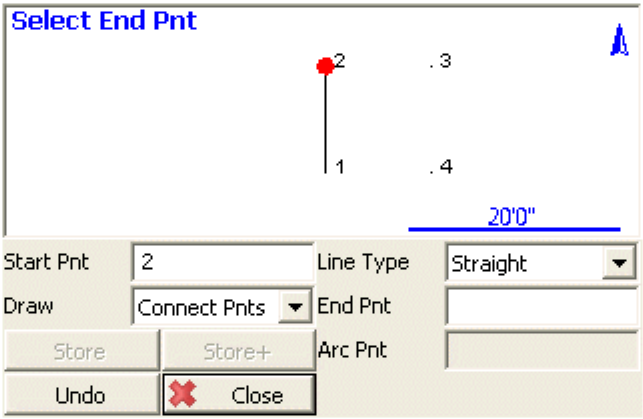
This does the same as the Store button, but you will see the Store/Edit Point screen. Use this to confirm or view the coordinates, or to specify a description.

Point by Arc Mode

This is the same as the Arc mode, except that when you press Store or Store+ it will only store the points, without drawing the arc segment.

Connect Points Mode

This mode lets you draw lines/arcs by connecting points that already exist in your project.



Start Point

Specify the start point for the new segment.

For starting a new plan, this should be set to an existing point in your project, typically a corner that you will begin drawing the plan from.

As you continue connecting subsequent points to your plan, you will see the Start Point field automatically advance for you.

Line Type

Specify one of the five available methods to define your next figure segment:

- Straight: this will draw a straight line between the specified Start Point and End Point.
- Arc (CW): this will draw a clockwise arc between the specified Start Point and End Point, with the specified Radial Point.
- Arc (CCW): this will draw a counter-clockwise arc between the specified Start Point and End Point, with the specified Radial Point.
- Arc (3Pnt): this will draw an arc (clockwise or counter-clockwise) between the specified Start Point and End Point, going through the specified intermediate Arc Point (any point directly on the arc, does not need to be the midpoint).
- Spline: this will draw a curvey line between the specified Start Point and End Point.

Store / Store+

The Store and Store+ buttons are disabled for this mode, because new points are not being calculated for your project. The line or arc segment will be automatically drawn into your project after you specify its parameters.

Undo

Press the **Undo** button to Undo the last segment you computed, removing both the point and/or the line segment (as appropriate) from your project. You can undo multiple steps.

Note, there is no Redo function.

Close

Press the **Close** button to exit from the Draw Plan command, and you will be returned to the map screen.

Undo Last Saved Point

Main Menu | Mapping Tools | Undo Last Saved Point

Use this to undo the last point that was saved. When you undo a point, a record is written the raw file indicating which point was undone. Also, when this function is used, the user is asked to enter a comment as to why they decided to undo the point. His or her comment is saved in the raw file. You can only undo up to the last ten points that have been stored.

When you select the undo command, you will be asked to confirm that you would like to undo the last saved point.

Press **Yes** to undo.

Press **No** to cancel.

If you select Yes, you will be asked to enter a comment explaining why you want to undo the point. Your comment is saved in the raw file. If you choose not to enter a comment, a note will be written to the raw file indicating that you didn't enter a comment.

Press **OK** to finish.

The point is now removed from the project's map and database, but the original measurement data and the reason for the undo remains in the raw file.

Raw File

Using the example from above, this is what you will see in the raw file.

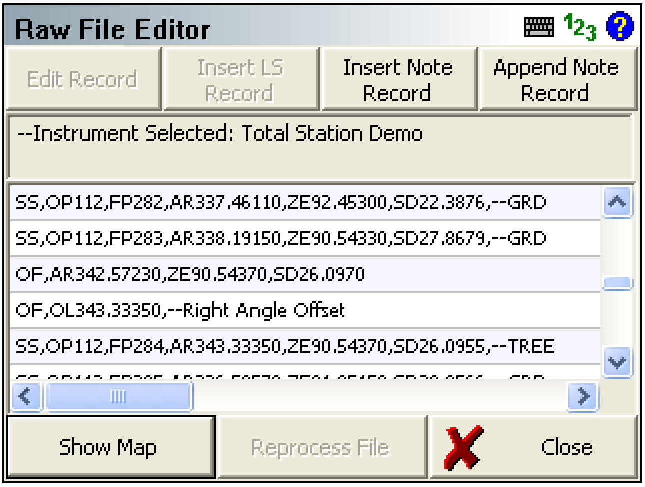
```
SS,OP34,FP36,AR270.00000,ZE121.16010,SD2.5060,--TABLE
--Undo PN 36
--Reason for Undo: Accidentally pressed the measure button
DP,PN36
```

The first line is the shot to point 36. The second and third lines are comments indicating which shot was undone and the reason for the undo. The last line is a delete point record which is used to remove the point from the database.

Raw File Viewer

Main Menu | Mapping Tools | Raw File Viewer

Use this button to open the raw file viewer. The raw file editor displays your scene's raw file and allows you to review it in an easy to read grid. For reference on the different raw file record types that Evidence Recorder uses you can refer to the Raw File Record Types topic for more information.



Insert Note Record

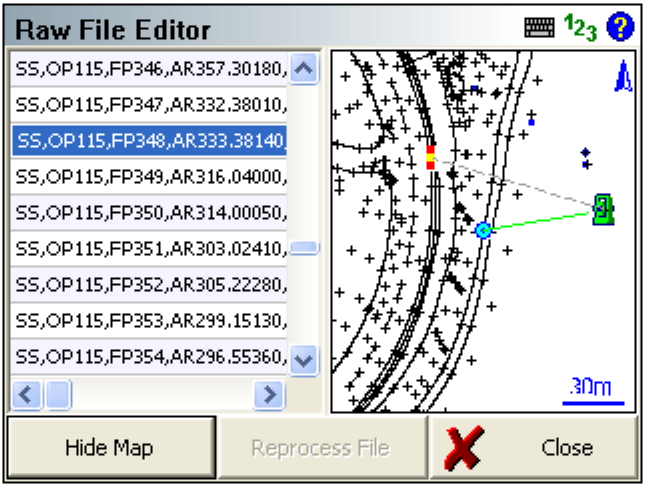
This will allow you to enter a comment. The comment will be inserted above the current line you have highlighted in the grid.

Append Note Record

This will allow you to enter a comment. The comment will be appended to the end of the raw file.

Show Map

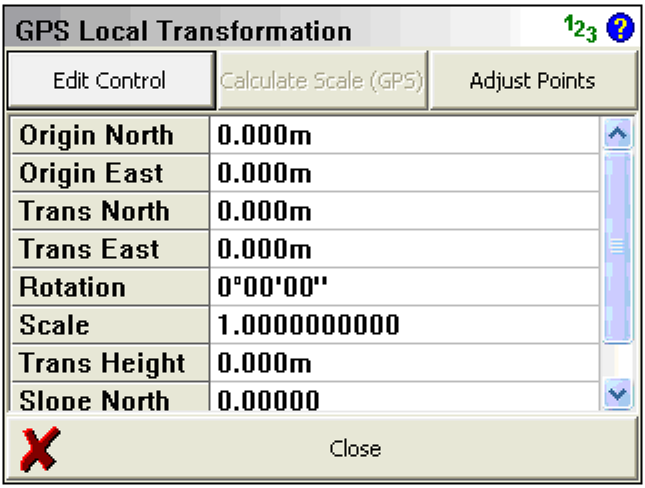
This will change the raw file viewer to a split-screen display with a map view of your scene on half of the screen. When certain raw file records are selected, you will be shown the reference and backsight points, and the selected measurement record will be highlighted on the map.



GPS Local Transformation

Main Menu | Survey Tools | GPS Local Transformation

Evidence Recorder includes a flexible localization utility. The first thing you need to do is specify the points that will be constrained. You can do this by using the **Edit Control** button. Once you've specified your constrain points, you can press the Calculate Parameters button to compute transformation parameters. The parameters will then be saved to the raw file when the OK button is pressed.



Control Points

You can think of the control points as a "fixed" coordinate system that you are wanting to transform your measurement to. For example if you are using a GPS receiver and you want to localize to a local system, your local points would be considered control points for the constraining. The points you derive with GPS need to be transformed, so these are the measured points.

All you need to do is press the **Edit Control** button to display the constrain point screen. Using the Add and Edit Control buttons you can define what points you want to use for control. You can then specify what point you want to constrain the control to, and you can also select what component of the measured point to use, either it's horizontal position, vertical position or both. An "X" indicates that the particular component should not be used in the transformation calculation.

Delta values are shown to help you determine how well your points match up with one another. Once you specify your constrain points, you can press the Calculate Parameters button which will compute the transformation parameters. The deltas shown are the differences between the control points and the measured points if the transformation parameters were applied.

When you're satisfied with the transformation parameters, the control point pairs and transformation parameters will be saved to the raw file upon exit.

Transformation Settings

Calculate Parameters

Use this to compute the transformation parameters. You have to have constrain point pairs defined before you will see anything calculated.

Calculate Scale (GPS)

When this is used it will compute the combined scale factor at your current position. This can be used while you're connected to either a base or rover receiver. The combined scale factor is computed by multiplying the map scale by the ellipsoid scale factor. The combined factor can then be applied to grid distances to get ground distances.

While programming the base, if you use the one point localization option to help you localize into a user defined local system, Evidence Recorder will automatically compute a combined scale factor and a translation. For the most part, the scale factor will not change very much over the workable range of your RTK system. But if you want to update the combined scale factor you can.

Adjust Points

Use this to compute new coordinates for your GPS derived points. Each GPS observation you store is saved in the raw file as an EP record, which is essentially a WGS84 position. If you want Evidence Recorder to compute new Cartesian or local coordinates for the GPS observations, you can. Simply press the Calculate Params button and Evidence Recorder will scan your raw file and will recompute new coordinates using the EP records, and will apply your transformation parameters to the coordinates.

An example where this could be used is after you've measured some constrain points to help you localize to a user (local) coordinate system. After you compute your transformation parameters you will still have two coordinate systems, one with the local coordinates and one with the GPS (UTM or SPCS) coordinates. It is usually beneficial to transform the GPS derived constrain points so they are now in the local system.

Do Not Calculate Scale (Checkbox)

If this is checked, Evidence Recorder will not compute a scale factor and will force it to a value of 1.0.

Do Not Calculate Vertical Slopes (Checkbox)

If this is checked then Evidence Recorder will not compute any slope values.

Parameters

Origin North and East

This is the centroid of the measured coordinates, or simply the average northing and easting of your measured constrain points.

Trans North and East

If you move the measured points, so that the centroid of your measured points is equal with the origin of the local system. The translation north and east is the shift amount that needs to be applied to your measured points to move them into the local system.

Rotation

This is the rotation amount between your measured and local systems.

Scale

This is the scale difference between your measured and local systems.

If you turn on "Do not calculate scale" these values will be equal to 1.0.

Trans Height

This is the vertical shift that will be applied to the transformation. It is computed by averaging the elevation differences between your point pairs. Positive translation heights will be added while negative heights will be subtracted.

Slope North & Slope East

This is an indication of or much your measured system is inclined in the north and east directions. The value that is displayed is the slope of each direction. For example if the difference in elevation along the north axis of your measured system is 3 meters, and the length of it is 19 meters, the slope of the axis will be (rise over run) or 0.15789. Negative slopes indicate that it is inclined downward from the origin, and positive slopes are inclined upwards.

You should only use vertical slopes if you do not have a geoid model to use for your point's elevations. Use this feature with care as it can cause distortions in your elevations if it is used incorrectly.

You can force Evidence Recorder to not compute these values by turning on the "Do no calculate vertical slopes" toggle.

Impact on new measurements

Once the transformation parameters have been adequately determined, all future GPS measured coordinates will automatically be transformed. All constrained point pairs will be saved along with the transformation parameters for the current project upon exiting the utility and will be saved to the raw file.

Notes:
- Only use a local transformation if necessary.
- GPS heights should be applied with a suitable geoid model. If possible only use vertical bias (Trans Height) because solving for slope North and slope East with inadequate control can severely distort the parameters.
- Use redundancy for confirming parameters.

Raw File Information

Whenever you compute transformation parameters, they're automatically written to the raw file when you exit the command.

Once the parameters are saved, they will automatically be read in again if you use the Transformation Command. Evidence Recorder will always start at the top of your raw file and will process the calibration records as they're found.

The control points you define are saved as a CT record and will always have an associated RP record. RP records store the measured coordinate that you defined for the control point.

Following the calibration points are a HA and VA records which store the transformation parameters that were computed. Following is an example of what you might see in your raw file.

```
--Calibration Points
CT,PN15,DM4,RH6.708,RV0.000
RP,PN15,N 11.0000,E 30.0000,EL0.0000,--
CT,PN16,DM4,RH5.243,RV0.000
RP,PN16,N 30.0000,E 30.0000,EL0.0000,--
CT,PN17,DM4,RH6.708,RV0.000
RP,PN17,N 30.0000,E 11.0000,EL0.0000,--
HA,N 23.6667,E 23.6667,TH6.6667,TE6.6667,RT0.000000000,SC1.0000000000
VA,PV3,N 23.6667,E 23.6667,LZ0.0000,SO0.00000,SA0.00000,GN
```

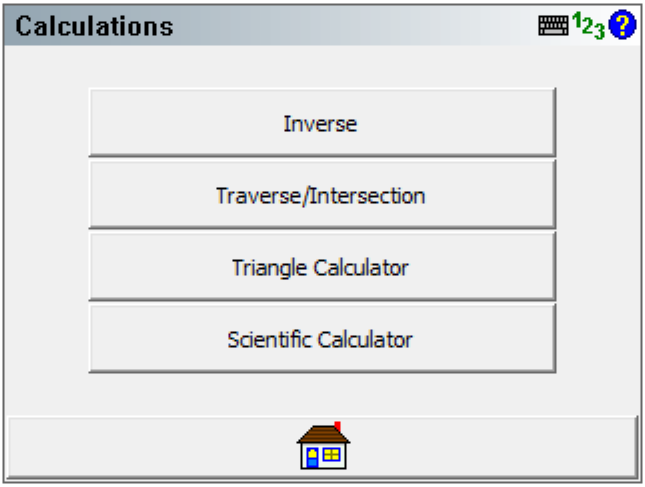
An important thing to remember is that if any of the original measured points you used in the calibration change, you need to go back into the transformation command and edit the corresponding control point. You need to re-define the measured coordinates for the control point, then press the **Calc Parameters** button to update the transformation parameters.

CALCULATIONS MENU

Calculations Menu

Main Menu | Calculations

The calculation menu contains COGO based functions that can be used to compute points.



Inverse

Use this to inverse between points. Please see the Inverse topic for more information.

Traverse / Intersection

This will open the Traverse / Intersect toolbar. You can enter in directions and distances and perform common intersections such as bearing / bearing, distance/distance and many more. Please see the Traverse / Intersection topic for more information.

Triangle Calculator

Use this to compute a triangle solution using known angles or distances. Please refer to the Triangle Calculator topic for more information.

Coordinate Calculator

Use this tool to help you convert Geodetic coordinates to Cartesian coordinates. Please refer to the Coordinate Calculator topic for more information.

Scientific Calculator

Use this to display the RPN calculator. Please see the Calculator topic for more information.

Traverse / Intersection

Main Menu | Calculations | Traverse / Intersection

Evidence Recorder includes a powerful COGO function that allows you to compute new points. The toolbar allows you to specify the solution type, point numbers, directions and distances. When you enter enough information to compute a solution it will be draw visually on the screen. Pressing the Store Pnt button will store the point that you just solved.

Input

You can type in the point ID, or select a point by tapping on the map screen.

The direction and distance fields support the direction and distance recall feature. To learn more about this, refer to these topics in the Calculating With Evidence Recorder section.

If you are measuring distances with a Leica Disto, just double tap in the distance field and choose the "Disto Observation" option.

Disto Distances

If you have a Leica Disto, you can send distances back to the distance edit fields. Simply double tap the distance field and select "Disto Observation" which will then set Evidence Recorder in a "waiting" mode. Take the measurement with the Disto, press the Bluetooth icon on the Disto, and the measured distance will be accepted by Evidence Recorder.

Calculator

You can open our calculator by double-tapping the Direction or Distance fields then pressing Calculator on the Keypad screen.

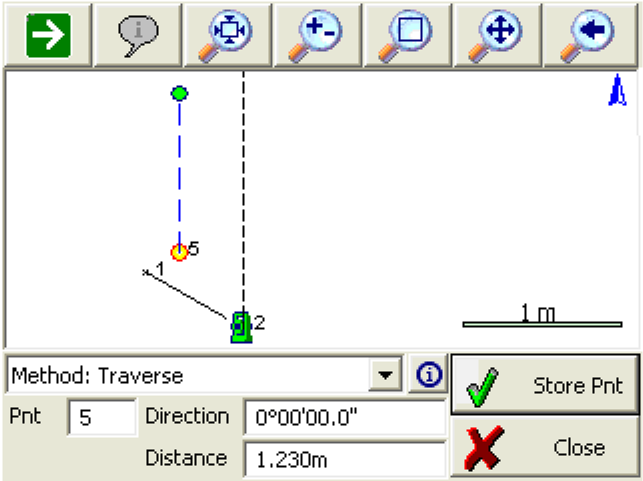
Information

You can review the results of your calculation by pressing the "i" information button. For intersections with multiple solutions, the results of both solutions will be displayed.

Solution Methods

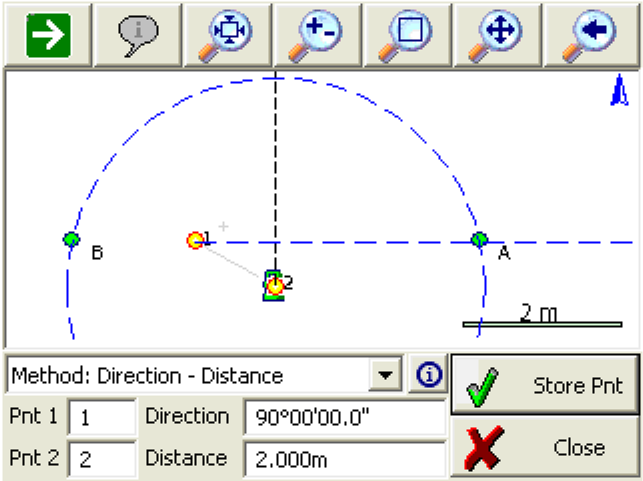
Method: Traverse

The traverse method allows you to define a direction and distance that you want to traverse. After you solve your point and store it, it will become the new start point.



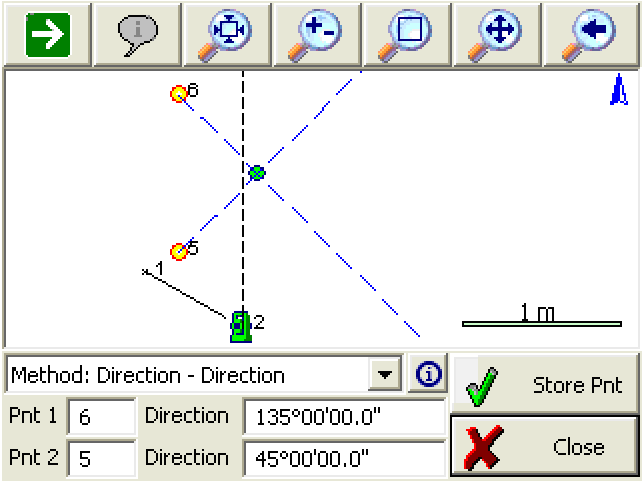
Method: Direction - Distance

This will compute two solutions based on the values you input. To store the solution, simply press the **Store Pnt** button which will ask you what solution to use, in this case either **A** or **B**.



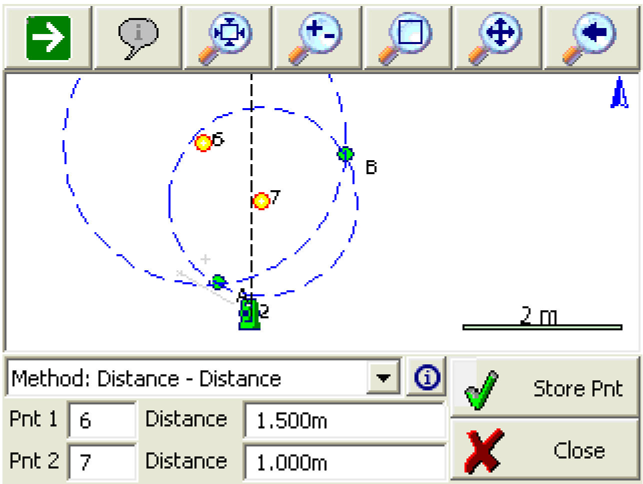
Method: Direction - Direction

Use this to compute a new point by computing an intersection using directions. After you enter your known values a solution will be displayed on the screen. To store the solution, simply press the **Store Pnt** button.



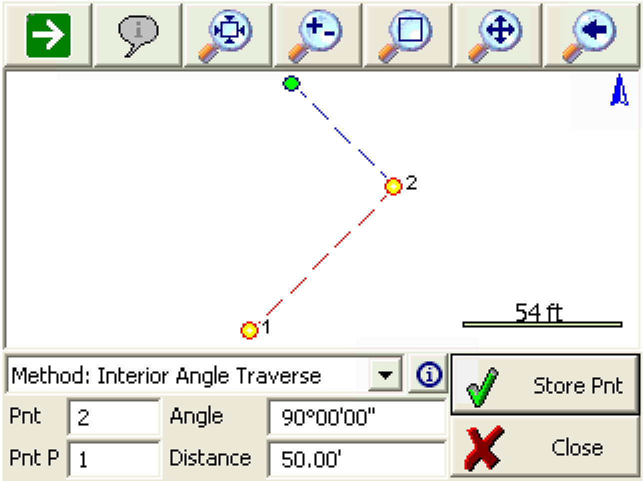
Method: Distance - Distance

Use this to compute a new point by computing an intersection using distances. This will compute two solutions based on the values you input. To store the solution, simply press the **Store Pnt** button which will ask you what solution to use, in this case either A or B.



Method: Interior Angle Traverse

Use this to compute a new point by turning an angle from another point. Enter the current (setup) and previous (backsight) points, then the interior angle and the distance. Positive angles will be interpreted as angle right; if you want to turn an angle left, enter the angle as negative. To store the solution, simply press the **Store Pnt** button. After the point is stored, the points will automatically leapfrog so you can continue traversing by just entering the next interior angle and distance.



COGO Results

Every calculation you make is written to the file called CogoCalcs.txt located in your project folder.

Please see the COGO History Viewer topic for more information.

Inverse

Main Menu | Calculations | Inverse

This command will calculate for you the inverse between two points. It will display the horizontal / slope distance, direction, vertical distance and slope between the two points. You do not need to have a line drawn between the points to use the inverse command.

A large font can be set for the results toolbar and COGO results. Please refer to the Options topic for more information.

All inverse information is saved in the COGO History file called CogoCalcs.txt located in your project folder. Please refer to the COGO History Viewer topic for more information.

Traverse Inverse

Function

1. Start the inverse command and make sure the **Traverse Inverse** and **Line** options are selected.
2. Enter or choose the first point to calculate from, and press your enter key to continue on to the next point.
3. Now you can choose or enter the second point and press your Enter button to compute an answer.
4. The inverse information will be displayed in the results toolbar.
5. In the COGO history you will see the following information for the two points:

```
-------------------------------
INVERSE
-------------------------------
PNT 44 to 8 (HD 1352.84' @ NA 323°48'03.1")SD 1353.39' GR -2.85' VD -
38.51'AR 323°48'03.1"
```

Your first inverse will calculate a right angle from north to the direction you inversed.

Multiple Lines

After you have specified two points, you can continue inversing from point to point. You should notice that the point id previously in the 2nd point field will move to the 1st point field, and the cursor will remain in the 2nd point field allowing you to quickly enter in your next point.

If you continue inversing from point to point, the angle right will not be referenced to north, but the last leg you inversed. Essentially this is computing a clockwise angle between the current and last legs you inverse.

Perimeter Distance and Area

If you close back to the first point, a perimeter distance and enclosed area will also be computed.

Radial Inverse

You can compute radial inverses from a point.

Function

1. Start the inverse command and make sure the **Radial Inverse** and **Line** options are selected.
2. Enter or choose the 1st point to calculate from, and press your enter key to continue on to the next point.

3. Now you can choose or enter the 2nd point and press your Enter button to compute an answer.
4. The inverse information will be displayed in the results toolbar.
5. You can now continue computing radial inverses. The 2nd point field will remain activated allowing you to continue entering point numbers.

Radial Arc

You can compute the curve information for an arc defined by three points, PC (start), Radius Point, and PT (End)

Function

1. Start the inverse command and make sure the **Rad Arc** button is turned on.
2. Enter or choose the starting point for the arc in the Start field, and press your enter key to continue on to the next point.
3. Enter or choose the radius point in the Arc field, and press your enter key to continue on to the next point.
4. Enter or choose the end point for the arc in the End field, and press your enter key to compute an answer.
5. The inverse information will be displayed in the results toolbar.

Three Point Arc

You can compute the curve information for an arc defined by three points along the arc.

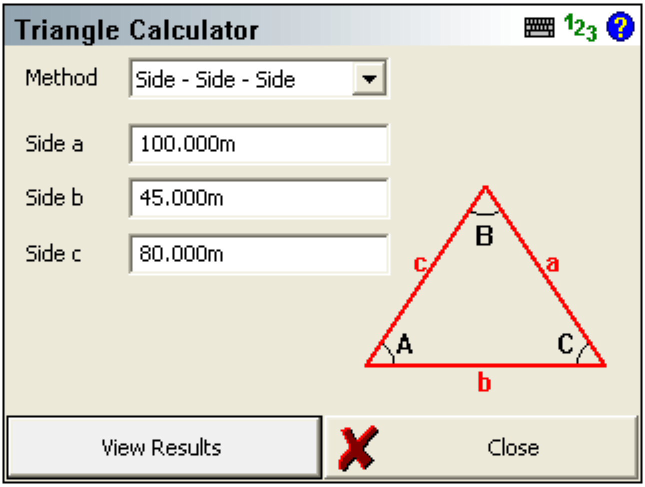
Function

1. Start the inverse command and make sure the **3 Pt Arc** button is turned on.
2. Enter or choose the starting point for the arc in the Start field, and press your enter key to continue on to the next point.
3. Enter or choose the point that falls on the arc in the Arc field, and press your enter key to continue on to the next point.
4. Enter or choose the end point for the arc in the End field, and press your enter key to compute an answer.
5. The inverse information will be displayed in the results toolbar.

Triangle Calculator

Main Menu | Calculations | Triangle Calculator

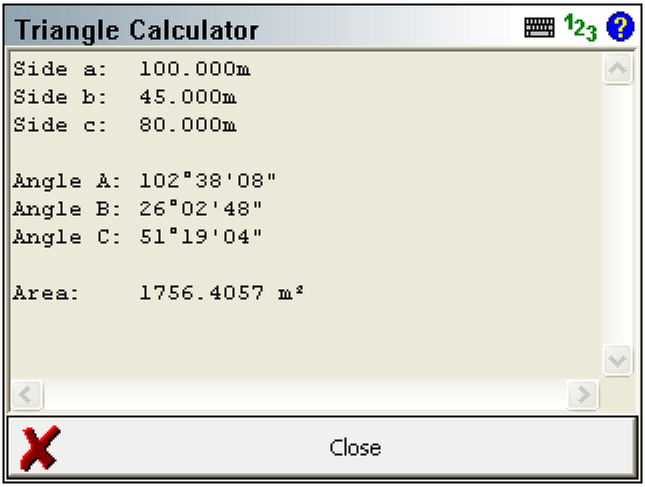
The triangle calculator can be used to solve unknown sides or angle of a triangle given three know components.



You first need to select a Method for the triangle calculation. There are 5 methods available to choose from and you can decide what method to use based on your known triangle components.

- **Side-Side-Side**: Use this when you know the length of the three sides of a triangle.
- **Angle-Side-Angle**: Use this when you know two angles and the distance between them.
- **Side-Angle-Angle**: Use this when you know two angles and one side. The know side must not lie in between the two known angles.
- **Side-Angle-Side**: Use this when two sides and the angle between them are known.
- **Side-Side-Angle**: Use this when two sides and one angle that is not between the known sides are known. This method will produce two solutions.

After you choose the solution method and enter the known components of the triangle, press the **View Results** button to complete the calculation.



Coordinate (Geodetic) Calculator

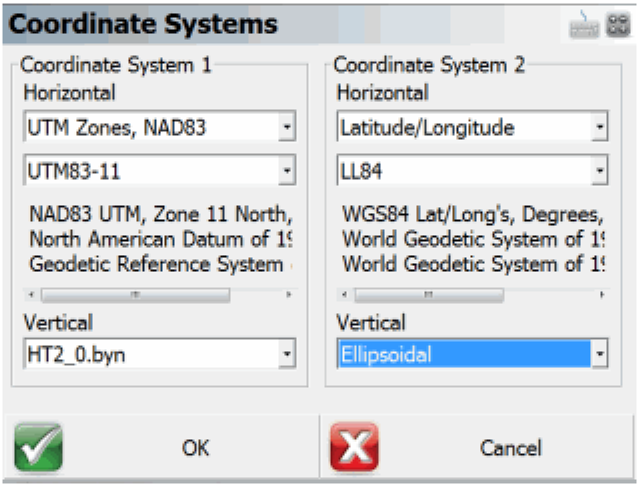
Main Menu | Calculations | Coordinate Calculator

The coordinate calculator is used to convert Geodetic coordinates to Cartesian coordinates and vice versa. You can also use it to convert ellipsoid heights to orthometric heights if you have defined a geoid.

Define Coordinate Systems

Press the Select Coordinate Systems button to select the coordinate system and geoid you want to use.

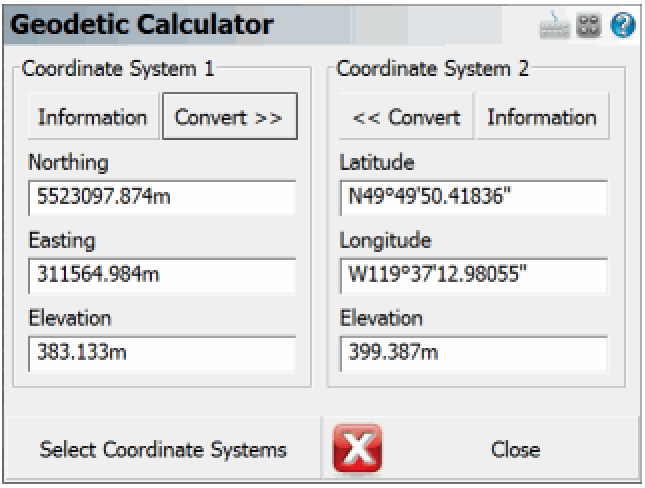
In the following example the user chose to convert between UTM Nad 83 Zone 11 to Lat and Long WGS 84. Also as the same time the elevation is being converted from an ellipsoid height to a ortho-metric height using the Canadian HT2.0 geoid.



Convert Coordinate

Once you've defined the coordinate systems you want to convert between you can then enter some numbers.

Press the Convert button to make the computation.



Information

Press the information button to see details about the coordinate system such as grid scale, and convergence angle.

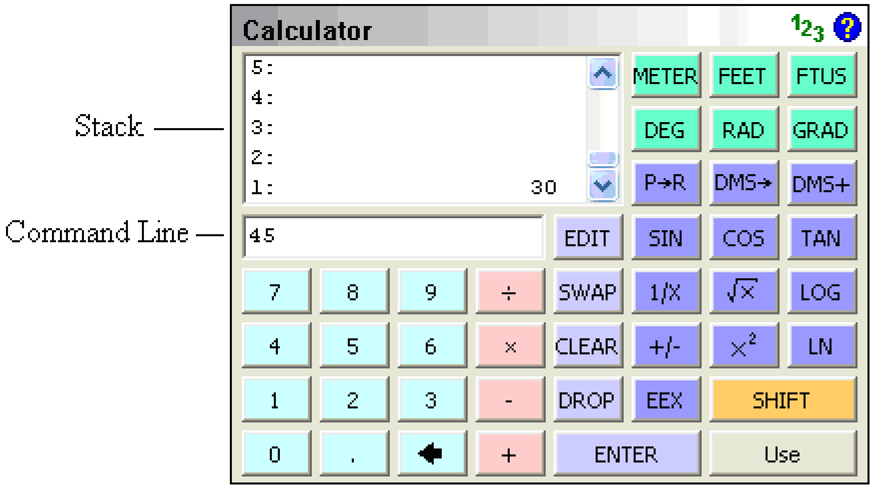
Calculator

Main Menu | Calculations | Scientific Calculator

Evidence Recorder includes an RPN (Reverse Polish Notation) Calculator. RPN Calculators (such as the HP48) are stack based, where values are popped from a stack, and the results of the calculation are pushed back onto the stack. This type of calculator may seem foreign at first, so several examples of its use are included below.

The calculator can be launched several ways:

1. By tapping inside certain numeric entry fields to directly open the Calculator. This will copy whatever value is currently in that entry field into the calculator's command line, and the calculated value can then be automatically copied back into the field which the calculator was launched from.
2. By tapping inside most text and numeric entry fields to open the keypad, and then tapping the "Calculator" button on the keypad. This will copy whatever value was currently in that entry field first into the keypad and then into the calculator's command line. The calculated value can then be automatically copied back into the keypad and then to the field which the calculator was launched from.
3. Or it can be launched through the menu system.



The Stack

The stack is a series of memory storage locations for numeric data. Each location in the stack is called a Level. There are a maximum of 20 Levels available in the Stack.

As you push new values on the stack, the stack grows to accommodate them: the new data moves into level 1, and older data is pushed to a higher level. Data in level 1 will move to level 2, data in level 2 to level 3, and so on. Any data in level 20 will be bumped off the stack if new data is added, and is unrecoverable. As you pop data off of the stack, the number of levels decrease as data is automatically bumped down to lower levels.

The stack display always shows levels 1 to 5, and you can use the scroll bar to view the other levels up to level 20.

The Command Line

The command line is where you enter or edit data. You can enter up to 20 characters in the command line.

The command line is closely tied to the stack. You use it to enter or edit data and then process it, and the results are pushed onto level 1 of the stack.

Function

Numeric Entry

You can enter values using the keys provided on the calculator or use the numeric keys on your keyboard.

[0] - [9] - Types numeric data into the command line

[<--] - Types a backspace into the command line. You can also use the Backspace key on your keyboard.

Stack Operations

Functions are available to help you manipulate data that is currently stored in the stack.

[EDIT] - Pops data from level 1 of the stack into the command line, bumping all other data down one level.

[SWAP] - Switches positions of the data in levels 1 and 2 of the stack. Or you can highlight a level on the stack and pressing the Swap button will move the value to level 1.

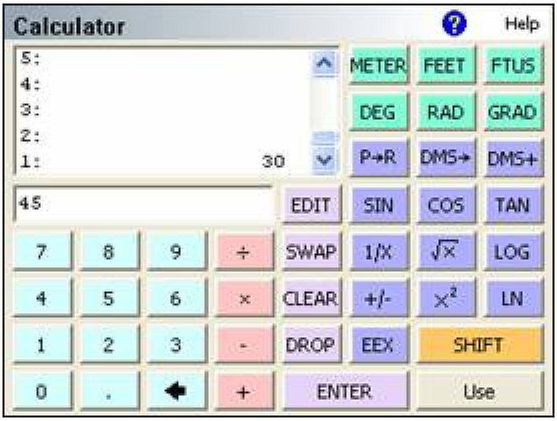
[CLEAR] - Deletes all data from the stack.

[DROP] - Deletes the data in level 1 of the stack, bumping all other data down one level.

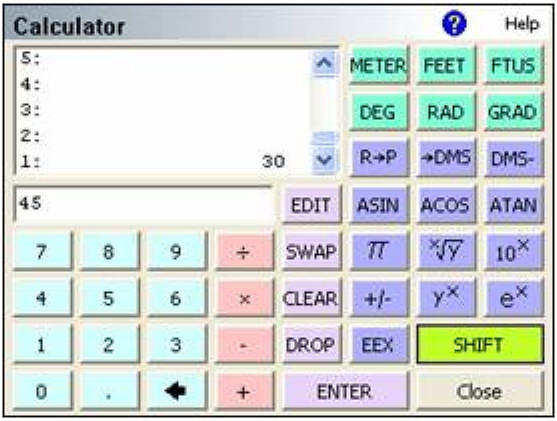
[ENTER] - Pushes data from the command line into level 1 of the stack, bumping all other data up one level. You can also use your keyboard's Enter key.

The Shift Button

[SHIFT] - This is used to show the reverse functions of each operation.



When the shift key highlighted in yellow, it Indicates that the shift key is currently depressed, press it again to un-shift



The OK/Cancel button

[OK] copies the value in level 1 of the stack back into the either the keypad or the numeric entry field which was double-tapped to launch the calculator, and closes the calculator.

[Cancel] closes the calculator, without copying the data anywhere

> **Note:**
> All data will remain on the Stack, and will be available the next time the calculator is re-started. On Exiting from Evidence Recorder, all data on the stack is written out to a file called CalcStack.bin and will be automatically re-loaded when Evidence Recorder is re-started.

Converting Units

[METER] , [FEET] , [FTUS]

Assigns a linear unit to the data in the Command Line, and places it on the Stack. If the Command Line is empty, then the unit is applied to the data currently in Level 1 of the Stack.

[DEG] , [RAD] , [GRAD]

Assigns an angular unit to the data in the Command Line, and places it on the Stack. If the Command Line is empty, then the unit is applied to the data currently in Level 1 of the Stack.

> **Note:**
> You do not need to press enter before pressing a unit button, it will automatically move whatever data is in the Command Line into Level 1 of the Stack.

Example: determine the metric equivalent of 15 feet:

[1][5] [FEET] [METER]

```
1:     4.572_m
```

Example: determine the gradient equivalent of 45 degrees:

[4][5] [DEG] [GRAD]

```
1:     50_grad
```

Basic Mathematical Operations

[+] , [-] , [x] , [/]

Performs a mathematical operation on the data in Level 1 and Level 2 of the Stack, or on Level 1 and the Command Line.

> **Note:**
> You do not need to press [ENTER] before pressing a math button, it will automatically move whatever data is in the Command Line into Level 1 of the Stack.

Example: determine the sum of 2 + 3

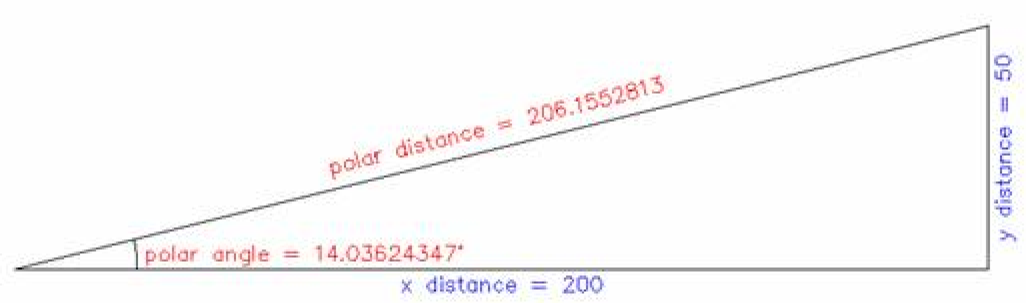
```
[2] [ENTER] [3] [+]
1:     5
```

Advanced Mathematical Operations

> **Note:**
> You do not need to press [ENTER] before pressing a math button, it will automatically move whatever data is in the Command Line into Level 1 of the Stack.

[P>R] , [R>P]

Convert data between Polar and Rectangular notation



Example: Convert 206 feet at 14° to Rectangular components.

```
[2][0][6] [ENTER] [1][4] [P->R]
2:     199.8809196
1:     49.83591049
```

Example: Convert x=200, y=50 to Polar components.

```
[2][0][0] [ENTER] [5][0] [SHIFT] [R->P]
2:     206.1552813
1:     14.03624347_°
```

[DMS>] , [>DMS]

Converts data between Degrees/Minutes/Seconds and Decimal Degrees

Example: Convert from 12° 34' 56" to decimal degrees

```
[1][2][.][3][4][5][6] [DMS->]
1:     12.58222222_°
```

Example: Convert from 12.3456° to degrees, minutes, seconds

```
[1][2][.][3][4][5][6] [SHIFT] [->DMS]
1:     12.204416
```

[DMS+] , [DMS-]

Add or subtract DMS angles

Example: 12° 34' 56" + 1° 2' 3"

```
[1][2][.][3][4][5][6] [ENTER] [1][.][0][2][0][3] [DMS+]
1:     13.3659
```

[SIN] , [COS] , [TAN] , [ASIN] , [ACOS] , [ATAN]

Trigonometric calculations

Example: Cosine of 12.3456°

```
[1][2][.][3][4][5][6] [COS]
1:     0.9768757205
```

Example: Cosine of 12° 34' 56"

```
[1][2][.][3][4][5][6] [DMS->] [COS]
1: 0.9759844006
```

Example: Arc Cosine of 0.3456°

```
[0][.][3][4][5][6] [SHIFT] [ACOS]
1:     69.78157371
```

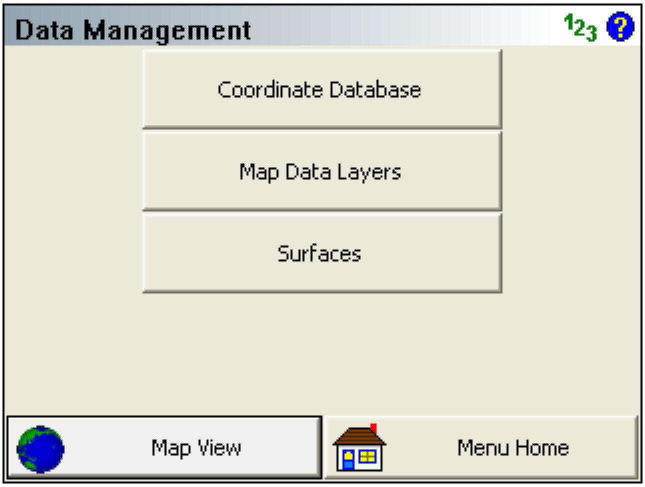
[1/X]	Inverse of X. Example: 1/4 = [4] [1/X] = 0.25
[√x]	Square Root of X. Example: ROOT(9) = [9] [√x] = 3
[LOG]	Logarithm (Base 10). Example: LOG(1000) = [1][0][0][0] [LOG] = 4
[+/-]	Change Sign. Example: [3] [ENTER] [+/-] = -3
[x^2]	X Squared. Example: 3^2 = [3] [x^2] = 9
[LN]	Natural Logarithm. Example: LN(148) = [1][4][8] [LN] = 4.997212274
[EEX]	Scientific Notation. Example: 3x10^4 = [3] [EEX] [4] = 30,000
[pi]	Pushes pi onto the stack. Example: [SHIFT] [pi] = 3.141592654
[x√y]	X'th root of Y. Example: 3ROOT(8)= [8] [ENTER] [3] [SHIFT] [x√y] = 2
[10^X]	10 to the X. Example: 10^3 = [3] [SHIFT] [10^X] = 1000
[y^X]	Y to the X. Example: 2^3 = [2] [ENTER] [3] [SHIFT] [y^X] = 8
[e^X]	Exponent of X. Example: e^1 = [1] [ENTER] [SHIFT] [e^X] = 2.718281828

DATA MANAGER MENU

Data Manager Menu

Main Menu | Data Manager

This menu allows you to organize, manipulate and view the different data types that may be associated with your Evidence Recorder projects.



Coordinate Database

Use this to open the points database. From here you will find numerous tools that can be used to edit your points. Please see the Coordinate Database topic for more information.

Map Data Layers

Use this to import DXF, and georeferenced raster image files into your project, and to control the visibility of database layers and any files that you may have associated with your project. Please see the Map Data Layers topic for more information.

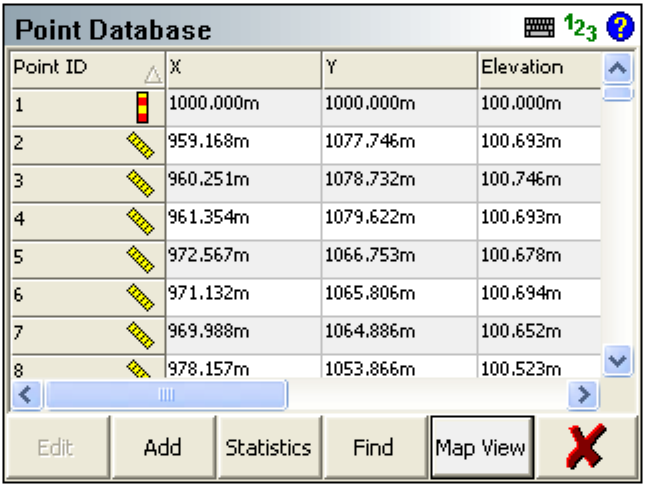
Surfaces

Use this to import DTM surface files into your project, view and edit your DTM surfaces, and perform volume calculations. Please see the Surfaces topic for more information.

Coordinate Database

Main Menu | Data Manager | Coordinate Database

The coordinate database dialog is used to edit and manipulate your coordinates in your project database. The list will display all coordinates currently stored in the database and the data can be sorted by pressing the column headers.



Point ID (Survey Role) Icons

 The instrument icon indicates your current occupied reference point.

 The rod icon indicates your current backsight point.

 The stake icon indicates points that are to be staked.

 The checked stake icon indicates points that have been staked out.

 The hub icon indicates control points, they can not be edited under any circumstances.

 The user icon indicates user entered points, the coordinate can not be edited.

 The ruler icon indicates measured points, the coordinate can not be edited.

 The 123 icon indicates calculated points, the coordinate can not be edited.

Note:
To edit the coordinate of a measured or calculated point, you must first change its survey role to user entered.

Edit

Use this to edit the coordinates of a point that is highlighted in the list using the Store/Edit Points tool.

Add

Use this to open the Store Point screen to manually enter a new point.

Find

Use this to select multiple points, based on a single point ID, a point ID range, a point coordinate range, or point descriptions.

Statistics

Use this to display statistics of the coordinate database, including the total number of points, bounding minimum and maximum coordinate values, and point ID's in use, and point ID's not in use.

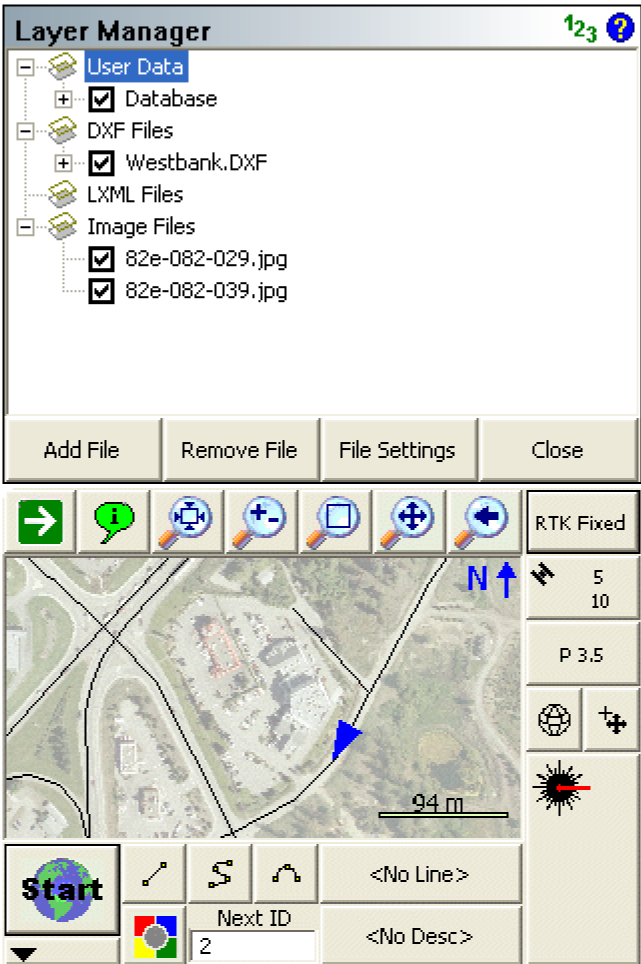
Map View

Use this to display the currently highlighted points on the screen.

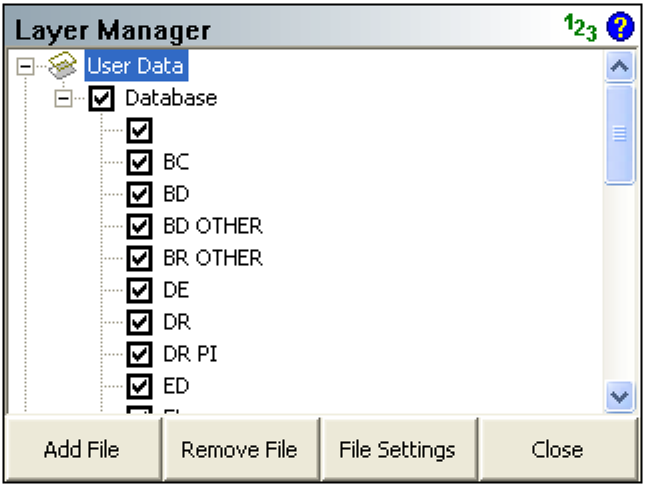
Map Data Layers Manager

Main Menu | Data Manager | Map Data Layers

Use this to load, unload, and control the visibility of DXF files, and JPG or TIFF raster image files that are associated with your project, and to control the visibility of your database layers.



User Data



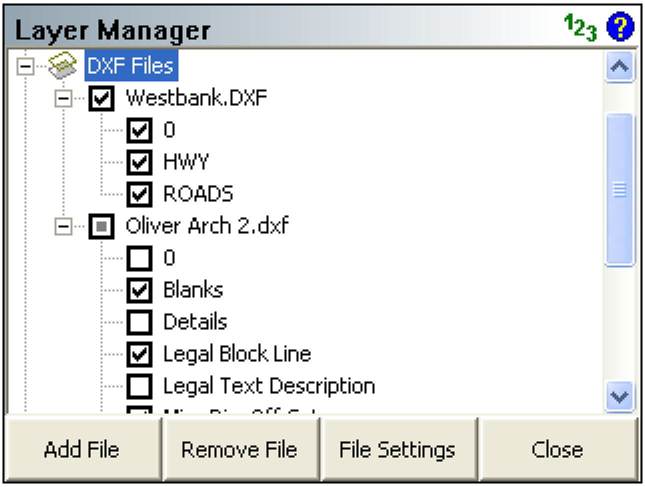
Evidence Recorder uses the layer names specified in the Automap library to control the visibility of points and figures by their description.

You can control the visibility of the entire database (both points and figures) by checking or unchecking the Database option under the User Data section of the tree. If the box is checked, then the database is turned on and all of its layers will be visible; if unchecked, then the file and all of its layers is turned off and it will not be visible. If the box has another smaller square inside it, this means that some of its layers are turned on and other layers are turned off.

You can control the visibility of individual layers by expanding Database option under the User Data section of the tree, and checking or unchecking the box beside the name of the layer. If the box is checked, then the layer is turned on and entities on that layer will be visible; if unchecked, then the layer is turned off and entities on it will not be visible.

When you close the project, the layer status will be saved so that the next time the project is opened, the layer visibility will automatically be set the same as you had left it, so layers that were turned off will remain turned off the next time the project is opened up.

DXF Files



You can load multiple DXF files into your Evidence Recorder project, and control the visibility of each of their layers independently from the others.

You can control the visibility of the entire DXF file by checking or unchecking the box beside the name of the DXF file, under the DXF Files section of the tree. If the box is checked, then the file is turned on and all of its layers will be visible; if unchecked, then the file and all of its layers is turned off and it will not be visible. If the box has another smaller square inside it, this means that some of its layers are turned on and other layers are turned off.

You can control the visibility of individual layers by expanding the name of the DXF file under the DXF Files section of the tree, and checking or unchecking the box beside the name of the layer. If the box is checked, then the layer is turned on and entities on that layer will be visible; if unchecked, then the layer is turned off and entities on it will not be visible.

When you close the project, the layer status will be saved so that the next time the project is opened, the layer visibility will automatically be set the same as you had left it, so files that were turned off will remain turned off the next time the project is opened up.

Add File

Press the Add File button to select a DXF file that you want to load into your project. You will be able to browse to and select any DXF file. Please see the Import DXF File topic for more information.

Remove File

Highlight the DXF file that you want to remove from your project, then press the Remove File button. If a file is not highlighted, you will be reminded that a file must first be selected from the tree. This will turn off all layers from the selected file in your Evidence Recorder project and disassociate the DXF file. It does not delete the DXF file.

File Settings

Highlight the DXF file that you wish to change the settings for, then press the File Settings button. You can enable or disable the display of text in the selected file. If your DXF file contains text, turning this off will improve performance of Evidence Recorder. Pressing the OK or Cancel buttons will return you to the Layer Manager screen.

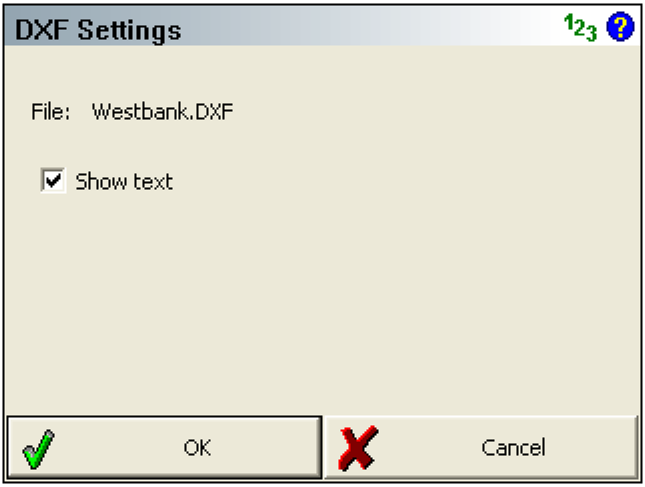
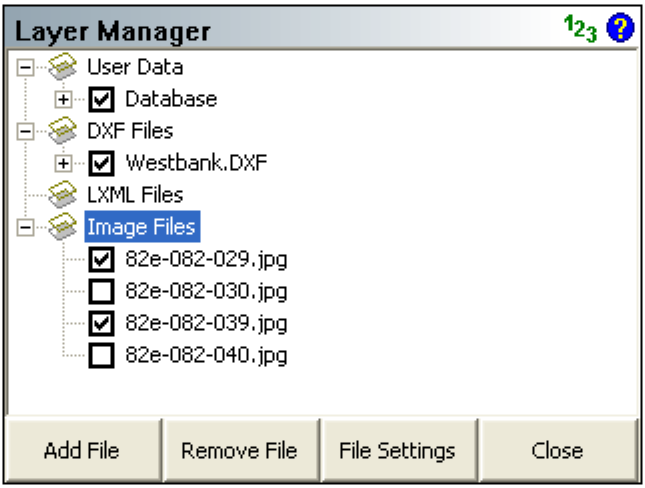


Image Files



You can load multiple georeferenced JPG or TIFF images into your Evidence Recorder project, and control the visibility of each of them independently from the others.

You can control the visibility of your images by checking or unchecking the box beside the name of the image file, under the Image Files section of the tree. If the box is checked, then the image is turned on and it will be visible; if unchecked, then the image is turned off and it will not be visible.

When you close the project, the visibility and opacity status of each image file will be saved so that the next time the project is opened, the image visibility will automatically be set the same as you had left it.

Add File

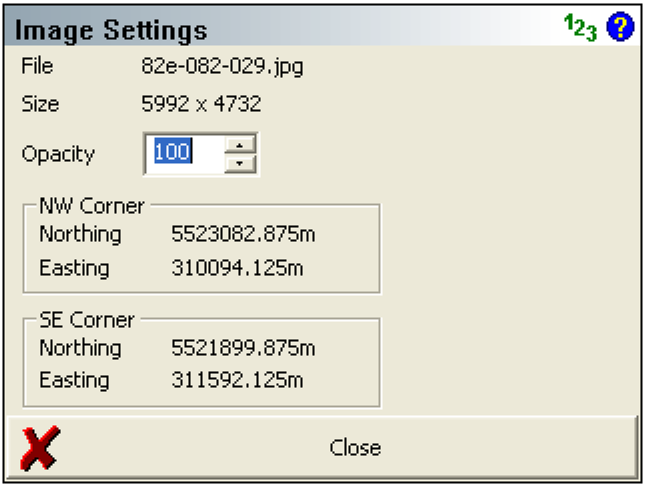
Press the Add File button to select an image (or DXF) file to load into your project. You will be able to browse to and select any JPG or TIF file. JPG files must have a corresponding JGW world file, and TIF files must have a corresponding TFW world file; these world files contain the georeferenced positioning information. The world file must have the same file name as the image file (just with the appropriate extension), and it will be automatically used to position the image.

Remove File

Highlight the image (or DXF) file you want to remove from your project, then press the Remove File button. If a file is not highlighted, you will be reminded that a file must first be selected from the tree. This will turn off the selected image in your Evidence Recorder project and disassociate the image file.

File Settings

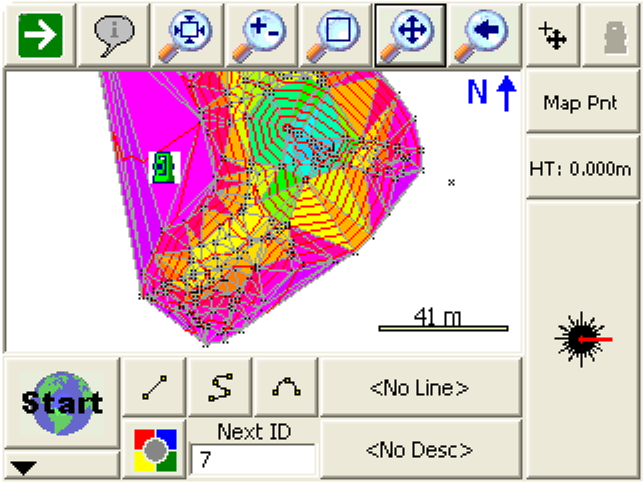
Highlight the image file you want to view or change the display settings for, then press the File Settings button. You will see the file's name, size, and position information. You can also adjust the opacity of the image. The default value of 100 will cause the image to be displayed normally, and reducing this value will make it appear fainter on the screen. This is useful if the image file being displayed makes your other Evidence Recorder data too hard to see over top of the image. Pressing the Close button will return you to the Layer Manager screen.



Surfaces

Main Menu | Data Manager | Surfaces

Evidence Recorder allows you to display a 3D surface representation of the points and lines in your project. This is done by turning on the Point Database surface.



Supported DTM Files

You can import surface information into Evidence Recorder. Currently you can import a surface from an QSB file.

LandXML Surface

Evidence Recorder can import surface definitions from XML data sets. These surfaces can be used to display a TIN, shaded surface or contours on the screen. The surface can also be used to perform real-time DTM staking.

To import a LandXML file, go to Map Data Layers and use the **Add File**command. Please see the LandXML Import topic for more information.

QSB Surface

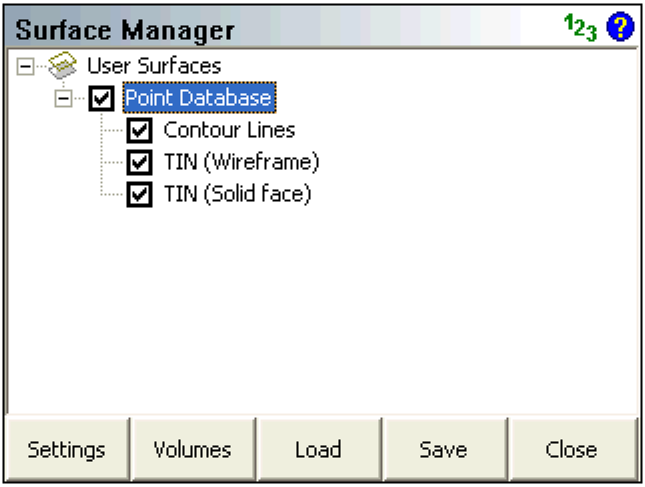
Surfaces created and saved in MapScenes desktop products will have a QSB extension. These QSB files can be imported into Evidence Recorder and used to display a TIN, shaded surface or contours on the screen.

To import a QSB file, use the Load button at the bottom of the Surface Manager screen. Please see the DTM Surface File Import (QSB) topic for more information.

DTM Surface Manager

The surface called Point Database represents the Realtime DTM Surface made up from points and lines that are in your project. If you have imported any other surfaces from a QSB file they will also appear in this list.

To use a surface you first need to load it into memory by checking inside the box before the name of the surface in the list. A surface is loaded if there is a checkmark shown before it. If you expand the surface you can control whether it is drawn as Contour Lines, a wireframe TIN, a solid TIN, or any combination of these.



Settings

Surface settings allow you to specify settings that affect the surfaces or contours that are drawn. Please see the Surface Settings topic for more information.

Volumes

Use this button to calculate a volume. Please see the Volume Calculation topic for more information.

Load

Use this button to load a .QSB surface file into your project. Please see the Import DTM Surface File topic for more information.

Save

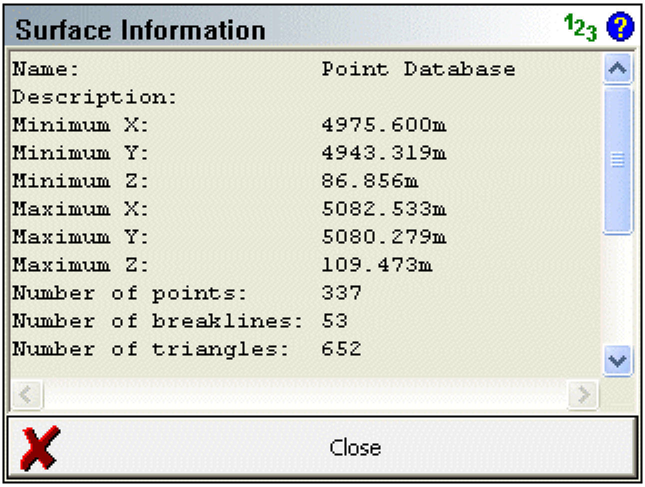
Use this button to save the selected surface as a .QSB file which can be imported into your Map-Scenes desktop software or into another Evidence Recorder project.

Close

If you close the surfaces screen and return back to the map screen you will see the loaded surface drawn as a wireframe, solid, and/or with contours depending on what is set in the Settings screen.

Surface Information

You can see additional statistics about the surface by double clicking on its name in the list. This will show the minimum and maximum bounding coordinates, the number of points, breaklines, and triangles in the surface, the minimum and maximum slopes in the surface, the plan and surface area, the positive and negative volumes calculated from a datum elevation of 0, and the amount of memory that the surface is using.



Point Database Surface

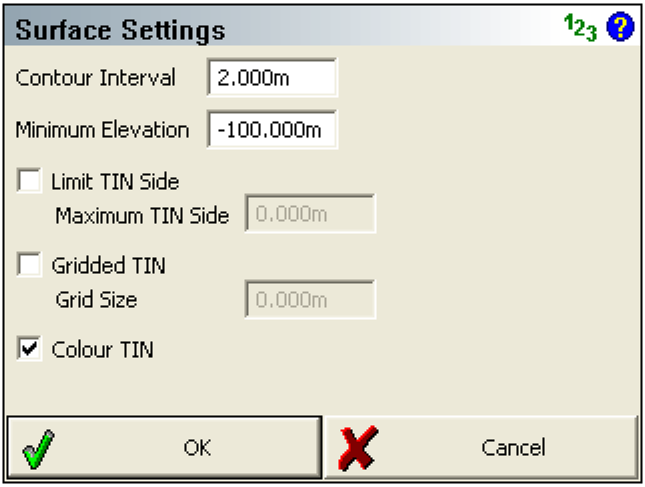
This can be used at any time. When this is turned on, all the points and lines in your project will be used to create a real-time DTM surface. This can be used while you're taking shots.

Please refer the Realtime DTM Surface topic for more information on Evidence Recorder DTM surfaces.

Surface Settings

Main Menu | Data Manager | Surfaces | Settings

Use the surface settings screen to define settings that affect TIN, TGRID and Contours.



Contour Interval

This will force the contours to be drawn at an interval equal to the value set here. The interval is equal to the drawing units.

Minimum Elevation

This controls the minimum elevation. This is useful if you have some data that is displayed at a zero elevation (example: alignment point data that is horizontal) and you want to exclude these points from the surface.

Limit TIN Side

This will determine the max length that will be allowed for a TIN triangle.

Gridded TIN

If this is on, when you draw the surface it will be represented using a TGRID model instead of a TIN model. TGRID surfaces will apply smoothing in areas that have no breaklines. This may create better quality contours. The Grid Size is a ground unit value that will determine the spacing of the grid lines. If the Grid Size is 0 then a grid size will be automatically calculated.

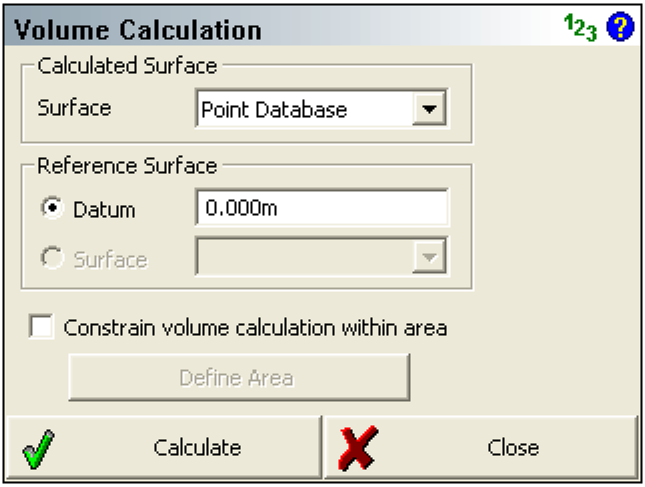
Color TIN

When this is turned on then the surface color will be determined by the triangles' elevation. When turned off the surface will be displayed using a gray color. If the TIN's wireframe and solid faces are both being displayed, then the faces will be colored but the wireframe will be gray for better visibility.

Volume Calculation

Main Menu | Data Manager | Surfaces | Volumes

Evidence Recorder allows you to calculate the volume between a surface and either another surface or a datum elevation. The volume can be computed for the entire surface, or it can be bound by a closed figure.



Calculated Surface

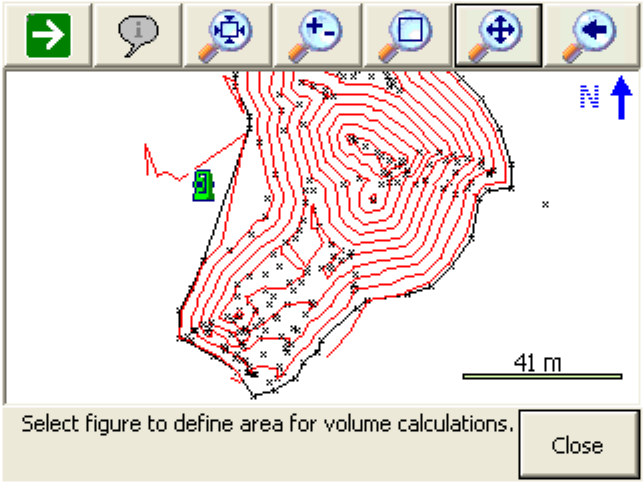
Choose the surface that you want to calculate the volumes for. If you have imported any surfaces from a QSB file they will be available to choose from, or you can choose the realtime Point Database surface.

Reference Surface

You can choose have the volume calculated between your selected surface and either a datum elevation (which defaults at 0 meters/feet), or if you have imported any surfaces from a QSB file they will be available to choose as a reference surface.

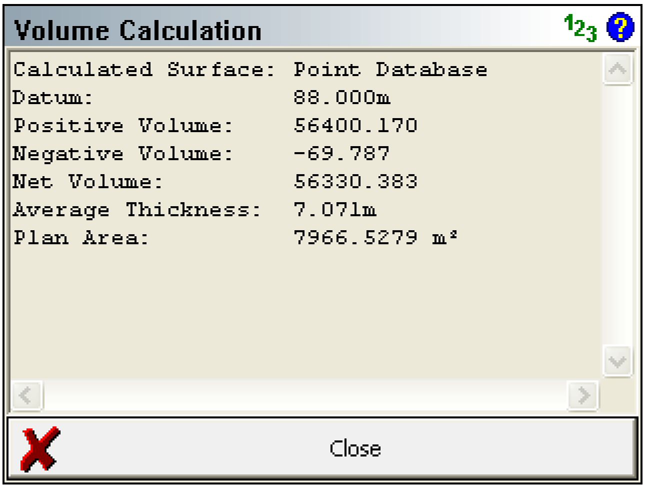
Constrain volume calculation within area

If this is unchecked, a surface volume calculation will be computed for the entire surface. If this is checked, an area volume calculation will be computed for a portion of the surface bounded by an area you define. You can press the **Define Area** button to select a closed figure to assign as a boundary for the volume calculation. After you have selected the figure, press Close to return to the Volumes Calculation screen.



Calculate

Pressing this will calculate and display the positive, negative and net volumes, the average thickness, and the area of the surface from either the selected datum elevation or reference surface, all constrained within the selected closed figure if selected.



The results will also be written into the project's CogoCalcs.txt history file.

Realtime DTM Surface

Evidence Recorder creates and manipulates a 3D surface from data collected in the field or from data imported through QSB or ASCII point files. A Evidence Recorder surface is a mathematical description of a surface that exactly honors all input 3D data points and lines.

A Surface represents the existing topography of a job site. Surfaces contain one or more parts such as points, break lines, triangulated irregular networks (TIN), or triangulated grids (TGRID).

A surface is not a drawing entity, rather it is a mathematical description held in the data collectors memory. Representations of a surface, such as contours, TGRIDS or TINS may be drawn into your diagram as polylines and polyface entities.

Creating a Realtime DTM in Evidence Recorder

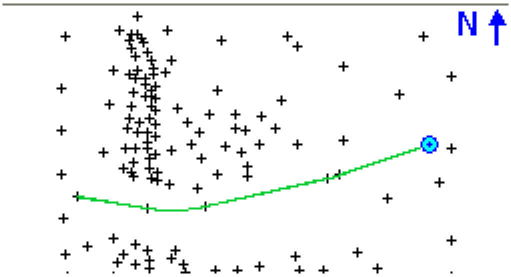
Evidence Recorder will compute a DTM model from points collected, staked, or imported from any ASCII file and from any existing Evidence Recorder project. There are no limits to the number of points that are used to create the DTM. The Automap Library controls what points and/ or lines are included or excluded from the DTM surface. The DTM is created in real time and can be appended as additional points are picked up.

To create a DTM, follow the instructions below:

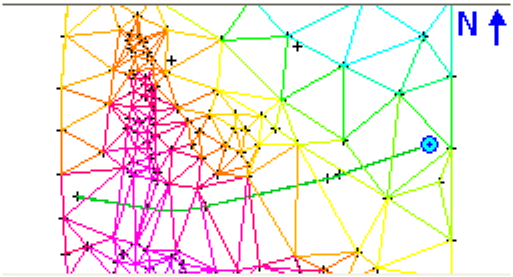
From Main Menu | Data Manager | Surfaces you can turn on the **Realtime DTM Surface** by placing a checkmark in the box before the "Point Database" surface. Expanding the tree will allow you to define whether it is displayed as Contour Lines, Solid Faces, and/or Triangle Edges.

The surface can be viewed or used in volume computations immediately.

Before turning on the Point Database surface:



After turning on the Point Database surface:



Each point in the database has an attribute called "DTM Attribute". This can be set to "donotinclude". If you set a point to this value, you will see that the surface no longer includes this point. This only applies to the current surface that is computed in Evidence Recorder. It does not apply to surfaces imported from a QSB file.

What is the difference between a TIN and a TGRID?

The user should become familiar with both options and decide which option is best suited for their project.

TIN honors breaklines but may be too restrictive for contours to follow the natural flow of the terrain. Contours around small hills may look jagged if too few data points were collected.

TGRD honors breaklines and allows the contours to follow the natural flow of the terrain. Contours around small hills will look better if the TGRD option is used.

Generally, the **TGRD**is for cases where you want curvature introduced between your data points and you have break lines. This is most easily shown with an example:

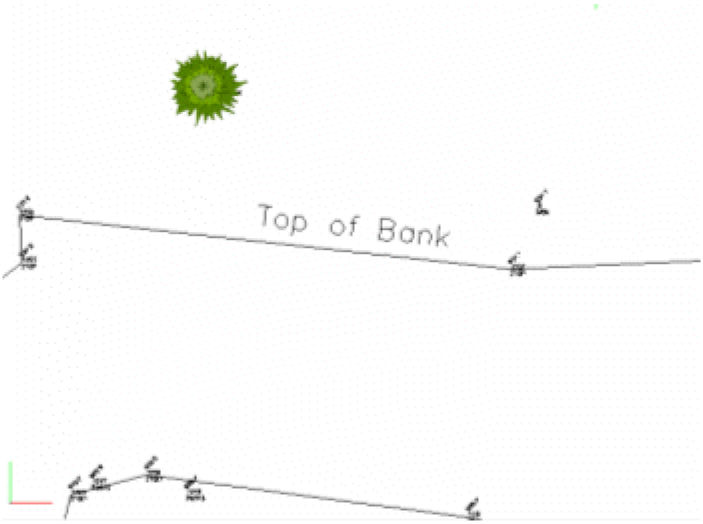
Adding Breaklines to a Surface

If a break in the slope continuity is desired, the user **MUST ALWAYS** use the TIN or TGRD (Triangulated Grid) in conjunction with break lines. When modeling a surface containing break lines, a TIN or TGRD honors break lines exactly.

What happens when you add break lines?

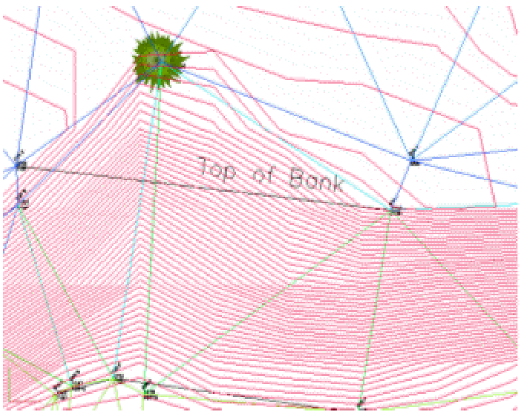
Break lines represent 3D continuous traces in space (think of them as a 3D polyline) which:

1. Define the surface elevation
2. Force slopes to be different on either side of the break line



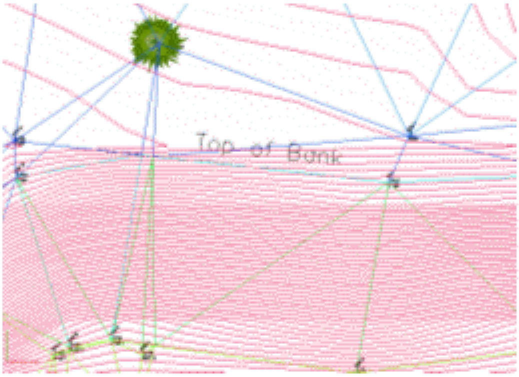
This line represents a location an the site where the slope changes from a steep hill to a relatively flat area.

Contours Generated without use of Top of Bank breakline:



Without a breakline, the contours "flow" over the top of the bank and the contours do not look correct.

Contours generated with use of Top of Bank breakline:



With a breakline, the contours are forced to honor the line, as a change in slope that helps the contours to look correct.

Breakline Control

The user would want to use a figure as a break line in the triangle formation process (TIN) for the edge of pavement, but probably not for a line connecting points that are not related to the surface features. An example of this might be a chain connecting legal boundaries as they might cross over roads or creeks without consideration for the existing topography.

Breaklines are used in the creation of the DTM by forcing the triangulation to follow them. Triangles created in the DTM cannot cross a breakline. The edges of the triangles will always follow the breakline. When necessary, Evidence Recorder will automatically densify the DTM along the breakline to create triangles that conform to the breaklines. This helps with the creation of accurate surface models and contours. Evidence Recorder contains the exact same functions for surface modeling, contouring, and volumes as MapScenes.

Contouring

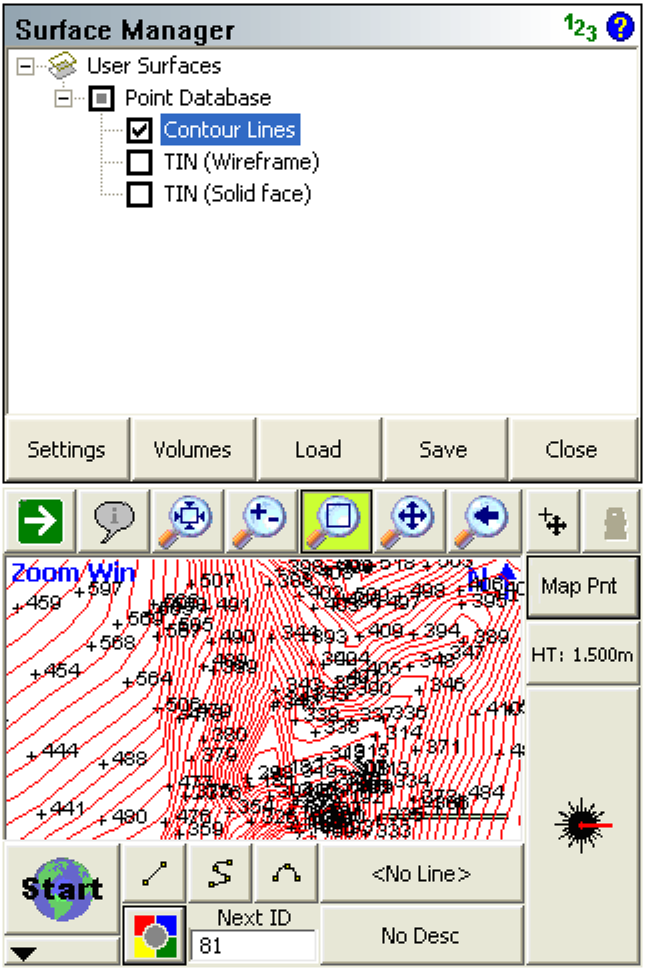
Creating contours in Evidence Recorder is a simple as choosing the desired DTM surface from the dialog and checking the contour option:

The procedures for contouring a DTM surface are outlined below:

1. Open the Surface Settings by going to **Main Menu | Data Manager | Surfaces | Settings**
2. Type in the appropriate **Contour Interval**. The default interval is every 2 units.
3. You can control the **Minimum Elevation**. This is useful if you have some data that is displayed at a zero elevation (example: alignment point data that is horizontal) and you want to

exclude these points.

4. If you want to create a TGRID, then turn on the Gridded TIN option, or leave this off to create a TIN. The Grid Size is a ground unit value that will determine the spacing of the grid lines.
5. Press **OK** to return to the Surface Manager screen.
6. Finally, turn on the contours by expanding the Point Database surface and selecting the Contour Lines option to display them.
7. Close the Surface Manager and return to the map screen to see your contours.

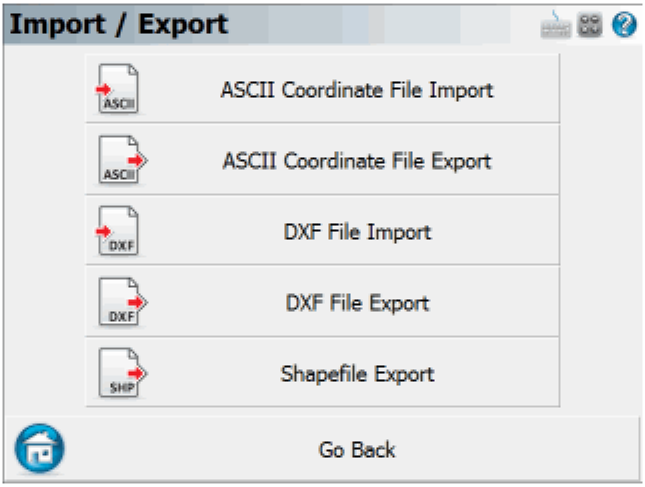


IMPORT/EXPORT MENU

Import/Export Menu

Main Menu | Import/Export

Use this menu to display different options for importing data into or exporting data out of your project.



ASCII Coordinate File Import

Use this to import an ASCII file into your project. Please see the ASCII Coordinate File Import topic for more information.

ASCII Coordinate File Export

Use this to export an ASCII file of your points. Please see the ASCII Coordinate File Export topic for more information.

DXF File Import

Use this to import a DXF file into your project. Please see the DXF File Import and Map Data Layers topics for more information.

DXF File Export

Use this to export a DXF file of your current project. The DXF file will contain drawing entities of your points and lines. Please see the DXF File Export topic for more information.

SDR File Export

The SDR Export in Evidence Recorder will convert the existing raw file into a SDR 33 compatible format. Please see the SDR File Export topic for more information.

Shapefile Export

Use this to export an ESRI shapefile. Please see the Shapefile Export topic for more information.

Import Template

You can import a template that was previously exported using this command. Please see the template import command for more information.

Export Template

You can export figures and points using this command. Please see the Export Template topic for more information.

Import User Coordinate Systems

You can import a template that was previously exported using this command. Please see the template import command for more information.

Export User Coordinate Systems

You can export figures and points using this command. Please see the Export Template topic for more information.

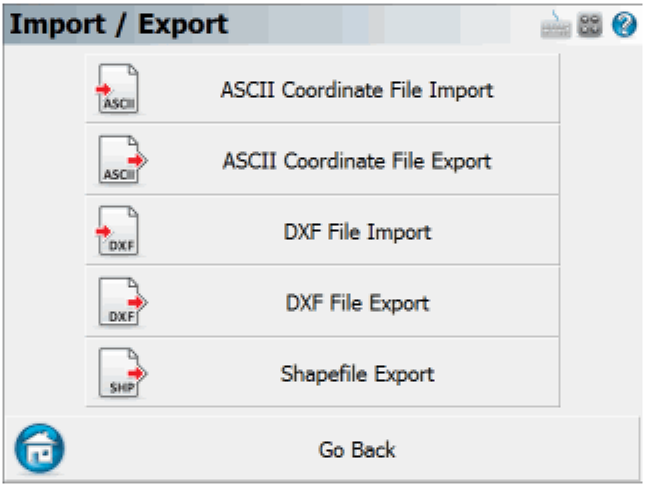
Notes:
- For importing DXF and raster image files, please see the Map Data Layers topic in the Data Manager menu.
- For importing DTM surface files, please see the Surfaces topic in the Data Manager menu.

IMPORT/EXPORT MENU

Import/Export Menu

Main Menu | Import/Export

Use this menu to display different options for importing data into or exporting data out of your project.



ASCII Coordinate File Import

Use this to import an ASCII file into your project. Please see the ASCII Coordinate File Import topic for more information.

ASCII Coordinate File Export

Use this to export an ASCII file of your points. Please see the ASCII Coordinate File Export topic for more information.

DXF File Import

Use this to import a DXF file into your project. Please see the DXF File Import and Map Data Layers topics for more information.

DXF File Export

Use this to export a DXF file of your current project. The DXF file will contain drawing entities of your points and lines. Please see the DXF File Export topic for more information.

SDR File Export

The SDR Export in Evidence Recorder will convert the existing raw file into a SDR 33 compatible format. Please see the SDR File Export topic for more information.

Shapefile Export

Use this to export an ESRI shapefile. Please see the Shapefile Export topic for more information.

Import Template

You can import a template that was previously exported using this command. Please see the template import command for more information.

Export Template

You can export figures and points using this command. Please see the Export Template topic for more information.

Import User Coordinate Systems

You can import a template that was previously exported using this command. Please see the template import command for more information.

Export User Coordinate Systems

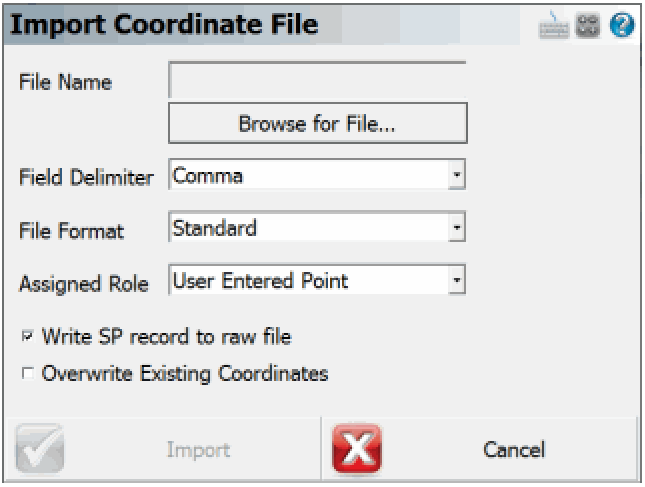
You can export figures and points using this command. Please see the Export Template topic for more information.

Notes:
- For importing DXF and raster image files, please see the Map Data Layers topic in the Data Manager menu.
- For importing DTM surface files, please see the Surfaces topic in the Data Manager menu.

ASCII Coordinate File Import

Main Menu | Import/Export | ASCII Coordinate File Import

Use this option to import a list of coordinates to the current project.



This may be required if a separate coordinate file is uploaded to the device by itself (not as part of a project with linework). This is also useful for transfer of points from one file to another.

Function

1. Click on the "Browse for File..." button to navigate to and select your file.
2. Choose the field delimiter, either Comma or Space.
3. Choose the file format. See below for more information regarding file format. If you are uncertain, use the **Standard** format.
4. Use the assigned role field to select the survey role of the points being imported. If these points are to go into the list, then select **To Stake Out** as the survey role.
5. **Write SP** (Store Point) **record to raw file** will store the imported coordinates to the raw file. This is very useful if you wish to reprocess coordinates later, so we recommend that you select this when importing points.
6. **Overwrite Existing Coordinates** - allows you to control whether points will be overwritten during the import.
7. **Set as Control Points** – will set a flag in the database that will prevent these points from being edited or changed in Evidence Recorder (under any circumstances!)
8. Choose **OK** to import the coordinates, **Cancel** to abort the import.
9. You will be shown a confirmation of how many points were imported to the current project.

File Formats

Both space and comma delimited files are supported.

For all formats, the order of the Northing and Easting fields are determined by setting the Coordinate Order in the Options screen.

Standard

```
ID, Northing/Y or Easting/X, Easting/X or Northing/Y, Elevation, Description:Note
```

This format expects the file to be in a standard ASCII format. If your descriptions have a colon in them, then Evidence Recorder will store everything before the colon as a description, and everything after the colon will be considered to be a note.

Standard with Header

Same as the Standard format, but the first row in the file is ignored.

Extended

```
ID, Northing/Y or Easting/X, Easting/X or Northing/Y, Elevation, Description, Note, Latitude, Longitude, Ellipsoidal Height, Latitude StdDev, Longitude StdDev, Height StdDev
```

This format is different than the standard such that notes are separate from descriptions. Also if you collected GPS data, the WGS 84 information can also be included and imported along with other information related to the GPS point.

Extended with Header

Same as the Extended format, but the first row in the file is ignored.

GD-1

```
ID, Northing/Y or Easting/X, Easting/X or Northing/Y, Elevation, Latitude (in Degrees Minutes Seconds), Longitude (in Degrees Minutes Seconds), description
```

GD-1 with Header

Same as the GD-1 format, but the first row in the file is ignored.

More about the Extended Format

If you import aEvidence Recorder extended file format ASCII file, Evidence Recorder will create EP and GS records in the raw file. Also, the coordinates will be imported and stored in the database. Importing this type of file is useful for seeding points when using the OmniStar GPS system or to create a list of geodetic and cartesian points that you can select while programming a GPS base receiver.

ID	Northing	Easting	Elevation	Description	Note	Latitude	Longitude	Ellip
100	5523097.874	311564.984	399.387	CONTROL		49.83067177	-119.6202724	
101	5523168.871	311529.912	401.188	CONTROL		49.83129864	-119.620794	
102	5523164.192	311507.476	400.85	CONTROL		49.83124955	-119.6211034	
103	5523135.07	311511.185	399.795	CONTROL		49.83098906	-119.6210377	
104	5523099.336	311521.81	399.552	CONTROL		49.83067133	-119.6208728	
105	5523074.024	311506.919	399.233	CONTROL		49.83043923	-119.6210673	
106	5523046.282	311521.379	398.049	CONTROL		49.83019451	-119.620853	
201	5523161.883	311526.004	400.632	CONTROL		49.83123463	-119.6208449	
202	5523159.786	311530.386	400.665	CONTROL		49.83121716	-119.620783	
203	5523167.28	311538.864	401.095	CONTROL		49.83128716	-119.6206689	
204	5523165.261	311551.194	400.946	CONTROL		49.8312729	-119.6204967	
205	5523172.776	311493.661	401.686	CONTROL		49.83132233	-119.6212995	

Importing Cartesian and Geodetic Coordinates

Above is an example of an Extended ASCII file. For the format to work correctly, each point should include Cartesian and Geodetic coordinates for each point. The standard deviations are not needed unless the point is going to be used to "seed" a position for use with the OmniStarVBS system. **The Latitude and Longitude values are required to be stored in decimal degrees.**

So if this type of file is imported into Evidence Recorder the following will occur:

- A point is stored in the project database using the Cartesian Coordinates.
- A GS record is written in the raw file using the Cartesian Coordinates as a reference.
- An EP record is written to the raw file using the Geodetic Coordinates as a reference.

Importing Geodetic Coordinates Only

You can create an Extended ASCII Point file that only contains a point number, description, note and Geodetic coordinates. Upon import Evidence Recorder will use the Geodetic coordinates and your defined coordinate system in your coordinate system settings to compute Cartesian coordinates to be stored in the database.

So if this type of file is imported into Evidence Recorder the following will occur:

- Using the horizontal and Vertical datum settings you've defined in your coordinate system settings, Evidence Recorder will compute a Cartesian coordinate for each point using the Geodetic values imported from the ASCII file.
- A point is stored in the project database using the Cartesian Coordinates that was computed. The point will be assigned the point number that was imported from the ASCII file.

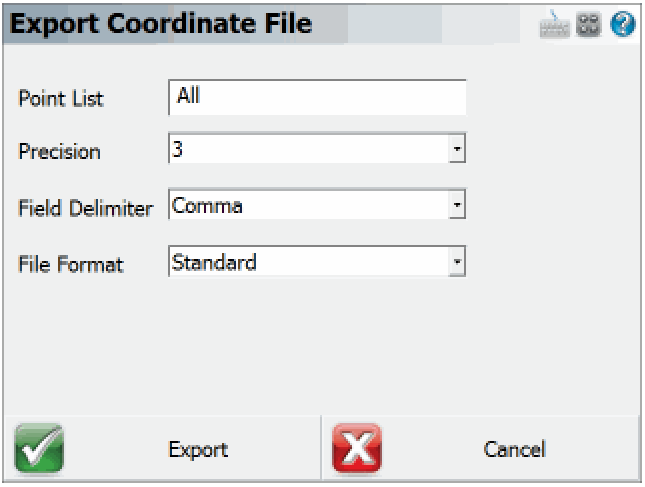
- A GS record is written in the raw file using the Cartesian Coordinates as a reference.
- An EP record is written to the raw file using the Geodetic Coordinates as a reference.

ASCII Coordinate File Export

Main Menu | Import/Export | ASCII Coordinate File Export

Use this option to export a coordinate list from the current file.

This is useful for transfer of points from one file to another.



Function

1. Specify a range of point to export in the form **#..#**. Accept default of **All** if desired.
2. Specify number of decimal places to carry on the export. (maximum=6)
3. Specify if you want to export them with either a space or comma delimiter.
4. Choose the file format type that you want to use. See below for more details about the different file formats. If you are uncertain, use the **Standard** format.
5. Choose **Export** to export the coordinates, or **Cancel** to abort the export.
6. Browse to the folder where you want to save the file, enter a filename including an extension, then press **Save File.**Evidence Recorder will not add any extension to the filename you enter.
7. You will be shown a confirmation of how many points were exported.

File Formats

Both space and comma delimited files are supported.

For all formats, the order of the Northing and Easting fields are determined by setting the Coordinate Order in the Options screen.

Standard

```
ID, Northing/Y or Easting/X, Easting/X or Northing/Y, Elevation, Descrip-
tion:Note
```

This format will append any notes you have to your description, separated by a colon.

Standard with Header

Same as the Standard format, but with Header data in the first row.

Extended

```
ID, Northing/Y or Easting/X, Easting/X or Northing/Y, Elevation, Descrip-
tion, Note, Latitude, Longitude, EllipsoidalHeight, LatitudeStdDev, Lon-
gitudeStdDev, HeightStdDev
```

This format is different than the Standard such that notes are separated from descriptions.

If you collected GPS data, the WGS 84 information will also be exported along with other information related to the GPS point. The WGS 84 information will be extracted from your GS records in the raw file.

Extended with Header

Same as the Extended format, but with Header data in the first row.

More about the Extended Format

If you import a Evidence Recorder extended file format ASCII file, we will create EP and GS records in the raw file. Also, the coordinates will be imported and stored in the database. Importing this type of file is useful for seeding points when using the OmniStar GPS system.

There is more detailed information about the extended format in the ASCII Coordinate File Import topic.

DXF File Import

Main Menu | Data Manager | Map Data Layers | Add File

Use this function to import CAD DXF files into an Evidence Recorder project.

Evidence Recorder supports all Point nodes, Lines, Arcs, Polylines, Text and 3D Faces in the DXF file.

Evidence Recorder does not support Blocks or any other entities not mentioned above in the DXF file.

All items from the DXF file will be drawn in their respective layers as defined in the DXF file. These layers may be toggled on and off using Evidence Recorder's layer manager.

Importing Steps

1. From the main menu, press the **Data Manager** button then the **Map Data Layers** button.
2. Press the **Add File** button on the Layer Manager.
3. Using the browse window, find the DXF file you would like to import and press the **Open File** button.
4. Use the Layer Manager to turn on or off any layers you don't want to view.
5. Press **Close** and return to the map view.
6. Press the zoom extents button to see your entire DXF file.

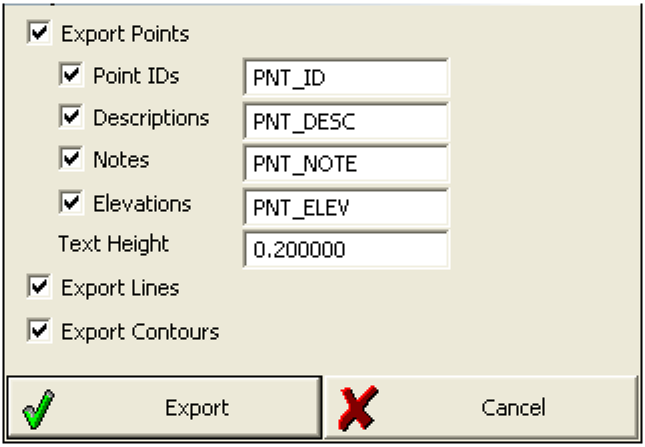
For more information on the layer manager please visit the Layer Manager topic.

Important Notes:
- Your CAD desktop system likely has a super fast processor and 1GB or more of RAM but most current Windows CE devices run at 206Mhz and have 32 or maybe 64MB of RAM. For this reason, you will not be able to manipulate a 5MB DXF file with the same speed as your desktop system so minimize the size of the DXF files for most efficient operation.
- TEXT is the biggest performance reducer in your DXF files. For best performance, minimize the amount of text in the DXF files or turn off layers containing text when not needed.

DXF File Export

Main Menu | Import/Export | DXF File Export

Use this to export your current Evidence Recorder drawing as a DXF file. This allows for easy import of linework and nodes into most cad or graphic systems



Function

1. Select the options for your DXF file.

   Export Points: If this is checked, your coordinate point nodes will be exported to the DXF file. You can also specify what layer you want the labels to go on and a default text height.

   Export Lines: If this is checked, all figures (lines, arcs, and splines) will be exported to the DXF file.

   Export Contours: If this is checked, all contour lines drawn using the Surface Manager will be exported to the DXF file.

2. Click **Export.**
3. Browse to the folder where you want to save the file, enter a filename, then press Save File. Evidence Recorder will add a .dxf extension to the filename if you did not include it.
4. The DXF file is created and you can copy it to your desktop computer.

Notes about DXF files:

- Upon export, Evidence Recorder will compare the figure name to see if it has a match in the AutoMap file. If it does, Evidence Recorder will draw the points along the figure, as well as draw the figure on the layer specified in the AutoMap library.
- Points that are exported will match the point color settings set in the Automap library.
- Figures that don't have a match in the Automap library will be drawn on a layer named "Default". Color setting will be set to 256.
- Points or nodes will be 2D or 3D depending on the Z value.

- Lines will be 2D or 3D depending on the Z values of the end points.
- Figures will be drawn as polylines.
- Curvy lines or arcs will be drawn as segmented polylines. Evidence Recorder will automatically interpolate an elevation along the arc or curved section of the figure at 1° intervals.
- Contours will be drawn as polylines and will be 3D based on the contour elevation.
- Points or nodes will appear as an "X" marker in the DXF file because the PDMODE variable is being set to 3 in the DXF file. In most desktop CAD programs you can change this marker type by typing PDMODE.

SDR File Export

Main Menu | Import/Export | SDR File Export

The SDR Export in Evidence Recorder will convert the existing raw file into a SDR 33 compatible format. It is important to note that currently not all existing raw record types are exported through the SDR export.

Currently the following types are exported:

- Store Points
- Job Info
- Units
- Notes / Comments
- Occupy Setups
- Sideshots
- Stakeout shots
- Target Heights
- Resection measurements are not exported, but computed resection point exported as Store Point.
- The resulting SS or TR shot for multisets will be exported as a sideshot.
- The resulting SS or TR shot for angle or distance offsets will be exported as a sideshot.
- Calculated points will be stored as a Store Point
- Adjusted Points are exported as Store Points

The following record types are not currently exported:

- GPS Datum Settings
- GPS Transformation Parameters
- GPS Measurements

Function

1. Select **SDR File Export** from the Import/Export menu.
2. Browse to the folder where you want to save the file, enter a filename, then press Save File. Evidence Recorder will add a .sdr extension to the filename if you did not include it.

Shapefile Export

Main Menu | Import/Export | Shapefile Export

Use this to export your points and linework in a shape file format. This can then be imported into products that support shape files. This export will create a DBF, SHP and a SHX file for the linework and points in your project.

For example, if your project name was HWY 97, the following files will be created for the linework.

HWY 97_POLYLINE.shx

HWY 97_POLYLINE.shp

HWY 97_POLYLINE.dbf

For the points in your project, Evidence Recorder already stores points in a DBF file (HWY 97.dbf) so only two other files will be created.

HWY 97.shx

HWY 97.shp

Function

1. Select **Shapefile Export** from the Import/Export menu.
2. You will see a message indicating "Shapefile export complete."

Importing into ESRI or other application

To open these files in a compatible product you need to ensure you have all six file saved in the same directory.

For more information on shape files, visit www.esri.com

Import / Export User Defined Coordinate Systems

User defined coordinate systems created by a user are saved in the binary mapping system files.

It is useful to be able to export these user created coordinate systems for the following reasons:

1. A backup of your user defined coordinate systems.
2. Allows you to share user defined coordinate systems with other crews.
3. Allows you to load user defined coordinate systems after installing a FieldGenius update.

Export

When you export the user defined coordinate systems you will be able to specify a directory to save the file to and a name for the file.

Exported files will automatically be saved with a CSMAP extension such as **mycoordinatesystem.csmap.**

All user defined coordinate systems in Evidence Recorder will be exported to the file.

Import

You can import coordinate systems from a previously saved file.

When you import a file you will be asked to browse to and select the file you want to import. Once selected, Evidence Recorder will check to make sure a user defined system doesn't already exist and if one does, you will be asked if you want to skip importing it, or overwrite the existing coordinate system.

Backups

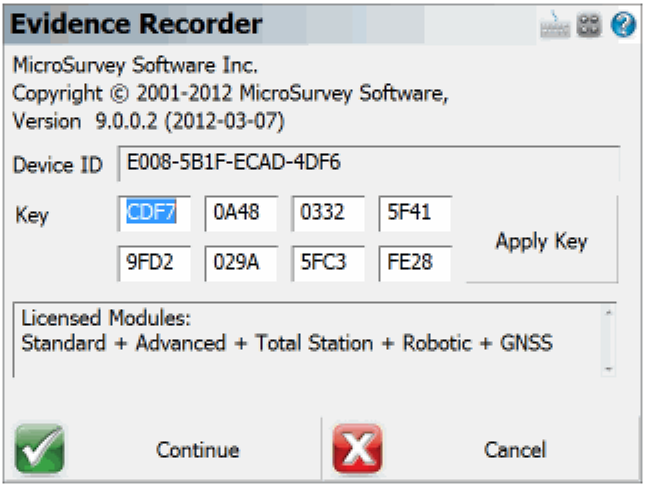
Evidence Recorder automatically creates a backup when you add or edit user defined coordinate systems. If you forgot to save your user defined coordinate systems, you may be able to restore them using a backup. Please see the Coordinate System topic for more details.

About Evidence Recorder

About Evidence Recorder

Main Menu | About

Use this to display information about the Evidence Recorder version you have installed or view what modules you have registered.



You will also see your Device ID and a series of fields where you can input the Key Code you received from MapScenes.

You will see an area that will show you the status of your license, including any modules that you currently have licensed. If you want to use Evidence Recorder in demo mode, press the **Run Demo Mode** button.

Please refer to the Registration & Demo Mode topic for further information.

TOTAL STATION REFERENCE

Conventional Total Station

When connecting to a conventional total station there are a few things you need to confirm before connecting to Evidence Recorder.

You need to know what the communication parameters are set to on the instrument. Please take the time to find what the following settings are set to on the instrument: Baud Rate, Data Bits, Stop Bits and Parity.

Because of all the different instruments available, we can not provide help on retrieving these settings from your instrument. Please refer to your owner's manual or contact technical support from your equipment manufacturer.

Total Station Profile

Once you know the settings, you can connect Evidence Recorder to the instrument. If you just installed Evidence Recorder you can start the program and follow the prompts until you get to the Instrument Selection screen. From there, select **Total Station** as the Instrument Type, and then press the **Add** button to create a new Instrument Profile. Name the profile for your instrument, and then press the **Edit** button to access the Total Station Configuration screen to configure your profile. From there choose the **Model and Communication** button to configure Evidence Recorder.

You can also access this screen by going to the **Main Menu | Settings | Instrument Selection** and choose total station.

Select Make and Model

Evidence Recorder uses a smart driver that will poll the instrument to see what commands it supports. Because of this you will see that in the Model section we don't list every instrument built by the manufacturer. If you're unsure of what make and model to choose visit our website and use the online helpdesk support center to do a search for your instrument.

Communication Settings

Confirm the settings so they match the settings from your instrument. If you don't know what the settings on the instrument are, you can always try the **Default Comm Settings** button.

Other Settings

On the Total Station Configuration screen, you can review the other options to set some additional parameters for your instrument.

Connect to Instrument

If you're not connected to the instrument you will see a status of "**Not Connected**" displayed above the Connect to Instrument button. When you're ready to connect make sure you have done the following:

1. Powered on the instrument
2. Levelled the instrument
3. Compensated the instrument.
4. Connected the data cable from the instrument to your data collector.

Once you have done all four steps, you can press the **Connect to Instrument** button. If you see a status of "**Connected**" displayed above the Connect to Instrument button then you have successfully connected.

Getting Started

To start taking measurement you need to exit out the Total Station Configuration screen by pressing close button. Depending on the instrument you connected to you will have different options available. Please review the Instrument Toolbar topic for more information.

Tip: You can use the enter key on your device to take a measurement. For example, if your measurement mode is set to Map Point and you press the enter key, your instrument will take a measurement.

Robotic Total Station

When connecting to a robotic total station there are a few things you need to confirm before connecting to Evidence Recorder.

You need to know what the communication parameters are set to on the instrument. Please take the time to find what the following settings are set to on the instrument: Baud Rate, Data Bits, Stop Bits and Parity.

Because of all the different instruments available, we can not provide help on retrieving these settings from your instrument. Please refer to your owner's manual or contact technical support from your equipment manufacturer.

Create Total Station Profile

Once you know the settings, you can connect Evidence Recorder to the instrument. If you just installed Evidence Recorder you can start the program and follow the prompts until you get to the Instrument Selection screen. From there, select **Total Station** as the Instrument Type, and then press the **Add** button to create a new Instrument Profile. Name the profile for your instrument, and then press the **Edit** button to access the Total Station Configuration screen to configure your profile. From there choose the **Model and Communication** button to configure Evidence Recorder.

You can also access this screen by going to the **Main Menu | Settings | Instrument Selection** and choose total station.

Select Make and Model

Evidence Recorder uses a smart driver that will poll the instrument to see what commands it supports. Because of this you will see that in the Model section we don't list every instrument built by the manufacturer. If you're unsure of what model and make to choose visit our website and use the online helpdesk support center to do a search for your instrument.

Communication Settings

Confirm the settings so they match the settings from your instrument. If you don't know what the settings on the instrument are, you can always try the **Default Comm Settings** button.

Other Settings

On the Total Station Configuration screen, you can review the other options to set some additional parameters for your instrument.

Connect to Instrument

If you're not connected to the instrument you will see a status of "**Not Connected**" displayed above the Connect to Instrument button. When you're ready to connect make sure you have done the following:

1. Powered on the instrument and radios
2. Leveled the instrument
3. Compensated the instrument.
4. Connected the data cable from the instrument to one radio, and your data collector to the other radio.

Once you have done all four steps, you can press the **Connect to Instrument** button. If you see a status of "**Connected**" displayed above the Connect to Instrument button then you have successfully connected.

Getting Started

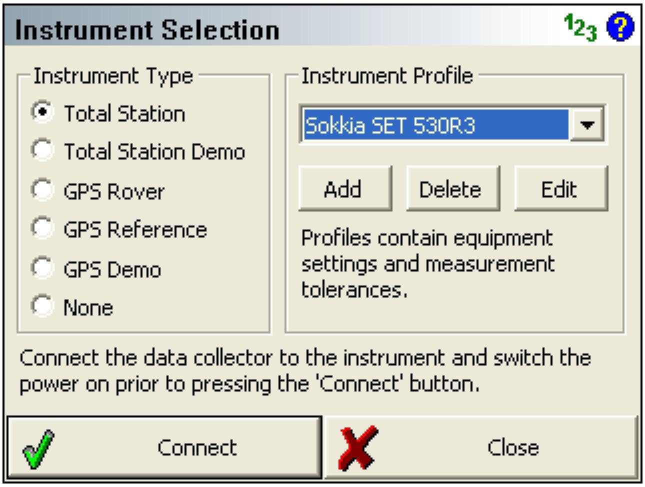
To start taking measurement you need to exit out the Total Station Configuration screen by pressing the Connect button. Depending on the instrument you connected to you will have different options available. Please review the Robotic Instrument Toolbar topic for more information.

Instrument Selection

Main Menu | Settings | Instrument Selection

The Instrument Selection screen allows you to choose the type of equipment you will be connecting to Evidence Recorder. An Instrument Profile can be created for each different instrument you will be working with, to make changing between different hardware a breeze. Once you have setup a profile for each different instrument you will be using, switching between them is a simple matter of selecting the appropriate profile and pressing **Connect**.

Note, this screen is not available if Evidence Recorder is running onboard your instrument.



For all future projects you create with Evidence Recorder, when you create a new or open an existing project you will see the Instrument Selection screen with the profiles you have already created. It will default to the last Profile you used, so if you are using the same instrument just press Connect. If you are using different equipment, just select the appropriate Instrument Type and Profile (or add a new profile if one does not yet exist for it), then press **Connect**.

Your profiles are stored in the file ...\MicroSurvey EVR9\Programs\MSURVEY.INI so once you have configured one data collector, you can simply copy this file onto your other data collectors to make the profiles available on them. This file should also be backed up for easy recovery.

Total Station

When you select Total Station mode, you will be able to Add, Delete, or Edit a profile to setup parameters for connecting to your conventional and robotic total stations, as well as laser devices. See the Total Station Configuration topic for more details about configuration for your total station.

For more information on connecting to your instrument please refer to the Conventional Total Station and Robotic Total Station topics.

Total Station Demo

If you choose this you will have to manually enter your shots. Manually entered shots are recorded in the raw file and points are computed based on the values you enter. A profile is not needed for this mode, just press Connect to begin using the Total Station Demo mode.

GPS Rover / GPS Reference

When you set it to GPS Rover or GPS Reference you will be able to Add, Delete, or Edit a profile for your rover or reference receiver. When you edit a GPS Rover or GPS Reference profile, you will see the Configure Rover or Configure Reference screens. For more information about using Evidence Recorder for GPS surveying, you should review the Starting GPS topic.

If you have not purchased the GPS module for Evidence Recorder, then you will not have access to the GPS commands and you will see a "Requires GPS module license" message.

GPS Demo

When you set it to GPS Demo you will be able to Edit and Connect to a profile for a simulated rover receiver. When you edit the RTK Demo profile, you will see the Configure Rover screen. Feel free to play with the Tolerance Mode settings, but please do not change the Model and Communications settings. For more information about using Evidence Recorder for GPS surveying, you should review the Starting GPS topic.

The GPS Demo will simulate connecting Evidence Recorder to a GPS Rover receiver. The coordinates in the GPS Demo are located outside our office in Westbank, British Columbia, Canada, so to use the GPS Demo mode you need to set your Coordinate System Settings to UTM Zones, NAD83, UTM83-11, Ellipsoidal.

None

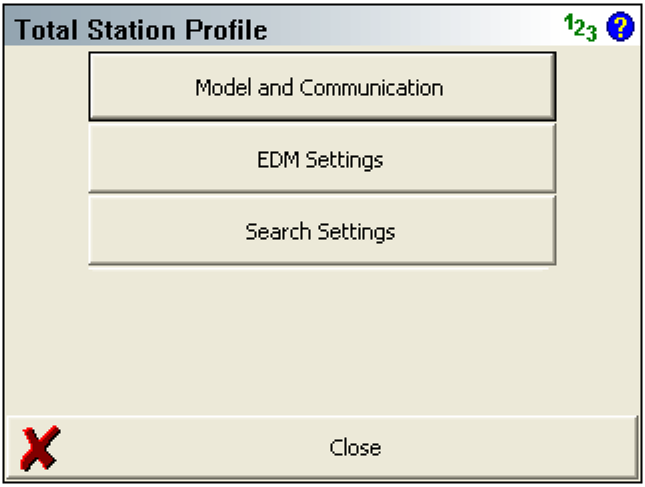
Use this option if you're not connecting anything to Evidence Recorder and also don't need to manually enter any shot information. With this mode, the instrument toolbar will not be displayed in the map screen.

Total Station Profile

Main Menu | Settings | Instrument Selection | Total Station | Edit

This screen will help you configure your total stating settings such as the make and model of instrument you plan on using and set any desired parameters you may need to use with your instrument.

This option will only be available if you specified **Total Station** in the Instrument Selection screen and then **Edit** a profile.



Model and Communication

This allows you to specify the make and model of instrument that will be connected to Evidence Recorder. You can also specify the communication settings such as baud rate and com port. See the Model and Communication topic for more information.

EDM Settings

This allows you to specify if you will be using prism offsets in Evidence Recorder and allows you to specify tolerances that will be used to ensure your EDM measurement meet your criteria. See the EDM Settings topic for more information.

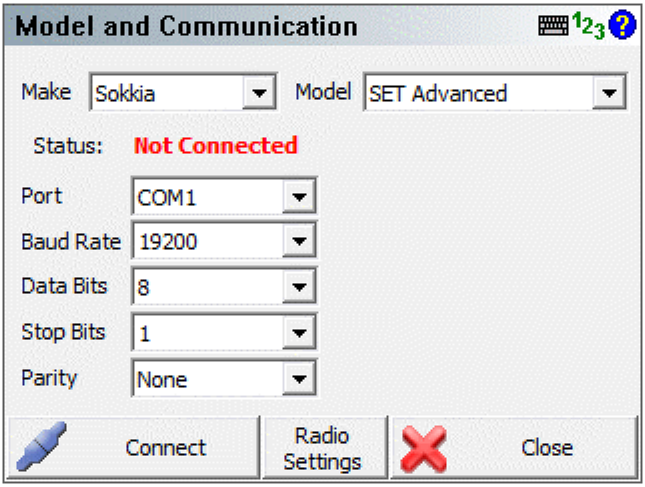
Search Settings

When using a robotic instrument, you can specify search window parameters. See the Search Settings topic for more information.

Model and Communication

Main Menu | Settings | Instrument Selection | Edit Total Station Profile | Model and Communication

This is where you can specify the make and model of instrument you will be connecting to, as well as specify your communication parameters.



Total Station Make

Use this to select the make of your instrument.

Total Station Model

Use this to select the model of your instrument.

Status

This indicates whether Evidence Recorder is Connected or Not Connected to your instrument.

Port, Baud Rate, Data Bits, Stop Bits, and Parity

If you know the settings of your instrument you can set them here in Evidence Recorder. They have to match exactly the ones on your instrument or you will get a communications error when you try to connect.

It is important to confirm these settings on your instrument when you're trying to connect Evidence Recorder for the first time! Most connection problems occur because the user has specified parameters that don't match the ones on their instrument.

On many data collectors you can select Bluetooth as your communication port. If you select the Bluetooth port, the traditional serial communication options (Baud Rate, Data Bits, Stop Bits, Parity) will be replaced with a Bluetooth Search function.

> Please note that not all bluetooth-enabled devices will list Bluetooth as a Port option. In some cases you must configure and use a virtual COM port through Windows CE's internal Bluetooth Settings, for example COM6.

Bluetooth Search

If you set the port to Bluetooth, a **Bluetooth Search** button will appear. Press the search button to find the device you want to communicate wirelessly with. All devices within range will be listed, choose the one you want to use

The device you selected will be saved into your instrument profile for future use so you do not need to Search every time.

Bluetooth PIN

After initiating a Bluetooth connection, you will be prompted to enter the PIN (passkey) for the instrument you are connecting to. If your instrument does not need one just leave it blank and continue by pressing OK.

The PIN you enter will be encrypted and stored in your instrument profile.

RC Port

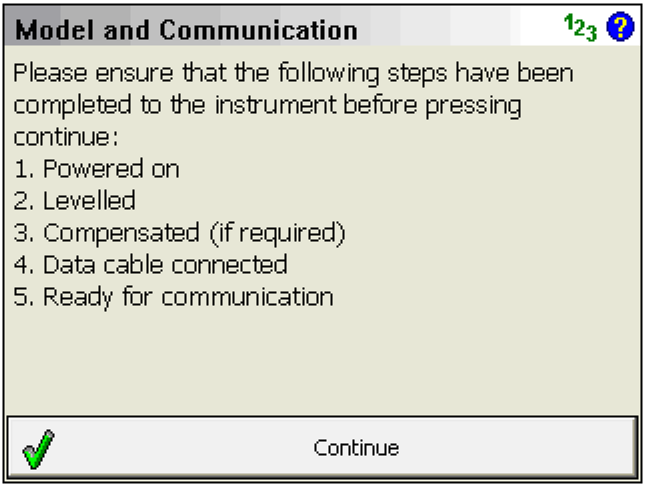
If you are connecting with a Topcon Robot, you can specify which port on your data collector the RC unit is connected to.

Radio Settings

Use this to set the communication parameters for your radios or other communication device, such as the channel or frequency. You can also use it to specify a direct connection to Evidence Recorder instead of using radios. Please see the Radio Settings topic for additional information.

Connect

Use this to connect to your instrument after you have specified your communication settings. After pressing the Connect button Evidence Recorder will display a reminder screen listing some items you should check before continuing.



When you press Continue on the screen and you see the following message, "No communication with instrument. Check settings, cables and power." read the No Communication topic for possible causes.

Evidence Recorder connects successfully, the Status will change to "Connected", and if your instrument supports graphical representation of the level bubble, you will see the Check Level screen.

Make and Model Settings

Evidence Recorder uses a smart driver that will query the instrument to see what commands it supports. Because of this you will see that in the Model section we don't list every instrument built by the manufacturer. Below you will find a list of instruments that we have tested with and had successful communication. Most instruments share common functionality; so even though your instrument might not be listed, just choose the model that most closely resembles your instrument.

Geodimeter	
Make	**Model**
400	Auto Trigger v1
440	Manual Trigger
510	Auto Trigger v1
600	Auto Trigger v2
600 Servo	** Use Trimble 5600 Robot
600 Robot	** Use Trimble 5600 Robot

Leica	
Make	**Model**
T 1600	Wild Series (GSI-8)
TC 1010	TPS Series (GSI-8)
TC 1610	TPS Series (GSI-8)
TC 500	TPS Series (GSI-8)
TC 600	TPS Series (GSI-8)
TC 805L	TPS Series (GSI-8)
TCR 1103	TPS Robot (GeoCOM)
TCR 305	TPS Series (GSI-8)
TCR 405	TPS Series (GSI-8)
TCR 705 Auto	TPS Series (GSI-8)
TPS 1100	TPS Robot (GeoCOM)
TPS 1200	TPS Robot (GeoCOM)
TPS Series 300	TPS Series (GSI-8)
TPS Series 700	TPS Series (GSI-8)
T 1010	TPS Series (GSI-8)
Disto A6	Disto A6

LTI	
Make	**Model**
Impulse CR400	Impulse (CR400)
Angle Encoder	Angle Encoder (SET)

Nikon	
Make	**Model**
DTM A20	Nikon Old
DTM 352	Nikon New

DTM 420	** Use Sokkia Set Basic
DTM 520	Nikon New
DTM 550	Nikon New
DTM 750	** Use Sokkia Set Basic
NPL 350	Nikon New

Pentax	
Make	**Model**
R-322 N	All Models
323	All Models
PCS 325	All Models

Sokkia	
Make	**Model**
SET 3B	Set Basic @ 1200 Baud
SET 4	Set Basic
SET 5B	Set Basic @ 1200 Baud
SET 6	Set Basic
E-Z Station	Set Basic
SET 230	Set Basic
SET 330	Set Advanced
SET 530	Set Advanced
SET 630	Set Advanced
Remotocatcher	Set Advanced (Note: no motorized servo controls are available.)
SRX	SRX

South	
Make	**Model**
NTS 325	NTS

Topcon	
Make	**Model**

APL-1A	APL-1A
GTS 212	Topcon Non-Robotic
GTS 230 W	Topcon Non-Robotic
GTS 300	Topcon Non-Robotic (Delay)
GTS 304	Topcon Non-Robotic
GTS 312	Topcon Non-Robotic
GTS 3B	Topcon Non-Robotic
GTS 4	Topcon Non-Robotic
GTS 800	Topcon Non-Robotic
GTS 800 Robot	Topcon Robot
GTS 8000	Topcon Robot
GPT 2004	Topcon Non-Robotic
GPT 3007 W	Topcon Non-Robotic
GPT 2003	Topcon Non-Robotic
GPT 9000	Topcon Robot

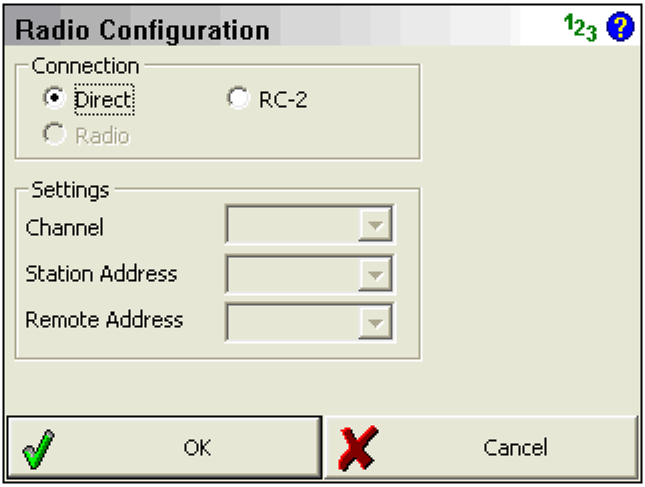
Trimble	
Make	**Model**
5600 Servo	5600
5600 Robot	5600 Robot

Zeiss	
Make	**Model**
ELTA R50	Elta R Series

Radio Configuration

Main Menu | Settings | Instrument Selection | Edit Total Station Profile | Model and Communication | Radio Settings

Use this to specify if you want to connect to your robotic instrument using a direct connection or through the instrument's radios. If you're using a Topcon, you can specify your RC unit as the communication device.



Connection

Direct

This will allow you to connect directly to your instrument through an instrument cable.

Radio

This will allow you to connect to your instrument using external radios. Select your radio channel, if this option is available.

Note: If you are using radios with your instrument but this option is disabled or not available, then pick the Direct option instead.

RC

This will allow Evidence Recorder and your instrument to communicate through the RC unit.

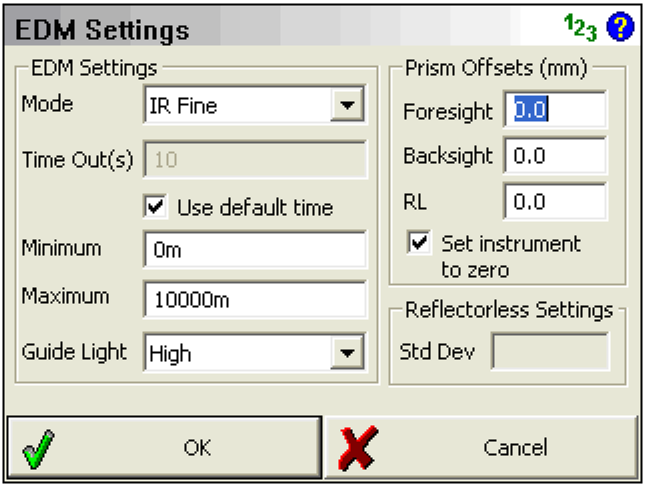
Settings

If you're using a Trimble or Geodimeter total station you will be able to specify the radio settings required to communicate with your instrument.

EDM Settings

Main Menu | Settings | Instrument Selection | Edit Total Station Profile | EDM Settings

From here you can specify EDM settings such as prism offsets and measurement modes.



EDM Settings

Mode

This list will display all the measurement modes supported by your instrument. These will be the same as the ones you're used to using and you can refer to your owner manual for more information on their specifications.

Time Out (s)

Use this to specify the length of time Evidence Recorder will try to receive a measurement from your instrument. You may need to set this to a higher number if you're trying to receive measurement in wooded areas or long sights.

Use Default Time Out

If this is checked on Evidence Recorder will use a default time out value. If you would like to change it you need to uncheck it and update the **Time Out** field.

Minimum and Maximum

You can specify the minimum and maximum distance that Evidence Recorder will accept as being valid. Example is if you set this the minimum to 10 feet and you measure 5 feet, Evidence Recorder will not record the measurement and will display a "Distance out of range" error in the status toolbar.

Guide Light

If your instrument has guide lights you will be able to set their intensity modes here. Please refer to your owners manual for more information on the different intensities.

Prism Offsets

Foresight Prism Offset

Use this if you want Evidence Recorder to control your prism offsets for your foresight shots. The values must be entered in millimeters. A positive value will be added to the distance that is measured, whereas a negative value will be subtracted.

All measurements other than the measurements to your backsight (reference measurement) are considered to be a foresight shot.

Note: If you specify a prism offset here, you need to make sure the prism offsets are set to zero on your instrument. Otherwise a double offset could be applied to your measurement which will produce incorrect answers.

When you first configure Evidence Recorder with your instrument, you should take the time to confirm that the distances being measured are correct. You can do this by first measuring a precise distance between your current occupy point and a point that you can easily reference and take a measurement to. When you compare the distance measured by Evidence Recorder to your manually measured distance, they should agree very closely.

Backsight Prism Offset

Use this if you want Evidence Recorder to control your backsight prism offsets. The values must be entered in millimeters. A positive value will be added to the distance that is measured, whereas a negative value will be subtracted.

Under normal circumstances, you will set the backsight prism offset to be equal to what you defined for the foresight prism offset. The only time these would be different is in situations where you're using different prisms that have different prism offsets. This is very common with robotic total stations where a permanent prism might be setup on the backsight, and a 360° prism is used at the pole. Typically these two configurations require different offsets be applied at the backsight and foresight shots. If you're unsure about your prism offsets, refer to your instrument's owners manual, or the dealer who sold you the instrument.

Note: If you specify a prism offset here, you need to make sure the prism offsets are set to zero on your instrument. Otherwise a double offset could be applied to your measurement which will produce incorrect answers.

When you first configure Evidence Recorder with your instrument, you should take the time to confirm that the distances being measured are correct. You can do this by first measuring a precise distance between your current occupy point and a point that you can easily reference and take a measurement to. When you compare the distance measured by Evidence Recorder to your manually measured distance, they should agree very closely.

RL (Reflectorless) Prism Offset

Most instruments when shooting reflectorlessly apply a zero offset to the measurement. Depending on the type of material you're measuring to, some materials require an offset be applied even though you're using a reflectorless EDM mode. For example, some reflective tapes used for these types of measurement require a small offset be applied. In this case you can specify this offset and Evidence Recorder will automatically apply it during reflectorless measurements.

Note: If you specify a prism offset here, you need to make sure the prism offsets are set to zero on your instrument. Otherwise a double offset could be applied to your measurement which will produce incorrect answers.

Set Instrument to zero

If this is turned on, a prism constant of zero will be uploaded to your instrument. The offsets specified in the foresight, backsight and RL fields will be applied to the measurements when received by Evidence Recorder. Turn this off if you don't want Evidence Recorder to modify your instrument's prism offset. **Not all instruments support this feature.**

When you connect your instrument to Evidence Recorder, special notes are recorded in the raw file regarding prism offsets.

If you have the ”Set Instrument” toggle turned on and your instrument supports this feature, Evidence Recorder will set your instrument's prism offset to zero so no correction will be applied to the measurement. Then once Evidence Recorder receives this uncorrected measurement, it will use the values you specified in the prism offset fields and adjust the distance accordingly. For example, if you specified an offset of 30mm, Evidence Recorder will upload an offset of zero to your instrument and apply the 30 mm offset to the measurement after it is received. In your raw file you will see the following note:

```
--Evidence Recorder Prism: 30mm Instrument Prism: 0mm
```

Most prism offset are specified in millimeters. Evidence Recorder will make the necessary conversions so the proper adjustment is applied.

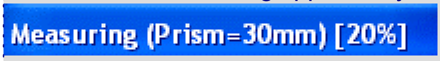
If Evidence Recorder can't set the prism offset on your instrument, it usually can't read it either. Since a prism offset wasn't uploaded, we don't know what prism offset is set on the instrument. So we indicate this by writing to the raw file that the instrument prism offset is "unknown".

```
--Evidence Recorder Prism: 30mm Instrument Prism: Unknown
```

When this happens you will usually want to confirm what offset are currently configured on your instrument in regards to prism offsets.

Special Notes:
- When using instruments that don't support uploading of prism constants, be sure not to double up your prism offsets by applying it in the instrument and Evidence Recorder at the same time.

- Since prism offsets are so important, on the measurement progress meter you will see what offset is being applied to your measurement.



Reflectorless Settings

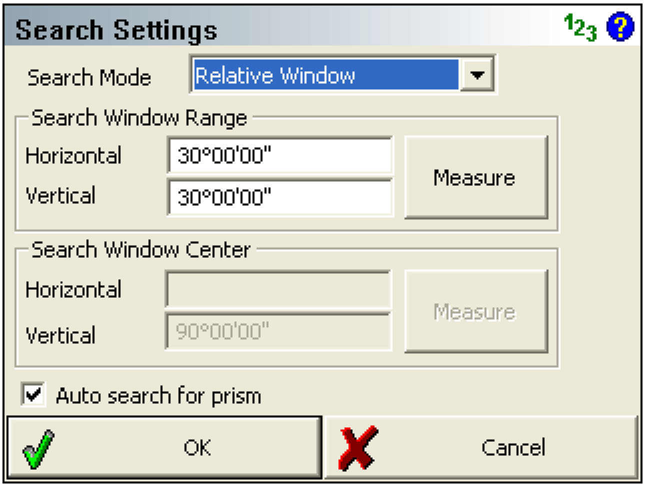
Std Dev:

This applies only to Trimble instruments. See your instrument guide for information on how the standard deviation affects your reflectorless measurements.

Search Settings

Main Menu | Settings | Instrument Selection | Edit Total Station Profile | Search Settings

When using a robotic or motorized instrument you can specify search settings for your instrument.



Search Modes

Some of Evidence Recorder's search modes are common to all robotic instruments, but there are a few model specific ones. The modes available are:

Relative Window

This allows you to specify a "window" defined by measuring a point at the top right and bottom left corners. If you press the search button, the search limits will be relative to the direction the instrument is currently pointing. In other words if your **search window ranges** are 30° horizontal and 30° vertical, it will apply this to your current direction. So the search will be limited to an area 15° left, right, up and down from your current direction.

Absolute Window

This allows you to specify an absolute search "center" for your search window. This forces Evidence Recorder to search in an absolute area defined by the angles set in the **search window center** fields. Furthermore, the search window range parameters apply to the search window center. For example, let's assume you defined 180° as the horizontal search window center, and the horizontal search window range is 30°. Your instrument will be forced to search in an area 15° left and right of the 180° plate reading. So if your prism is situated at a circle reading of 210°, it would never find you as the instrument would never go past a circle reading of 195° (180+15) when searching.

RC-2 Fast Track

If you're using a Topcon instrument, you can set the search mode to RC-2. This will force the instrument to use the RC-2 system for the search.

PS Next (CW)

This setting will appear if your Leica instrument has the power search system. Settings it to this will force the instrument to search in a clockwise direction.

PS Next (CCW)

This setting will appear if your Leica instrument has the power search system. Settings it to this will force the instrument to search in a counter-clockwise direction.

PS Absolute Window

This setting will appear if your Leica instrument has the power search system. This will force the power search system to do a relative search based on the **search window range**.

RC-PR

If you're using a Sokkia SRX, you can set the search mode to RC-PR. This will force the instrument to use the RC system for the search.

Search Window Range

Use this to define the upper right corner and lower left corner of your search window. Pressing the measure button will step you through the procedure and it will calculate the horizontal and vertical search range. This range will be applied to the instrument's current direction when the user presses the search button.

Search Window Center

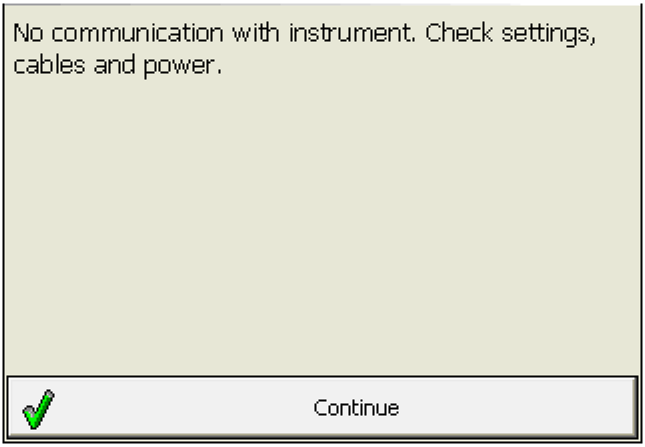
Use this to set an absolute center for your search window. The search window range parameters will be applied to the search window values that were measured. Pressing the measure button will step you through the procedure and it will calculate the horizontal and vertical search range.

Auto search for prism

If this is checked, then if your instrument has lost its lock on the prism, Evidence Recorder will automatically initiate a search for the prism when the measure button is pressed. You will see the word "Search" on the lock button at the top of the robotic instrument toolbar while a search is in progress.

No Communication

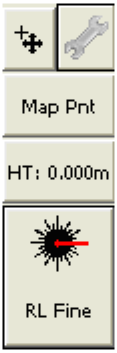
When trying to communicate with your instrument you will see the following screen if Evidence Recorder can't make a connection with your instrument.



Usually this happens when your communication parameters are not the same on the instrument and in Evidence Recorder. You need to check these settings again to make sure they're correct.

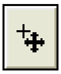
This can also happen if you have a bad cable. If you're using a robotic instrument you might have setup your radios incorrectly.

Instrument Toolbar



When you use Evidence Recorder in either manual or total station mode, you will see the instrument toolbar beside the map area.

This toolbar allows you to control your instrument settings, EDM modes, measurement modes and target heights.



Auto-Center

This toggles the auto-center feature on or off. If turned on, whenever you take a measurement, the map screen will always re-center on the measured point.

Instrument Settings

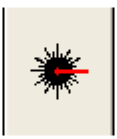
This opens the instrument settings screen where you can control specific settings for your total station such as EDM settings, Tolerance setting and Instrument Connection/Disconnection.

Measurement Mode

This opens the Measurement Modes screen where you can select what type of measurement you want to take. The current measurement mode is always displayed on this button - for example if you're using the distance offset mode it will display "Dist Off".

Target Height

This opens the Target Heights screen where you can change the current target height. The current target height is always displayed on this button.



Measure Button

This triggers your total station to take a measurement.

If you are using a robotic total station, please see the Robotic Instrument Toolbar topic.

If you are using GPS, please see the GPS Toolbar topic.

Robotic Instrument Toolbar

When you use Evidence Recorder in robotic total station mode, you will see the robotic instrument toolbar in the map area. Like the Instrument Toolbar, this toolbar allows you to control your instrument settings, EDM modes, measurement modes, and target heights. It also lets you search and lock onto the prism.

Lock Button

Evidence Recorder uses a button to trigger the instrument to search for the prism and lock onto it. You can also use this button to turn the lock off.

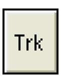
The button when not locked on a prism will display a **No Lock** status with a un locked icon. To search for the prism, simply press the No Lock button.

After you have pressed the No Lock button you will see a **Search** icon on the button while the instrument searches for your prism.

When Evidence Recorder finds a prism and locks onto it, the button will display a **Lock** icon. To stop the instrument from tracking, you can press the Lock button again to set it to a No Lock status.

If you're using multiple prisms and you want to force Evidence Recorder to look for another one when you're locked onto a prism, double tapping the Lock button will force it to search for the next available prism.

Also during a search you can cancel the current search by pressing the Stop Search button on the search progress toolbar.



Cursor Tracking

This turns the cursor tracking feature on or off. If turned on, the current position of the target will be displayed on the screen in real time. You can only use this feature once you have specified an instrument setup using the Setup Occupy Point command.

Note: The cursor tracking position will use a coarse measurement to plot your position. When you are stationary, the cursor is a hollow triangle pointing towards the instrument. When you are moving, the cursor is a solid triangle pointing in the direction of travel.

Instrument Settings

This opens the Instrument Settings Toolbar. On this toolbar you can control specific settings for your total station such as EDM modes.

Measurement Mode

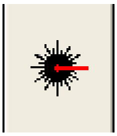
This button will open the Select Measurement Mode screen, From here you can select what type of measurement you will be using. When you choose your mode, this button will display the mode you're using. For example, if you're using the Distance Offset mode, the button will display "Dist Off".

Target Height

This is the target height button and it controls the target heights used by Evidence Recorder. The current target height is always displayed on this button.

EDM Mode

This opens the EDM Settings screen where you can toggle between all available EDM modes. The current EDM mode is always displayed on this button.



Measure Button

Use this to trigger your total station to take a measurement.

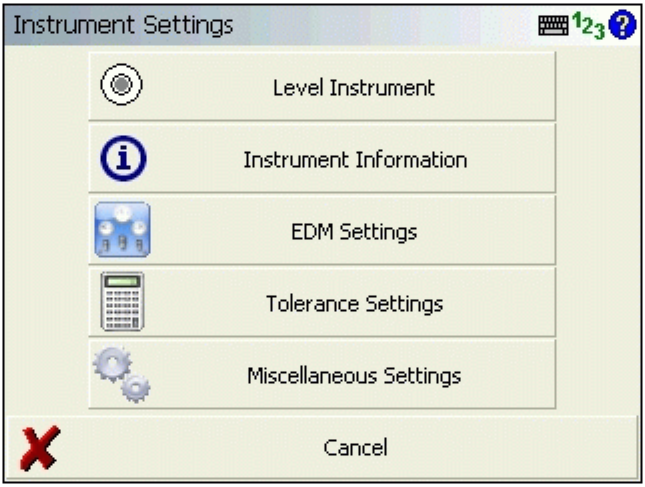
If you are using a conventional non-robotic total station, please see the Instrument Toolbar topic.

If you are using GPS, please see the GPS Toolbar topic.

Instrument Settings

Main Menu | Settings | Instrument Settings

Instrument Toolbar | Instrument Settings



Use the vertical scroll bar along the side to access additional instrument settings if they cannot all fit on screen at the same time.

Please note that not every instrument supports each of the following functions, so you may not see all of the following buttons when connected to your total station.

Level Instrument

This will open the Check Level screen, where you can check how level your instrument is.

Instrument Information

When this is pressed, we will display the current battery status of your instrument. Note, not all instruments support this.

EDM Settings

Use this to set the EDM mode for your instrument. Every manufacturer has different measurement modes available but we will list only those that your instrument supports. Please refer to your instrument manual for more information on the EDM modes your instrument supports. Any time you change your EDM Mode, Evidence Recorder writes a comment into the raw file indicating which mode is being used.

Tolerance settings

This will take you to you measurement tolerance settings.

Set Angle

Use this to open the Set Angle screen where you can view the current angles and turn or flop your motorized instrument.

Auto-Center On / Off

Use this to automatically center the map when a point is shot. If turned on, whenever you take a measurement, the current prism location will always appear in the center of your map display.

ATR On / Off

Use this to turn on and off your instruments Auto Target Recognition feature.

Laser Pointer On / Off

This turns on and off the instrument's red laser pointer.

Guide Lights On / Off

This will turn on and off your instrument's guide lights.

Instrument Joystick

This is the Total Station Joystick function. When activated you will be able to move your motorized instrument to the left, right, up and down by using the joystick touch-screen. There are three speeds that can be activated: slow, medium, and fast. The smaller inside blue buttons activate the slowest turn mode, and the larger outside blue buttons activate the fastest turn mode. To stop the instrument from turning, simply press the red Stop button at the center. **The directions assume you are at the pole looking at the instrument.** Pressing the right buttons will turn the instrument to your right, pressing the up buttons will turn the scope up, etc.

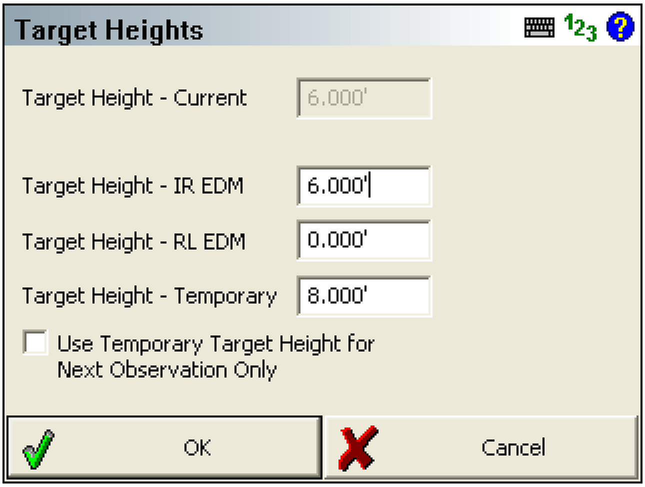
Instrument Connect / Disconnect

Use this to connect or disconnect Evidence Recorder from the instrument. When you are connected to the instrument you will see the Disconnect Instrument button.

Target Height

Instrument Toolbar | HT Button

You can access this function by pressing the **HT** button on the instrument toolbar.



Target Height – Current

This is the current target height.

Target Height – IR EDM

Enter the target height that you will be using for measurement to a prism. When you select an IR edm mode, Evidence Recorder will automatically switch to this target height during the measurement.

Target Height – RL EDM

Enter the target height that you will be using for your reflectorless measurements. When you select any RL edm mode, Evidence Recorder will automatically switch to this target height during the measurement. Since most reflectorless shots require a zero target height, Evidence Recorder defaults this field to zero and can be altered by the user if needed.

Target Height - Temporary

Use this to specify a one time only target height. In other words after you take your measurement it will revert back to the the previous target height automatically.

> **Note:**
> When the user changes the current target height a LS record will be written to the raw file.

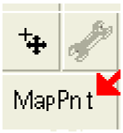
MAPPING METHODS MENU

Mapping Methods Menu

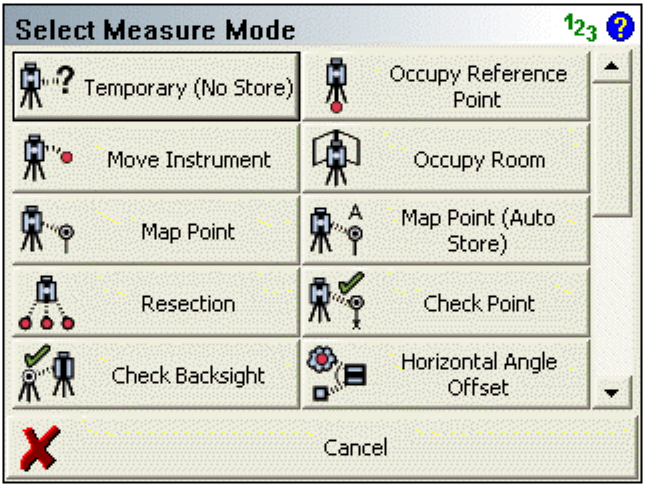
Main Menu | Mapping Methods

These are commands built into Evidence Recorder that will help you measure and map your points. The desired method must be selected before you begin a measurement.

For a faster way to get to this screen, you can also press the measure mode button which is located on the instrument toolbar.



Measure Mode Button



Use the vertical scroll bar along the side to access additional measurement modes if they cannot all fit on screen at the same time.

Note: Several of these modes will not be available until you have setup an occupy point and measured a backsight via the Occupy Reference Point, Occupy Room, or Resection commands. Most of these modes will also not be available if you are using GPS.

Temporary (No Store)

This will allow you to take a measurement without storing it. Please see the Temporary (No Store) topic for more information.

Occupy Reference Point

Use this to define an instrument setup. Please see the Occupy Reference Point topic for more information.

Move Instrument

This is a wizard that will help you establish a new reference point, and then will step you through moving your instrument. Please see the Move Instrument topic for more information.

Occupy Room

Use this to define an instrument setup so that one wall in the room becomes a baseline where one end of it is at 0,0. Please see the Occupy Room topic for more information.

Map Point

This mode allows you to measure a point. After the measurement, it will allow you to review your measurement data and allow you to make changes to the point id and description before it is stored. Please see the Map Point topic for more information.

Map Point (Auto Store)

This mode allows you to measure a point using the next available point id, and the description and line toggles specified on the main map screen. Using this is a very fast method for recording your measurements. Please see the Map Point (Auto Store) topic for more information.

Resection

This will start the multiple point resection routine to allow you to determine your current instrument position by measuring to known points. Please see the Resection topic for more information.

Reference Line

This will start the reference line routine. Please see the Reference Line topic for more information.

Check Point

Use this to display a check measurement to an existing point in your project. Please see the Check Shot topic for more information.

Check Backsight

Use this to compare your backsight to your previously measured values. Please see the Check Backsight topic for more information.

Horizontal Angle Offset

This will start the angle offset routine. Please see the Horizontal Angle Offset topic for more information.

Vertical Angle Offset

This will allow you to compute the height of an object. Please see the Vertical Angle Offset topic for more information.

Distance Offset

This will start the distance offset routine. Please see the Distance Offset topic for more information.

Manual Distance

This will record a HA and VA for a shot, but the user can manually enter the distance. Please see the Manual Distance topic for more information.

Manual Entry

This will allow you to manually enter in a shot including HA, VA and SD. Please see the Manual Entry topic for more information

Two Line Intersection

This allows you to measure two baselines and Evidence Recorder will compute the intersection point. Please see the Two Line Intersection topic for more information.

Line - Angle Offset

This allows you to measure two points to define a baseline, measure an angle, and Evidence Recorder will compute the intersection point. Please see the Line - Angle Offset topic for more information.

Line - Distance Offset

This allows you to measure two points to define a baseline, then manually enter measured distances. These distances will be used to compute a new point based on the baseline. Please see the Line - Distance Offset topic for more information.

Line - Perpendicular Point

This allows you to measure two points to define a baseline, then you can select an existing point which will be used to compute a perpendicular intersection. Please see the Line - Perpendicular Point topic for more information.

Trilateration

This will allow you to compute new points by observing their distances from two known existing points. Please see the Trilateration topic for more information.

Baseline Offset

This will allow you to compute points offset from a baseline. Please see the Baseline Offset topic for more information.

Vertical Scene Projection

This will allow you to compute points on a user defined vertical plane. Please see the Vertical Scene Projection topic for more information.

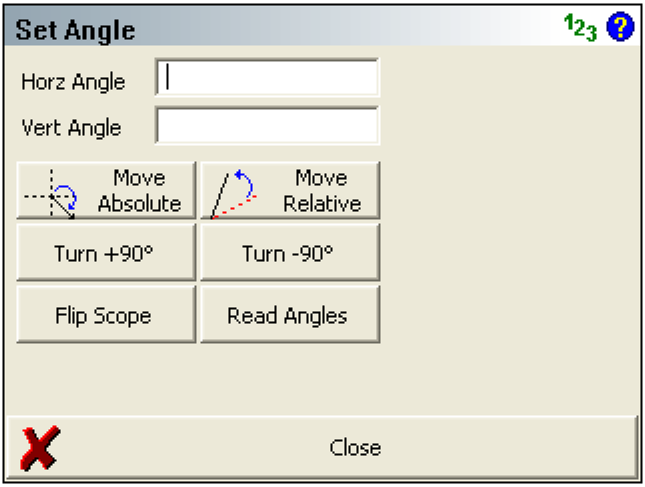
Point Scanning

Use this to activate Point Scanning with your motorized reflectorless instrument. Please see the Point Scanning topic for more information.

Set Angle

Instrument Settings toolbar | Set Angle

You can access this screen by pressing the **Set Angle** button on the instrument settings toolbar.



Horizontal and Vertical Angles

Use these two fields to enter in angles that will be used by the Set Angle buttons.

Move Absolute

Use this to turn the instrument to a plate reading that you've entered in the HA or VA fields. For example if you enter 45°30'30" for the HA and 90°10'00" for the VA, pressing the Absolute button will turn your instrument so the plate reading equals these values.

Move Relative

Use this to turn an angle to the right or left of the current instrument plate reading. Positive values will be added to the current plate reading, negative values will be subtracted. Enter your values in the HA and VA fields.

Turn +90°

Pressing this will force your instrument to turn 90 degrees to the right.

Turn -90°

Pressing this will force your instrument to turn 90 degrees to the left.

Flip Scope

This will plunge the scope and reverse the direction for you.

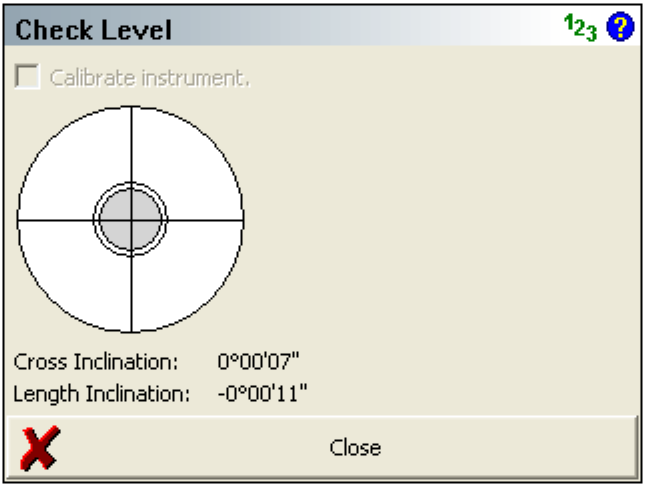
Read Angles

This will display the current horizontal and vertical angles as displayed on your instrument. This button acts as a toggle and if left on, will display the angle in real time.

Check Level

Instrument Settings | Level Instrument

If your instrument supports it, you can check to see how level your instrument is.



If your instrument has a laser plummet or laser pointer, Evidence Recordercan toggle those functions on or off. On some models of total station this feature is turned on automatically.

If you're using a Trimble or Geodimeter instrument you can turn on the **Calibrate Instrument** option and when you press Close it will force the instrument to do a calibration.

GPS Reference

Starting GPS

Before you can start your GPS survey, there are a few things you need to do.

Profile and Datum Files

- Using the Datum Grid Editor, create datum files that cover the area you will be surveying in. Once you create the files, you can copy them to Evidence Recorder. These grid file are used to convert your RTK position (Latitude, Longitude, Ellipsoid Height) to grid coordinates.
- Create a profile for your reference (base) and rover receivers. Profiles contain receiver settings such as baud rates and tolerance masks that are used by Evidence Recorder. Refer to the Reference Configuration and Rover Configuration topics for more information.

Reference (Base) Connection Procedure

1. Main Menu | Settings | Instrument Selection
2. Choose **GPS Reference** as the type of instrument.
3. If you have not already done so, you need to create a profile for your reference receiver. If you have a profile already defined, select it now and then press **Connect**.
4. You will then be prompted with the Correction Link Settings where you can configure your radio settings. Press the **Connect** button to turn on your radio to prepare to begin broadcasting corrections.
5. If your profile is configured properly, you will see a message, "Press the measure button at any time to configure the reference receiver with a position and to enable the transmission of corrections." Select **Continue**.
6. You will now see the map screen. On the GPS Toolbar you can review information about receiver, sky plot list, display current position, and review DOP values.
7. When you're ready to program a position into the base receiver, all you need to do is press the **Measure** button on the GPS Toolbar. There are several different options you can use to program the position and they're described in more detail in the Program Reference Receiver topic.
8. After you program the receiver with a position you will be able to physically disconnect the data collector.

Rover Connection Procedure

1. Main Menu | Settings | Instrument Selection
2. Choose **GPS Rover** as the type of instrument.
3. If you have not already done so, you need to create a profile for your rover receiver. If you have a profile already defined, select it now and then press **Connect**.
4. You will then be prompted with the Correction Link Settings where you can configure your radio or modem settings. Press the **Connect** button to turn on your radio or modem to begin receiving corrections.
5. With a successful connection you will see the map screen. The Measure button might say **"No Link"** to begin with, then switch to **"RTK Float"** and finally to **"RTK Fixed"**.
6. To record a position, simply press the **Measure** button on the GPS toolbar. Refer to the GPS Measurement topic for more information.

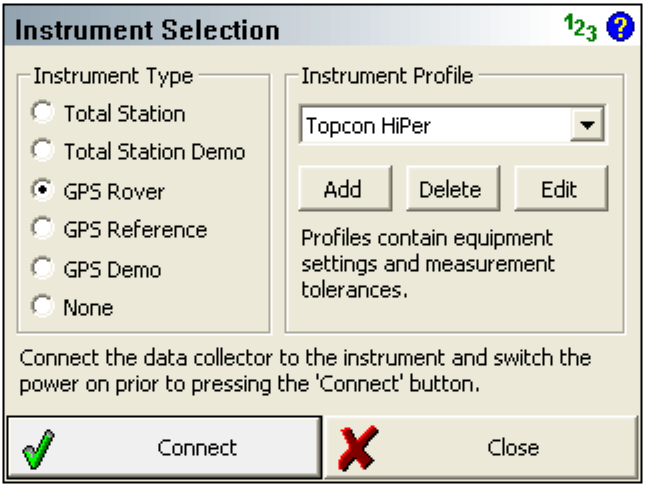
Select GPS Profile

This is where you can create a new profile for each rover/base receiver you will be using.

There are two ways to get to this screen.

1. You can open the profile screen for your rover or base by going to Main Menu | Settings | Instrument Selection. This will display the Instrument Selection screen which contains the GPS Rover and GPS Reference profiles.

2. If you already have your instrument type set to GPS and you're currently in the map view, you can press the **Settings** button on the GPS toolbar. This will display the Instrument Selection screen which contains the GPS Rover and GPS Reference profiles.



Editing Profiles

On the Add Profile screen you can enter any name you wish for the profile. Profiles can be copied from one data collector to another, so you can have a "Master" profile file that is sent to all crews so they can quickly set up systems.

When you're ready to edit the settings for the profile you have selected, press the **Edit** button. This will display the GPS configuration screen for the selected rover or reference profile.

Refer to the GPS Configuration (Reference) or GPS Configuration (Rover) topics for more information on the settings available for your profiles.

Your profiles are stored in the file ...\MicroSurvey EVR9\Programs\MSURVEY.INI so once you have configured one data collector, you can simply copy this file onto your other data collectors to make the profiles available on them. This file should also be backed up for easy recovery.

Using Profiles for Connection

Once you've created your profiles, you can use them to connect to your receiver. Simply select the correct GPS Mode, either GPS Rover or GPS Reference, then select the profile you want to use in the profile list.

When you've physically connected the your data collector to your receiver, press the **Connect** button to start the connection process.

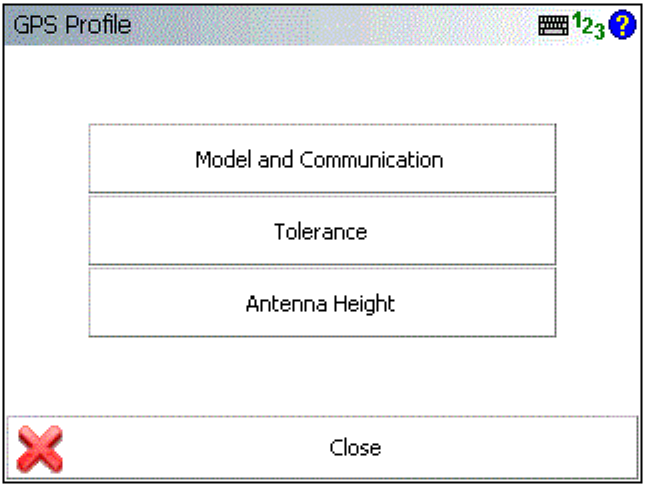
If it isn't successful you will see the following message "Could not detect GPS receiver! Please check configuration, cable and power." You can then press the Auto Detect Baud Rate button to force Evidence Recorder to automatically try different baud rate settings. If this doesn't work you should review your profile settings and ensure that you have the correct COM port selected and that you have your data collector connected to the correct port on the GPS receiver.

GPS Demo

The GPS Demo Mode contains a profile called "RTK Demo" which can be used to explore the GPS Capabilities of Evidence Recorder without being connected to a receiver.

GPS Reference Profile

The GPS Configuration for your reference unit is accessed from the Instrument Selection screen by selecting GPS Reference as the Instrument Type, then pressing the **Edit** button to configure your selected GPS Reference Profile.



Model and Communication

This is used to select the Make and Model of receiver, the port that the data collector is connected to and the mode that the current receiver will play in the RTK process. Please see the GPS Model and Communication topic for more information.

Tolerance

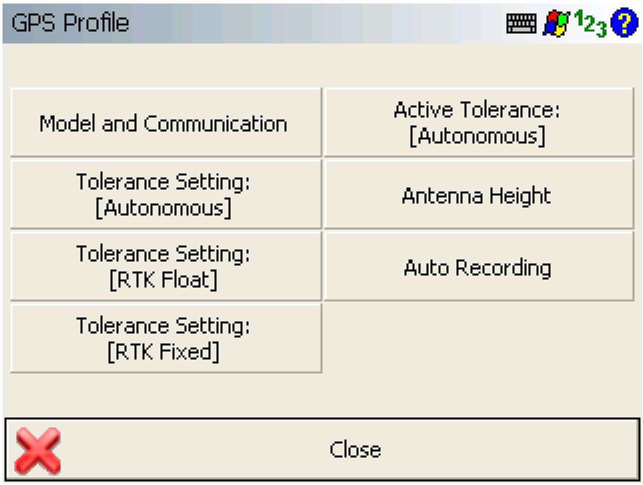
This is used to enter information about the location of the reference (base) station. Please see the GPS Tolerance (Reference) topic for more information.

Antenna Height

The antenna settings are used to calculate or enter the height of the antenna phase center above the ground. Please see the GPS Antenna Configuration topic for more information.

GPS Rover Profile

The GPS Configuration for your rover unit is accessed from the Instrument Selection screen by selecting GPS Rover as the Instrument Type, then pressing the **Edit** button to configure your selected GPS Rover Profile.



Model and Communication

This is used to select the Make and Model of receiver, and the port settings that the data collector will connect with. Please see the GPS Model and Communication topic for more information.

Tolerance Setting: [Description] (x3)

The three configurable tolerance modes are used to enter information used in computing the position of the rover once a measurement has begun. Please see the GPS Tolerance Modes (Rover) topic for more information.

Active Tolerance: [Description]

This displays the current tolerance mode, which can be changed at any time during your survey by selecting the GPS Settings button in the GPS toolbar. Please see the GPS Tolerance Modes (Rover) topic for more information

Antenna Height

The antenna settings are used to calculate or enter the height of the antenna phase center above the ground. Please see the GPS Antenna Configuration topic for more information.

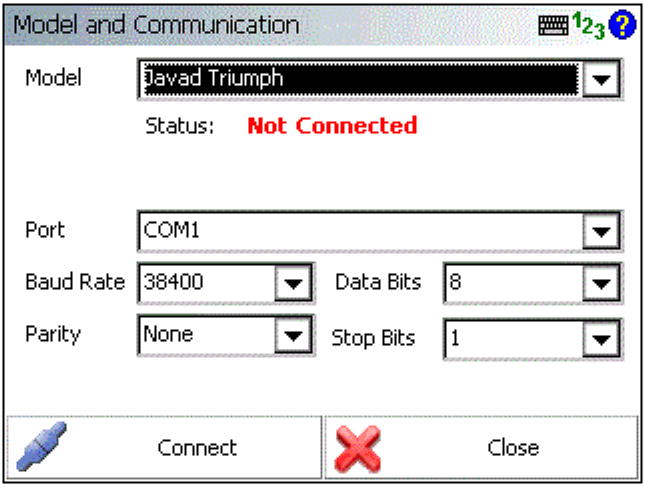
Auto Recording

The Auto Recording settings are used for collecting data in a "Kinematic" mode. The receiver can automatically log a point every X distance or Y seconds. The user simply selects what option they prefer to use for logging Kinematic data and start the survey. Keep in mind while collecting data at higher velocities that Evidence Recorder receives position updates from the GPS at a maximum rate of once per second.

GPS Model and Communication

The Model and Communication settings are used to select the Make and Model of receiver, the port that the data collector is connected to, and other communication parameters.

Cable Connection



Model

Specify the make and model of receiver you are connecting to.

Sensor Port

If your receiver has more than one data port, specify the port on the receiver that the data collector will be connected to.

Port

Specify the port on your data collector (usually COM1) that you will connect a cable between your receiver and this port.

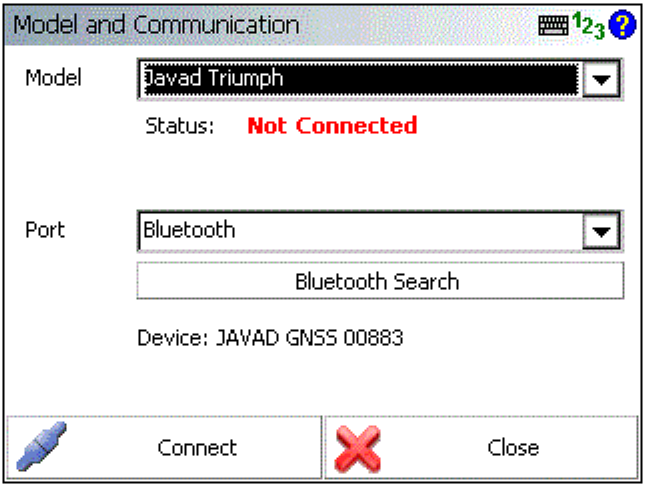
Baud Rate, Data Bits, Parity, Stop Bits

Specify the communication paramaters for the serial connection. If you're unsure of what baud rate your receiver is set to you might want to set the baud rate to Auto Detect. This will force Evidence Recorder to check for communication using all the baud rate settings and if successful, it will set this baud rate in the profile.

Bluetooth Connection

Port

On many data collectors you can select Bluetooth as your communication port. If you select the Bluetooth port, the traditional serial communication options (Baud Rate, Data Bits, Stop Bits, Parity) will be replaced with a Bluetooth Search function.



Please note that not all bluetooth-enabled devices will list Bluetooth as a Port option. In some cases you must configure and use a virtual COM port through Windows CE's internal Bluetooth Settings, for example COM6.

Bluetooth Search

If you set the port to Bluetooth, a **Bluetooth Search** button will appear. Press the search button to find the device you want to communicate wirelessly with. All devices within range will be listed, choose the one you want to use

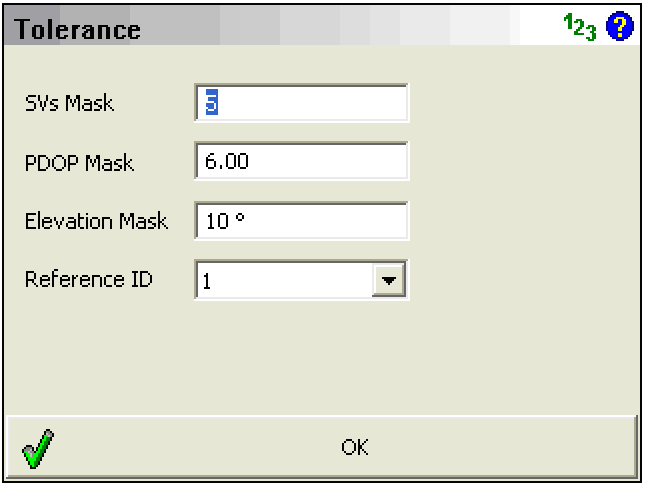
The device you selected will be saved into your instrument profile for future use so you do not need to Search every time.

Bluetooth PIN

After initiating a Bluetooth connection, you will be prompted to enter the PIN (passkey) for the instrument you are connecting to. If your instrument does not need one just leave it blank and continue by pressing OK.

The PIN you enter will be encrypted and stored in your instrument profile.

GPS Tolerance (Reference)



SVs Mask

The SVs Mask setting is used to establish the minimum number of satellites that are necessary to produce a solution with a valid position. The SVs must also pass the elevation mask test to be included in this number for the calculation of the rover position.

PDOP Mask

The PDOP mask is used to control the acceptable geometry of the satellites used to compute the RTK position. If the PDOP value exceeds this number, the user will not be eligible to collect an RTK position.

Elevation Mask

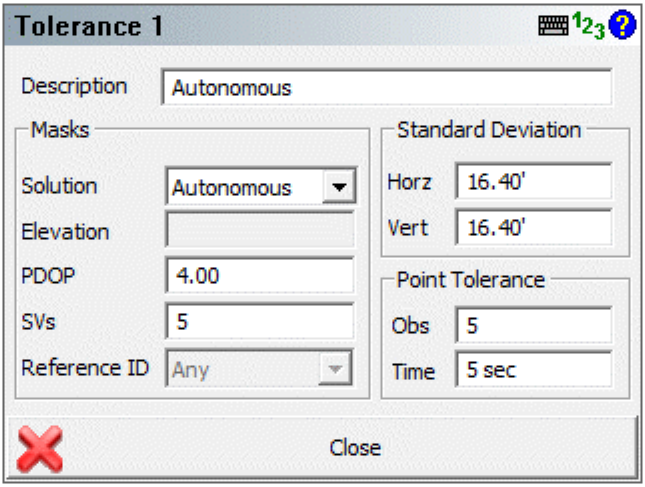
The Elevation Mask is used to determine which satellites to use in computing the differential corrections to broadcast to the rover(s). Satellites below this value will not be used in the solution. Elevation mask angles are typically equal or less than the elevation mask set for the rover system.

Reference ID

The Reference ID will be used by the rover to determine which differential corrections it is receiving (if you have more that one reference station in use). This is useful information to know if one of the base stations goes down or experiences problems during an RTK session.

GPS Tolerance Modes (Rover)

The tolerances modes are used to enter information used in computing the position of the rover once a GPS measurement has begun.



You can define three different tolerance modes that can be selected from the GPS Tasks menu while surveying. Tolerance modes are used to ensure that certain criteria are being met every time you take a measurement. The reason for three different settings is to allow you to specify different tolerances for different types of measurements you might need to make. For example, control points would need to be measured more precisely then those used for topographic measurements.

Description

This is where you can assign a "friendly" description to your three tolerance modes to make them more easily identifiable to you - for example "Control Points" or "Topo Points".

Masks

Solution

Each observation must be of the specified solution type (or better). You can select from several Solution modes depending on your receiver make and model, these can be:

- Autonomous
- WAAS
- DGPS (differential code solution)
- RTK Float (differential carrier solution)
- RTK Fixed (differential carrier solution)

Please refer to your GPS manufacturer's documentation for the solutions' respective positional accuracy.

Elevation Mask

The elevation mask is used to filter out satellites that are close to the horizon and are, thus, unreliable. Typical elevation mask angles can range between 10º and 20º.

PDOP

The PDOP (Position Dilusion Of Precision) mask is used to control the acceptable geometry of the satellites used to compute the solution. If the PDOP value exceeds this number, the user will not be eligible to collect a position. Typical PDOP masks are 5 or 6.

Satellites (SVs)

The Satellites mask is used to establish the minimum number of satellites that are necessary to produce a solution with a valid position. Each satellite must also pass the elevation mask test to be included in this number for the calculation of the rover position.

Reference ID

The Reference ID is used to tell the Rover which reference station (base) to use for the differential corrections. If "Any" is selected, it will use the first correction set identified for all future position solutions.

Standard Deviation

Standard Deviation - Horizontal

Evidence Recorder will use the instantaneous Standard Deviation values that your receiver is outputting to determine if the measurement can proceed. If the instantaneous Standard Deviation values are equal to or less than the values you've specified, then the measurement can proceed. Once this happens, Evidence Recorder will start averaging the measurements and will compute and display averaged Standard Deviation values. These averaged Standard Deviation values must then remain equal to or less than the values you've specified for the entire duration of the measurement, for the measurement to be accepted as being within the specified tolerances.

This is your maximum acceptable horizontal standard deviation to be maintained during the point measurement.

Standard Deviation - Vertical

This is your maximum acceptable vertical standard deviation to be maintained during the point measurement.

Point Tolerance

Point Tolerance - Observations

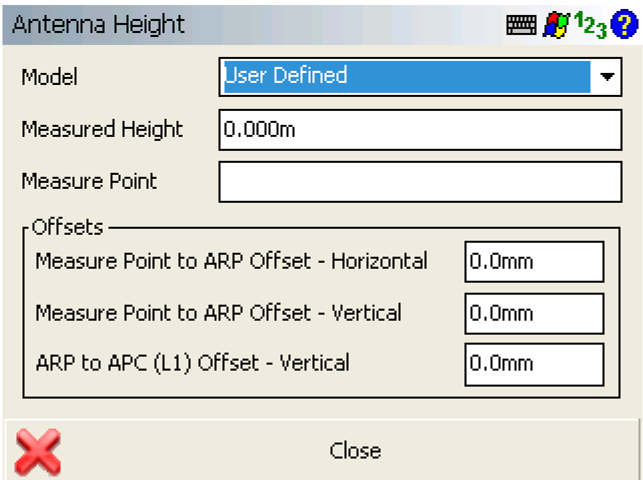
This is the minimum number of observations that the receiver must collect and average in order to compute a solution.

Point Tolerance - Time

This is the minimum time duration that the receiver must collect and average observations in order to compute a solution.

GPS Antenna Height

The antenna settings are used to calculate or enter the height of the antenna phase center above the ground. You can enter the true height (if it is known) or enter the measured height and any horizontal or vertical offsets and have Evidence Recorder calculate the antenna height for you.



Depending on the model you've selected, manufacturer specific antenna offsets will be listed. If your specific antenna model is not listed, you can select "User Supplied" and specify appropriate offset measurements. For more detailed information about these offsets, refer to your users guide for your receiver.

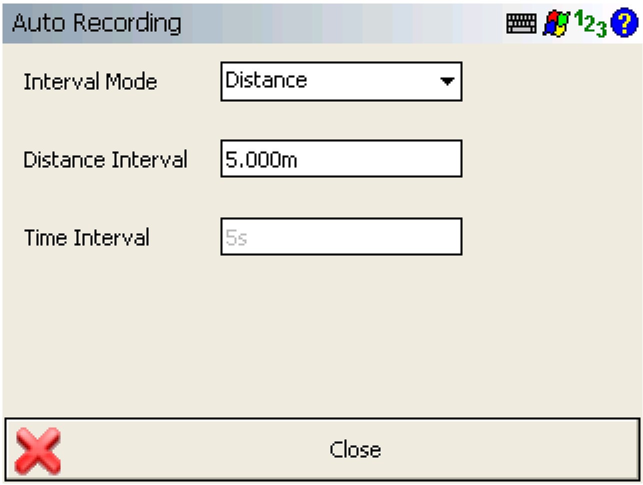
The true height is simply computed by the use of Pythagoras' theorem:

$$TrueHeight = VerticalOffset + sqrt((MeasuredHeight)^2 - (HorizontalOffset)^2)$$

You can change the true or measured antenna height at any time, on the Store Point screen when storing your GPS shots.

GPS Auto Recording

The Auto Recording settings are used when collecting GPS data in a "Kinematic" mode. The receiver can automatically log a point every X distance or Y seconds. The user simply selects what option they prefer to use for logging Kinematic data and start the survey. Keep in mind while collecting data at higher velocities that Evidence Recorder receives position updates from the GPS at a maximum rate of once per second.

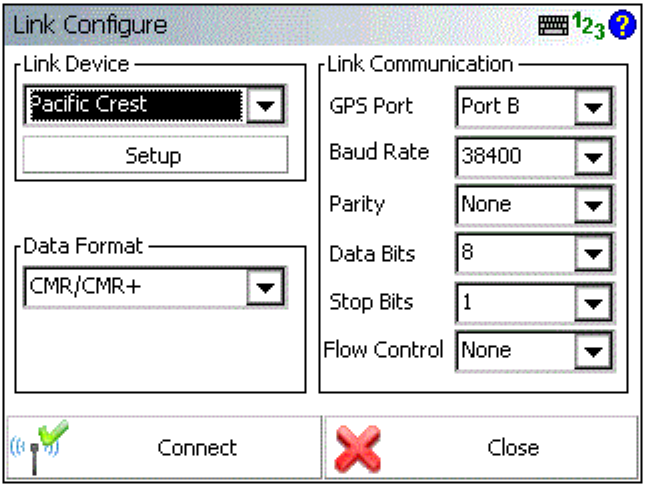


Once configured, Auto-Recording is activated on the GPS Measurement screen after pressing the Measure button:

Once activated, Auto-Recording is deactivated by pressing the Measure button again.

Correction Link

The link settings are used to configure the radio or GSM link from the reference station to the rover. The mode will vary depending on your receiver type. The Setup button allows the user to go into further device details including channels and frequencies for radios and AT commands for GSM.



Mode

Select the appropriate Correction Link mode, such as Radio, Modem, or None.

Setup

When you press the Setup button on the dialog above, the Radio Setup or Modem Setup screen will appear. Choose the radio make and model from the pulldown and set the channel or frequency, the radio will be programmed by Evidence Recorder to the channel or frequency selected (on some models). If you are using an NTRIP or GPRS server, enter your internet and server credentials here.

Enable WAAS Option

The option to enable WAAS solution is available depending on your receiver type. Evidence Recorder will indicate if WAAS is available for the selected receiver type.

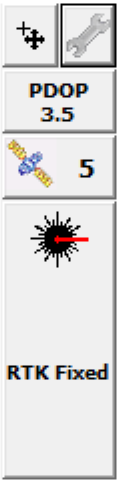
Message Type

The message type is used in determining what data streams are sent from the reference station to the rover. They can be RTCM, CMR or a proprietary format.

Communication Parameters

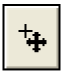
The communication parameters are used for interaction between the receiver and the communication device. Refer to the communication device's documentation for additional instructions and settings.

GPS Toolbar



Once the user has selected a GPS receiver and communication has been established, the GPS toolbar will appear on the main interface.

NOTE: You will only see the GPS toolbar if you selected GPS Reference, GPS Rover, or GPS Demo as your instrument type. If you have selected a GPS Profile but are not yet connected to the receiver, most of these buttons will be disabled.



Auto-Center

Single-tapping this button will re-center the display on the current position of your receiver.

Double-tapping this button will set the system into an auto-pan mode where the display will always be centered on the current position. When active, single-tapping this button once more will disable the auto-pan mode.

GPS Settings

If you press this button while you are connected to a receiver, you will see the GPS Settings screen. At any time this button can be used to adjust or stop your GPS survey.

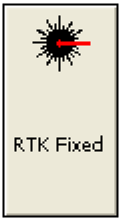
If you press this button without being connected to a receiver, you will see the Instrument Selection screen where you can edit your GPS profiles or connect to your receiver.

DOP Values

This displays the current DOP (Dilution of Precision) values. Pressing this button will cycle through the PDOP, HDOP and VDOP. The PDOP is the default setting as this is most often used to ascertain the quality of the satellite geometry.

Satellite Plot/Satellite List

This shows the total number of satellites the receiver is currently using in its solution. Press this to view a sky plot of the current SVs visible to the rover, or to access the Satellite List.



Measure

This is the measure button.

This button also indicates the current solution type. This tells the user if the solution is Fixed, Float, WAAS, DGPS or Autonomous. This button will also indicate to the user if the corrections from the reference station have been discontinued by denoting "No Link".

Please refer to the GPS Measurement topic for more information.

If you are using a conventional non-robotic total station, please see the Instrument Toolbar topic.

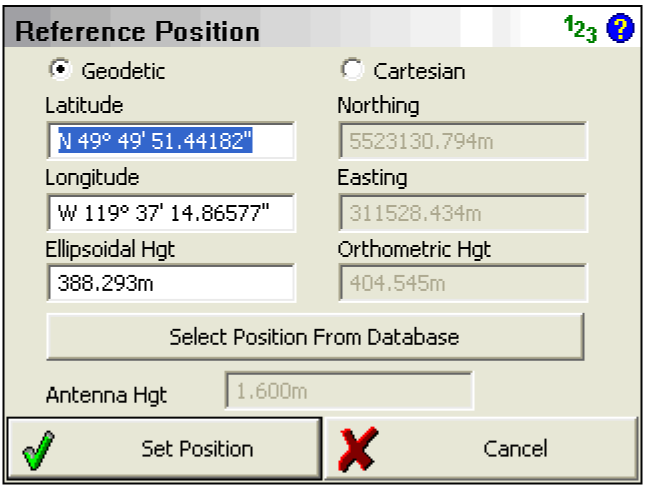
If you are using a robotic total station, please see the Robotic Instrument Toolbar topic.

Program Reference Receiver Position

When you're ready to program your base receiver with a position you need to press the **Measure** button on the GPS toolbar. When you do you will see a screen that allows you select three difference methods, known Geodetic position, averaged Geodetic position or transform to a point.

Known Geodetic Position

Use this when you know the geodetic position of the point the base is setup on. You have two options, you can program it with a known Geodetic or known Cartesian Coordinate.



Geodetic Coordinates

Enter the know Latitude, Longitude and Ellipsoidal Height for your base setup. The coordinates you enter here will be programmed into the receiver.

Cartesian Coordinates

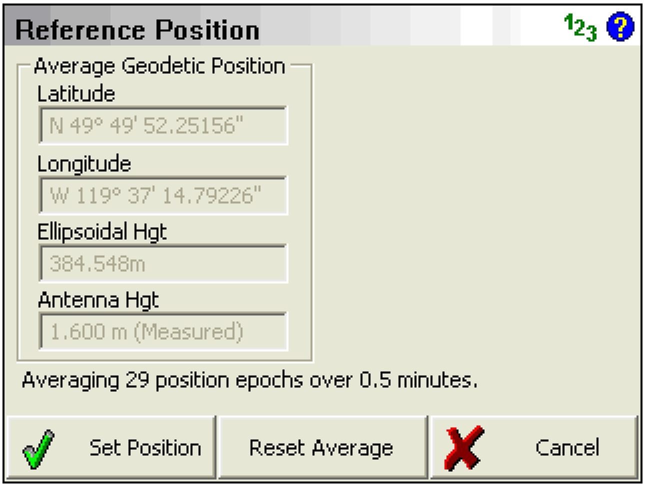
Cartesian coordinates can be SPCS, UTM coordinates or any other grid system as long as it matches the horizontal and vertical system you've defined in your GPS profile. You can not enter local coordinates as Cartesian coordinates! Doing so will cause a warning message to be displayed indicating that the coordinates you entered do not fall inside the GPS grid files you have loaded on your data collector.

Select Position from Database

This allows you to choose a point a number of different ways. The point you select must be a grid coordinate such as a SPCS or UTM coordinate.

Use Averaged Geodetic Position

Use this to measure and average an Autonomous Geodetic position.

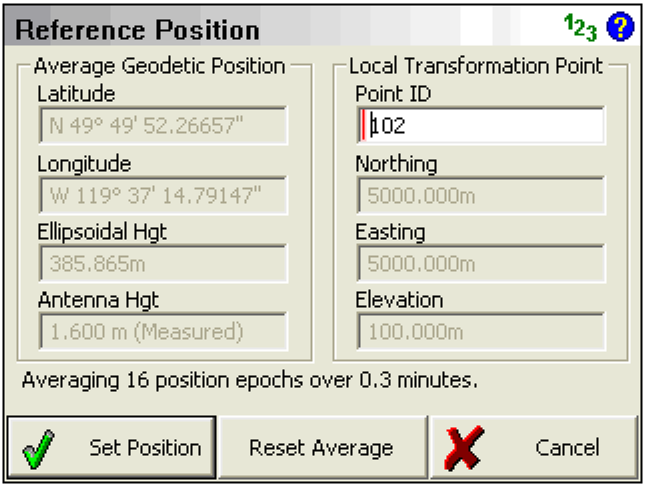


It is up to you to determine how many observations or the duration of time you want to wait before accepting the averaged position. At any time you can restart the process by pressing the **Reset Average** button.

If you press **Set Position**, your receiver will be programmed with the new position and you will have the option of storing a point's position in the database.

Local Transform to Point

Use this to compute a one point transformation so your GPS derived measurements can be referenced into a local system.



When this option is used, Evidence Recorder starts receiving data and computes an averaged Autonomous position for the base receiver. The current position, how many epochs it has received and the total elapsed time is displayed on the screen.

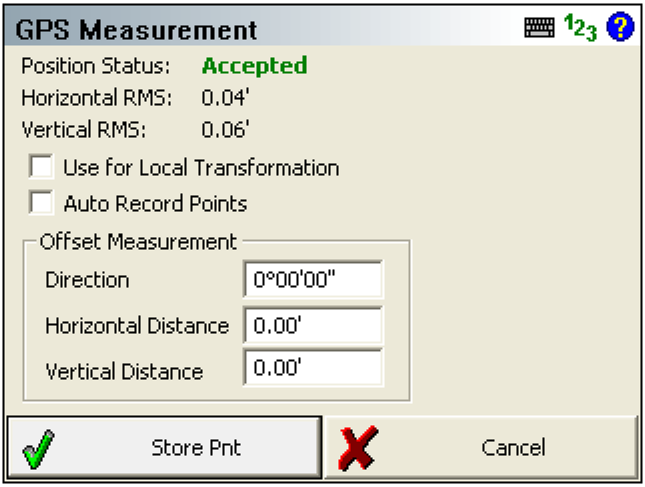
It is up to you to determine how many observations or the duration of time you want to wait before accepting the averaged position. At any time you can restart the process by pressing the **Reset Average** button.

You then have to define a local coordinate that you want to localize to. It is assumed that the point exists in your project. If it doesn't, simply double tap the Point ID field which will open the point toolbar. You can use the new option to create a point or if it exists select it from the map or from the list.

When you press Set Position, Evidence Recorder will save the averaged location into the point database. It will then compute a one point transformation which is simply a horizontal and vertical shift from the grid coordinate system into your local system, as well as a combined scale factor. All future GPS measurements will have your new transformation parameters applied automatically.

GPS Measurement

When you have connected to your rover and you press the measure button on the GPS Toolbar you will see the GPS Measurement Screen



The measurement process works like this:

Once the satellites have been filtered out based on your tolerance settings, Evidence Recorder will only begin collecting measurement data if all your tolerances are met. During the measurement process you might see that certain tolerances are not being satisfied, this is normal. Evidence Recorder will continue monitoring the measurement data and will accept measurements that pass the mask criteria.

Once the tolerances have been met, the position status will change to an **Accepted** position. Prior to accepting the position, the user can look at the RMS values for the computed position and determine if they wish to accept or reject the measurement. Pressing Cancel will exit the measure function without storing any data. Pressing Store Point will accept the position and store it in the database. You can change your true or measured Antenna Height on the Store Point screen.

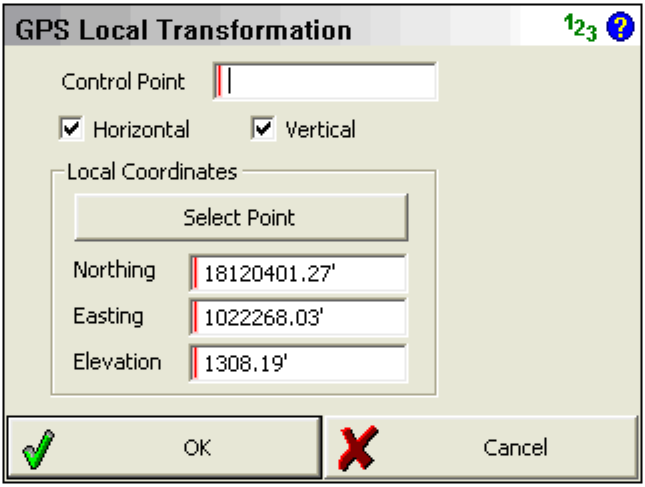
By default, if you have some transformation parameters defined, they will be applied to the measurement prior to storing it.

Offsets

You can specify an offset from your current position. The offset direction is a computed grid azimuth that you have determined.

Use For Local Transformation

To help you localize quickly, you can use this option. What will happen is after the measurement has been stored, we will automatically add this point to the GPS Local Transformation calibration point list. The point will be considered a measured point, and so you will be asked to define the control point that this point is to be constrained to.



Example: You've localized to a local system using a one point transformation so you can visually see in the map where your other points should be. You then decide to stake one of them so you can navigate to it. When you find the second point, you want to measure it's location and use it as one of the transformation points. Simply turn on the "Use for Local Transformation" parameter and Evidence Recorder will automatically store the point's Cartesian position, and automatically add it to your transformation points list.

When you use this option, Evidence Recorder will automatically ignore any transformation parameter you have defined and will store the ”raw” GPS derived measurement.

Auto Record Points

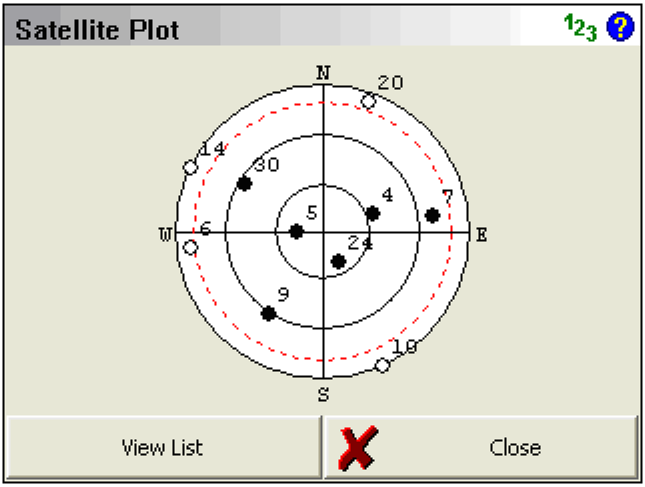
The Auto Record toggle allows the user to start measuring data in a Kinematic fashion. The data is logged based on a time or distance interval specified in the Auto Recording settings in your GPS Profile. Descriptions, Point ID's and the active linework are all automatically advanced with each successive point. To exit the Auto Record measurement mode, simply tap on the Measure button again.

GPS Satellite Plot

To access this screen, press the Satellite button on the GPS Toolbar.

The Satellite Plot screen is a graphical representation of the current GNSS satellite constellation. It shows all visible satellites including both GPS and Glonass. Those satellites being used in the current solution are indicated with a black dot, and those being ignored are indicated with a white dot.

Each satellite is displayed with its PRN (identification) number, and the Elevation Mask specified in your current Tolerance Mode is indicated by a red dashed line.



Press the **View List** button to open the Satellite List screen.

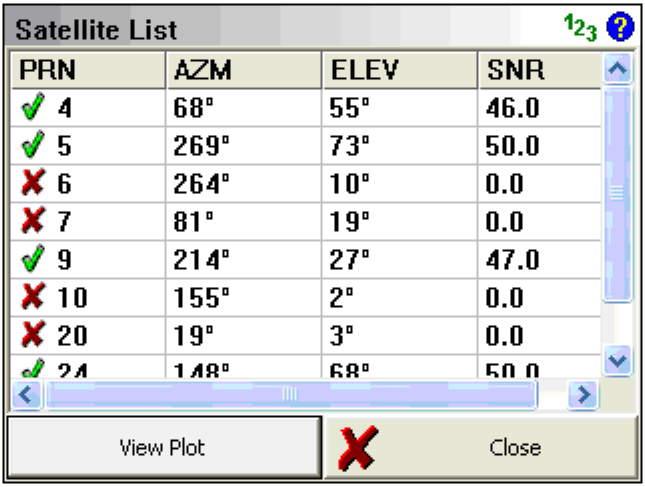
Press the **Close** button to return to the map screen.

GPS Satellite List

To access this screen, press the Satellite button on the GPS Toolbar, then press the **View List** button on the Satellite Plot screen.

The Satellite List screen displays information on the current GNSS satellite constellation. It shows all visible satellites including both GPS and Glonass. Those satellites being used in the current solution are indicated with a checkmark, and those being ignored are indicated with an X.

Each satellite is displayed with its PRN (identification) number, Azimuth and Elevation, and Signal-to-Noise Ratio.

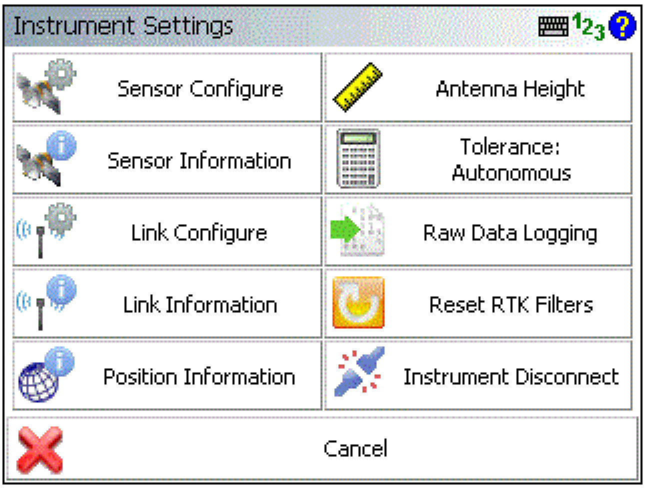


Press the **View Plot** button to open the Satellite Plot screen.

Press the **Close** button to return to the map screen.

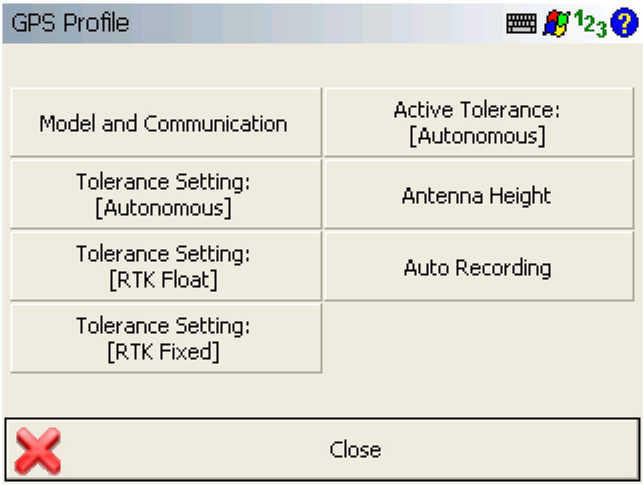
GPS Settings

The GPS Settings screen is accessed from the GPS Toolbar.



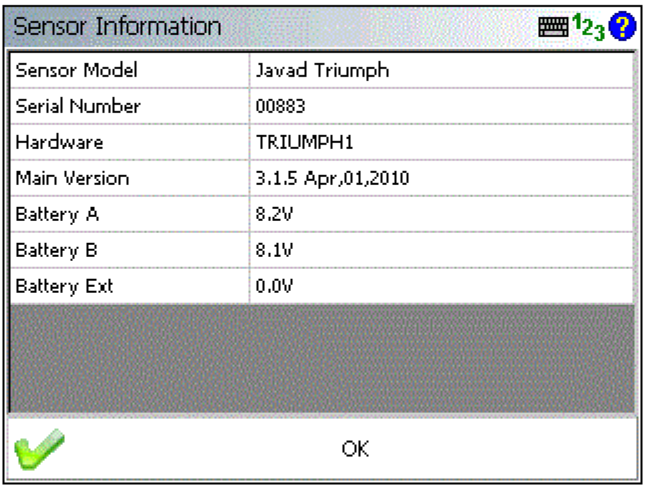
Sensor Configure

This will allow you to make changes to most of the settings in your reference or rover profile, including configuring the three tolerance modes, selecting the active tolerance mode, configuring the antenna height, and configuring the auto-recording options. (The Model and Communication options cannot be configured while you are connected to your GPS receiver.)



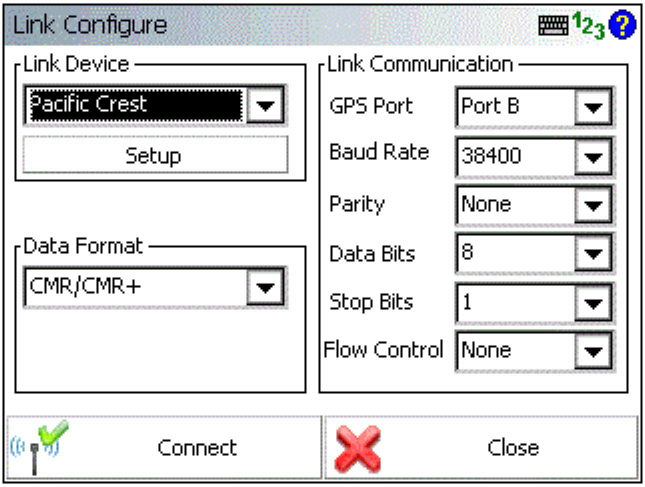
Sensor Information

The Sensor Information screen displays detailed information about the hardware you are connected to.



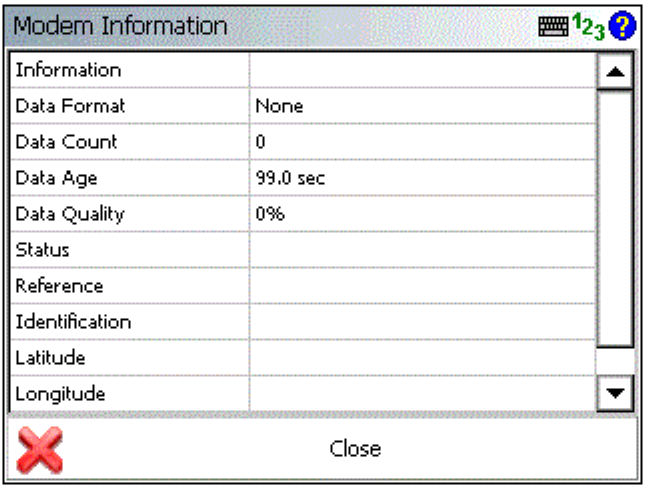
Link Configure

This turns on your GPS Receiver's radio or modem to begin receiving RTK corrections, from either a base receiver or an NTRIP or GPRS server.



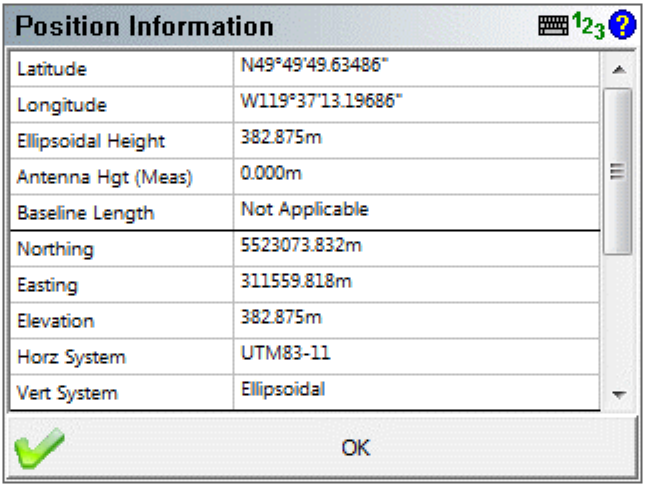
Link Information

The Link Information screen displays detailed real-time information about the correction message being received by your receiver via a radio link from a base receiver, or via a cellular modem link from an NTRIP or GPRS server.



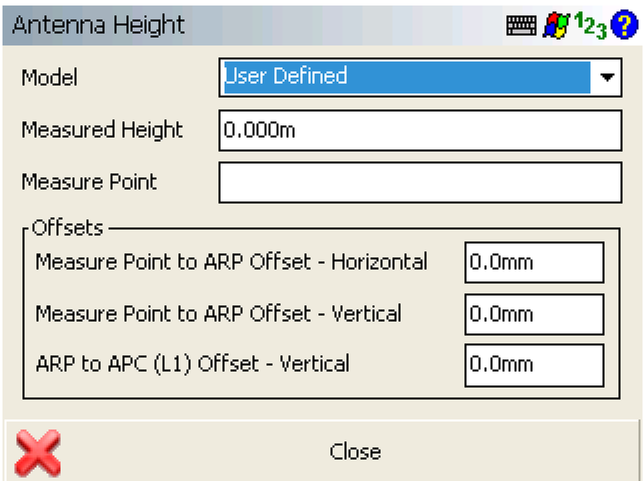
Position Information

The Position Information screen displays detailed real-time information about your current position.



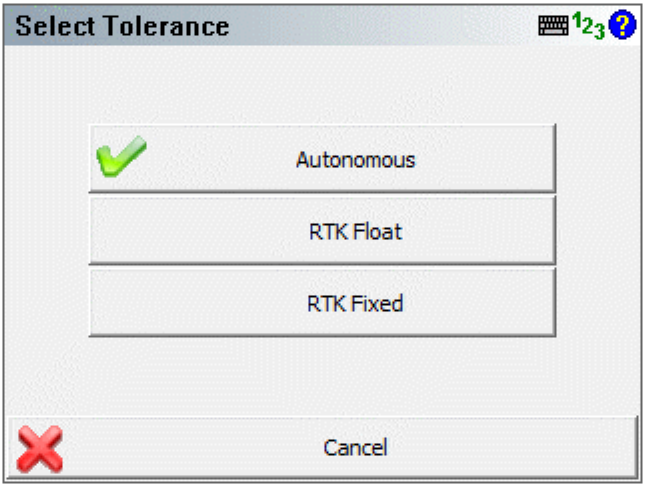
Antenna Height

The Antenna Height screen allows you to configure the antenna height of your GPS receiver.



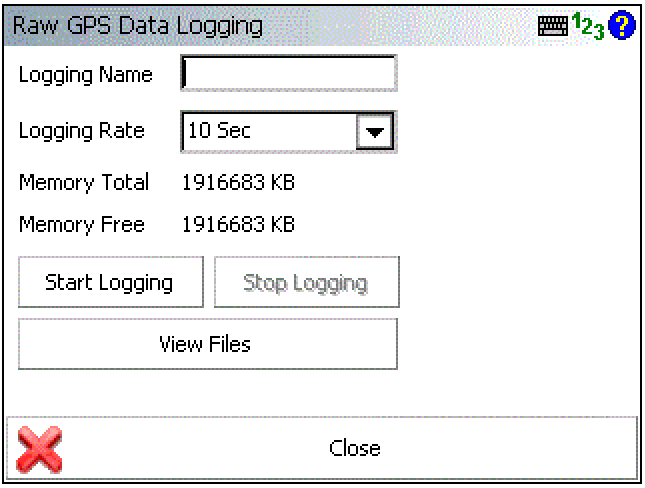
Active Tolerance Mode

This button indicates which of the three tolerance modes setup in your Rover Profile is currently being used. Press this button to select the active tolerance mode. To configure the three tolerance modes, see the "Sensor Configure" button described above.



Raw Data Logging

The Raw Data Logging screen is used to start and stop raw data logging on your GPS reference or rover receiver, for later post-processing.



Reset RTK Filters

Use this to reset the RTK solution in your receiver, to force it to recalculate a new solution and resolve any ambiguities again from scratch. This has the same effect as inverting your receiver to reset the solution.

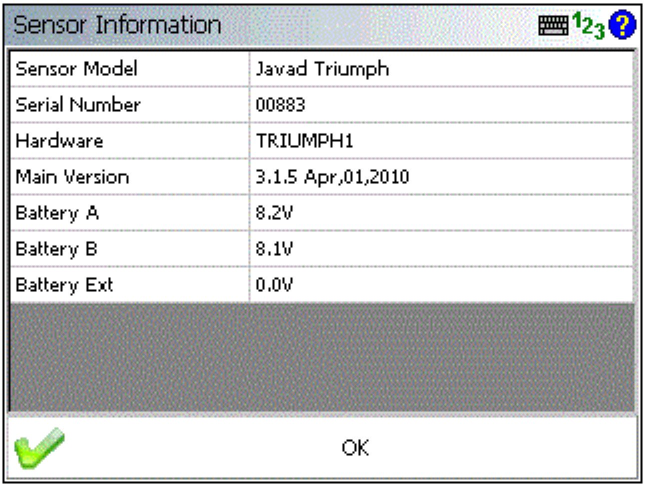
Instrument Disconnect

Use this to disconnect from your receiver. If you are connected to a reference receiver, corrections will continue to be transmitted after you disconnect.

Sensor Information

GPS Toolbar | Settings | Sensor Information

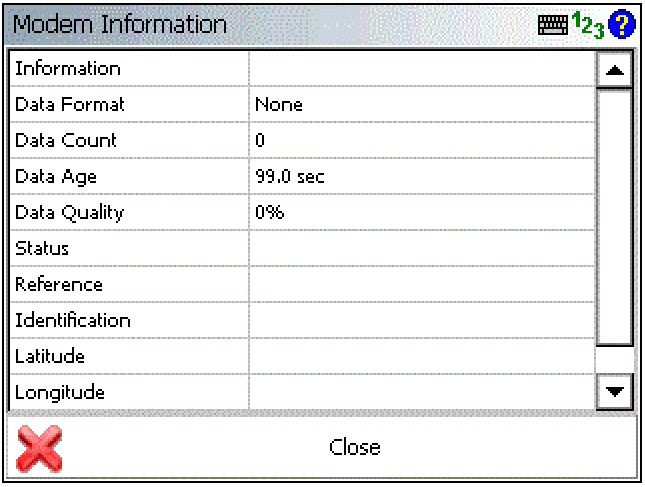
The Sensor Information screen is accessed from the GPS Settings screen. It displays information about the hardware you are connected to. The specific information available will vary by model, but typically you will see the make and model of your receiver, its serial number, battery status, firmware information, and more.



Correction Information

GPS Toolbar | Settings | Link Information

The Correction Information screen is accessed from the GPS Settings screen. It displays information about the correction message being received by your receiver via a radio link from a base receiver, or via a cellular modem link from an NTRIP or GPRS server.

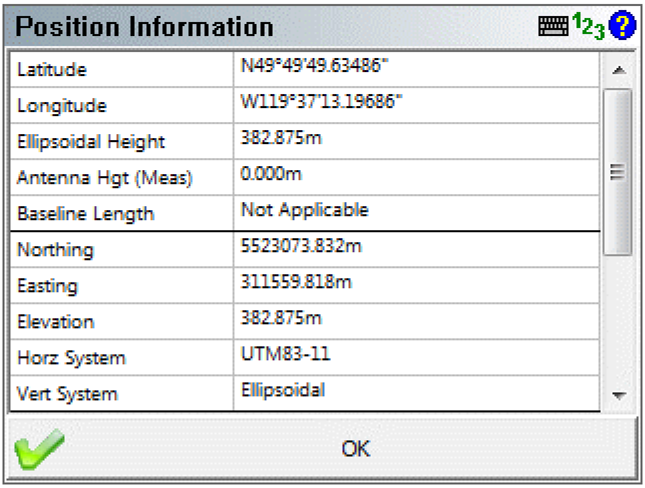


For information on configuring your correction link please see the Correction Link topic.

Position Information

GPS Toolbar | Settings | Position Information

The Position Information screen is accessed from the GPS Settings screen. It displays detailed information about your current position.



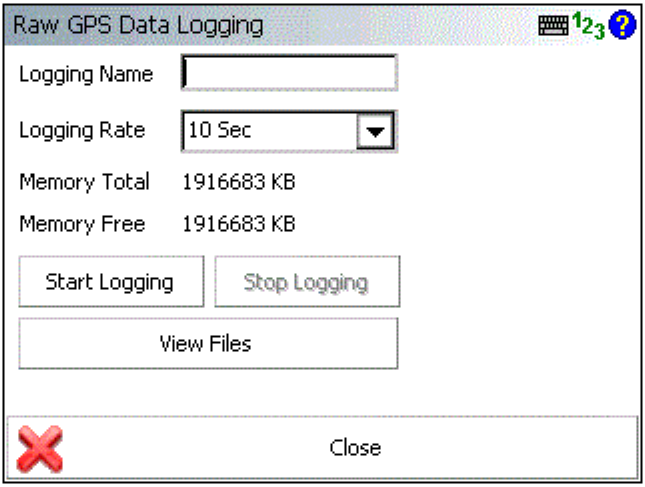
The following information is displayed and updates in realtime:

- Geodetic Position (Latitude, Longitude, Ellipsoid Height)
- Measured Antenna Height
- Baseline Length
- Cartesian Position (Northing, Easting, Elevation)
- Coordinate Systems (Horizontal and Vertical)
- Solution Type
- Standard Deviation
- PDOP
- Number of Satellites
- UTC Date and Time

Raw Data Logging

GPS Toolbar | Settings | Raw Data Logging

Use this to start and stop raw data logging on your GPS reference or rover receiver, for later post-processing of your point data. You can log raw data on the receiver while you carry on with your survey in Evidence Recorder.



Note: Evidence Recorder can not control the data logging on all models of GPS receivers. Currently, we support data logging on the Altus APS-3, Javad Triumph, Leica 1200, Magellan PM500, Novatel OEM3/OEM4, Trimble 5800/R8, and Topcon Hiper.

Local Transformation

Due to a variety of reasons, it may be necessary to adjust position coordinates for distortions which can include scale, rotation, translation in northing and translation in easting. The flexibility of Evidence Recorder's local transformation utility allows it to be used for a variety of applications and applied to positions derived from GPS or terrestrial observations. For GPS applications there are two possible reasons for the need of a transformation:

1. Translating from Local System to Plan System

   GPS receivers by default generate geodetic coordinates (latitude, longitude and ellipsoidal height) and the process of converting to Cartesian coordinates (northing, easting and orthometric height) or local system is done with existing well defined map projection systems such as Universal Transverse Mercator (UTM) or the State Plane Coordinate System (SPCS). Selection of the map projection in Evidence Recorder is done within the Datum page of the GPS Configuration and a local zone is selected to minimize scale and meridian convergence distortion. Most land, boundary or property surveys are unique with regards to their generalized plane and coordinate origin for each project. The coordinate system for these surveys is often referred to as a plan system with coordinate magnitudes being kept small for ease of recording and calculations. The majority of projects can suffice with a simple translation in northing and easting to produce plan system coordinates from GPS determined local system coordinates. The translation is easily determined by comparing a plan system coordinate and a local system coordinated for a single point.

2. Consideration for Scale and Rotation

   Projects with larger extents need to take into consideration the curvature of the earth's surface which can be handled by the application of scale and rotation transformations plus the previously mentioned translations. In the case of mixing GPS observations and terrestrial observations it does become important to apply a transformation, especially in scale, due to the fact that there is a difference in distance between positions measured on the ellipsoid and the terrain surface. As seen in Figure 1, coordinates derived from GPS are always referenced to the surface of the ellipsoid as per the application of map projections. When the two points on the ellipsoid are projected upwards along the ellipsoid normals onto the earth's surface, they diverge, and a terrestrial distance observed between the points will be greater than the computed distance of the same two points on the ellipsoid. The effects of this zenith divergence becomes more evident as distance between the two points becomes greater and for larger terrain heights above the ellipsoidal surface.

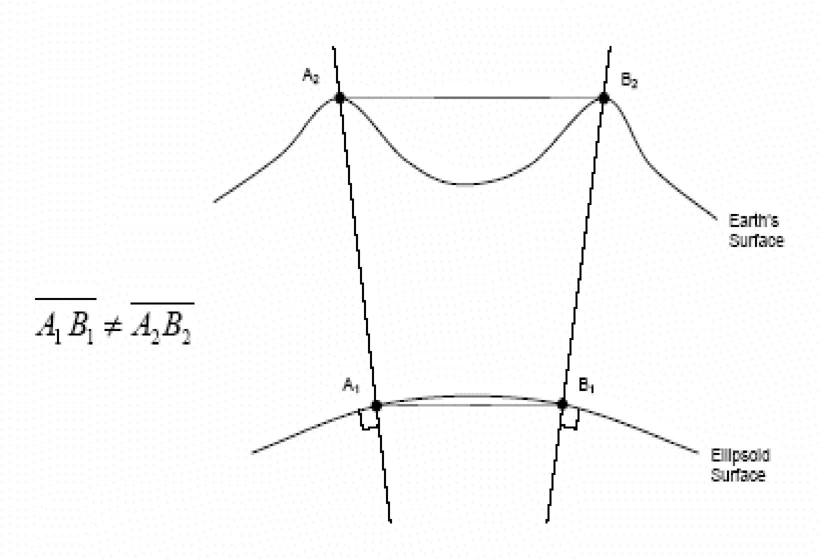


Figure 1. Divergence of Ellipsoid Normals.

Transformation Concepts

In order for the transformation parameters to be resolved, a sufficient number of control points are required with coordinates in both the plan system and local system. The determination of a four parameter transformation (two translations, scale and rotation) on a horizontal plane requires at minimum two physical points with each having two sets of corresponding coordinates as illustrated in Figure 2. Points A1 and B1 exist in what is termed the local system and are transformed into the plan system points of A2 and B2. The use of more coordinate observations will provide redundancy and the means to identify outliers for elimination. Solving for over constrained parameters is done with the application of least squares to provide the most rigorous minimization of residuals. Once transformation parameters have been resolved, newly observed or existing coordinates can easily be converted to the plan coordinate system.

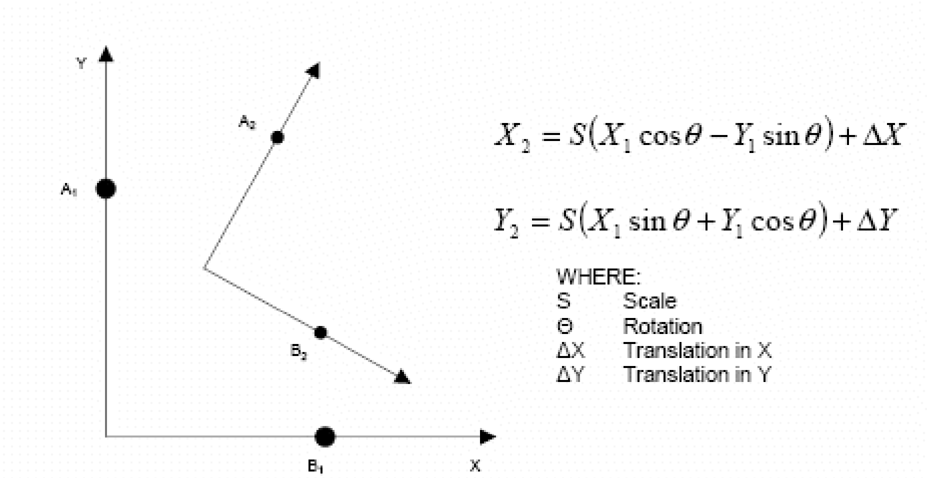


Figure 2. Horizontal Four Parameter Transformation.

The selection of control points for determining the transformation parameters are critical in reducing a colinearity condition along a particular axis. Colinearity will present itself if the control points are concentrated in a linear fashion as shown in Figure 3 (Poor Design) and thus weaken the parameters in a perpendicular direction. Control points should extend to the corners of the project boundary and be extended with equal distances in both horizontal directions.

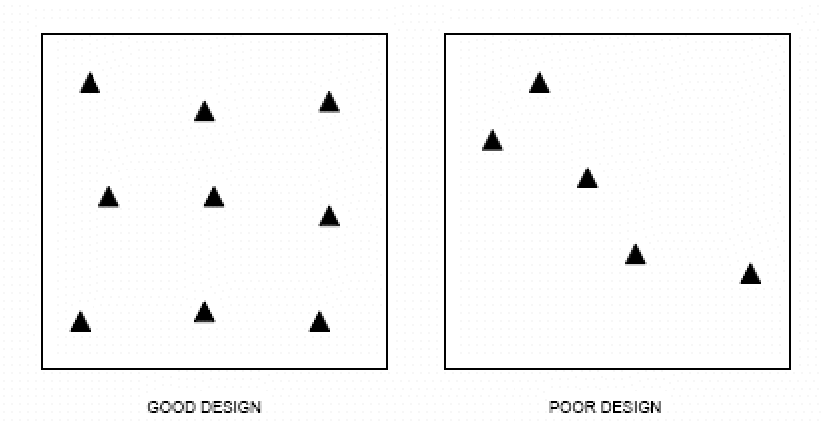


Figure 3. Transformation Control Design.

Vertical Transformation

The vertical transformation function of Evidence Recorder operates independently of the horizontal transformation. A sloped plane is calculated from the residuals of the constrained point pairs to determine a vertical bias, slope in X and slope in Y. To determine a vertical bias at least one point pair must be constrained and for all three parameters to be determined at least three point pairs must be constrained.

The use of the vertical transformation function should be restricted to cases where a geoid model is not available or there is a know problem with an existing geoid model.

Local Transformation Example A

For this example the simple case of translating the GPS derived coordinates to the desired plan coordinates will be used. The example will demonstrate how Evidence Recorder can be used to determine and apply the transformation parameters. A project is created consisting of four points in the plan system as denoted in Figure 4 and the corresponding coordinate listing shown in Table 1.

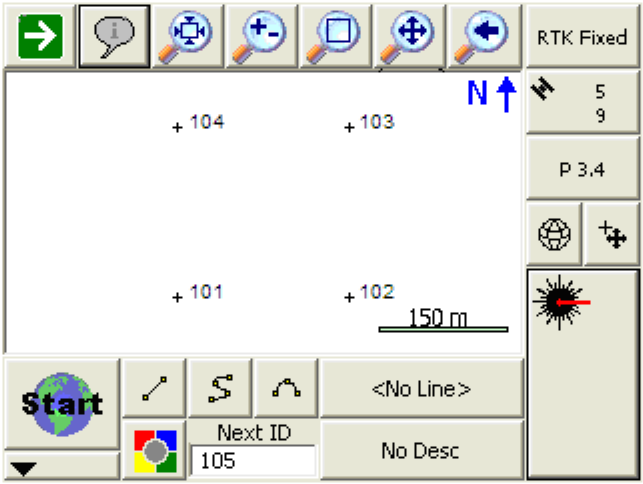


Figure 4. Evidence Recorder Project with Points in the Plan System.

Point	Northing	Easting
101	1000.000 m	1000.000 m
102	1000.000 m	1200.000 m
103	1200.000 m	1200.000 m
104	1200.000 m	1000.000 m

Table 1. Plan System Points.

The GPS reference station will need to occupy a point within the project area which can be an existing plan system point (101-104) or a new point set up randomly somewhere in the project area. For either setup of the reference station, the GPS antenna should have an unobstructed view to the satellite constellation to ensure that the rover station operates at its full potential. If the reference station is unable to occupy a plan system point, the rover station can instead measure an existing plan system point with local system coordinates and for this example that case will be assumed. Using Evidence Recorder to configure the GPS reference station, a suitable map projection is selected and the reference station position will be determined autonomously.

Once the reference station is operating and transmitting corrections, the rover station is used to measure plan system point 103 and the new local system point is assigned point number 203. Table 2 indicates the measured coordinates of point 203 in the local system which corresponds to point number 103 in the plan system. Figure 6 illustrates that Evidence Recorder now has points in two different coordinate systems as indicated by the large separation.

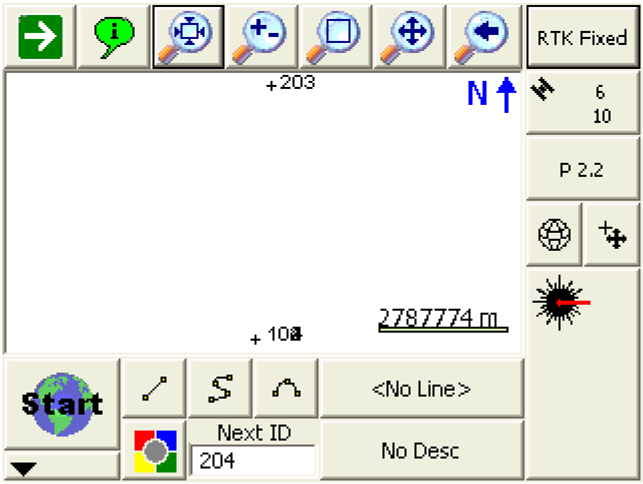


Figure 6. Evidence Recorder with Two Coordinate Systems.

Point	Northing	Easting
203	5523295.939 m	311585.808 m

Table 2. Local System Point.

Now that points exist in each of the coordinate systems the local transformation parameters can be determined and applied. Transformation Settings can be accessed from the **Main Menu | Survey Tools | GPS Local Transformation.** Initially the transformation parameters of translation in northing, translation in easting, scale and rotation will be null and any transformation will not be applied to GPS positions as indicated in Figure 7.

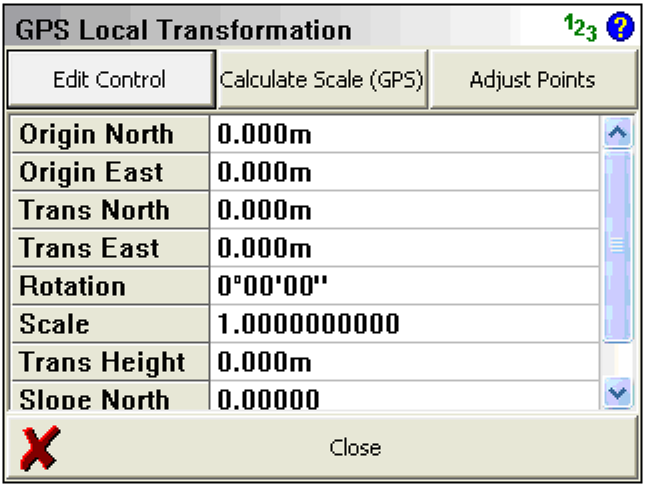


Figure 7. Evidence Recorder Default Transformation Parameters.

From the Local Transformation Setup select the **Edit Control** button for the entry of control and measured point pairs to be used in the determination of the transformation parameters.

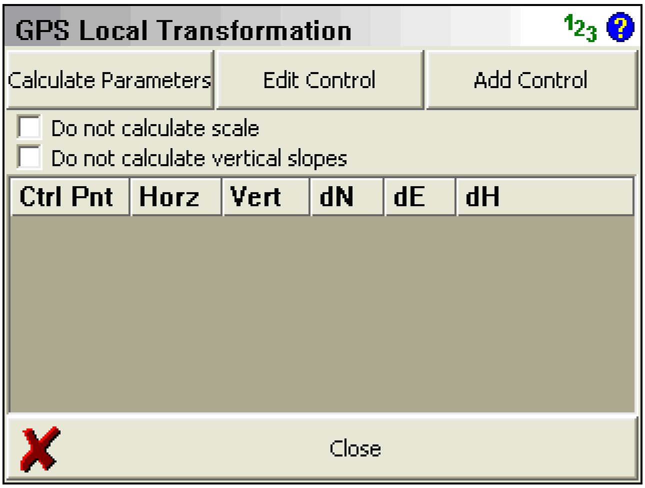


Figure 8: Evidence Recorder Default Control-Measured Point Pairs.

Select the **Add Control** button to enter the control and measured points. As seen in Figure 9 point 203 is selected as a measured (local coordinate) point and corresponding point 103 is entered as a control system point. The check boxes for constraining to horizontal and vertical are left enabled.

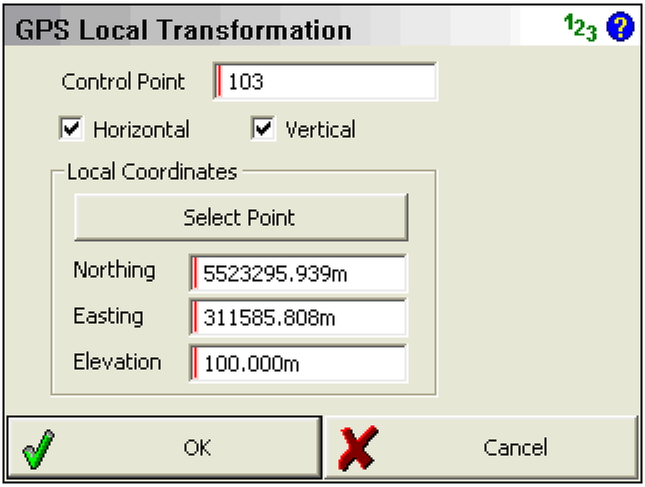


Figure 9: Evidence Recorder Control Point Pair Definition.

Select the **Calculate Parameters** button to have Evidence Recorder calculate new transformation parameters based on the control pair that has been added. The following tabular columns denote residuals in northing, easting and height and for this case are all zero due to the transformation being minimally constrained.

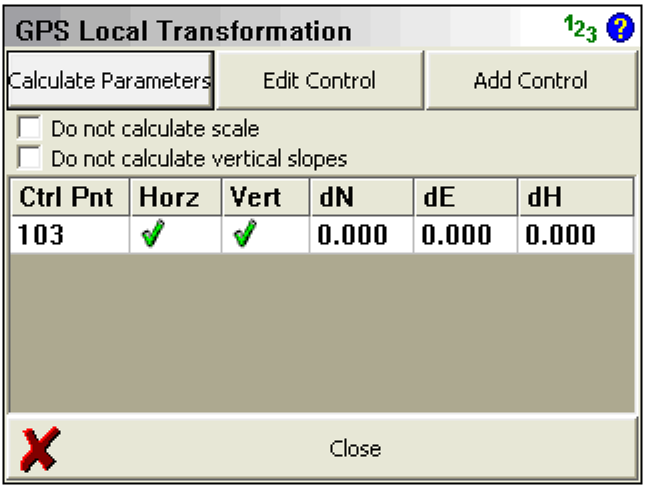


Figure 10: Evidence Recorder Contrained Points for Transformation.

The calculated transformation parameters can be viewed by choosing **Close** and returning to the Parameters page. Since only one point pair is being constrained, the utility has only determined a translation in northing, translation in easting and vertical bias. The addition of more point pairs would allow for scale, rotation and slopes in X and Y to be determined.

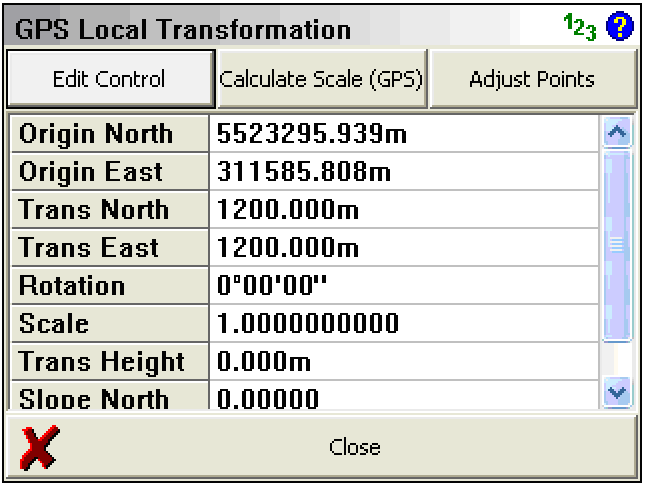


Figure 11. Evidence Recorder Calculated Transformation Parameters.

The map view of Evidence Recorder will now show the effect of the transformation by showing the new position of the GPS position cursor and denoting new coordinate values. Returning to point 103 with the rover station will verify the transformation process. New points measured with GPS will reflect the applied transformation parameters.

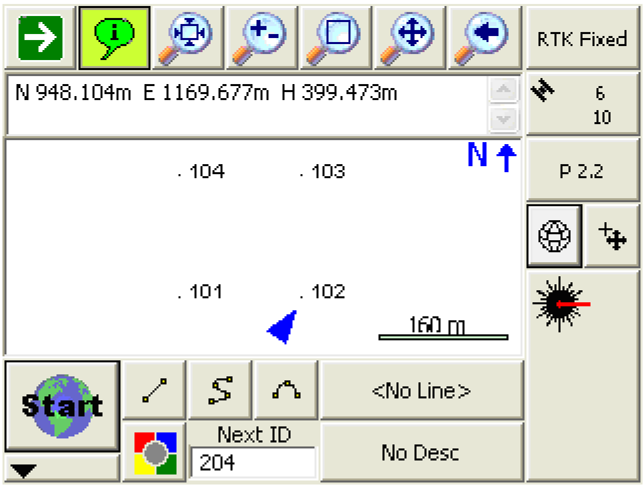


Figure 12. Evidence Recorder Transformation in Effect.

The GPS measured observations at this point are still stored in the project database as a cartesian coordinate. It is sometimes beneficial to have Evidence Recorder re-compute the coordinates for these points by using the Adjust button in the Transformation Settings screen. This will force Evidence Recorder to scan your raw file and convert all the GPS derived points into your local system.

Local Transformation Example B

This example will investigate the process of transforming a set of existing terrestrially derived positions so that they are constrained to a set of GPS derived positions. The process of transforming points is reversed from previous discussions and will therefore imply that the GPS derived coordinates are in the plan system and the terrestrially derived positions are in the local system. Another consideration for this example is that the project area is relatively large and more than one point pair will require to be constrained to determine all four parameters and for redundancy. Determination of the transformation parameters will account for the geodetic implications of the earth's curvature and meridian convergence. The existing Evidence Recorder project is illustrated in Figure 13 with the 100's series points having been established with a total station.

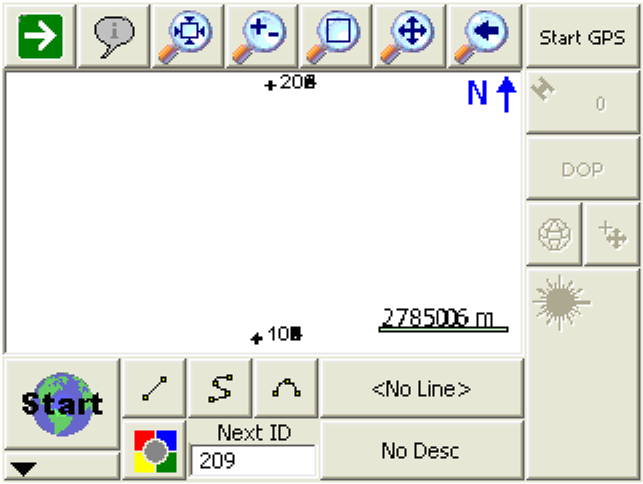


Figure 13. Evidence Recorder Project with Points in the Local System.

The GPS reference station occupies a national geodetic control point and has been configured with the corresponding published coordinates. The GPS rover station is used to measure points 102, 104, 106 and 108 to establish coordinates in the plan system and these new points are respectively named 202, 204, 206 and 208 (Table 3).

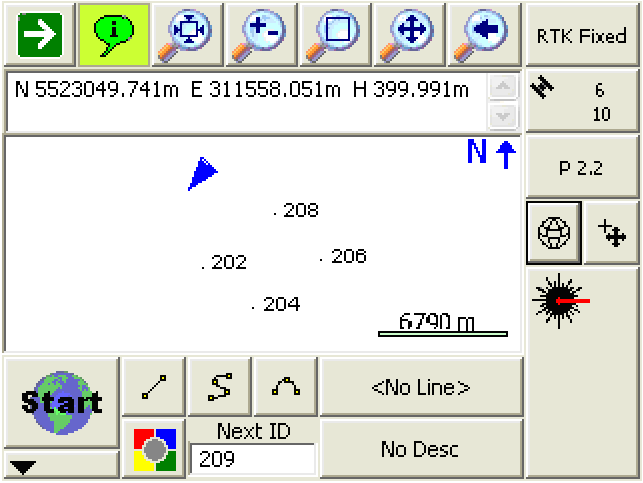


Figure 14. Evidence Recorder Project with Points in the Plan System.

Local System (Conventional Points)				Plan System (GPS Points)			
Point	Northing	Easting	Height	Point	Northing	Easting	Height
101	10820.603	3060.696	383.133				
102	6765.098	1674.638	384.936	202	5516443.987	311551.600	384.94
103	3325.620	2136.657	384.589				
104	3941.646	5216.788	383.543	204	5513620.403	315093.864	383.55
105	3736.304	8810.273	383.299				
106	7227.118	9939.654	382.980	206	5516905.954	319816.969	382.98
107	11539.300	9323.628	381.795				
108	10461.255	6654.182	384.380	208	5520140.241	316531.321	384.37

Table 3. Coordinate Listing.

Now that coordinates have been established in both the plan system and local system, the Transformation Setup is started from the Point menu of Evidence Recorder. Transformation Settings can be accessed from the **Main Menu | Survey Tools | GPS Local Transformation.** Figure 15 shows the Constrain page after the point pairs have been entered and their corresponding computed residuals. With four point pairs being used the horizontal transformation has a redundancy of two point pairs and the vertical transformation has a redundancy of one point pair. The residuals are within acceptable limits and do not necessitate the removal of point pairs.

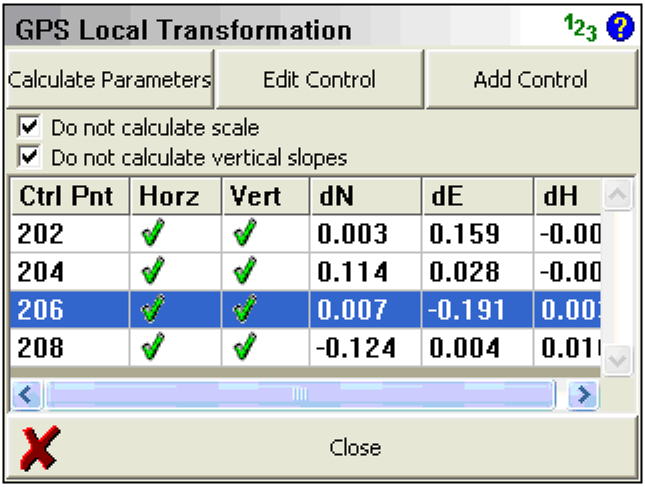


Figure 15. Evidence Recorder Constrained Points for Transformation.

Viewing the Parameters page, as indicated in Figure 16, will provide feedback of the calculated horizontal and vertical transformation parameters.

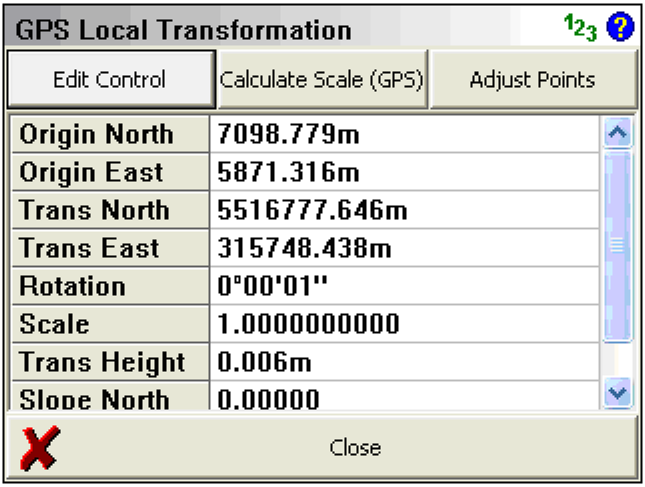
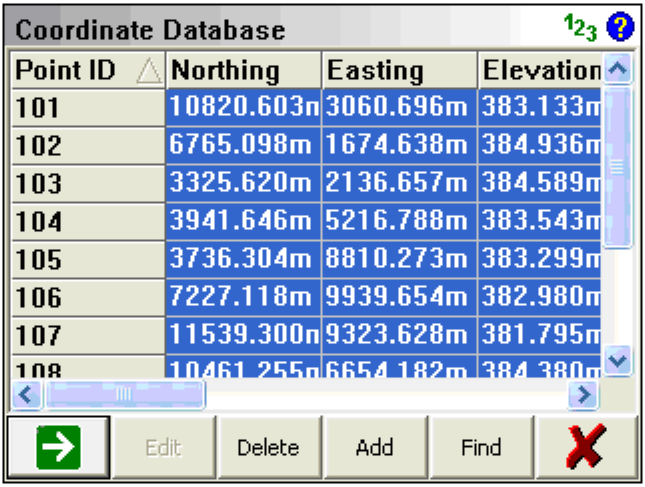


Figure 16. Evidence Recorder Calculated Parameters.

Using the calculated transformation parameters the control system points (101–108) can be transformed. First you need to open the coordinate database by going to **Main Menu | Data Manager | Coordinate database**, or by clicking on the  button on the map screen. Click the Find button and enter a point range 101-108 to select these points. The list of terrestrially derived points is entered as shown in Figure 17.



Point ID	Northing	Easting	Elevation
101	10820.603n	3060.696m	383.133m
102	6765.098m	1674.638m	384.936m
103	3325.620m	2136.657m	384.589m
104	3941.646m	5216.788m	383.543m
105	3736.304m	8810.273m	383.299m
106	7227.118m	9939.654m	382.980m
107	11539.300n	9323.628m	381.795m
108	10461.255n	6654.182m	384.380m

Figure 17. Transforming Existing Points to the Control System.

To apply the transformation parameters to the local points, go to the second set of buttons by pressing the **green arrow** and then the **Local Transform** button.

After successfully transforming the points 101 through 108 from the local system to the plan system which was constrained to the GPS point 202 through 208 the results can be seen in Figure 18. The diagram illustrates the matching of points 102, 104, 106 and 108 with corresponding points 202, 204, 206 and 208 respectively.

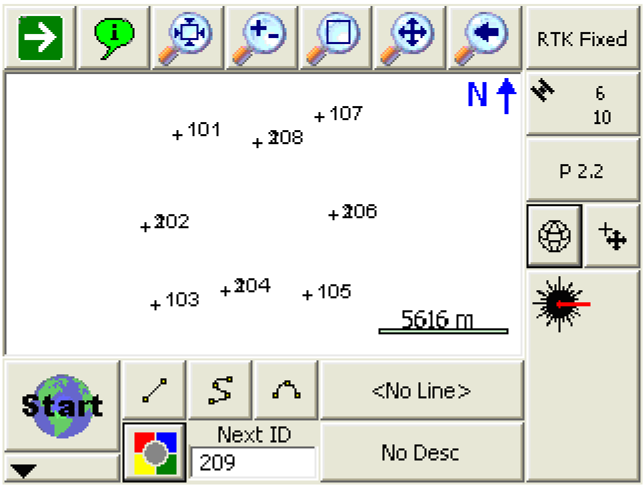


Figure 18. Results of the Transformation.

Local Transformation Example C

Two approaches can be used in applying the Local Transformation utility; parameters can be manually entered or automatically computed given a set of control points. The explanation of the use of Evidence Recorder's Local Transformation is best described with an example of integrating GPS observations and terrestrial observations and using the utility to compute the parameters.

Terrestrial Observations

The example project has a local user defined system that was uploaded to the data collector. Below you will find the coordinate listing for this user coordinate system. For the rest of the example we will refer to this as the Plan System.

We will make the assumption that the plan system is to be held fixed, that is we want to transform our GPS derived UTM coordinates into the user (plan) system.

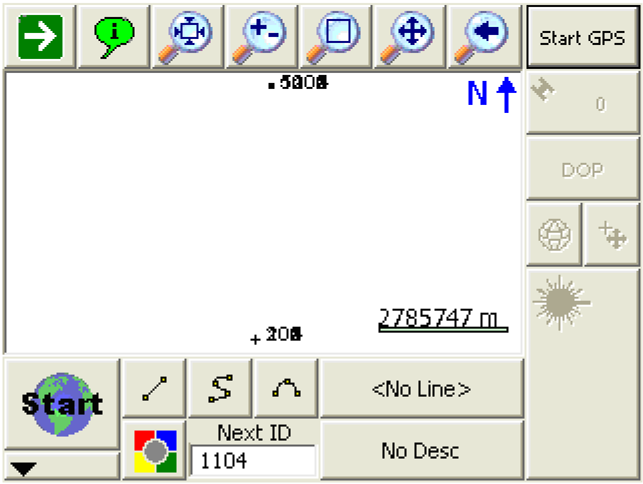
Point ID	Northing	Easting	Elevation	Description
100	4937.480	5033.487	399.387	
101	5009.092	4999.688	401.188	
102	5004.814	4977.172	400.850	
103	4975.631	4980.361	399.795	
104	4939.713	4990.346	399.552	
105	4914.671	4975.005	399.233	
106	4886.675	4988.968	398.049	
201	5002.175	4995.656	400.632	
202	5000.000	5000.000	400.665	
203	5007.341	5008.610	401.095	
204	5005.103	5020.902	400.946	
205	5013.644	4963.513	401.686	

GPS Observations

This project is going to be surveyed using a RTK system so measurement were made to some of the plan points and tagged with a new point number. The GPS derived coordinates are in the 1000 range. Their coordinates are listed below and for the remainder of this topic we will refer to this coordinate system as the local system.

Point ID	Northing	Easting	Elevation	Description
1000	5523156.277	311533.446	400.536	HUB:TEMP
1001	5523168.850	311529.902	401.204	NAIL
1102	5523164.198	311507.469	400.863	NAIL
1103	5523135.089	311511.178	399.787	NAIL
1105	5523074.026	311506.904	399.243	NAIL
1106	5523046.273	311521.362	398.068	NAIL
1202	5523159.787	311530.386	400.664	HUB
1203	5523167.281	311538.852	401.104	NAIL
1204	5523165.231	311551.178	400.957	NAIL
50	5523150.433	311520.031	399.906	MH

If you do a zoom extents in the project, you will see the two coordinate systems.



Adjustment Analysis

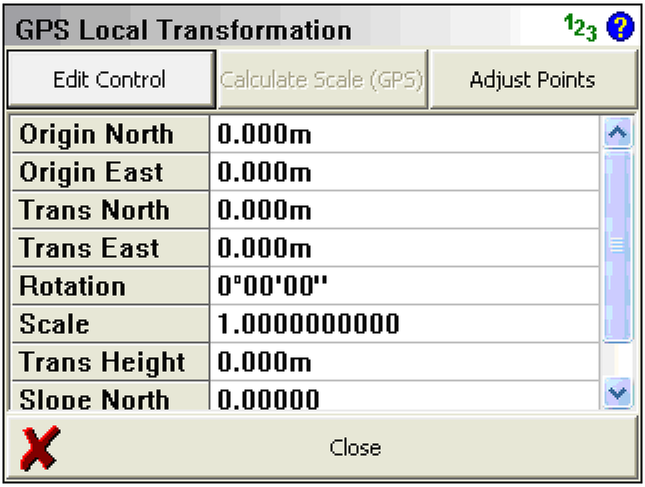
The program assumes the following:

The coordinates of the plan system are considered fixed and error free.

Equal weighting is applied to all "measured" coordinates in the local system that are used to calculate the solution

Completion of the gps observations to the control stations will produce a list of point pairs with the terrestrial determined points (100-205) being termed control points and the GPS determined points (1000-1204) being termed local points. The computed transformation parameters will provide the transformation to go from measured local points to resulting plan points. The transformation utility in

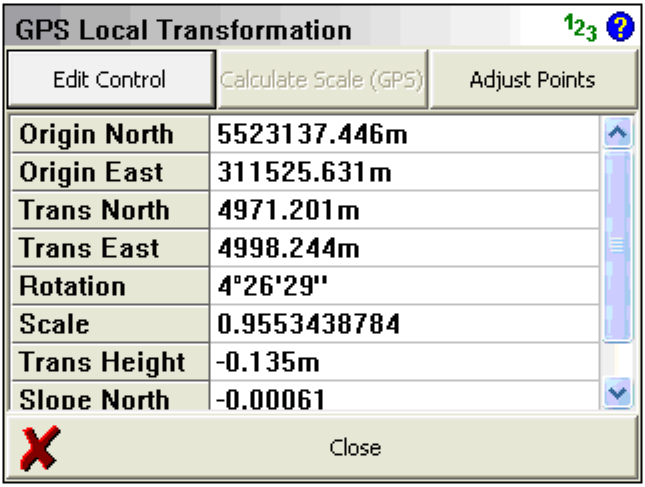
Evidence Recorder is started by going to the **Main Menu | Survey Tools | GPS Local Transformation** button.



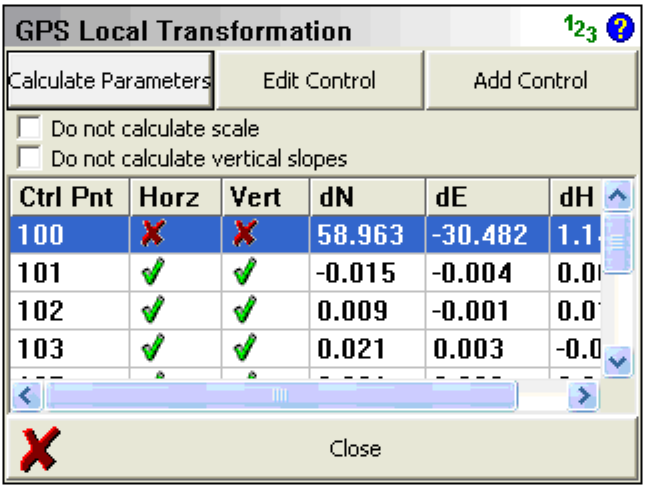
To begin computing the transformation you need to define the point pairs. You can do this by pressing the **Edit Control** button which will open the point pair's screen. Use the Add Control button to add control points to the list and to define the measured coordinate the control point should be constrained to. Note: Control points are points that reside in the plan system and are considered to be fixed.

In this example, control points 100, 101, 102, 103, 105, 106, 202, 203, and 204 were paired with the measured local points 1000, 1001, 1102, 1103, 1105, 1106, 1202, 1203, and 1204 respectively.

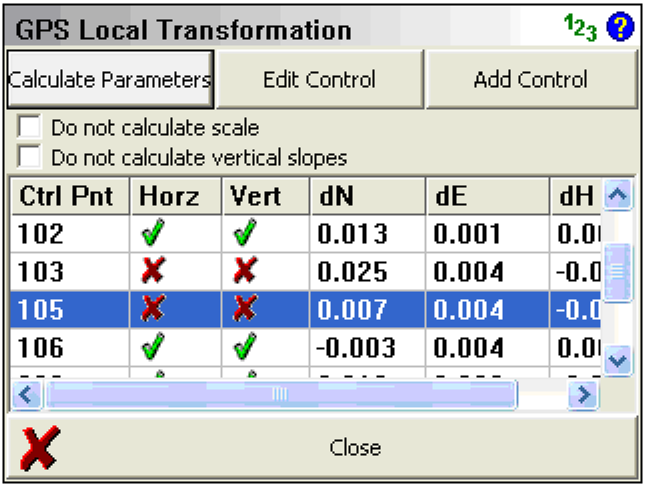
After all of the control station pairs have been entered, you need to compute the transformation parameters. To update the grid of the constraint pairs so it displays the transformation parameters and residuals, press the **Calc Parameters** button. You will see the transformation parameters update with new values. Instantly we can tell that there is a mistake with one of the point pairs as the scale value should be closer to a value of 1.



Upon returning to the control point list you will notice that the delta northing is large for the first point pair, so let's exclude it from the solution by turning off the green checkmarks. Highlight row 100 then press **Edit Control** and uncheck the Horizontal and Vertical options. Once you do this you will have to use the **Calc Params** button again to compute a new solution. In our example that helped tighten up the residuals.



Enabling or disabling constraints in either the horizontal or vertical components for determining the transformation parameters is done with the **Edit Control** button. The last three columns of dN, dE and dH represents the residuals between the control coordinates and the transformed local (measured) coordinates in northing, easting and height.

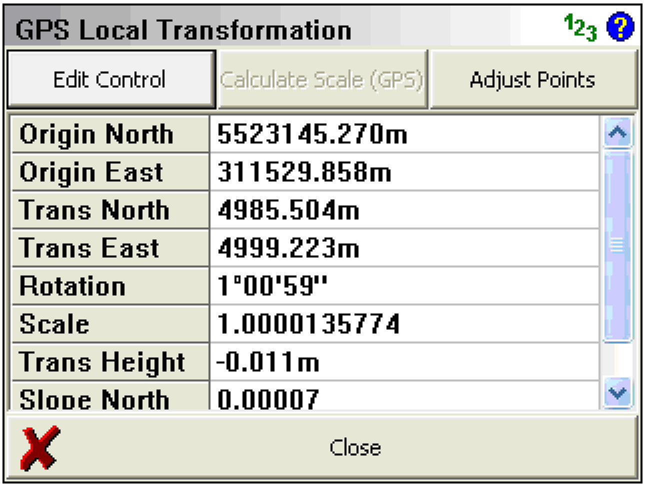


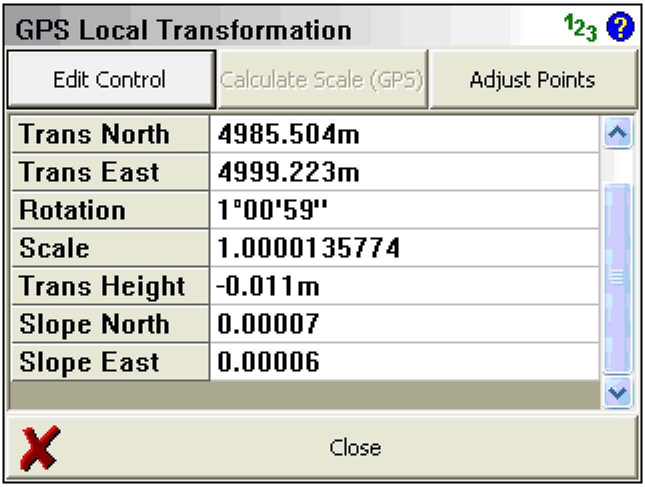
Since this network is over constrained, it is possible to reserve a couple of point pairs as check values in testing the parameters of the horizontal transformation. Pairs 103/1103 and 105/1105 have been randomly selected as test pairs and have been deselected as constraints in the horizontal and vertical component.

These two test pairs will not be used in the computation of the horizontal transformation parameters but the transformation parameters will be applied to the measured points (1103 and 1105) to produce the residuals as shown. In this case we see that the residuals are acceptable and thus it can be assumed that the determined transformation parameters are reliable.

Adjustment Results

Upon satisfaction of the applied constraints and relevant residuals, the transformation parameters can be viewed or modified. As indicated in Figure 9, the four horizontal transformation parameters (translation in northing, translation in easting, scale and rotation) and the three vertical transformation parameters (bias, slope in X, and slope in Y) are shown in the grid list.





When you press the **Calc Parameters** button it uses the point pairs that you've defined to calculate the transformation parameters. The values that are computed can be modified by the user. You can do "what if" scenarios by changing any of the values and checking the residuals on the control screen. You can always revert back to the default calculated values by pressing the **Calc Parameters** button again.

The number of horizontal transformation parameters can be decreased to three from four by fixing the scale to unity using the Do not calculate scale check box.

For the vertical component the determination of the parameters can be reduced to solving only for a vertical translation by toggling the parameter "**Do not calculate vertical slopes**". Upon enabling this, the parameters North Slope and East Slope will be automatically set to zero.

Datum Grid Editor

This is a desktop program that is installed on your desktop computer. You can start it by running "Datum Grid Editor" under the MapScenes\Evidence Recorder 9 program group on your system.

Special NOTE: Evidence Recorder2011 and newer versions don't require the use of this program. All necessary files are installed with the newer versions. Additional geoid and grid shift files for Evidence Recordercan be found in the MicroSurvey helpdesk.

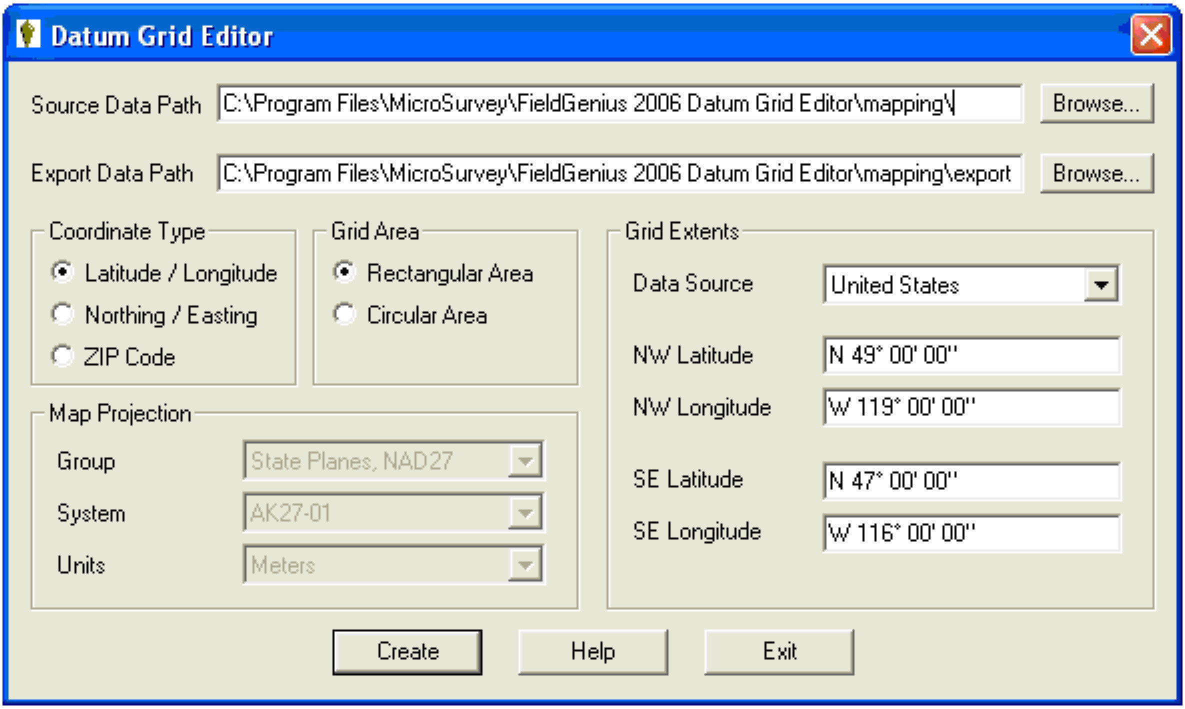
The GPS module of Evidence Recorder requires geodetic datum transformation grids and geoid model grids in order to precisely determine positions in the user's coordinate system.

Usually these grids are supplied by national organizations such as the National Geodetic Survey (USA) or the Geodetic Survey Division of Canada and the data files can be upwards to 15 megabytes in size.

Data collectors are restricted in storage resources and cannot handle the large sizes of the grid files; therefore it is necessary to create smaller more manageable files. The Datum Grid Editor is a companion utility for Evidence Recorder to build smaller sub grids from the original grids while preserving integrity.

The process of building sub grids needs to be repeated only when performing GPS surveys in locations which exceed the area of the original sub grids. The Datum Grid Editor is installed on the desktop machine and is available for download from our website www.mapscenes.com.

When it starts, you will see the following dialog:



Data Paths

Installation of the Datum Grid Editor utility will include recent grid data for both the United States and Canada. The edit box for the source data path will contain the installed path for the datum configuration files and the respective national grid data. Newly built grids will be written to the path defined by the edit box for the export data path. The installation process will have created a specific export path. Paths can be modified by changing the contents of the edit boxes or by pressing the adjoining browse button and selecting the path from the presented directory tree.

Coordinate Type

Coordinates for defining the extents of the user sub grid can be either geodetic (latitude and longitude) or Cartesian (northing and easting). The contents of the Map Projection section and Grid Extents section will reflect the selected coordinate type. You can also specify a ZIP code that will define the center of your sub grid.

Grid Area

The user sub grid extents can be entered as a rectangle where the diagonal corners of the northwest boundary and southeast boundary are used. Alternatively a central coordinate can be used with a bounding radius. Selection of either boundary method will be shown as parameters in the Grid Extents section.

Map Projection

If using Cartesian coordinates (northing and easting) for defining the boundary of the sub grid, it will be necessary to select the appropriate map projection for deriving geodetic coordinates used with internal computations. The group field contains various national and regional coordinate systems composed of map projection and related horizontal datum. Each group will be composed of zones or sub coordinate systems and will be updated in the system field as the group field is changed. Finally the linear unit can be selected for the coordinate entry.

Grid Extents

The data source from which the sub grid is to be built must be selected and is defined by national organization. All necessary grids and supporting files will be built for Evidence Recorder including horizontal datum transformations, vertical datum transformations and geoid models. Be aware of the fact that the source data for both Canada and the United States extend beyond their political boundaries and therefore the choice of the source data is critical to avoid coordinate deviations.

The remainder of this section contains the boundary information for the user grid and its format will depend on the selected coordinate type and the selected grid area. Linear Cartesian coordinates do not need to be appended with a unit designator. Geodetic coordinates must be delimited with spaces to denote direction, degrees, minutes and seconds. Listed below are possible entries for geodetic coordinates with all being equivalent in value:

N 49 12 9.0 (direction, degrees, minutes, decimal seconds)

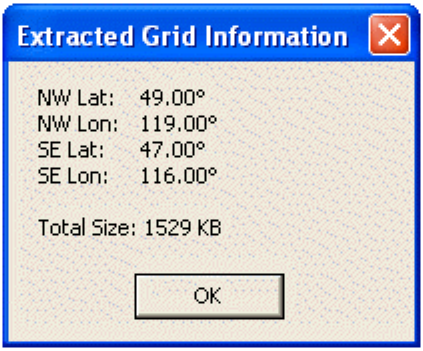
N 49 12.15 (direction, degrees, decimal minutes)

N 49.2025 (direction, decimal degrees)

Grid Creation

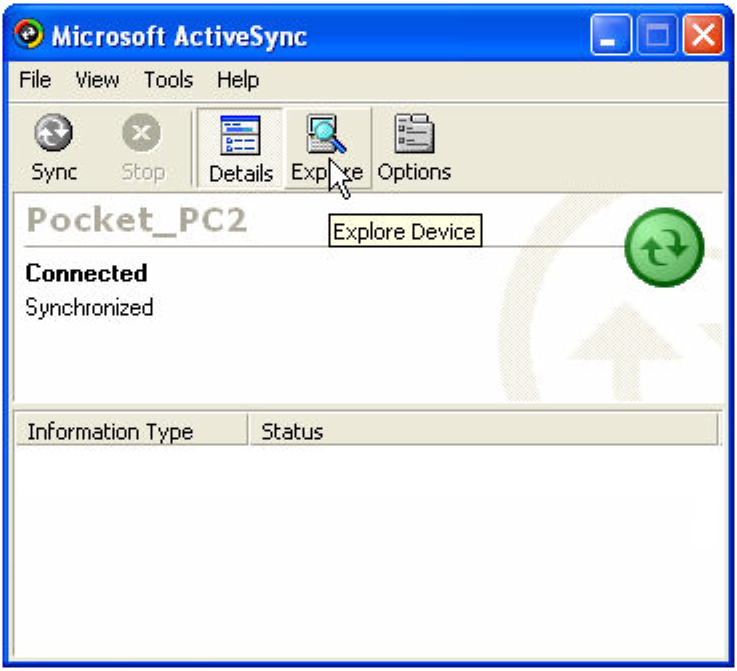
Once all parameters have been carefully selected, the sub grids can be produced by pressing the **Create** button. The time period for building the grids will depend on the area of the chosen grids and completion will be indicated by the following dialog which reiterates the grid extents and the total size of the sub grids and supporting files.

If the source path or export path described above are invalid, the appropriate message box will be presented to denote the error.

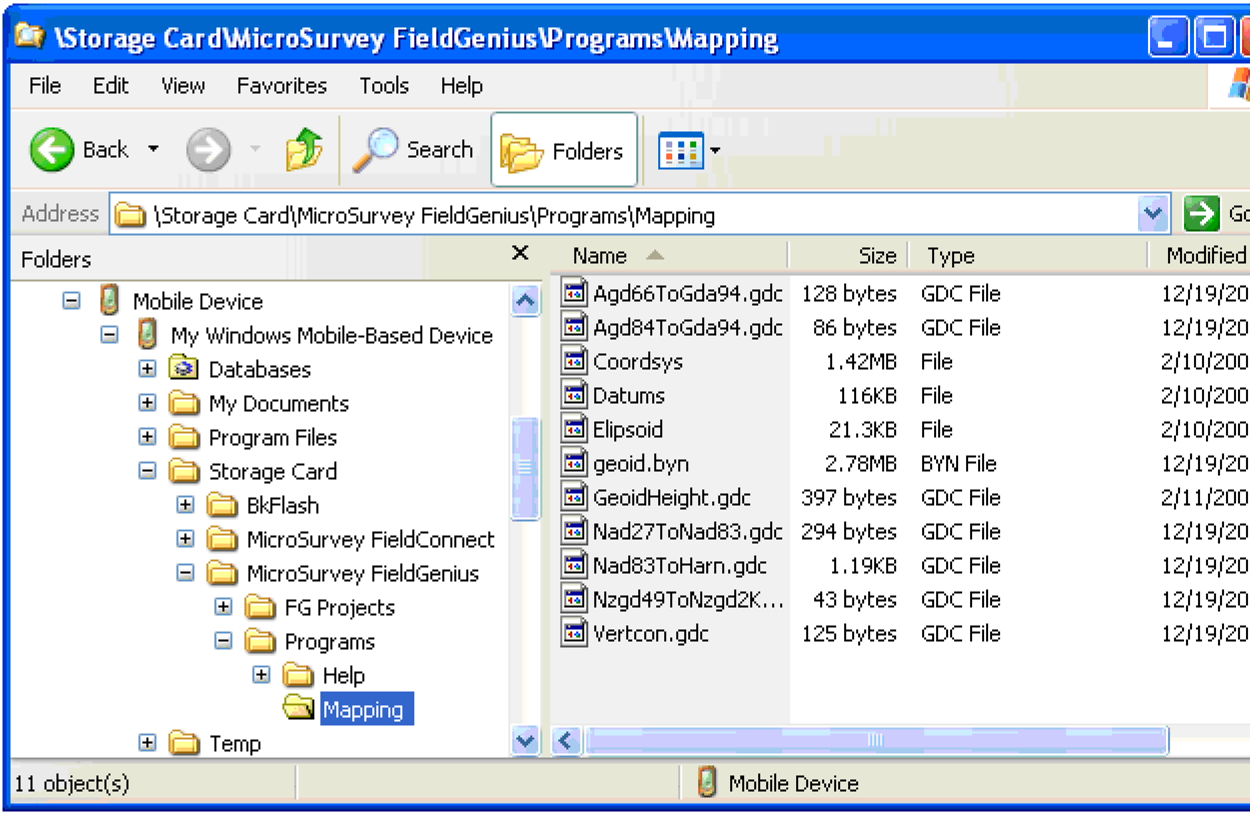


Transferring Data

The final step in creating sub grids is transferring the entire contents of the defined export path to the data collector. Microsoft ActiveSync provides easy access to **Explore** the contents of the data collector.



After cutting or copying the contents of the export path, use the explorer to paste the files into the ...\MicroSurvey EVR9\Programs\Mapping\ path on the data collector. If prompted to overwrite the existing files while pasting, respond with yes.



NOTE: the path shown may not exactly match your device. Make sure you know where Evidence Recorder is installed in your data collector. It might be in SystemCF, C_Drive, Disk, Storage Card, SD Card, Built-in Storage, Program Files, or some other memory location.

Connecting to Computer

Microsoft ActiveSync / Windows Mobile Device Center

Microsoft ActiveSync and Microsoft Windows Mobile Device Center facilitate communication between your PC and your handheld device.

If you are using Windows XP or earlier, **Microsoft ActiveSync** has to be installed on your computer so you can download data between your hand held and desktop computers. The current version (at time of printing) is ActiveSync 4.5. You may have to use an earlier version if you are running Windows 95 or 98. Check the web page noted below for more information.

If you are using Windows Vista, **Microsoft Windows Mobile Device Center** has to be installed on your computer, rather than Microsoft ActiveSync. The current version (at time of printing) is Windows Mobile Device Center 6.1.

Installing ActiveSync / Windows Mobile Device Center

Installing From Web

Microsoft ActiveSync or Microsoft Windows Mobile Device Center might already be installed on your computer; you can confirm this by looking for it in your Windows Start Menu.

If you do not have Microsoft ActiveSync or the Windows Mobile Device Center installed, you can download and install the latest version from Microsoft's website at this address:

http://www.microsoft.com/windowsmobile/activesync/default.mspx

Note: You may be asked to reboot your system once the installation is complete.

Installing From CD

Microsoft ActiveSync or Microsoft Windows Mobile Device Center might be already be installed on your computer, you can confirm this by looking for it in your Windows Start Menu.

If you do not have Microsoft ActiveSync or the Windows Mobile Device Center installed, and you don't have access to the internet, it can be installed from your Evidence Recorder CD. You can browse into the Evidence Recorder folder on your CD and run one of the following files:

MSASYNC.EXE (for Windows XP or earlier)

MSWMDC32.EXE (for Windows Vista 32-bit)

MSWMDC64.EXE(for Windows Vista 64-bit)

Note: You may be asked to reboot your system once the installation is complete.

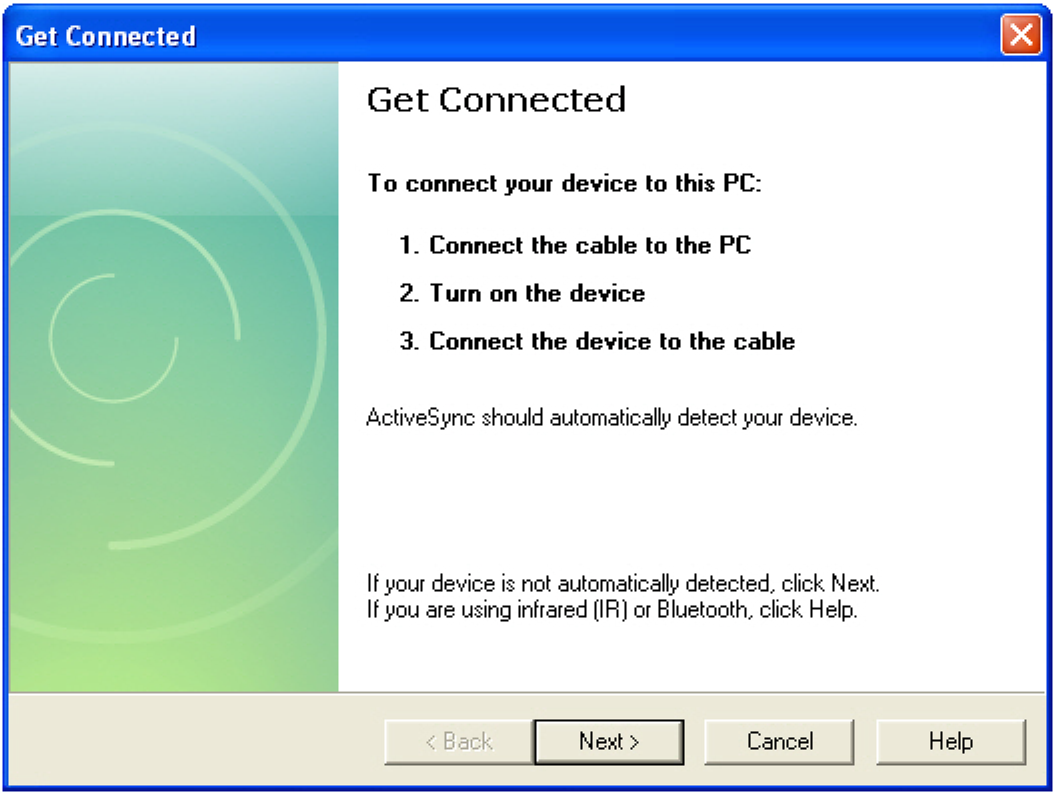
Connecting ActiveSync / Windows Mobile Device Center

Get Connected

We now need to establish a connection between your data collector and desktop computer as prompted by the ActiveSync or Windows Mobile Device Center Connection Wizard. The following screenshots are specific to ActiveSync, but the Mobile Device Center is almost identical.

After the install is complete, ActiveSync will display a Get Connected screen.

If ActiveSync was already installed, you can start it by going to your Start menu | All Programs | Microsoft ActiveSync. The Get Connected Wizard should appear. If it does not, go to the ActiveSync **File** menu and select **Get Connected**.



Connect your handheld data collector to your desktop or laptop computer using the supplied cradle and/or cables.

Power ON the data collector and click **Next** on the Get Connected Wizard. Some devices require you to tap a **PC Link** icon on the device while the Get Connected function is in operation.

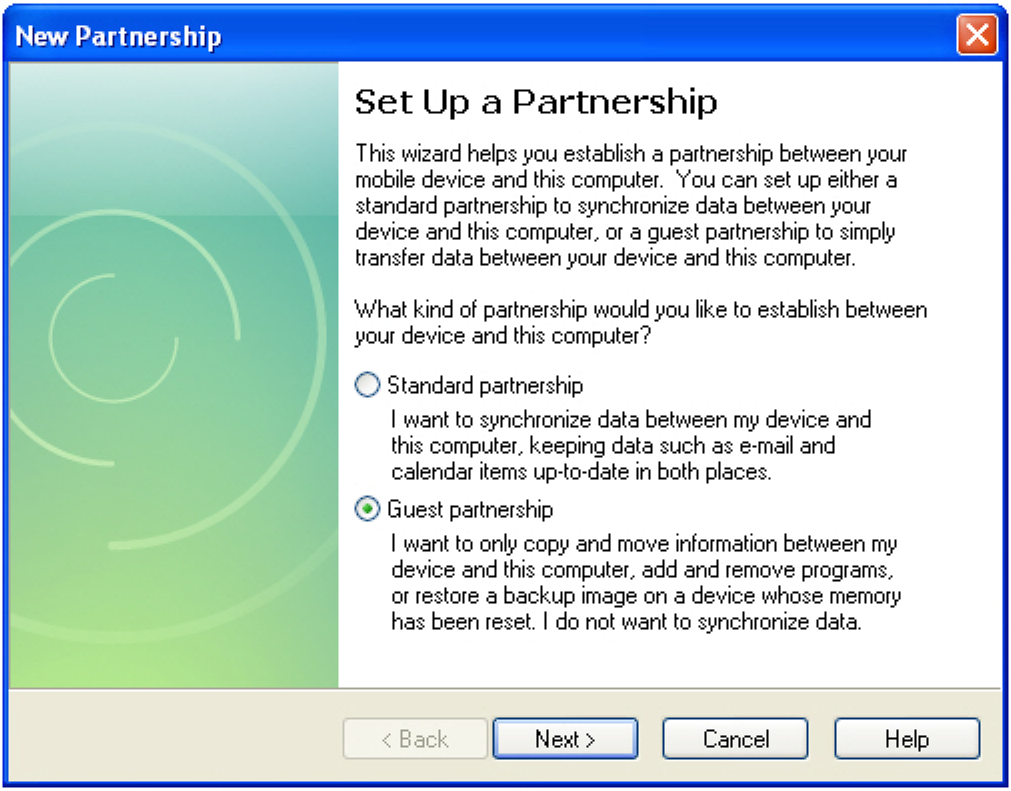
When communication is established, you will be prompted to set up a partnership between your data collector and the desktop computer.

Note: If your device does not connect as shown, turn the device off, and then back on again to retry

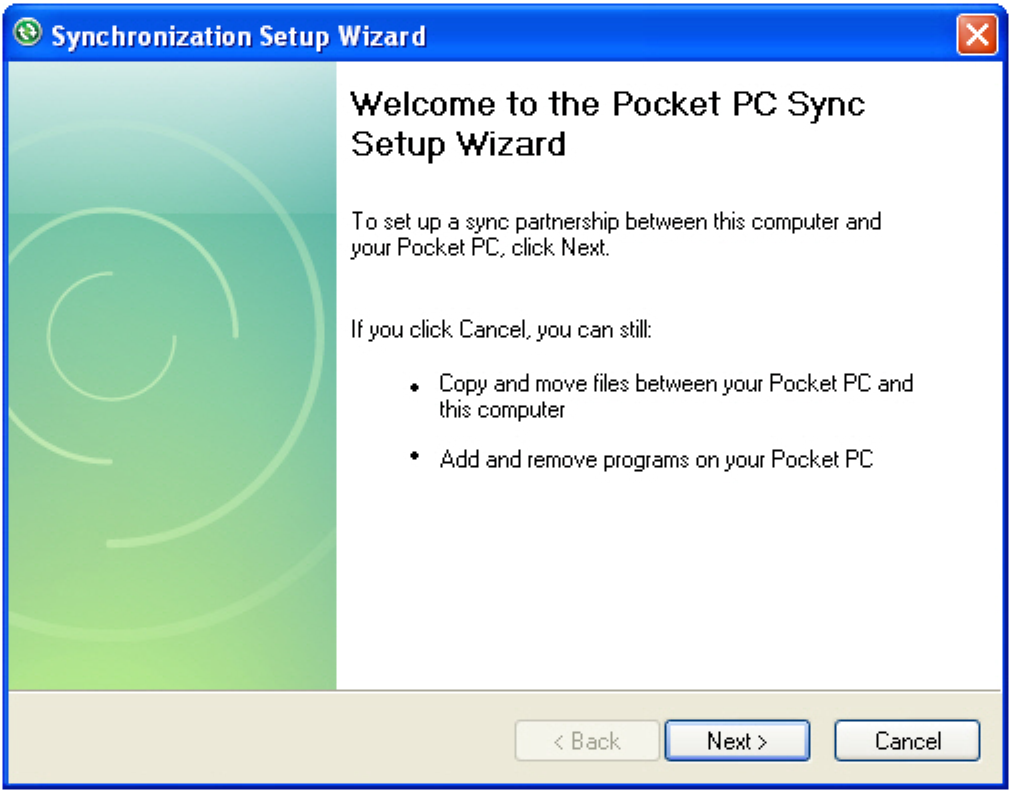
Establish a Guest Connection

After you successfully connect to your computer, you will be asked to setup a partnership. Choose **Guest Partnership** then click **Next** to continue.

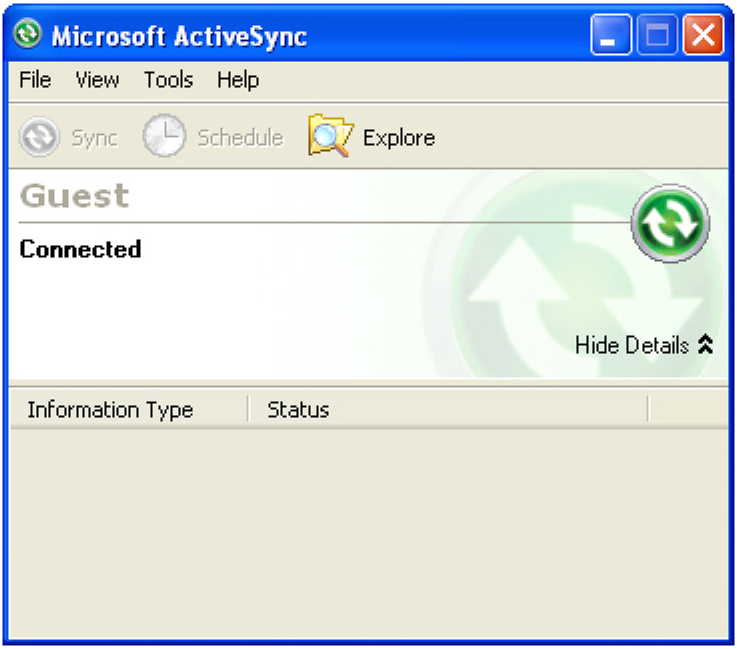
> **Note:**
> You can setup a Standard Partnership if desired, but this is not necessary and adds complexity. We recommend using a Guest Partnership.



Or if you are using a handheld device running Windows Mobile 5.0 or newer, you may instead see the Synchronization Setup Wizard, simply press **Cancel** to use a guest connection.



ActiveSync should now display as shown below:



You are now ready to move on to the next step - MicroSurvey Transfer Program

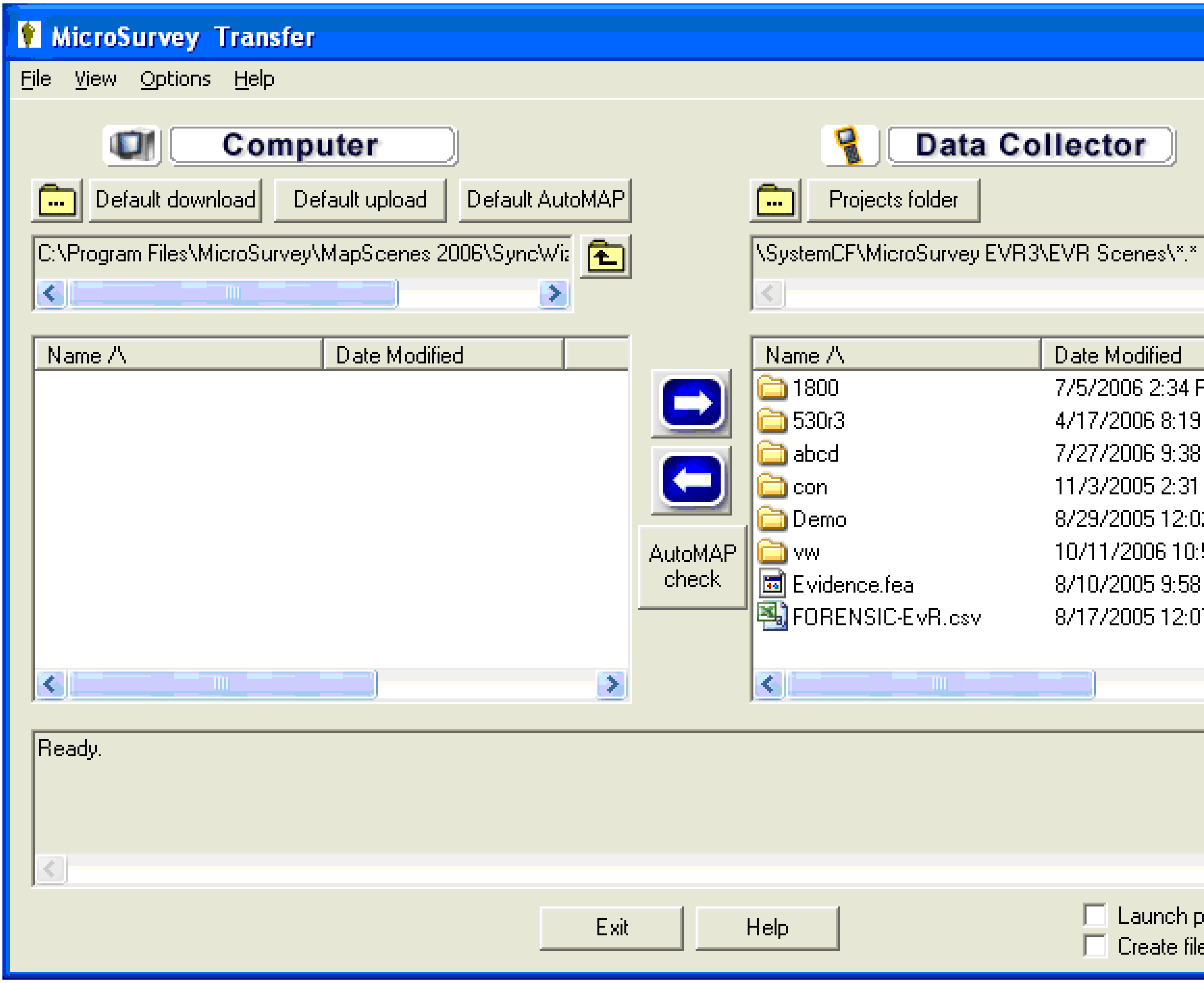
Note:
A small circular ActiveSync icon will appear in the lower right corner of your desktop (like the one at right in the above image). This will display in gray when ActiveSync is inactive but will change to green when your device is connected.

MicroSurvey Transfer

We provide a free transfer tool with Evidence Recorder to help you copy projects to and from your data collector. The program is called MicroSurvey Transfer and it can be download from our website or installed directly off of the CD provided with Evidence Recorder.

Once installed all you need is to connect your handheld computer to your desktop computer via an ActiveSync or Windows Mobile Device Center connection. ActiveSync is a Microsoft Windows product which establishes a serial or USB connection between your data collector and your computer.

Once connected, you can start the MicroSurvey Transfer program.



The program has been designed to streamline the transfer of projects and files back and forth between you data collector and computer.

For more details, please refer to the Help file included with the MicroSurvey Transfer program.

Synchronize with MapScenes

To import your projects into your MapScenes desktop product, please refer to the **Evidence Recorder SyncWizard** topic in the MapScenes help file.

Evidence Recorder 3 scenes can only be imported into MapScenes 2006 or newer.

Evidence Recorder 4 (and newer) scenes with an unencrypted raw file (*.raw) can only be imported into MapScenes 2006 or newer.

Evidence Recorder 4 (and newer) scenes with an encrypted raw file (*.rae) can only be imported into MapScenes 2008 or newer.

RAW File Reference

Raw File Record Types

To increase our compatibility with other data collectors and desktop systems, Evidence Recorder uses the TDS RW5 raw file format. The raw file contains virtually all the measurements made in the field and is a complete history of what was recorded.

For more information on the raw data record format, or for additional record types, please review the Raw Data Record Specification document from Tripod Data Systems, Inc. It is available for download at www.tdsway.com

Conventional Raw Data Records

-- - Note or Comment Records

A comment in the raw file will be depicted with a record type of two dashes. Text found after the dash is the comment.

Comments are ignored during processing of the raw file and are used only for information purposes only. You can add a comment to the raw file by using the Add Comment button in the Survey / Traverse Menu.

```
-- This is a comment
```

BK - Backsight Record

A backsight record is written to the raw file when you complete an occupy point command. Please review the Setup Occupy Point topic for more information.

Field headers:

OP: Occupy point

BP: Back point

BS: Backsight

BC: Back circle

```
BK,OP101,BP100,BS0.00000,BC0.00000
```

CF - Cut Sheet

When you stake out a point, a CF record will be recorded in the raw file.

ST: Station

OD: Offset direction (ENUM)

OL: Offset length

EL: Elevation

GD: Grade (design)

DE - Design Point / Location

During a stakeout the point you're staking will be recorded in the raw file with as DE record.

PN: Point name (*design point, may be blank*)

N : Northing

E : Easting

EL: Elevation

--: Description (*design point description, may be blank*)

JB - Job Record

Every time a raw file is created or opened a JB record will be written to the file.

Field headers:

NM: Job name

DT: Date

TM: Time

```
JB,NMTraverse1,DT03-05-2004,TM14:07:52
```

LS - Line of Sight (Instrument and Target Height)

HI: Height of instrument

HR: Height of rod

```
LS,HI1.500,HR1.500
```

MO - Mode Setup Record

Every time a raw file is created or opened a MO record will be written to the file.

Field headers:

AD: Azimuth direction - (0 = North) (1 = South)

UN: Distance unit - (0 = Feet) (1=Meter) (2=US Survey Feet)

SF: Scale factor

EC: Earth curvature - (0 = off) (1=On)

EO: EDM offset (inch) (Default string "0.0") **Not used by Evidence Recorder

AU: Angle unit - (0=Degree) (1=Grads)

```
MO,AD0,UN1,SF1.000000,EC0,EO0.0,AU0
```

OC - Occupy Point Record

When you complete the occupy point command an OC record will be written to the raw file. Please review the Setup Occupy Point topic for more information.

Field headers:

OP: Point number

N : Northing (the header is N space)

E : Easting (the header is E space)

EL: Elevation

--: Description

```
OC,OP101,N 1000.0000,E 1000.0000,EL10.0000,--
```

OF - Off Center Shot Record

When you use any of the offset shot commands an OF record will be written to the raw file. Two types of measurements will create offset records and they are the Angle Offset and Distance Offset measurement modes. Please see the Measurement Modes topic for more information.

Field headers:

AR: Angle right

ZE: Zenith

SD: Slope distance

OL: Offset length

HD: Horizontal distance

VD: Vertical distance

LR: Left/Right Offset

```
OF,AR90.00000,ZE90.00000,SD50.0000
OF,ZE60.00000,--Vert Angle Offset
```

```
OF,OL45.00000,--Right Angle Offset
OF,HD-10.0000,--Horizontal Distance Offset
OF,LR0.0000,--Left / Right Offset
OF,VD0.0000,--Elevation Offset
```

Offset shots will always contain the original measurement plus the offset information. You will also see a SS record accompany the OF records and it will contain the reduced measurement. Following is an example of a distance offset where an offset of -10 was entered:

```
OF,AR180.00000,ZE90.00000,SD50.0000
OF,HD-10.0000,--Horizontal Distance Offset
OF,LR0.0000,--Left / Right Offset
OF,VD0.0000,--Elevation Offset
LS,HI1.500,HR1.500
SS,OP1,FP5,AR180.00000,ZE90.00000,SD40.0000,--<No Desc>
```

RS - Resection

When you use the resection function a RS record will be recorded for each observation made to your control points. Please refer to the Resection topic for more information.

PN: Point number

CR: Circular reading

ZE: Zenith (or VA, CE)

SD: Slope distance (or HD)

```
RS,PN103,CR2.42220,ZE90.00000,SD25.0980
```

When you complete a resection the control points you used will be written as SP records and after the RS records you will see one final SP for the computed resection point. An example of a resection is shown below:

```
--Resection
SP,PN103,N 3135.070,E 1511.185,EL399.795,--:
SP,PN100,N 3097.874,E 1564.984,EL399.387,--:
LS,HI1.300,HR0.000
RS,PN103,CR2.42220,ZE90.00000,SD25.0980
RS,PN100,CR102.26120,ZE90.00000,SD56.3050
SP,PN999,N 3110.000,E 1510.000,EL398.291,--
```

SD - Stakeout Deltas

When you complete a stakeout by pressing the store point command a SD record will be written to the raw file. It is the difference between the design location (DE record) and the actual point staked

(SP record).

ND: Delta northing

ED: Delta easting

LD: Delta elevation

SK - Stake Out Record

When you stake out a point and use the Store Point command a SK record will be written to the raw file. This is the raw observation that was recorded when you stored you stake point.

OP: Occupy point

FP: Foresight point

AR: Angle right

ZE: Zenith

SD: Slope distance

```
SK,OP251,FP10000,AR175.00000,ZE90.00000,SD6.0000,--Design Point: 342
```

SP - Store Point

Many routines in Evidence Recorder will write a SP record to the raw file. SP records contain coordinate information that can be used for setups, resections, etc…

PN: Point number

N: Northing

E: Easting

EL: Elevation

--: Description

```
SP,PN103,N 3135.070,E 1511.185,EL399.795,--:
```

SS - Sideshot

When you record a shot a SS record will be recorded in the raw file. Many other functions also create a SS record such as when offset and multi set shots are reduced.

OP: Occupy point

FP: Foresight point

AR: Angle right

ZE: Zenith

SD: Slope distance

--: Description

```
SS,OP1,FP7,AR176.11093,ZE90.00000,SD60.1332,--<No Desc>
```

GPS Raw Data Records

AH - GPS Antenna Height

DC: Derivation Code (ENUM)

MA: Measured antenna height

ME: Measure Method (ENUM)

RA: Reduced antenna height (to phase center)

BL - GPS Base Line

DC: Derivation

PN: Point Name

DX: Base line Delta X

DY: Base line Delta Y

DZ: Base line Delta Z

-- : Description (Feature Code)

GM: GPS Measure Method (ENUM)

CL: Classification

HP: Horizontal Precision

VP: Vertical Precision

BP - Set Base Receiver Position

PN : Point Name

LA: Latitude

LN: Longitude

HT: Ellipsoid Height

SG: Setup Group (default = 0)

CS - Coordinate System Identity

CO: Coordinate system option (ENUM)

ZG: Zone group (system) name

ZN: Zone name

DN: Datum name

CT - Calibration Point

PN: Point Name

DM: Dimensions used (ENUM)

RH: Horizontal residual

RV: Vertical residual

CV - RMS Covariance of GPR Position

DC: Derivation (ENUM)

SV: Minimum number of SV during observation

SC: Error Scale

XX: Variance X

XY: Covariance X,Y

XZ: Covariance X,Z

YY: Variance Y

YZ: Covariance Y,Z

ZZ: Variance Z

EP - Geodetic Position

When you save the location of a point, its geodetic position is also recorded.

TM: Time

LA: Latitude

LN: Longitude

HT: Ellipsoid Height

RH: Horizontal RMS returned from receiver

RV: Vertical RMS returned from receiver

DH: HDOP if receiver returns this info

DV: VDOP if receiver returns this info

GM: GPS Method (ENUM)

CL: Classification (ENUM)

HA - Horizontal Calibration (Adjust)

N : Origin north

E : Origin east

TH: Translation north

TE: Translation east

RT: Rotation about origin

SF: Scale factor at origin

GS - GPS Store Point

This is similar to a regular SP (store point) record but the GS indicates that it is create by GPS.

PN: Point Name

N : Local Northing

E : Local Easting

EL: Local Elevation

-- : Description

RP - Local coordinates of calibration point

N : Northing

E : Easting

EL: Elevation

-- : Description

VA - Vertical Calibration (Adjust)

PV: Type of vertical adjustment (ENUM)

N : Origin north (*may be blank*)

E : Origin east (*may be blank*)

LZ: Constant adjustment – translation Z (*may be blank*)

SO: Slope north (*may be blank*)

SA: Slope east (*may be blank*)

GN: Geoid Model Name

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