Zeno Field Help

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Getting Started

Welcome to Zeno Field

Leica Geosystems Zeno Field is a mobile mapping and geographic information system (GIS) software. Mobile computing is bringing fundamental changes to the way geography is utilized with the ability to bring your work with you and to interact directly with the world around you.

Zeno Field takes advantage of mobile computing and input devices such as GPS, rangefinders, and cameras to provide workers with the tools to collect, edit, update, and query GIS data in the field. Data collection with Zeno Field is efficient and significantly improved with immediate data validation and availability. The end result of using Zeno Field is a GIS database that is accurate, complete, consistent, and current. This leads to more accurate analysis and better decision-making.

- Field Mapping
- Asset Inventories
- Asset Maintenance
- Inspections
- Incident Reporting
- GIS Analysis and Decision Making
- Mobile component of Zeno Office for Zeno 10/15

What can you do with Zeno Field

Zeno Field is based on ESRI ArcPad 8 OEM.

- Collect geometry and attributes of new feature
- Modify existing feature
- Image capture
- Working with offset devices like Laser Rangefinder

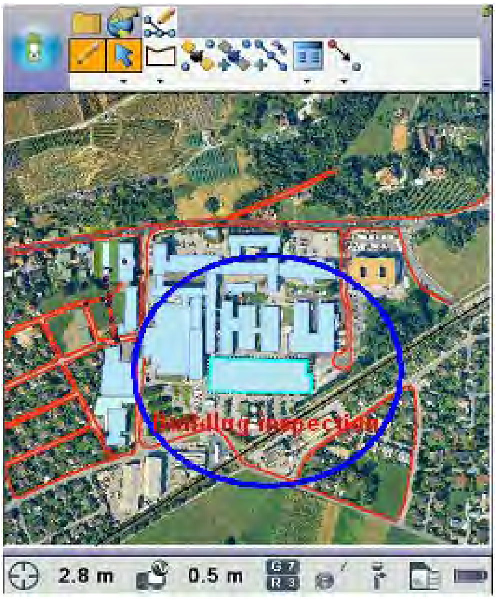
GNSS device control

- RTK device configuration wizard
- GNSS raw-data logging for post-processing
- Accuracy management
- GNSS toolbar

Using your existing data

Using your existing data, Zeno Field leverages existing mapping and GIS software systems and databases. Zeno Field supports vector map and raster image display including numerous industry-standard formats. In addition, Zeno Field supports most of the symbology used in Zeno Field Desktop, enabling you to display layers in your mobile GIS applications using the standards of your organization.

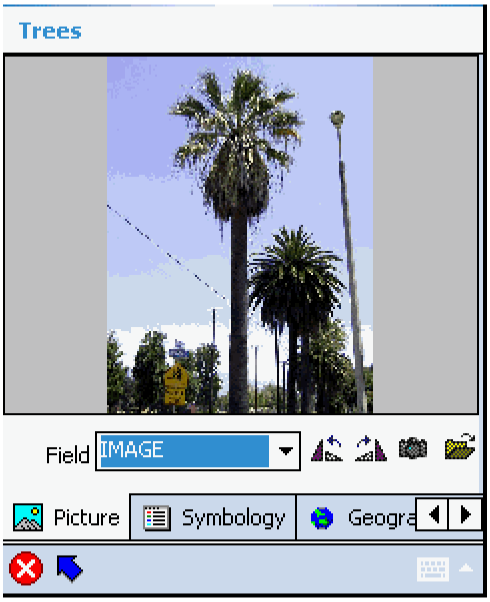
Zeno Field supports vector and raster data in a multilayered environment.



Zeno Field enables you to identify target areas for inspections using a graphics layer. The camera icon represents the location of a feature with a geotagged photo.

Capturing data in the field

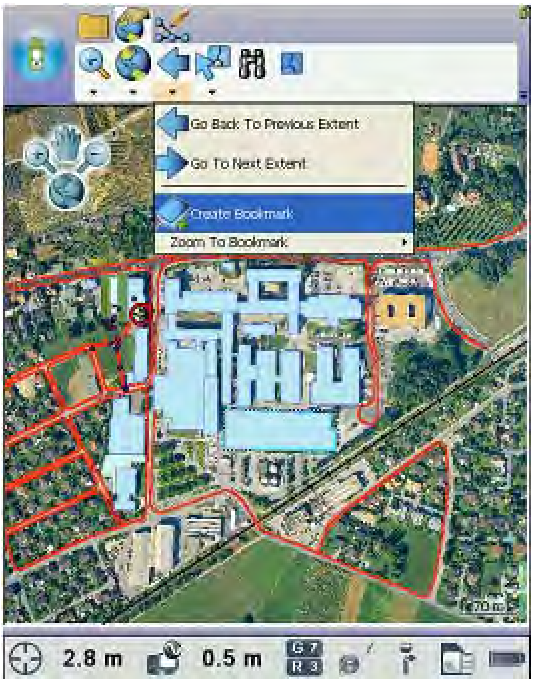
Zeno Field provides a comprehensive set of tools users need for collecting and capturing data in the field including redlining using a graphics layer, and extensive support for capture devices such as GPS receivers, rangefinders, and cameras.



Zeno Field enables you to capture photos in the field using a connected digital camera. The photos are then immediately associated with features in a layer.

Moving around your map

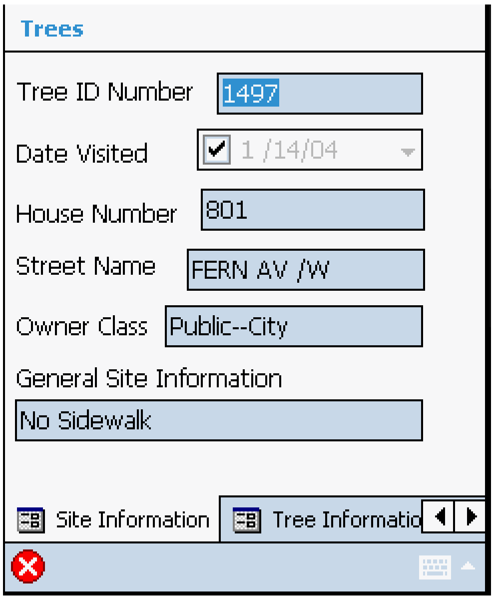
Zeno Field has a number of map navigation tools, including variable zoom and pan, fixed zoom, zoom to a specified layer or spatial bookmark, and center on the current GPS position.



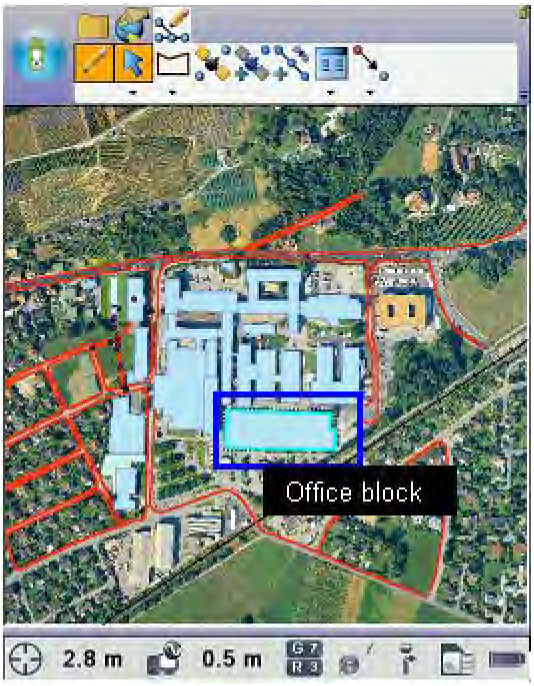
Create a spatial bookmark to easily identify your study area.

Querying your data

Zeno Field enables you to identify features by tapping on them; display additional information about features through a hyperlink; navigate to a specific geographic coordinate; and locate a feature within the extent of your map, label it, and zoom to it.



Use the Identify tool to display information about a feature.



Locate a feature, label it, and zoom to it.

Measuring distances on your map

Zeno Field lets you measure distance, area, and bearings on your map with three measuring tools: Measure, Freehand Measure, and Radial Measure.

Measure the distance along features in your map.

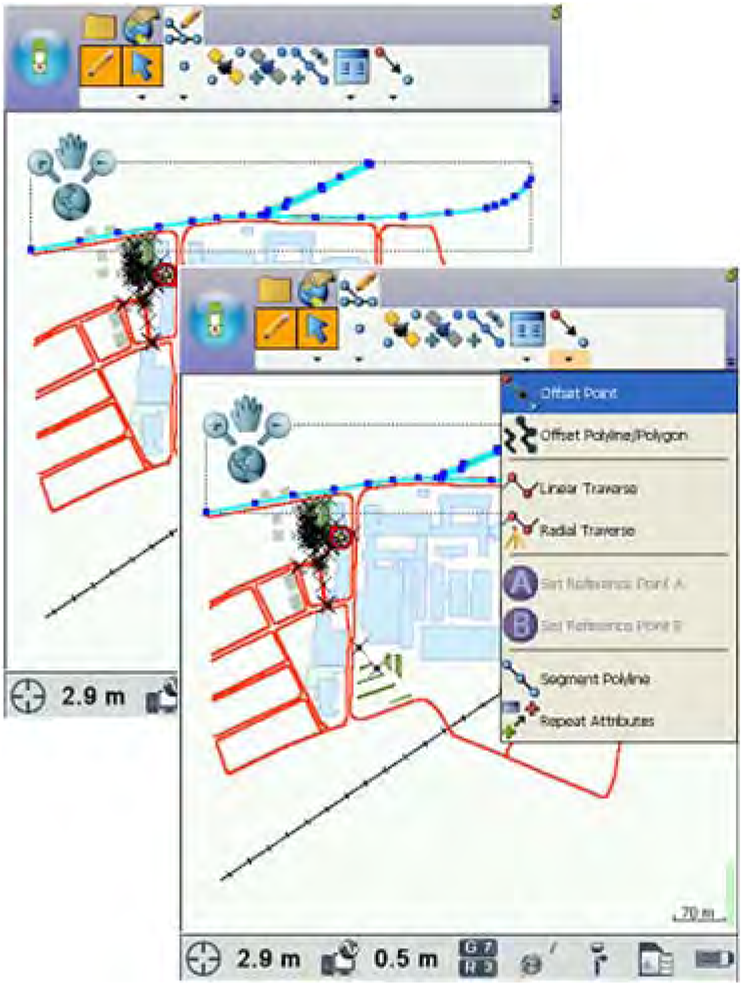
Navigating with your GPS

Connect a GPS to your mobile device and let Zeno Field guide you. Zeno Field provides navigational information from the current GPS position to the destination and a GPS tracklog that illustrates the path you have travelled.

Use the GPS tracklog to log the path you have traveled.

Editing your data

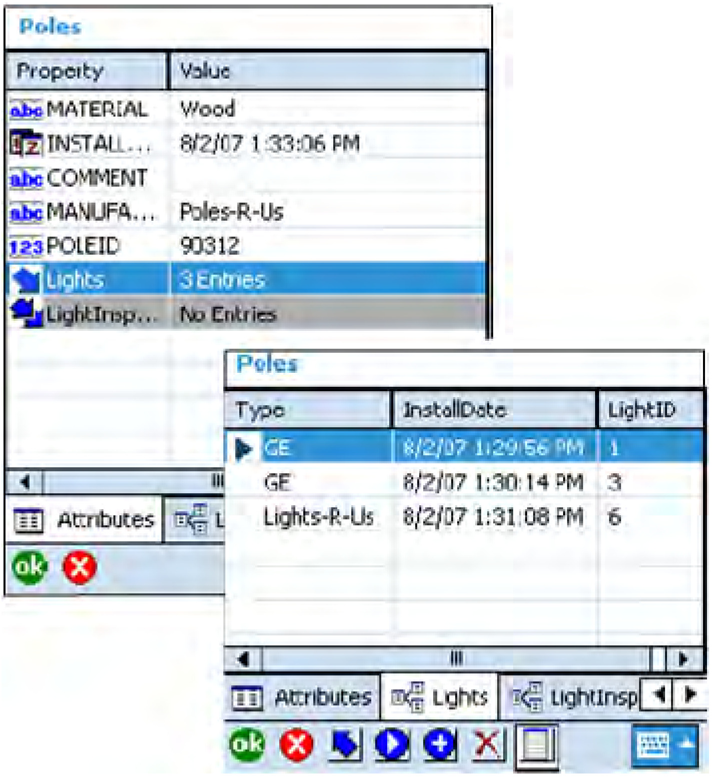
In addition to displaying and querying spatial data, Zeno Field allows you to create and edit spatial data using input from either the mouse pointer, pen, GPS, or rangefinder. Zeno Field also supports offsets, traverses, repeated attributes, and segmented lines to ensure more accurate and efficient data capture.



Edit your existing features by adding and moving vertices (left) or by using offsets and rangefinders (right).

Editing attributes in related tables

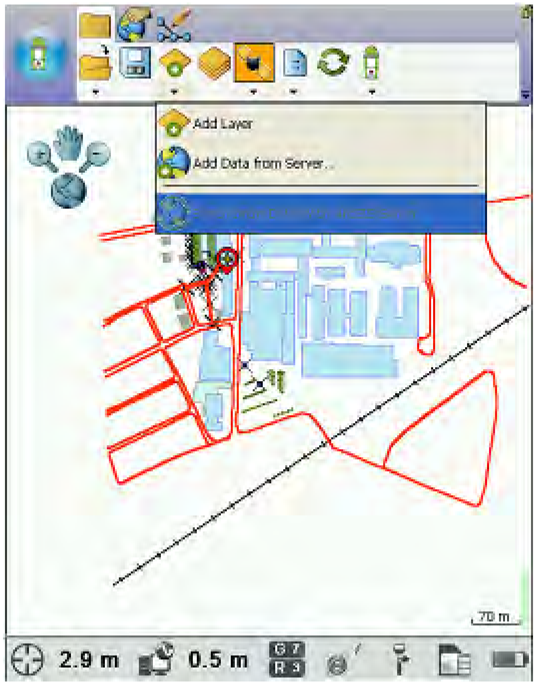
Zeno Field allows you to edit attribute data associated with spatial features. This attribute data can be located in the feature data table, or in a related table. Zeno Field supports viewing and editing of attributes in related tables, where each feature may have one or more related records in a secondary table.



Edit attribute data in feature data tables or in related tables.

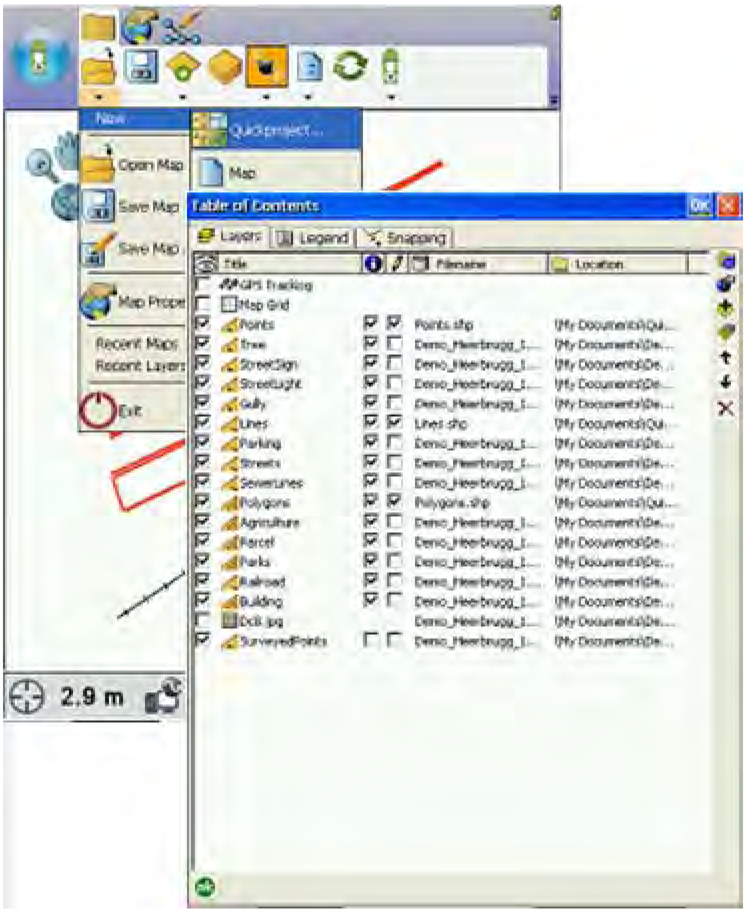
Synchronizing Zeno Field edits directly with ArcGIS Server

Zeno Field Extension, you can publish a Zeno Field project to ArcGIS Server and use in Zeno Field. Any device that can connect to internet (by cradle, USB, WIFI, or phone connection) can synchronize Zeno Field edits directly with the enterprise geodatabase via ArcGIS Server.



Rapid data collection with QuickProject

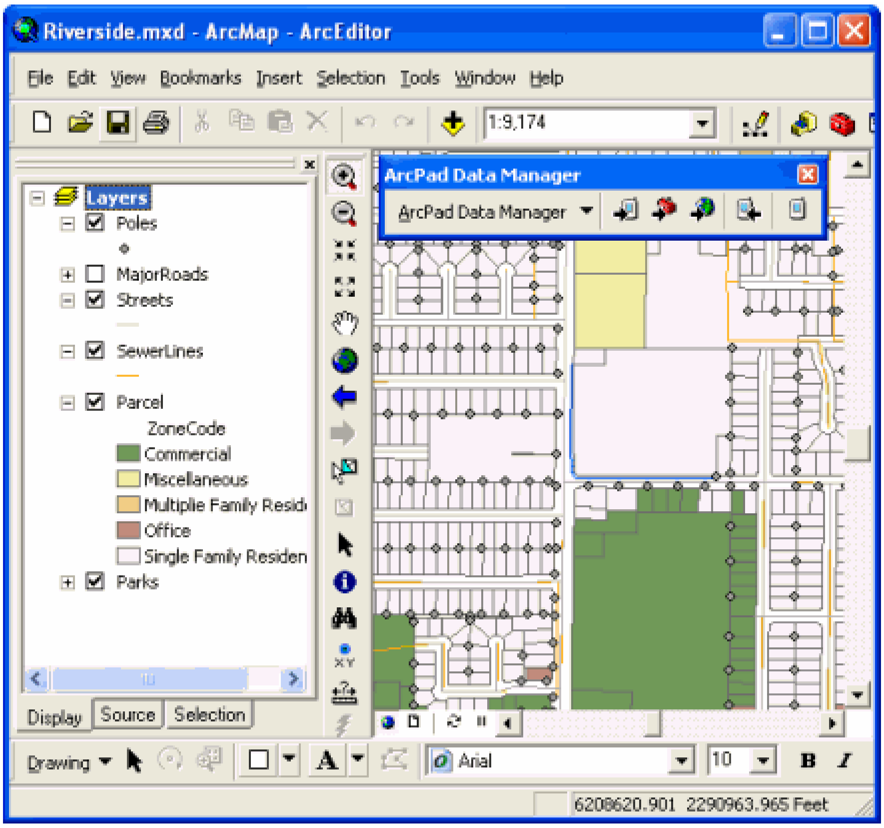
Zeno Field provides flexibility for field data capture. You can capture new data or edit existing data. You can have vector and image background reference data to help locate yourself in the field. New data can be captured into existing layers or into new layers created in the field with Zeno Field. The QuickProject tool allows you to rapidly create a ready to use data capture project with or without background reference data.



Quick Project creates a ready to use data capture project.

Including Zeno Field in your GIS solution

Zeno Field is the field component to your GIS solution. Use the Zeno Field Data Manager in Zeno Office to extract, convert, project, and update your data.



Use data maintained in Zeno Office in the field with Zeno Field.

With the Zeno Field Data Manager you can prepare data for immediate use in Zeno Field or prepare data for use with geoprocessing tools or publication to ArcGIS Server.

Zeno Field Basics

Introduction

Zeno Field is a field-based extension to your mapping and GIS system. The ability to compare your data directly to geographic features in the real world adds a deeper sense of reality to your GIS database. It also opens many new avenues for field data collection, display, and analysis.

Whether you need to add new pump station locations, take a measurement or locate an address, you can do it in the field with Zeno Field. This chapter will guide you through the basics of Zeno Field and the Zeno Field interface and illustrate how to use the tools provided.

Maps and layers

A map is the fundamental component you work with in Zeno Field. Maps help you visualize geographic data in the field by showing you where things are, telling you what they are, and helping you understand why they are that way. The screen shot below shows how to open an existing Zeno Field map and save the current map in Zeno Field.

The Zeno Field map file (.apm) stores a list of the map layers and their properties in your Zeno Field session. A map lists all of your layers together with the geographic extent and projection of the map. When you begin an Zeno Field session, you can open an existing map or create a new map by adding layers of data or information.

You can display geographic information on a map as layers. Each layer represents a particular type of feature, such as streams, lakes, highways, political boundaries, or light posts. A layer does not store the actual geographic data; instead, it references the data contained in shapefiles, Zeno Field AXF files, or images. The Table of Contents (TOC) button becomes active once a layer has been added to the current Zeno Field map.

The Table of Contents displays all layers loaded in the current map, the GPS Tracklog, and the Map Grid layer. Within the Table of Contents, you can also change symbology using the legend, set snapping properties for editing, and select whether or not each layer can be identified or edited.

The screenshot below explains different tabs and icons on the Table of Contents window:

a. Displays the dropdown list

b. Opens a Zeno Field map

c. Saves the current map

Starting Zeno Field

Installation Overview of Starting Zeno Field

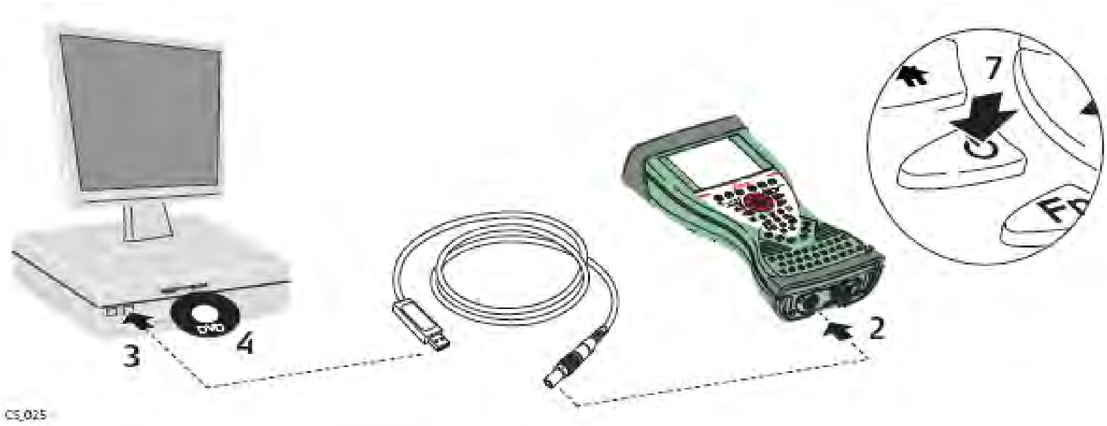
Starting Zeno Field is the first step to field data collection and management. However, before you can start, Zeno Field must be installed on your computer. If you don't know whether it's installed, check with your system administrator.

Step	Action
1	Install Microsoft ActiveSync or Windows Mobile Device Center on your desktop computer and the device drivers.
2	All Zeno devices are shipped with pre-installed Zeno Field software. To upgrade to a new version uninstall the old version prior to the new installation. There are two types of installations 1. Install Zeno Field using the Deployment Manager 2. Install Zeno Field using a CAB installation file
3	Start Zeno Field from the Zeno 10/15.

For more information about installing Zeno Field, please read the Leica Zeno 10/Zeno 15 User Manual.

Install Microsoft ActiveSync or Windows Mobile Device Center on your desktop computer

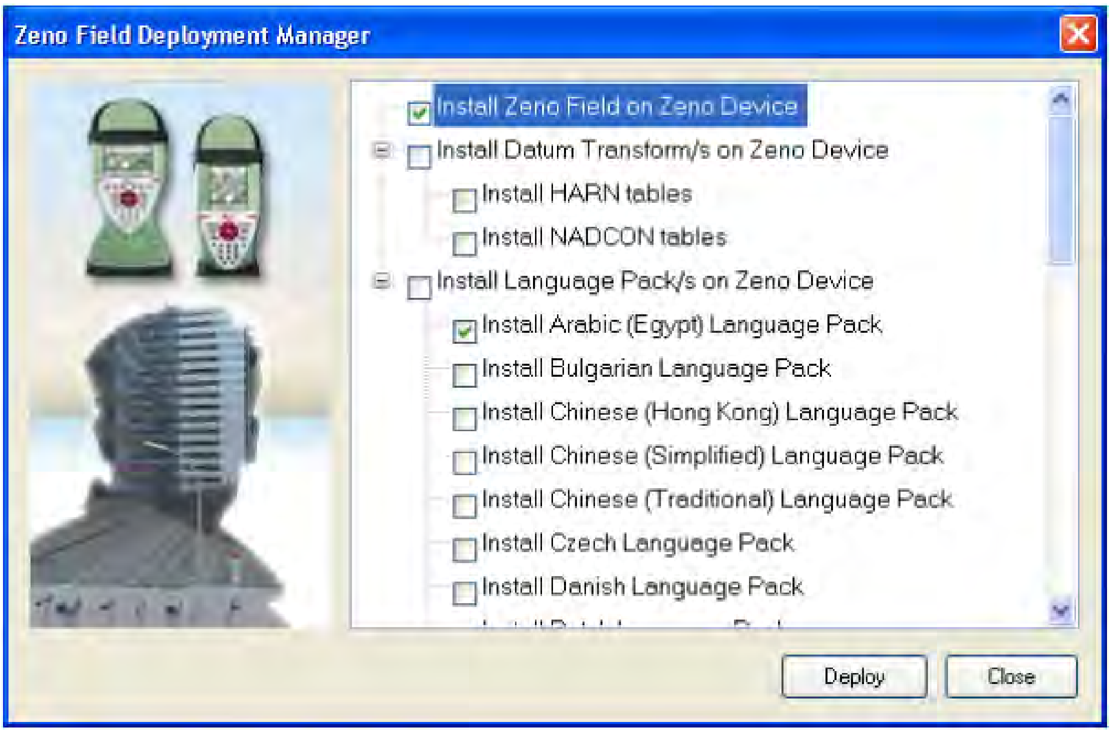
Microsoft ActiveSync (for PCs with Windows XP operating system) or Windows Mobile Device Center (for PCs with Windows Vista operating system) is the synchronisation software for Windows mobile-based pocket PCs. Microsoft ActiveSync or Windows Mobile Device Center enables a PC and a Windows mobile-based pocket PC to communicate.



Step	Action
1	Start the PC.
2	Plug the GEV234 cable into CS field controller. • For CS field controllers with DSUB9 connector, the GEV223 cable has to be used. • Ensure that the CS field controller is turned off.
3	Plug the GEV234 cable into the USB port of the PC. • If the CS field controller is already turned on, the new hardware wizard starts up automatically. Click Cancel to quit the new hardware wizard if it starts.
4	Insert the Leica Viva Series DVD.
5	Run the SetupCS.exe to install the drivers necessary for your instrument.
6	The Welcome to InstallShield Wizard for Remote NDIS based LGS device connection window appears.
7	Turn on the CS field controller.
8	Next>.
9	The Ready to Install the Program window appears.
10	Install. The drivers will be installed on your PC.
11	The InstallShield Wizard Completed window appears.

12	Click Finish to exit the wizard.
	For PCs with Windows XP operating system:
13	Run the ActiveSync installation program if not already installed.
14	Allow USB connections inside the Connection Settings window of Active-Sync.
	For PCs with Windows Vista operating system:
15	Run the Windows Mobile Device Center installation if not already installed.

Install Zeno Field using the Deployment Manager

Step	Action
1	Run the Leica Zeno Field.msi on your desktop PC from the Zeno Field installation DVD or. Alternatively you can download the latest installation files from https://myworld.leica-geosystems.com Insert the Zeno DVD and follow the instructions on the screen. If Auto run has been disabled for your DVD drive, use Windows Explorer to locate the Zeno Field Setup.exe file on your DVD. Double-click the Zeno Field Setup.exe to start the installation.
	The Deployment manager tool is created to simplify the installation process for the Zeno Field components. This tool is a user friendly wizard to install the required applications into the Zeno 10/15 handheld device which include the following: a. Installation of Zeno Field on the Zeno 10/15 b. Installation of Datum Transform/s c. Installation of Language Packs
2	Establish a synchronization connection between your desktop PC and your Zeno 10/15 handheld device.
3	Start the Zeno Field Deployment Manager on your Desktop by clicking Start > All Pro-grams > Leica Zeno Field > Zeno Field Deployment Manger. 

4	Check the check box for the components to be installed to your Zeno handheld device and click Deploy.
5	Click Yes to confirm the installation in the default path.
6	Click OK to close the Software deployment process.
7	Close the Zeno Field Deployment Manager.
8	A message will appear on your Zeno asking you to restart the device to finalize the installation. Click Yes. Your Zeno will restart. Zeno Field is now ready to be used.

Install Zeno Field using a CAB file

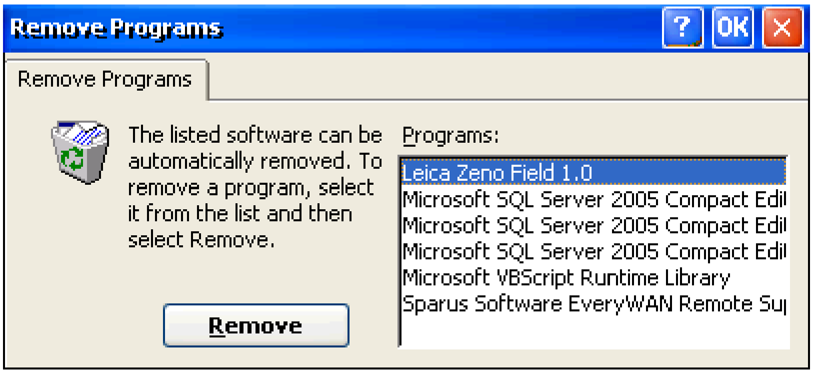
Step	Action
1	Download the most recent Zeno Field installation file from https://myworld.leica-geosystems.com or DVD package.
2	Connect the Zeno field controller to your PC through synchronization software
3	Copy the Zeno Cab file onto a folder on the Leica handheld device, SD card, Leica CompactFlash card or USB stick.
4	Double-tap the My Device icon on the desktop of the Zeno 10/15 handheld device.
5	Browse to the directory into which you've copied the Zeno Cab file.
6	Double-tap the CAB file to start the installation process.
7	Tap OK to install Zeno Field in the default installation path.
8	A message will appear asking you to restart the device to finalize the installation. Click Yes. Your Zeno will restart. Zeno Field is now ready to be used.

Starting Zeno Field from the Zeno 10/15

☞ Zeno 10/15 Start Menu: The Start Menu on your Zeno 10/15 can only contain 7 programs. If Zeno Field is not listed, you can tap **Start>Settings >Menus** to add Zeno Field as one of your Start Menu programs.

Step	Action
1	Tap Start on the Windows taskbar.
2	Tap Programs
3	Tap Zeno Field You will see the Zeno Field splash screen briefly, and Zeno Field will open with the Open Map dialog box. 
☞	If this is the first time you are opening Zeno Field since installing, you will see a message advising you as such, and that a new toolbar file has been created. After clicking OK, you will then be prompted for your registration number. If you do not have a registration number, you can click OK, and continue using Zeno Field in evaluation mode. Evaluation mode allows you to use all Zeno Field functionality for 20 minutes.

Uninstall Zeno Field on your Zeno 10/15

Step	Action
1	On your Zeno tap Start > Settings > Control Panel.
2	Double-tap Remove Programs
3	Select Leica Zeno Field. 
4	Tap Remove.
5	Tap Yes to confirm that you want to remove the program.

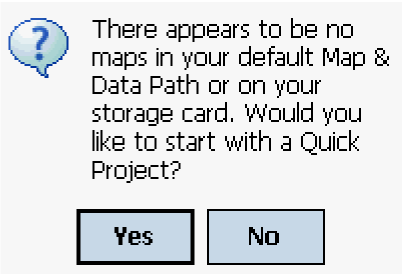
Uninstall the Zeno Field Deployment Manager

Step	Action
1	On your Desktop PC click Start > Control Panel.
2	Double-click Add or Remove Programs.
3	Select the Leica Zeno Field entry.
4	Click Remove.

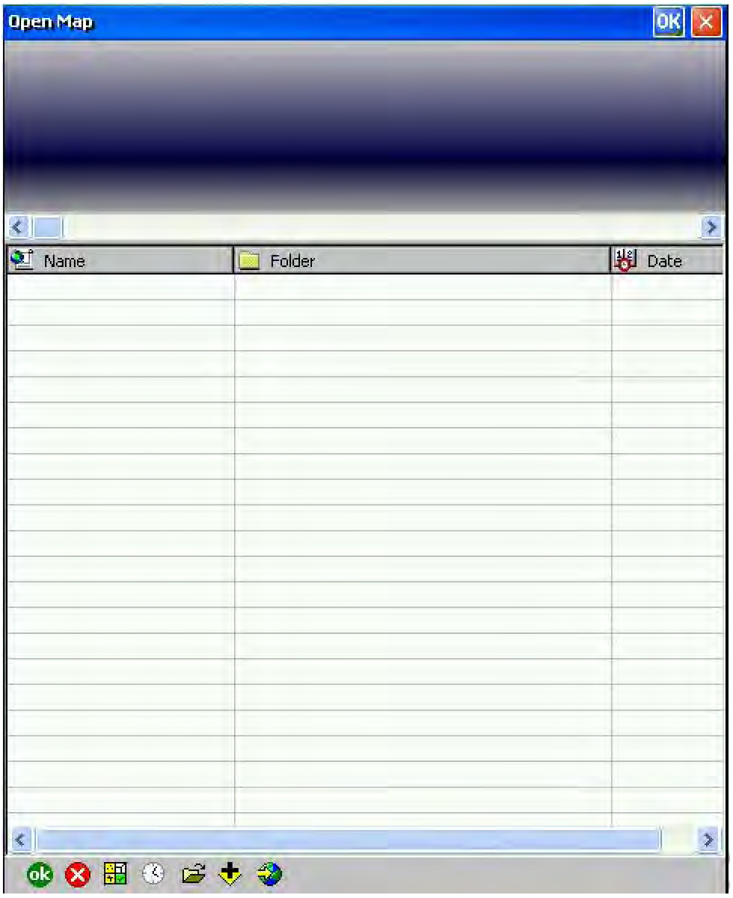
Using the Open Map dialog box

Overview of Open Map dialog box

By default when Zeno Field begins, the Open Map dialog box will appear. This allows you to quickly get started with Zeno Field. Using the Open map dialog box, you can start using Zeno Field with an empty map, browse for data, open an existing map or data, or create a new QuickProject. If you are a new user, the following dialog appears.



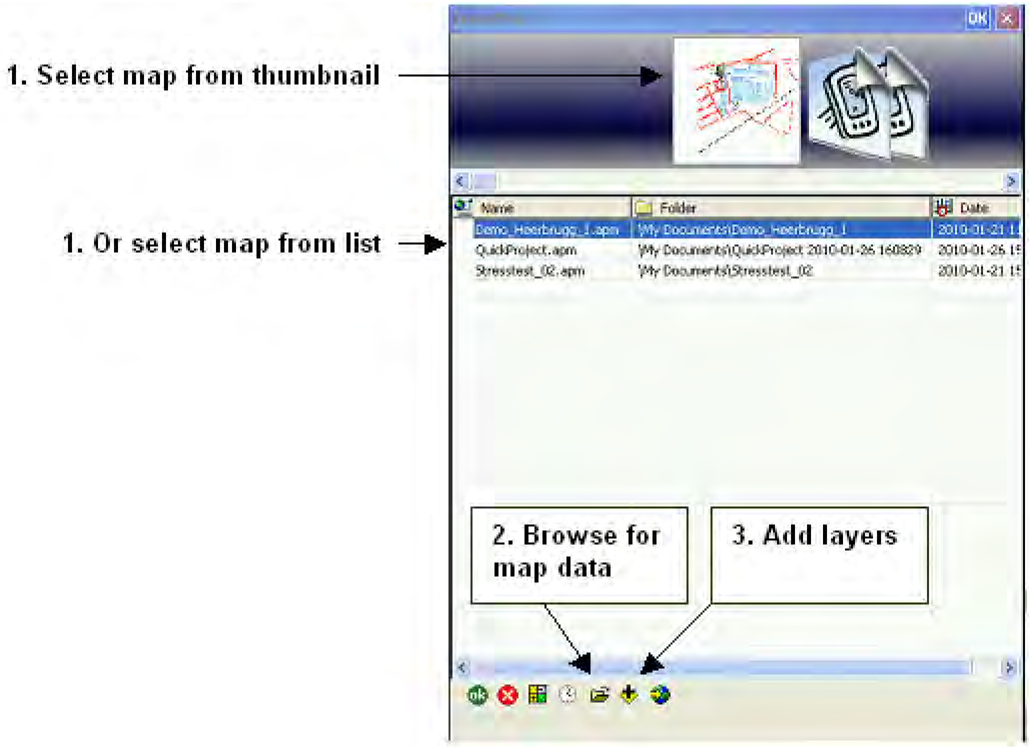
This dialog gives you the option to either start with **QuickProject** or search for layers. If you click **Yes** the **QuickProject** dialog box appears, and if you click **No** the **Open Map** dialog appears, as shown below.

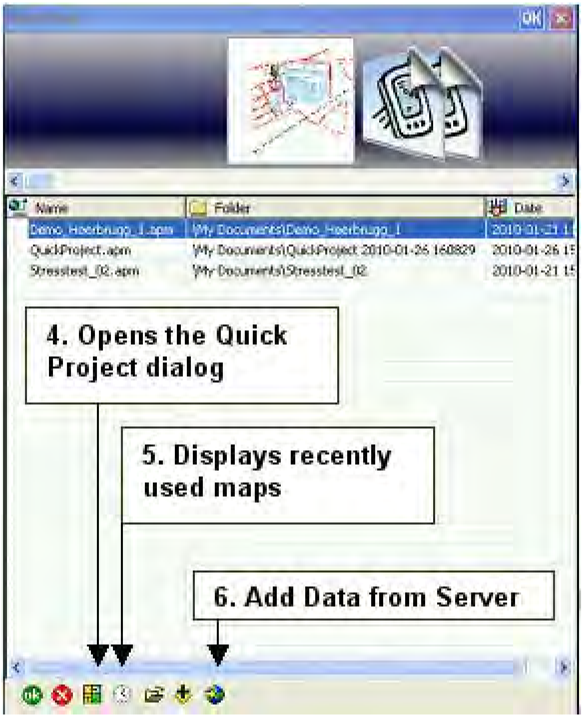
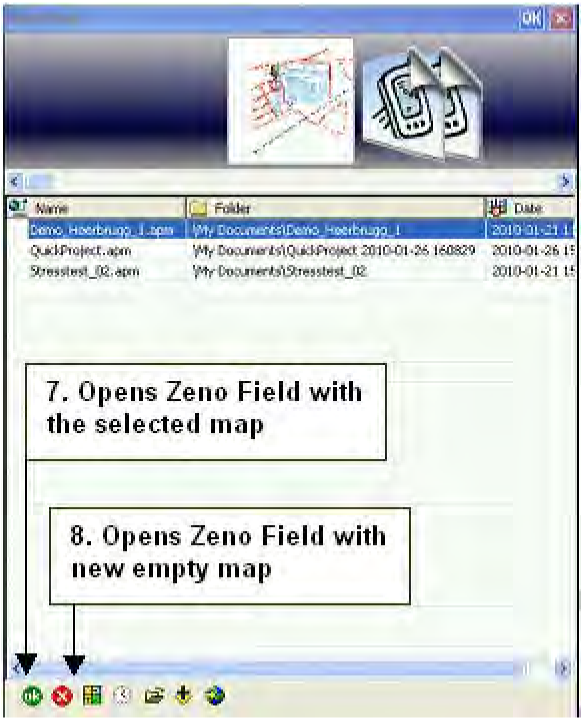


To turn the Open Map dialog box on/off, go to the General page in the Zeno Field Options dialog box, and check/uncheck the box 'Show open map dialog on startup'.

Performing an action in the Open Map dialog box: You can either tap the button or the corresponding radio button and ok to perform the desired action in the Open Map dialog box. For example, tap the Add data  button and the Add Layer(s) dialog box opens.

Open an existing Zeno Field map from the Open Map dialog

Step	Action
1	On the Zeno Field Open Map dialog box, select from the list of available maps. Zeno Field displays a list of previously used maps and data.
2	Use your devices file brower to browse for an existing map or data. 
3	Add individual layers to an empty map.
4	Opens the QuickProject dialog, and you can create a ready to use data capture project.
5	Toggles between the recently used maps and available maps.
6	Open the Add Data from Server dialog, you can add ArcGIS Server Zeno Field Services or ArcIMS Services here.

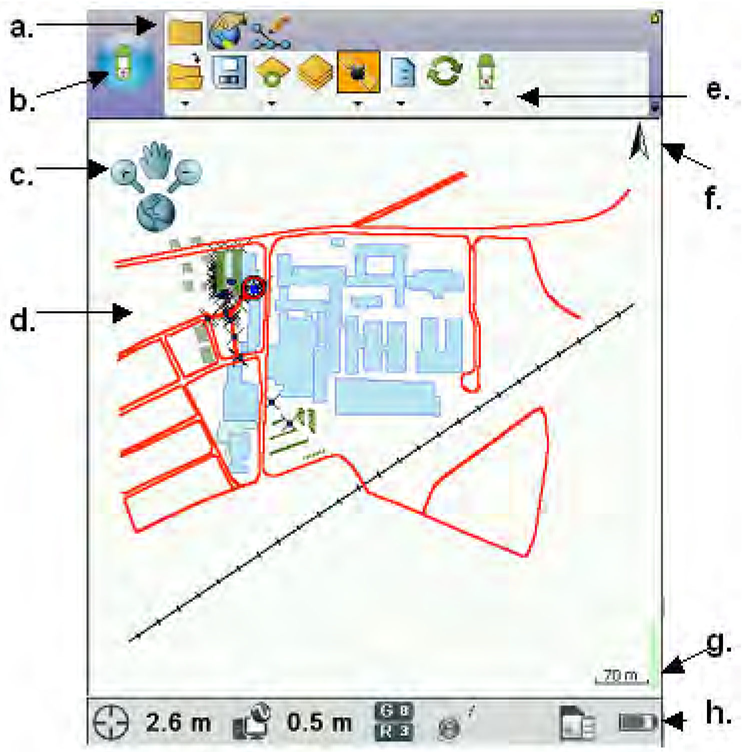
<table>
<tr><td></td><td>
</td></tr>
<tr><td>7</td><td>Tapping OK starts Zeno Field with the selected map.

</td></tr>
<tr><td>8</td><td>Tapping close starts Zeno Field with an empty new map.</td></tr>
</table>

The Zeno Field map window

The Zeno Field user interface provides a simple and intuitive approach to the underlying functionality. It is possible to perform a wide range of functions through controllable toolbars.

The Zeno Field map window includes three standard toolbars, the Main toolbar, the Browse toolbar, and the Edit toolbar. You can select the toolbars from toolbar selector. The selected toolbar becomes active and appears below the toolbar selector.

The map window also includes a map navigator, panning frame, scalebar, north arrow, and status bar, all of which can be turned on or off.



a. Toolbar Selector: Toolbars shown here include Main, Browse and Edit.

b. Quick action

c. Map Navigator

d. Panning Frame

e. Main Toolbar

f. North Arrow

g. Scale Bar

h. Status Bar

Opening a map

Overview of Opening a map

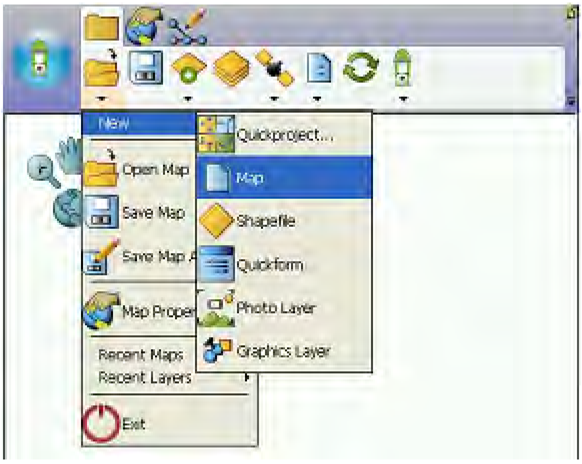
Once you have started Zeno Field, you can create a new map file or open an existing one using the tools on the Main toolbar or as previously discussed using the Startup dialog box/open map. A new map is automatically created if no default map is specified.

The Zeno Field map file (.apm) stores a list of the map layers in your Zeno Field map. A map lists all your layers together with the geographic extent and projection of the map.

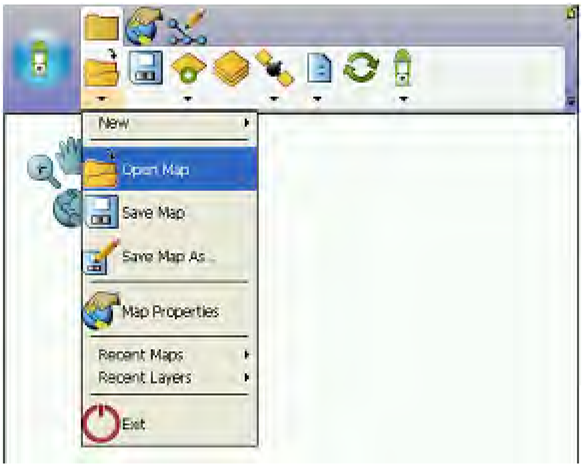
Starting Zeno Field with a default map: When Zeno Field starts, it looks for the default map, Zeno Field.apm. Zeno Field will open this map on startup if it exists. The location of the default map is specified on the Paths page of the Zeno Field Options dialog box.

Create a new map

Step	Action
1	On the main toolbar, tap the black arrow below the folder icon  to display the drop down list.
2	Tap New. The New submenu is displayed.
3	Tap Map. Zeno Field will create a new map. You can then add data and create your own Zeno Field map file.



Open an existing map

Step	Action
1	Tap the open map button on the main toolbar.
2	Alternatively, tap the dropdown arrow below the Open Map button on the Main toolbar to display the drop-down list.
3	Tap Open Map. The Open Map dialog appears. 
4	On this page, choose from the list of maps you would like to open. 
5	Alternatively, you can tap the browse button and navigate to the location of your existing map file. Tap the map file you would like to open. Zeno Field opens the selected map document.

☞ **Setting path options:** Zeno Field allows you to specify a default map and data, system files, and applet file paths.

☞ **Setting the toolbar button sizes:** You can increase the size of the buttons on toolbars by changing the button size in the General page of the Zeno Field Options dialog box.

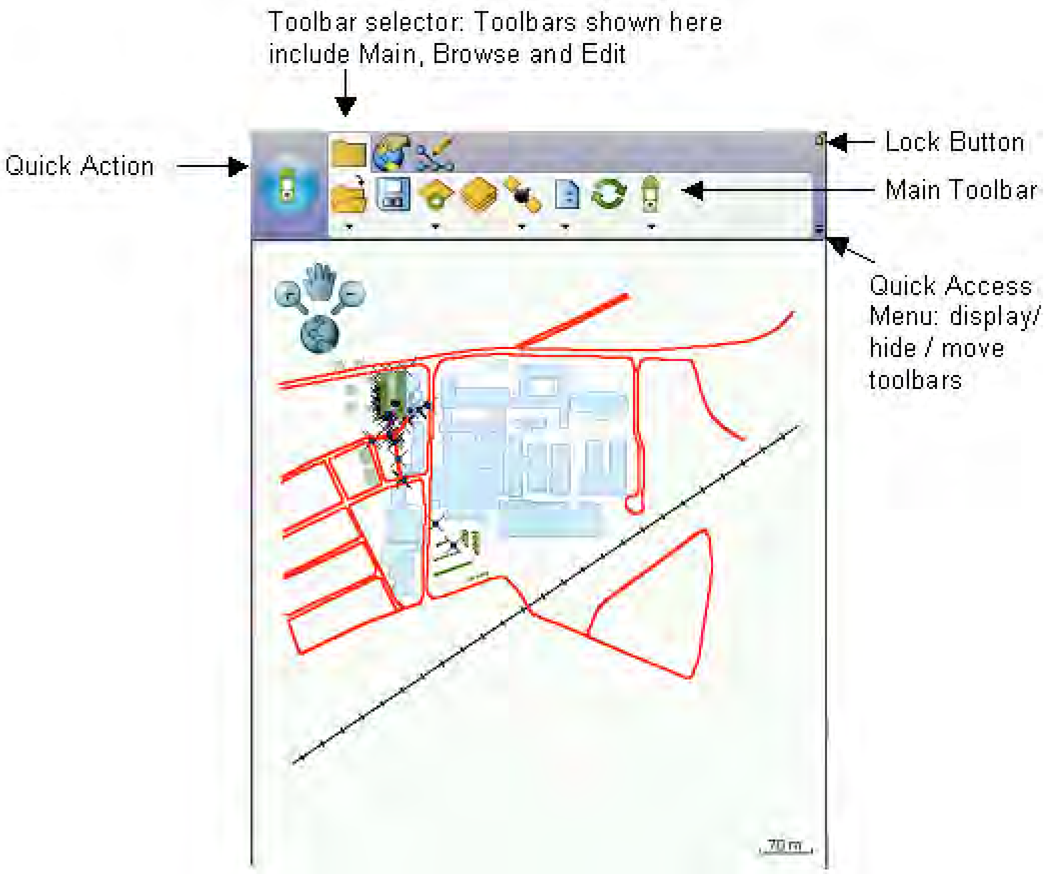
Zeno Field toolbars

Overview of Zeno Field toolbars

Zeno Field tools are organized onto four default toolbars. You can switch between toolbars by choosing a toolbar icon from the toolbar selector. As you choose the toolbar icon, you will see that the tools in the area below it also change. The four default toolbars:

- Main toolbar
- Browse toolbar
- Edit toolbar

The Command bar is located at the bottom (by default) of the Zeno Field window and is only visible whilst editing.The Main toolbar contains the tools necessary for managing your data. The Browse toolbar allows you to explore your data by panning, zooming, and retrieving information. The Edit toolbar and the Command bar activate the editing tools so you can add new data or update existing data.



You can switch between toolbars by:

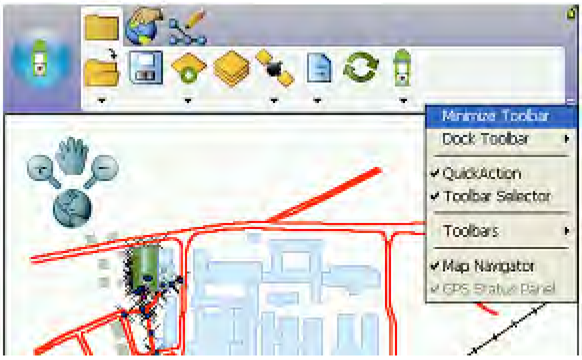
- Tapping the chosen toolbar on the toolbar selector with a stylus or mouse
- On a pc, pressing F2 to enable the keyboard, press tab to select the toolbar

- On Zeno 10/15 press menu and use the arrows to select the toolbar

The Command bar is automatically displayed when a layer is selected for editing.

By default on the left hand side of the toolbars is a large round button. This is the 'Quick Action' button. You can choose what action this tool performs, for fast easy access. You can choose to assign a single tool, making the Quick Action button a one click stop for your most used tool, or choose to assign multiple tools to create a Quick Action menu. By default when you click on this tool, a selection of commonly used file tools are listed as a menu. To modify the Quick Action button see the Zeno Field Toolbar Manager' section.

The display of toolbars can be easily changed within Zeno Field from the Quick Access menu, located on the right hand corner of the toolbar area, as shown below.



Toolbars can be docked to the top, bottom, left and right of the screen, and various parts of the total toolbar area hidden.

The Quick Access Menu icon  gives you the options to:

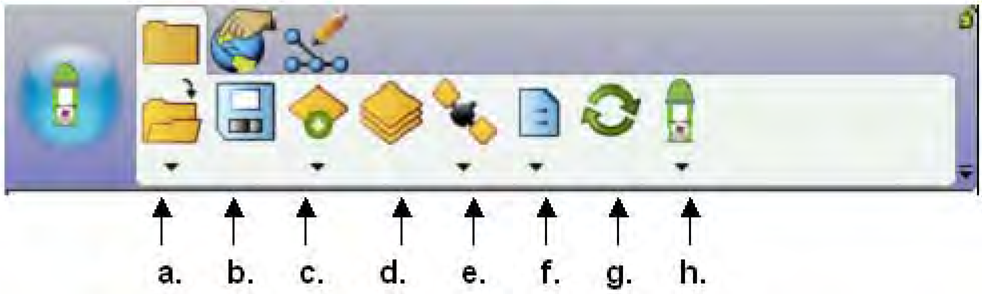
- Minimize Toolbar: reduce the toolbar area to a thin bar, displaying the maximum size of the map as possible. Clicking on the thin bar gives the option to maximize, and it returns to the normal mode.
- Dock Toolbar: Chose to dock toolbars to the top, bottom, left or right of the screen.
- Quick Action: Hide or show the Quick Action tool by check / unchecking it.
- Taskbar: Hide or show the Taskbar.
- Toolbar Selector: Hide or show the Toolbar Selector.
- Toolbars: Hide or show any individual Toolbar.
- Map Navigator: Hide or show the Map Navigator.
- GPS Status Panel: Hide or show the GPS Status Panel.

You can also create new toolbars that contain built-in and custom tools using the Zeno Field Toolbar Manager.

Toolbars can have an unlimited number of tools. A toolbar that contains more tools has a scroll toolbar on the right hand side, so the tools can be viewed by scrolling left and right. Scroll toolbar only appears if there are too many tools to fit within the allocated toolbar space.

Main toolbar

The Main toolbar provides the tools to manage your map, its layers, and their associated properties. You will also find the options to connect to a GPS, rangefinder, or camera; set your display preferences, such as color or pen size; and establish your default map and system file paths. The Main toolbar cannot be toggled off.



a. Open map

b. Save map

c. Add layer

d. Table of contents

e. GPS Position Window

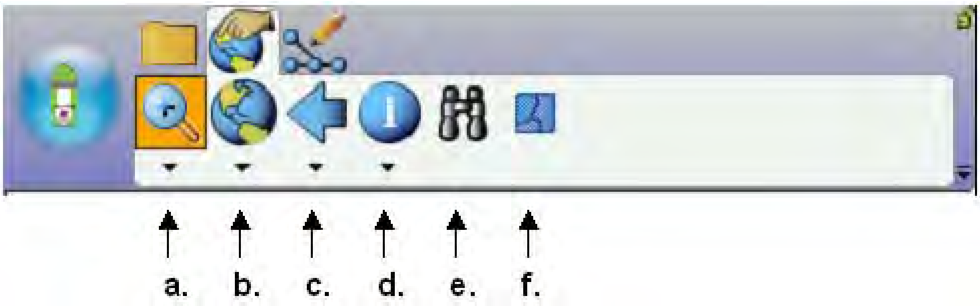
f. Zeno Field options

g. Refresh

h. GNSS settings

Browse toolbar

The Browse toolbar includes tools for resizing, reframing, information retrieval, spatial bookmarks, and panning and zooming of your display.



a. Zoom out

b. Zoom to Full extent

c. Go back to Previous Extent

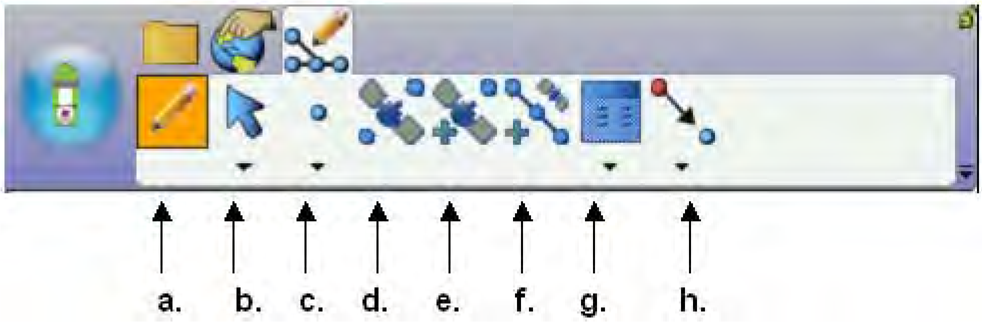
d. Identify

e. Find

f. Clear selected features

Edit toolbar

All editing takes place after a data layer is selected from either the Start/ Stop Editing tool on the Edit toolbar or from the Table of Contents. When a layer is set as editable within the Table of Contents, the Edit toolbar is automatically added . A GPS needs to be activated in order for the GPS buttons to be enabled.



a. Start/Stop Editing

b. Select a feature

c. Capture a point

d. Capture a point using GPS

e. Add a single vertex from a GPS position

f. Add vertices continuously from a GPS position

g. Show Feature Properties

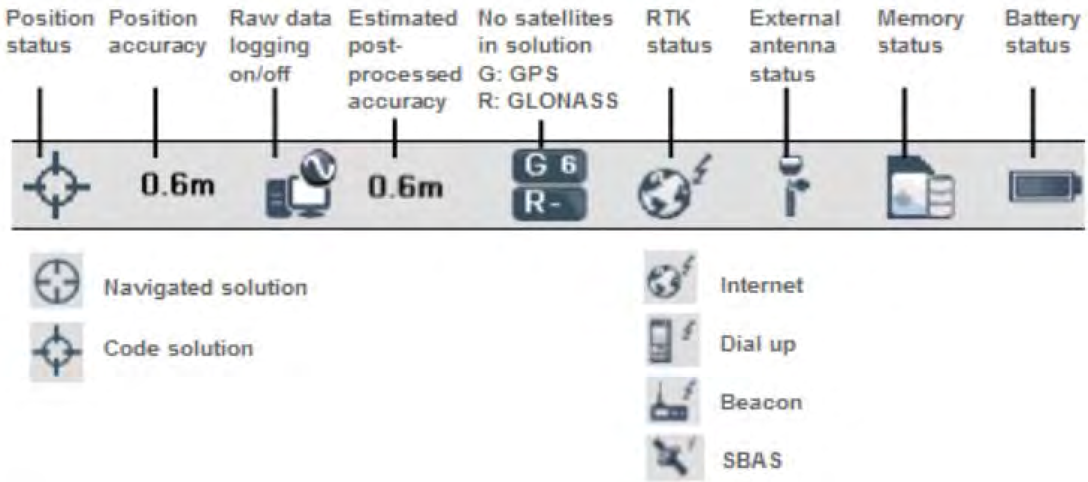
h. Offset polyline and polygon toggle

GNSS Status Bar

In addition, Leica Zeno Field has an easy to understand GNSS Status bar. In here the user can see the actual state (No Position, absolute Position, or real-time position).

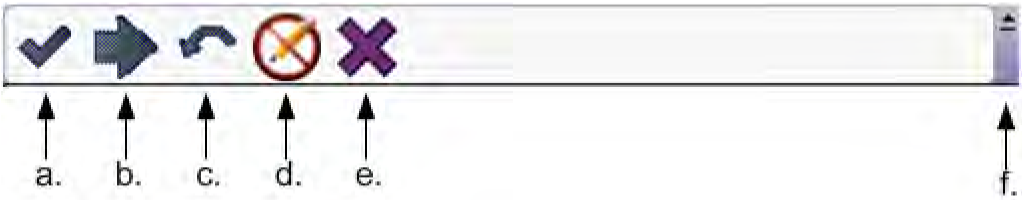
1. Open the GNSS Settings drop down menu.

2. Tap Show GNSS Status



Command bar

The Command bar is also automatically added when a data layer is selected for editing. It includes tools for geometry capture and editing including completing a feature, committing or cancelling changes to a feature, and undoing edits. The Command bar toggles on and off with the Edit toolbar.



a. Commit geometry changes

b. Proceed or complete feature

c. Undo

d. Toogle pen for capture

e. Cancel feature edits

f. Display / hide / move the Command Bar

Toolbar button sizes

The size of the buttons on toolbars can easily be increased by setting the button size on the General page of the Zeno Field Options dialog box. Larger button sizes are easier to see and tap, especially when working outdoors in adverse weather conditions. Increasing the button size is not a good idea with the standard toolbars on small screens, but it is a good idea for custom toolbars with fewer buttons and on large screens.

Toolbar contents are stored in a configuration file. When customizing toolbars refer to the Zeno Field Toolbar Manager section of this user guide, on how to create a custom toolbar.

You can either edit the default Zeno Field.apx file (in that case no change is required on the Zeno Field option general tab) or you can create a new .apx file. This may be useful if you have different projects that require different toolbars. If you create a new .apx file for your custom toolbars, you need to choose that file on the Zeno Field options general tab, click ok, close and reopen Zeno Field for the new toolbars to take effect.

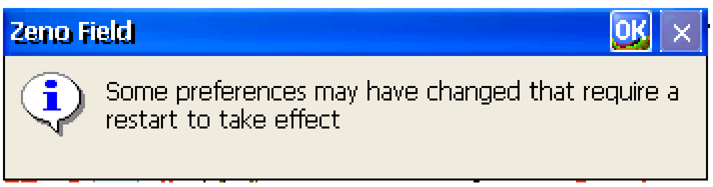
Favourites Toolbar

Favourites toolbar is an optional toolbar in Zeno Field. It can be configured from the Zeno Field Options menu.

<table>
<tr><th>Step</th><th>Action</th></tr>
<tr><td>1</td><td>On the Main toolbar, tap Zeno Field Options and scroll to the Favourites tab.

</td></tr>
<tr><td>2</td><td>Select your Favourite tools and hit OK.

A pop-up window displays that some preferences have changed, which require a restart to take effect. Hit OK and Exit Zeno Field. When you restart Zeno Field, the Favourites toolbar appears as the first toolbar displaying the selected tools. See the screenshot below:



You can use these tools like other tools on the toolbars. The Favourites toolbar reduces the number of clicks among the different toolbars.</td></tr>
</table>

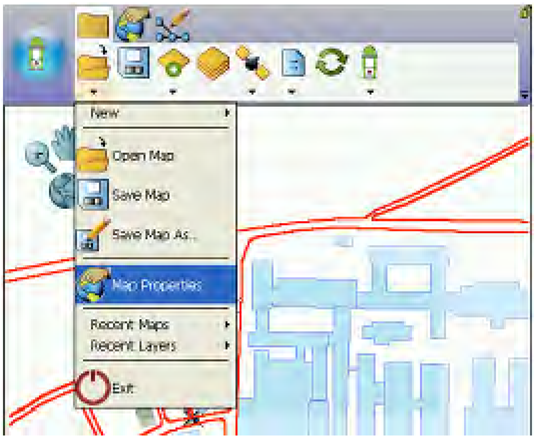
	The Favourites toolbar can be removed by deleting the **Zeno FieldPrefs.apx** file from My Documents\My Zeno Field folder, or by unchecking all of the tools on the favourites tab of the Zeno Field options dialog in Zeno Field. After deleting **Zeno FieldPrefs.apx**, only the toolbars in Zeno Field.apx appear.

Overview of Map properties

Properties for the current map can be viewed, defined, and changed in the Map Properties dialog box. Properties include scale, title of the map, geographic extent, spatial bookmarks, projection information, and snapping tolerance.

☞ View map properties by selecting the Map Properties tool  in the Open Map drop down list located on the Main Toolbar : You can also view a map's properties via the Table of Contents. On the Layers page, tap the Map Properties button .

Setting map properties

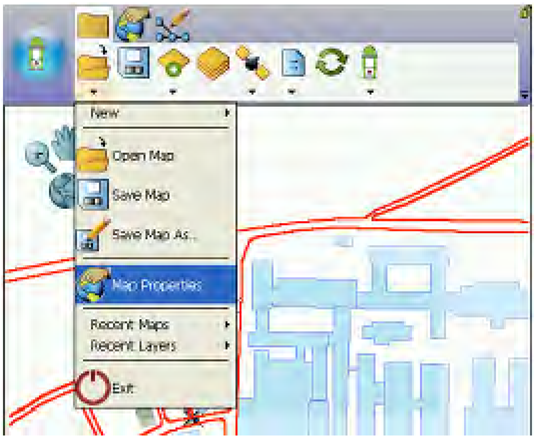
Step	Action
1	Tap the drop-down arrow below the Open Map button on the Main toolbar.
2	Tap Map Properties. 
3	Scroll through the different tabs using the left and right arrow buttons. Set your properties. 
4	When finished, tap OK.

Overview of Map projections

Each layer in Zeno Field should have projection information associated with it. Projection information for shapefiles and some image formats is stored in an associated .prj file. Projection information for Zeno Field AXF files and some image formats is stored in the data file. Projection information can also be stored in the Zeno Field map file (.apm).

You can view the map's projection information in the Map Properties dialog box.

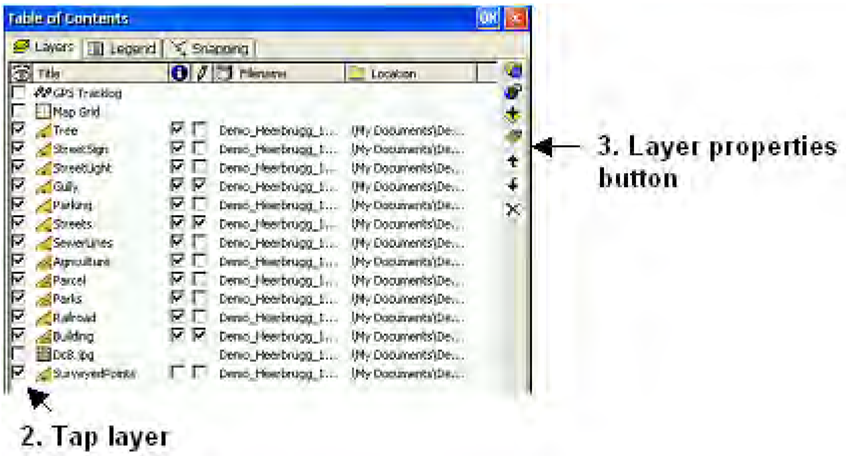
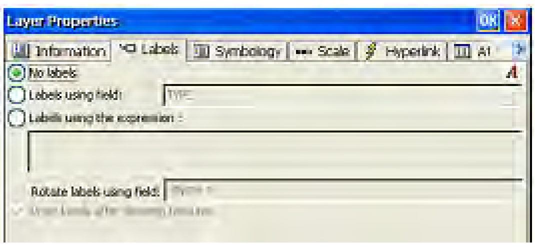
Viewing a Map's Projection

Step	Action
1	Tap the drop-down arrow below the Open Map button on the Main toolbar.
2	Tap Map Properties. 
3	Scroll through the different tabs using the left and right arrow buttons.
4	Tap Projection. The projection information for the map is displayed, as shown below 
5	When finished, tap OK.

Overview of Layer properties

Properties for a selected layer can be defined and changed on the Layers page of the Table of Contents. Properties include information on the selected layer, symbology used to draw the layer's features, a hyperlink field, attributes for the layer, display scale, and the geographic extent of the layer.

Setting layer properties

Step	Action
1	Tap the Table of Contents button on the Main toolbar. 
2	On the Layers page, tap the layer you want to set the propeties for.
3	Open the Layer's properties dialog box by either double tapping on the selected layer or tapping the Layer Properties button. 
4	Scroll through the different tabs using the left and right arrow buttons. Set your properties. 
5	When finished, tap OK.

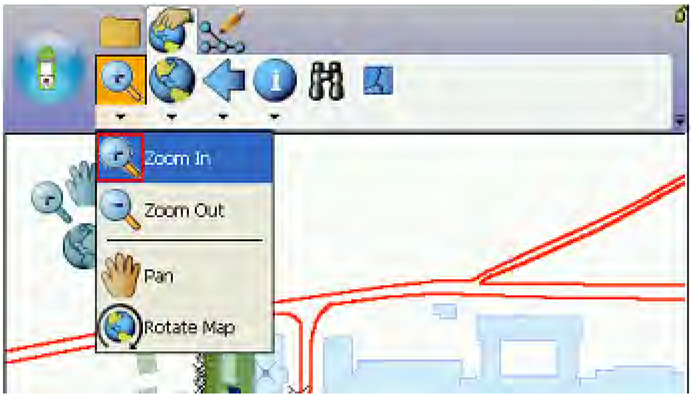
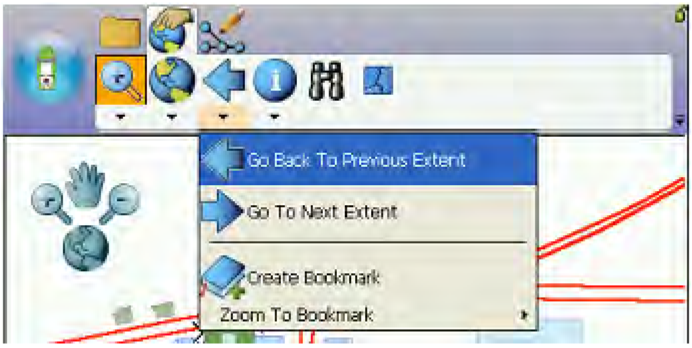
Overview of Moving around the map

The Browse toolbar provides tools to move around your map and investigate different areas and features. Zeno Field has a number of map navigation tools including variable zoom/pan, fixed zoom, zoom to a specific layer or bookmark, map rotation, and center on the current GPS position.

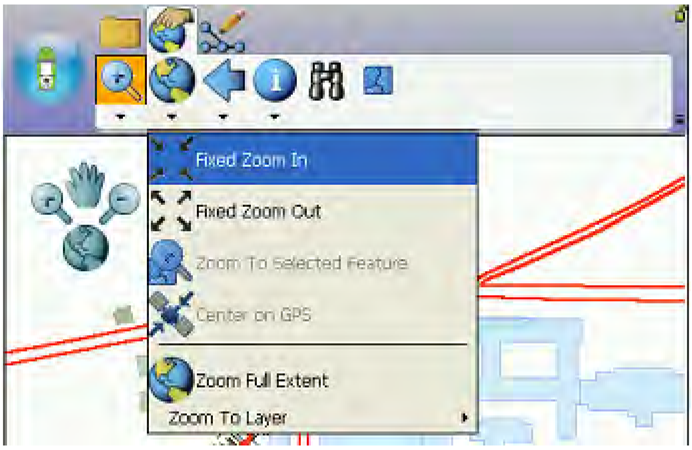
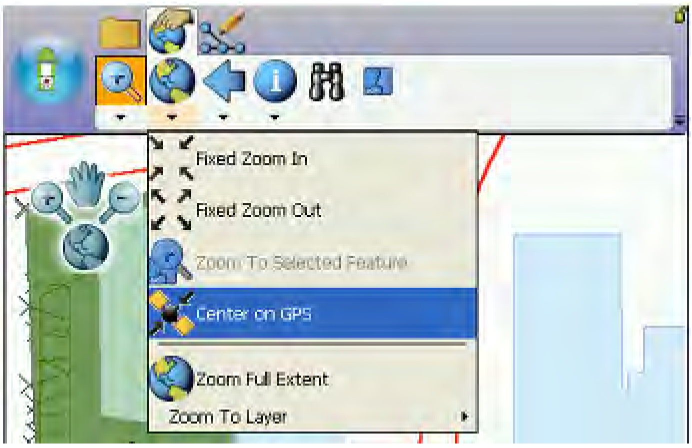
Active tools: Any button that requires tapping on the map can be activated including Zoom In, Zoom Out, Pan, and Rotate Map buttons. A tool is activated by tapping the button, either on the toolbar or from a dropdown list. When a tool is active, the tool's icon is displayed on the toolbar in a depressed mode, and the icon in the dropdown list is highlighted with a red square. Only one tool can be active at a time. A tool is deactivated by tapping a different button

Centering the map: Whilst any of the zoom and pan tools are selected, a single tap on the map will recentre the map on that location.

Zooming and panning

Step	Action
1	Select the Browse toolbar from the Toolbar Selector area. 
2	Tap either the Zoom In, Zoom Out, or Pan tool, depending on what you would like to do.
3	Zoom In or Out by drawing a rubberband box. Pan by dragging the pen along the map. Alternatively, with the Zoom In, Zoom Out, or Pan tool active, tap the map and Zeno Field will perform the action and recenter the map at that location.
4	Tap the Go Back To Previous Extent button to undo your last zoom or pan. 

Zooming with the fixed zoom tool

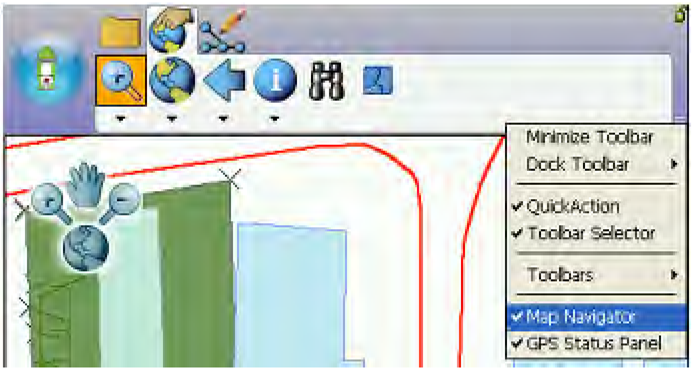
Step	Action
1	Tap the drop-down arrow below the Zoom to Full Extent button to display the drop-down list.
2	Tap the Fixed Zoom In/Out tools to perform an incremental zoom in or zoom out. 
3	Tap Zoom to Full Extent to zoom to the extent of all the layers in the map.
4	Tap Zoom To Layer to select a layer to zoom to. Zeno Field zooms to the geographic extent of the selected layer.
5	Tap Center on GPS when you want to center the display on the current GPS position. Your GPS receiver needs to be activated for this tool to be enabled. 

The Map Navigator

The Map navigator is combination of four frequently used tools.

- Zoom In
- Zoom Out
- Pan
- Zoom to full extent

It is on by default, but it can be hidden from the Quick Access Menu



The map navigator tools operate as “use once only" tools. When visible, the map navigator is displayed in a blue colour with no tool highlighted. When the equivalent tool is selected from the main toolbar, it is not selected in the map navigator. The map navigator does not interfere with, or reflect the current pen mode, instead, the tool that you select is available as a once off, returning the pen mode that what you were using once it is used. For example, when pan is selected on the map navigator, the current tool is temporarily de-selected and the map navigator tool is selected in the map navigator toolbar, shown by a coloured icon. If the similar tool is visible in the main toolbar, it is shown as temporarily selected by using a blue background colour as a differentiator (instead of the normal orange background when a tool is normally selected). After you use the tool once on the map view, all the toolbars return to their previous state. Clicking on another main toolbar tool while you have

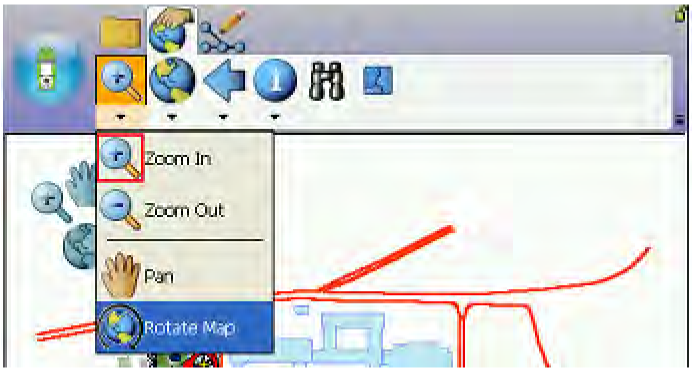
Rotating the map orientation

Overview of rotating the map orientation

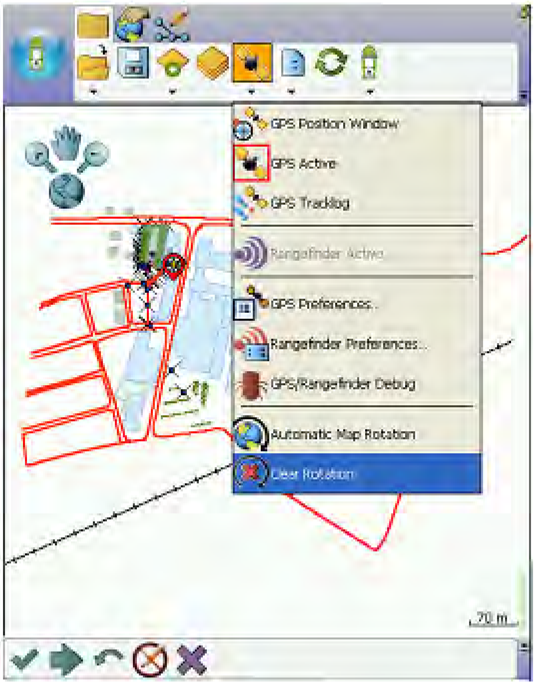
Zeno Field enables you to rotate the map based on your own orientation. Map orientation is extremely useful in the field when you want to angle the map to match what you are observing or collecting or to navigate with your GPS receiver.

Automatic map rotation using a GPS: You can set the rotation of the map to automatically update when connected to a GPS receiver so that the map is orientated in the direction of travel. See ‘Navigating with your GPS’, for more information.

Rotating the map

Step	Action
1	Select the Browse toolbar from the Toolbar Selector area.
2	Tap the drop-down arrow below the Zoom In button to display the dropdown list. 
3	Tap the Rotate Map tool.
4	Tap, hold, and drag the pen clockwise on the screen to the desired map orientation. A black arrow is displayed to guide you with your map rotation, as shown below 

Clear map rotation

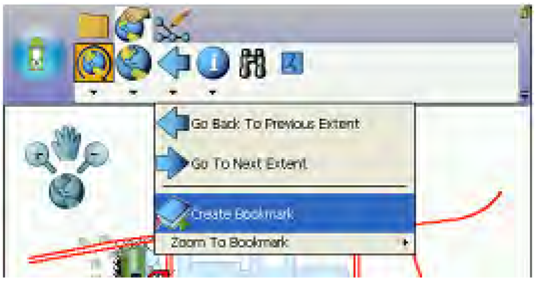
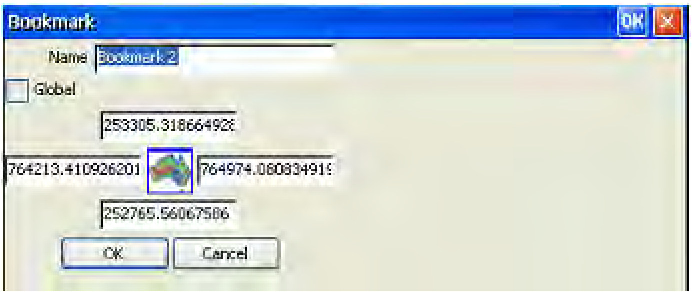
Step	Action
1	On the main toolbar, tap the drop-down arrow below the GPS Position window button to display the dropdown list. 
2	Tap Clear Rotation.

Setting spatial bookmarks

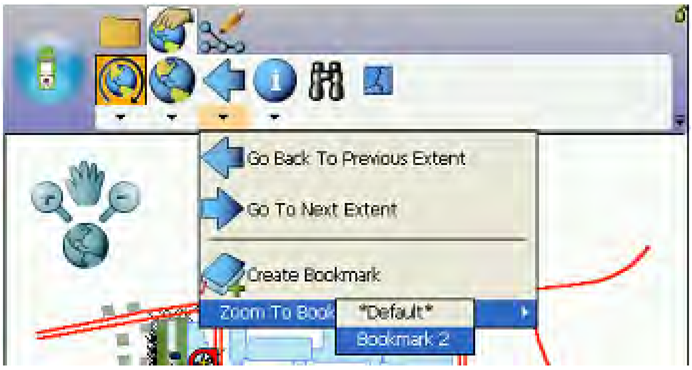
Overview of setting spatial bookmarks

A spatial bookmark identifies a particular geographic extent that you want to save and return to later. For example, you might create a spatial bookmark that identifies a study area. That way, as you pan and zoom around your map, you can easily return to the study area by accessing the bookmark. You can also use spatial bookmarks to highlight areas on your map that you want others to see.

Creating a spatial bookmark

Step	Action
1	Pan and zoom the map to the area in which you want to create a bookmark. 
2	Tap the drop-down arrow below the Go Back To Previous Extent button to display the drop-down list.
3	Tap Create Bookmark. The Bookmark dialog box is displayed.
4	Type a name for your bookmark in the Bookmark dialog box.
5	Check the Global check box if you want the bookmark to be saved in your Zeno Field preferences file. Global bookmarks can be accessed within any map. Local bookmarks are saved in the current map file. 
6	Tap OK.

Zooming to a spatial bookmark

Step	Action
1	On the browse toolbar,tap the drop-down arrow below the 'Go Back To Previous Extent' button to display the drop-down list. 
2	Tap Zoom To Bookmark.
3	Tap the bookmark that you would like to zoom to. Zeno Field will zoom to the extent of the bookmark you selected.

Managing bookmarks: Bookmarks are managed via the Map Properties dialog box. You can delete a bookmark, change the name of a bookmark, or set a bookmark to be global.

Locking the Zeno Field application

Overview of locking the Zeno Field application

Zeno Field lets you lock the application so that no tools can be accidentally selected when your device is not in use or if you simply want to view a map in the field.

When locked, Zeno Field cannot receive input from a mouse or pen; the keyboard, however, remains unlocked. The Lock tool applies to Zeno Field only and does not lock the entire system. You can therefore access other applications on your device or computer.

Locating the Lock tool: The Lock tool is located on the top right-hand corner of the toolbar selector area.

Using the lock tool

Step	Action
1	To lock the Zeno Field screen, tap the Lock tool.
2	To unlock the Zeno Field screen, tap the Lock tool.
3	At the prompt screen, tap Yes. 

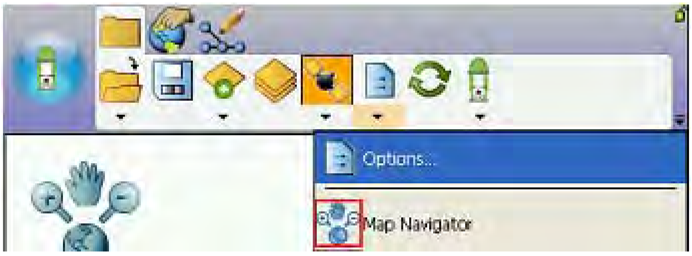
Overview of setting Zeno Field options

The Zeno Field Options dialog box allows you to set a number of options, including display preferences and quality, map and data paths and camera settings. These options are saved in the Zeno Field preferences file (ZenoPrefs.apx), located under the My Documents/My Zeno Field folder. Once set, these preferences are applied to all your maps created in Zeno Field. You are not required to set them for each new map you create.

Restoring Zeno Field defaults: To restore all Zeno Field default parameters, close Zeno Field, delete the Zeno Field preference file (ZenoPrefs.apx), and restart Zeno Field

Setting GPS and rangefinder preferences: You can set GPS options in the GPS Preferences dialog box and rangefinder options in the Rangefinder Preferences dialog box.

Steps for setting Zeno Field options

Step	Action
1	On the Main toolbar, tap the Tools button. 
2	Navigate through the tabs and search for the option you would like to set.
3	Set your options. 
4	Tap OK.

Saving a map and exiting Zeno Field

Overview of saving map and exiting Zeno Field

After you finish working on a map, you can save it and exit Zeno Field. You save it as an Zeno Field map file and store it on your computer or your mobile device. Zeno Field automatically appends a file extension (.apm) to your map document name when saved.

Compact Flash and Secure Digital Memory Cards: Consider storing your data on Compact Flash (CF) or Secure Digital (SD) Memory Cards. This will ensure that your data is not lost if the battery on your mobile device is drained.

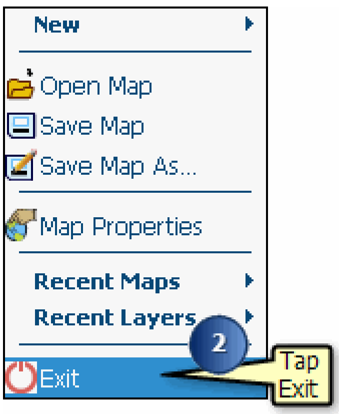
Saving a map

Step	Action
1	Tap the arrow below the Open Map button to display the drop-down list.
2	Tap Save Map.
3	Alternatively, tap the Save Map button on the Main toolbar. If you haven't saved the map before, you'll need to provide a name for it.

Saving as a new map

Step	Action
1	Tap the arrow below the Open Map button to display the drop-down list.
2	Tap Save Map As.
3	Type a name for your map.
4	Navigate to the location of the folder where you would like to save the map file.
5	Tap Save.

Exiting Zeno Field

Step	Action
1	Tap the arrow below the Open Map button to display the drop-down list.
2	Tap Exit. 
3	Tap Yes to save any changes, No to discard any changes, or Cancel to continue working on your map.

Working with Zeno Field files

With Zeno Field, you work with several different types of files. Each file type plays a specific role in Zeno Field and is differentiated by a unique file extension.

The key file types include:

- **Custom Default Configuration File (Zeno Field.apx):** This file is loaded by default each time Zeno Field starts and is saved in the My Documents\My Zeno Field folder on your device. Zeno Field.apx can contain custom toolbars, forms, and system object event handlers. In addition, it can contain other parameters that override the Zeno Field default such as which toolbars are initially visible when the application starts.

- **Zeno Field Favorites File (Zeno FieldFavorites.apx):** This file is created when you select tools on the favorites tab of the Options dialog. To remove the favorites toolbar from Zeno Field you can simple delete (or rename) this file. It is saved in the My Documents\My Zeno Field folder on your device.

- **Zeno Field Preference File (Zeno FieldPrefs.apx):** This file contains Zeno Field default parameters, such as GPS settings, default symbology, default file paths, and so on. It is saved in the My Documents\My Zeno Field folder on your device.

- **Zeno Field Layer Definition File (*.apl):** Layer definitions are stored in a file associated with a shapefile, with the same filename as the shapefile but with the extension .apl. Layer definition files provide a way of developing customizations that are delivered and loaded with data. Layer definition files may also contain custom symbology exported from Zeno Office.

- **Zeno Field Map File (*.apm):** An Zeno Field map file, or map, stores a list of the map layers for your Zeno Field session. A map lists all of your feature layers together with their display settings, including the extent of your map, color, and projection environment.

- **Graphics Layer file (*.apg):** The Zeno Field Graphics Layer file is an XML file that can store text, points, lines, and polygons. It is used to make freehand georeferenced edits in the field which can then be imported into Zeno Office.

- **Photo Layer file (*.aph):** The Zeno Field Photo Layer file is an XML file that references a folder containing georeferenced images. Images contained in the folder are projected on-the-fly to the current map projection coordinates when displayed in

Zeno Field. The Zeno Field Photo Layer file supports JPEG images. The default symbol for features in this layer is a camera.

- **Stylesheet (*.aps):** An Zeno Field Stylesheet is a file that provides symbol definitions for the symbol styles used by Zeno Field. Zeno Office stylesheet files can be exported to Zeno Field Stylesheet files.

Preparing data

Using existing data

Using existing data can be the quickest and easiest way to perform a field data project. Amending or annotating existing data can be a far quicker (and more efficient) operation than starting with nothing. The following data is directly supported by Zeno Field.

- ESRI shapefile
- Zeno Field AXF file
- Zeno Field Graphics layer
- Zeno Field Photo layer
- Raster layers including:
    - JPEG (*.jpg)
    - JPEG 2000 (*.jp2)
    - MrSID Generation Two, or MG2 (*.sid)
    - MrSID Generation Three, or MG3 (*.sid)
    - Portable Network Graphics, or PNG (*.png)
    - Tagged Image File Format, or TIFF, including GeoTIFF (*.tif)
    - Windows Bitmap (*.bmp)
    - CADRG raster maps

Additional data formats can be supported via Zeno Field extensions.

Shapefile

Shapefiles can be displayed and edited in Zeno Field, but depending on the nature of your project editing capabilities for any one shapefile may vary.

Firstly, existing shapefiles that you may already be using in Zeno Office, can simply be copied to Zeno Field either manually, or via the Get Data for Zeno Field wizard in the Zeno Field Data Manager. Shapefiles can be displayed and edited in Zeno Field, but changes cannot be merged with or ‘checked in’ to your desktop GIS using the Zeno Field Data Manager.

The Zeno Field Data Manager in Zeno Field gives you the choice to create shapefiles when preparing ‘background data’. Read only shapefiles are drawn much faster than AXFs, but editable shapefiles take much longer, therefore shapefiles are ideal for data layers that you only wish to view in Zeno Field (and not edit).

A good example of a background layer suited to the shapefile format, is a contour layer. Contours are rarely edited and contain a large amount of geometric features.

The Zeno Field Data Manager does allow you to export editable shapefiles, but note that these edits cannot be checked in.

Zeno Field AXF file

An Zeno Field AXF file (filename.AXF), which uses Microsoft SQL Server Compact Edition, is a single file that is made up of the following multiple components:

- Feature tables, which contain all the data for the feature class, including the geometry and attribute data
- Feature layers, which can be thought of as a representation of the feature data
- Data tables, which are tables that have no spatial component (for example, related tables).

The Zeno Field AXF file can also store the following:

- Customization for each feature layer, including custom forms and scripts
- Projection metadata
- Spatial and attribute indexes, which are automatically maintained
- Layer icons
- Data rules, such as subtypes, coded value and range domains
- Data tables
- Relationships between feature tables and data tables

AXF's are created by the Get Data for Zeno Field wizard in the Zeno Field Data Manager for Zeno Field when you choose to Check out layers for editing. Edits made to AXF's in Zeno Field can subsequently be checked into your geodatabase.

Zeno Field Graphics layer

A Zeno Field Graphics layer (filename.APG) is a vector file format written in XML.

The Zeno Field Data Manager for Zeno Office includes tools for exporting Zeno Field graphic elements to Zeno Field graphics layers, and vice versa. You can deploy a graphics layer to your Zeno Field session together with other data layers or simply create a new graphic layer on its own, and add to an existing project in Zeno Field.

Zeno Field Photo layer

An Zeno Field Photo layer (filename.APH) is a file format written in XML. An Zeno Field Photo layer specifies how georeferenced photos are to be displayed in Zeno Field . Before opening an existing Photo Layer in Zeno Field, ensure that the layer file and photo files are in the same folder.

Raster layers

All raster layers must have either a world file or AUX file, with the exception of GeoTIFF and MrSID images. When adding a raster layer to an Zeno Field map, Zeno Field first looks in the image header for the georeferencing information, then in the associated .aux (if present), then within an associated world file (if present).

Creating new data

Overview of creating new data

When working with Zeno Field you have the choice of either using existing data or creating new data—or a combination of both options.

This section shows how you can create new data layers for Zeno Field, including shapefiles, graphics layers, and photo layers. You can also create QuickForms for shapefiles, making it easier to accurately capture attribute data. Finally, you can use the QuickProject tool to create a “ready to use” data capture project. QuickProject enables you to take Zeno Field into the field, with or without pre-existing data, and quickly start capturing data with minimum steps.

This section focuses on creating new data. The following section discusses how to prepare and use existing data with Zeno Field.

Creating New Shapefiles

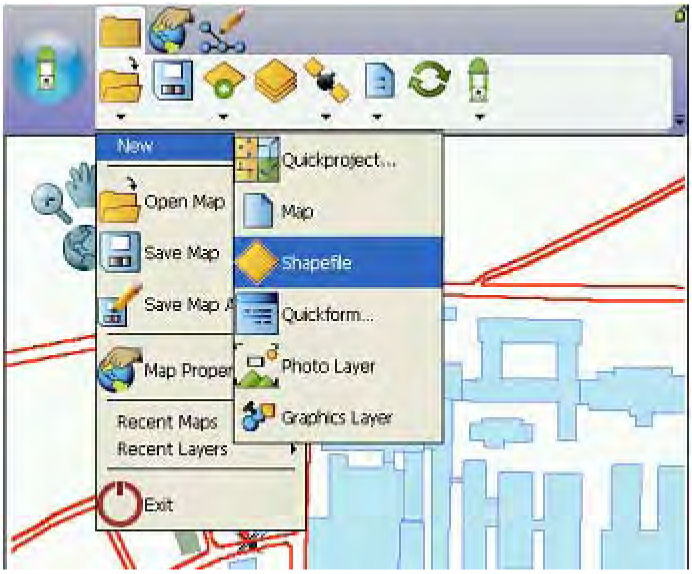
Overview of creating new shapefiles

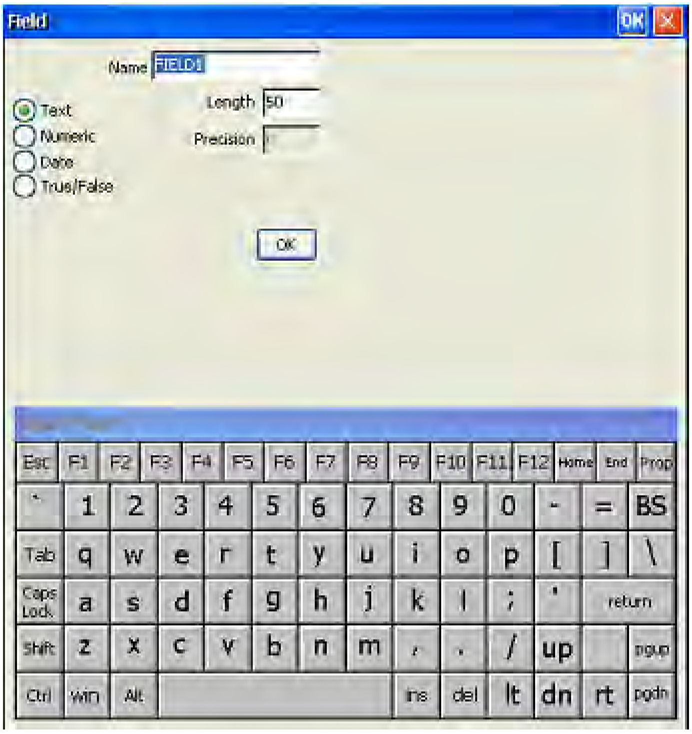
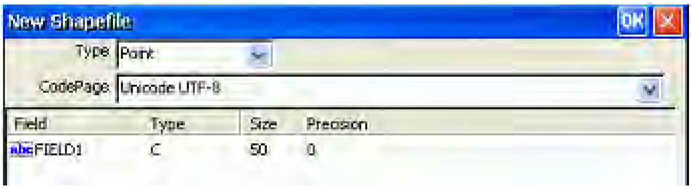
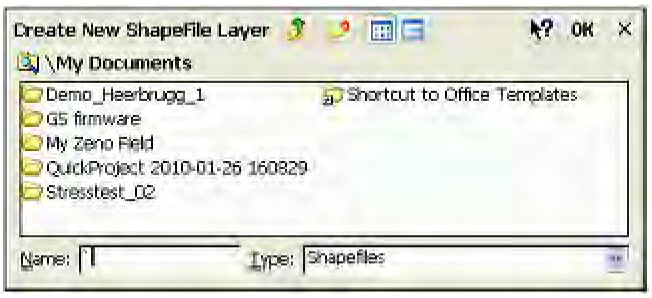
Occasionally you might want to capture data into a new shapefile rather than into an existing shapefile. There are two methods for creating new shapefiles:

- You can use the New Shapefile tool to define the attribute fields and create a new shapefile. You can also create a QuickForm for your new shapefile.
- The new shapefile and QuickForm, if available, are automatically added to the current Zeno Field map and checked for editing in the Layers page of the Table of Contents.
- You can use QuickProject to create "ready to use" point, polyline, and polygon shapefiles.

Specifying the type of shapefile : You need to select the type of shapefile you want to create from a list of available types. Point,Polyline, and Polygon types are 2D shapefiles that only store x,y coordinates. PointZ, PolylineZ, and PolygonZ types are 3D shapefiles that store x,y, and z coordinates, as well as m-measure-values. PointM, PolylineM, and PolygonM types are 2D shapefiles that store x,y coordinates and m values

Using the Shapefile to create a new shapefile

Step	Action
1	Tap the drop down arrow below the Open Map button to display the drop down list.
2	Tap New. The New submenu is displayed.
3	Tap Shapefile. The New Shapefile dialog box is displayed. 
4	Choose the type of shapefile that you want to create from the Type drop down list. 
5	Tap the  button to open the Field dialog box and define the fields for your new shapefile's dBASE table.
6	Type the name of the first field that you want to create in the new dBASE table.
7	Choose the field type: Text, Numeric, Date, or True/False.
8	Type the length of the new field and optionally the precision for Numeric fields.

	
9	Tap OK to create the new field.
10	Repeat steps 4 through 9 if you want to define additional fields. The new fields and their definitions are listed in the New Shapefile dialog box. 
11	Tap OK when you have defined all of the required fields for the shapefile's dBASE table.
12	Type the name of the new shapefile.
13	Choose the folder and location where you want to save the new shapefile. 
14	Tap Save to complete the task and create the new shapefile. The shapefile will be created and you will be asked if you would like to create a

	QuickForm for this shapefile. The added shapefile will also be checked for editing, and the Edit toolbar and the Command bar will be displayed.
15	Tap Yes and proceed to the next section to learn how to create a QuickForm for your new shapefile. If you tap No you can always come back and create a QuickForm later. 

Importing field definitions from an existing dBASE table: To import the field definitions for your new shapefile from an existing dBASE (DBF) table, which may or may not be associated with a shapefile, tap the Import button to open the Import Fields From dialog box, and select the source dBASE table.

Specifying the codepage for the attribute data: A codepage maps character codes to individual characters. You can select the available codepage from the dropdown list on the New Shapefile dialog box.

Creating a QuickForm

Overview of creating a QuickForm

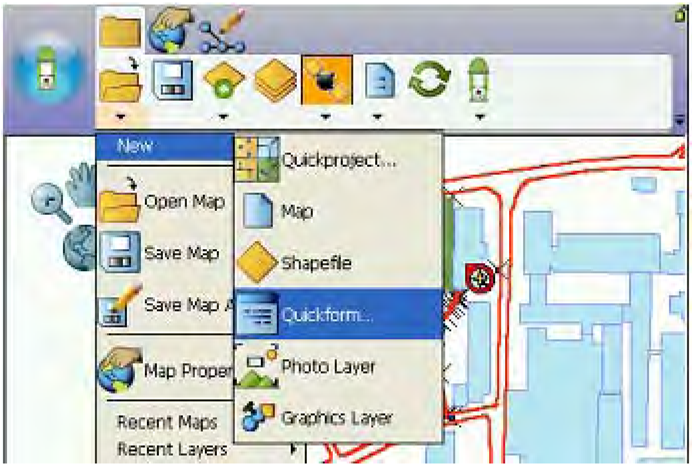
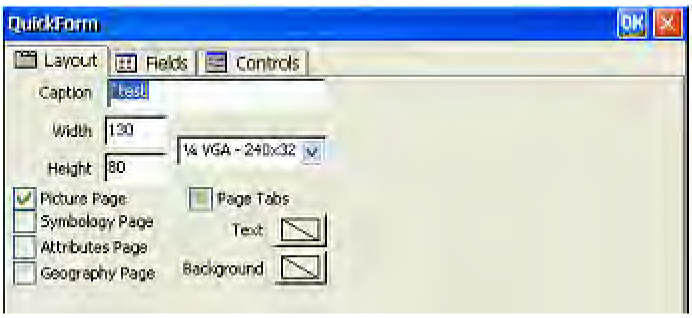
In order to facilitate data capture in the field, you can create custom input forms for any shapefile in Zeno Field. QuickForms contain basic functions and options for creating forms in the field when you do not have access to your desktop PC.

When creating a QuickForm you can select from the following options:

- Layout: Determine the name, size, page types, text and background color of the form.
- Fields: Select the fields to appear on the form.
- Controls: Manage required fields including settings for minimum and maximum values, and create list values and tool tips.

Steps to create a QuickForm

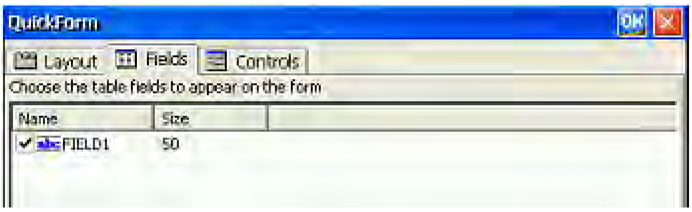
If you elected to create a QuickForm directly after creating a new shapefile, skip to step 5, otherwise;

Step	Action
1	Tap the drop down arrow below the Open Map button to display the drop down list
2	Tap New. The New submenu is displayed.
3	Tap QuickForm. A dialog box opens to allow you to select the shapefile you would like to add a QuickForm to. 
4	Tap FireHydrants, the shapefile you created in the previous exercise. The QuickForm dialog box opens.
5	On the Layout page, type a Caption for the form. By default, Zeno Field uses the name of the shapefile the form is associated with.
6	Using the dropdown list, select the screen size of the device you would like your form to be optimized for. Zeno Field automatically enters a width and height for your form based on the screen size you selected. 
☞	**Selecting a smaller form size than your device screen size:** You may want to

<table>
<tr><td></td><td>select a smaller height dimension than your device screen size so that when the Soft Input Panel (SIP) is displayed, it will not obscure any of the controls. When creating a QuickForm, Zeno Field places a single control and label on each line. Therefore, for example, on a 1/4 VGA screen, 6 fields can be displayed without being obscured by the SIP.</td></tr>
<tr><td>7</td><td>If needed, alter the default settings for height and width.</td></tr>
<tr><td>8</td><td>Select the default pages you would like to include on your form in addition to the pages created for your QuickForm.

You can add Picture, Symbology, Attributes, and Geography pages.

If there are no default pages checked, and the selected fields fit on one page, and the Page Tabs is unchecked, then the QuickForm only has one page and no tabs will be displayed.</td></tr>
<tr><td>9</td><td>Optionally, you can set the text and background color of the form. By default, it uses black text on a white background</td></tr>
<tr><td>10</td><td>Tap the Fields tab.</td></tr>
<tr><td>11</td><td>On the Fields page, select the fields you would like to include on your form by checking their checkbox


</td></tr>
<tr><td>12</td><td>Tap the Controls tab.</td></tr>
<tr><td>13</td><td>On the Controls page, you can set other properties for your form controls:

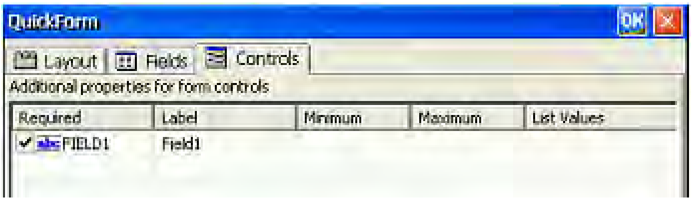
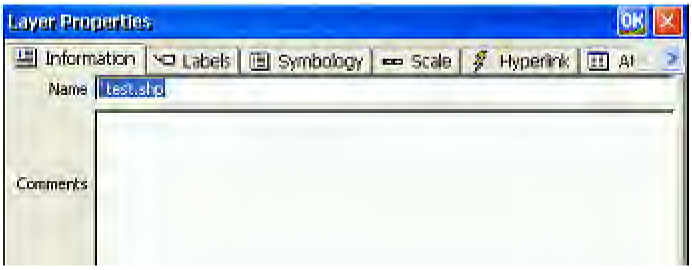
Required: check if you would like to make the field required.

Label: Caption that appears on the form.

Minimum/Maximum: Set minimum and maximum values to set the limits of your data capture values.

List Values: Enter values to include in a dropdown list. Items must be separated by a comma (e.g., red, yellow, brown).

Tooltip: Add a description for your fields.</td></tr>
</table>

	
14	Tap OK. Zeno Field confirms the creation of your QuickForm.
15	Tap OK. The shapefile and form are loaded into your Zeno Field map as an editable layer. You can select the shapefile for editing from the draw toolbar. The Edit toolbar and Command bar are automically displayed, when you select the layer for editing. 
16	Use your new QuickForm to add features to your shapefile. 
17	Tap OK when you are finished.

Creating a new graphics layer

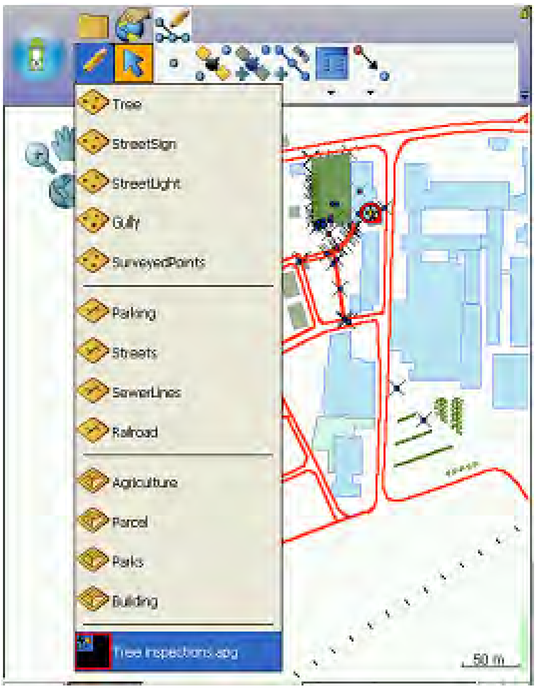
Overview of creating a new graphics layer

Zeno Field supports graphics layer files. The Zeno Field Graphics Layer (.apg) is an XML file that can store text, points, lines, and polygons. It is used for redlining or to make freehand georeferenced edits in the field. Graphics layer files can be easily imported into Zeno Office. If you select the Graphics Layer for editing, all previously selected layers are deselected. However, with the Graphics Layer selected, you can then select up to two shapefiles for editing. In this case, the shapefiles take precedence over the Graphics Layer when editing, but you are still able to add sketches and notes to your Zeno Field map while adding or updating features.

A graphics layer is different than a shapefile or vector layer. You can have many features of different types in one layer such as a point feature, a freehand polygon feature, a line feature, and text.

When editing a graphics layer, you can use any of the feature types—point, line, polyline, freehand line, rectangle, polygon, ellipse, circle, freehand polygon—to create features for your layer.

Steps to create a new graphics layer

Step	Action
1	Tap the drop down arrow below the Open Map button to display the drop down list.
2	Tap New. The New submenu appears.
3	Tap Graphics Layer.
4	Type the name of the new graphics layer.
5	Choose the folder and location where you want to save the new graphics layer. 
6	Tap Save to complete the task and create the new graphics layer. The graphics layer will be created, added to your map, and checked for editing. 

Creating a new photo layer

Overview of creating a new photo layer

Zeno Field supports photo layers. A photo layer is a file that contains photos with GPS coordinates in the EXIF header of each photo file. The photo layer file, which has an .APH extension, specifies how the photo layer should be displayed in Zeno Field.

To create a new photo layer, use the Photo Layer tool in the New sub-menu. Once a photo layer has been created it can be added to the Zeno Field map in the same way that other layers are added.

The Identify and Hyperlink tools can be used with the photo layer.

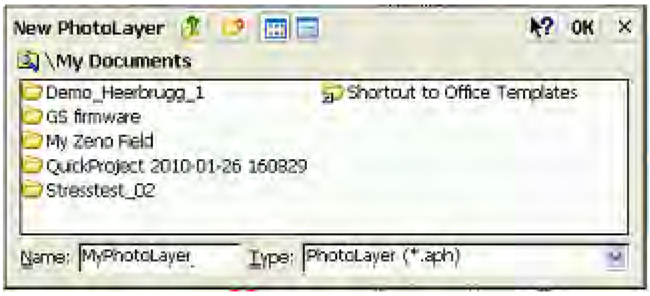
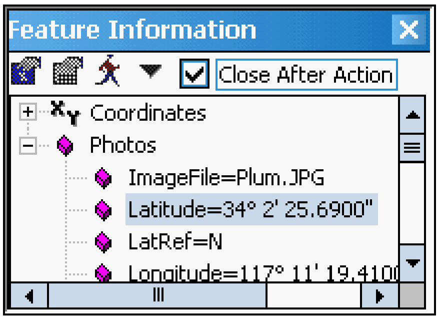
The Identify tool displays the photo's attributes, or EXIF information, in the Feature Information dialog box.

The Hyperlink tool displays the photo, using the external application associated with JPEG files

Changing the symbol and label settings for the photo layer: A photo layer is an XML file, with an .APH extension, that can be edited with a text editor. You can specify the symbol used to display the location of the photos by editing the .APH file. You can also specify whether or not the symbol is labeled with the photo filename.

Note: Visit www.exif.org for more information on EXIF, the Exchangeable Image File Format.

Steps to create a new photo layer

Step	Action
1	On the Main toolbar, tap the Open Map dropdown menu.
2	Tap New to open the New sub-menu.
3	Tap Photo Layer. The Save As dialog box will be displayed.
4	Enter the name for your new photo layer in the Name input field.
5	Tap the Folder dropdown list to select the folder on your device which contains the photos for your photo layer. 
6	Tap Save when you have entered all the necessary information. The new photo layer will be added and displayed on the map. By default, a camera symbol is used for each photo position, and is labeled with the photo file name. Optionally use the Identify tool to select a photo and view the photo's attributes in the Feature Information dialog box. 

Creating a Quick Project

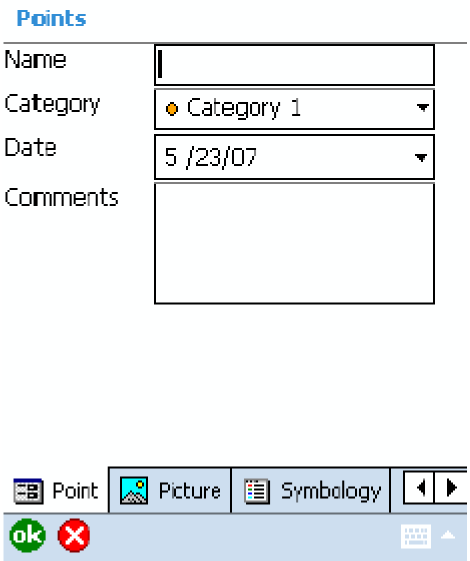
Overview of QuickProject

A QuickProject is a “ready to use” data capture project.

Sometimes there is a need to go into the field—sometimes with no pre-existing data—and start capturing data as quickly and easily as possible.The QuickProject tool creates a “ready to use” data capture project, providing a simple and efficient method for capturing data into new shapefiles.

The QuickProject tool is located in the Zeno Field Open map dialog box, in the submenu and on the toolbar selector area. The tool does the following:

Step	Action
1	Closes the current map, prompting to save any changes that have been made. An option is provided to keep the layers from the current map, that is to automatically add all the layers from the current map to the new QuickProject map.
2	Creates a new project folder, located in the Default Maps and Data Path. (This path is specified in the Paths page of the Zeno Field Options dialog box.). The new project folder is called QuickProject_YYYYMMDD_HHMM, where YYYYMMDD is the current date, and HHMM is the current time.
3	Creates three new shapefiles in the project folder: Points.shp, Polylines.shp, and Polygons.shp. Each new shapefile has the following fields: Name, Category, Date, Comments, and Photo. Each layer is symbolized based on the Category field. By default, the projection for each new shapefile is latitudelongitude, WGS 1984. However, this default can be changed by placing an Zeno Field.prj file with the required projection the Default Maps and Data path folder. If the option is selected to keep the layers from the current map, then the projection of the new QuickProject shapefiles— and the new QuickProject map— will be the same as the projection of the current map.



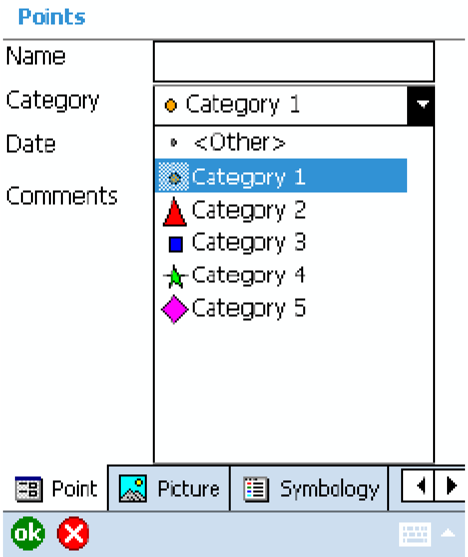
4	Creates a QuickForm for each new shapefile layer. The QuickForm contains a pick list for the Category field. There are five categories by default: Category 1 to Category 5.
5	Creates a new Zeno Field map, called QuickProject.apm, in the project folder. The map contains all three new shapefiles, each shapefile is activated for editing and the Identify tool. The QuickProject.apm is automatically loaded into Zeno Field.

In most situations QuickProject will be used to capture data using a GPS. Capturing data with a QuickProject is easy—just use the following steps:

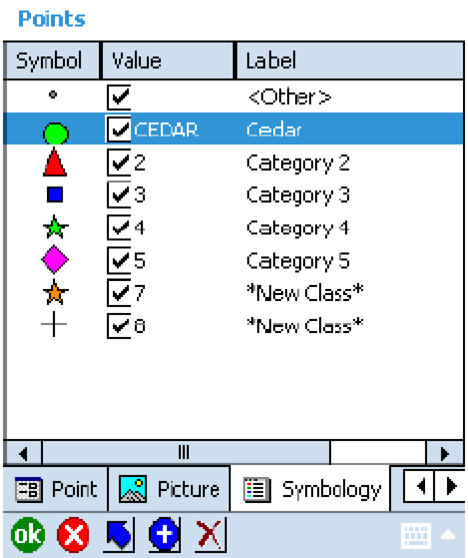
Step	Action
1	Create a QuickProject.
2	Tap the GPS Position Window tool to activate the GPS. Wait until you have a GPS fix.
3	Select the appropriate GPS capture tool, depending on whether you want to capture a point, polyline, or polygon feature: Capture Point using GPS, Add GPS Vertex, or Add GPS Vertices Continuously. Or, use the Point, Polyline, or Polygon feature capture tools capture a feature using the mouse or stylus.

You can find more detailed information on data capture in the Editing data section.

The QuickForm will be automatically displayed once you have captured a feature in Zeno Field.



You may wish to rename the categories using terms that are more appropriate for the type of data that you are capturing. For example, if you are capturing trees you may wish to rename the categories to: Cedar, Fir, Maple, Oak, and Pine. You may also need to have more than five categories. You can rename the existing categories, add new categories, and change the symbol for each category in the Symbology page of the QuickForm.



You can change the symbol, value, or label by tapping on the corresponding field and making the appropriate changes. (Note, the value is the text stored in the database, while the label is the text displayed in the pick list. In many cases the value and label will be the same.)

You can add new categories by tapping the + button at the bottom of the Symbology page, and then editing the symbol, value and label for the new category.

You can delete categories by selecting, or tapping, the category and tapping the X, or delete button which is displayed when a category is selected.

Any changes are automatically saved when you tap the OK button.

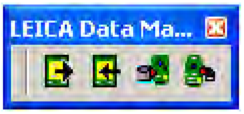
The symbols used to display each layer are determined automatically, based on the contents of the Category field. The Legend page, of the Table of Contents, shows the symbols used for all the layers in the map.

Using Leica Data Manager in Zeno Office

Using Leica Data Manager in Zeno Office

The Leica Data Manager toolbar in Zeno Office includes following tools:

- **EasyOut:** Used to extract data from your office database to use with Zeno Field including automatic data transfer.
- **EasyIn:** Used to Check in edits that you made in Zeno Field including automated post processing and data transfer.
- **Import Survey Data:** Import of several survey data formats
- **Export Survey Data:** Export to several survey data formats



Preparing your data for Zeno Field

Zeno Field is a mapping tool for working with your GIS data in the field. GIS tasks in the field are often quite different from the GIS tasks performed in the office, and so too are the computers used in these different environments. Desktop computers usually have fast CPUs, large amounts of RAM and disk space, and large display monitors. In contrast, field computers have relatively slow CPUs and limited RAM and storage capacity. Furthermore, the field work environment ranges from working in bright sunlight to rain to subzero snow conditions, compared to the constant temperature and lighting conditions of the office environment. Consequently, you need to consider all of these factors before preparing your GIS data for use in the field with Zeno Field.

Answers to the following questions will determine how you need to prepare your data for optimum use in the field:

- What tasks will be performed in the field, and what data will be needed for these tasks?
- What data will be updated, and what data will be needed for background reference?
- What is an appropriate amount of data, taking into account the field tasks as well as the field computer’s CPU, RAM, and storage capacity?
- What symbology needs to be used for effectively displaying the data on the field computer in the expected weather and lighting conditions?

This is an important issue. The artificial light and large monitors used in the office environment enable the use of a wide range of colors and symbols, whereas only a limited number of colors and symbols provide sufficient contrast when used in the field with small computer screens and strong sunlight.

Although Zeno Field supports most of the symbology available with Zeno Office, it may not always be appropriate for field conditions to use the complex symbology supported by Zeno Office and Zeno Field. In many cases simple, high-contrast symbols using primary colors are more effective in the field than detailed symbols using a wide spectrum of colors.

There are a number of different operations that you may need to perform to prepare your data for use in the field with Zeno Field, including:

- Extracting an appropriate subset of the data
- Converting the data into a format supported by Zeno Field
- Projecting the data into a projection supported by Zeno FieldSpecifying symbology that has sufficient contrast for the expected field lighting conditions
- Preparing data input forms and validation rules to ensure that data is captured accurately in the field

The Zeno Field Data Manager for Zeno Office provides some of the tools for preparing data for use with Zeno Field. Additional tools for tasks such as projecting data are included with Zeno Office.

In summary, it is essential to always bear in mind that field computers, tasks, and conditions are very different to computers, tasks, and conditions in the office. Therefore, what works in the office environment may often not be effective in a field environment.

Important:

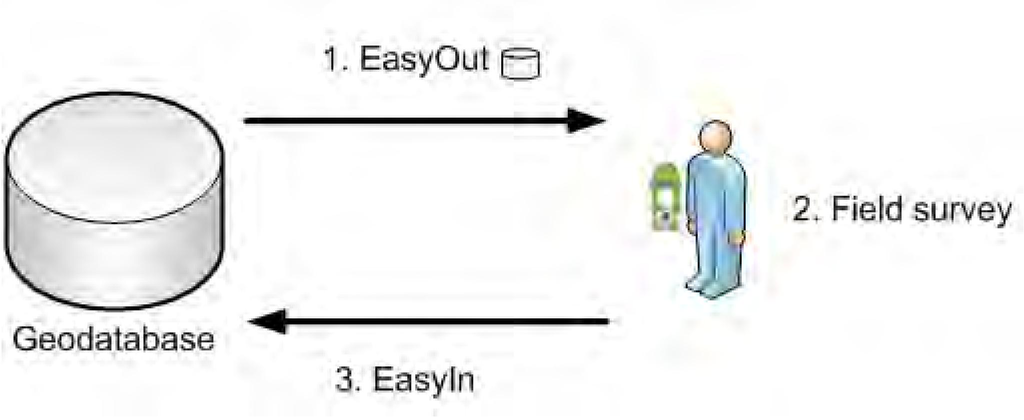
Data not supported by the Zeno Field Data Manager

The following data types are not currently supported by the Zeno Field Data Manager:

- **Geometric Networks:** you can check out the feature classes that participate in a geometric networks but the network itself is not supported in Zeno Field.
- **Table to table, and table to feature class relationships**
- **Annotations are not supported in Zeno Field**
- **Zeno Office online services are not supported in Zeno Field**

Suggested workflows using EasyOut and EasyIn

Single EasyOut and EasyIn

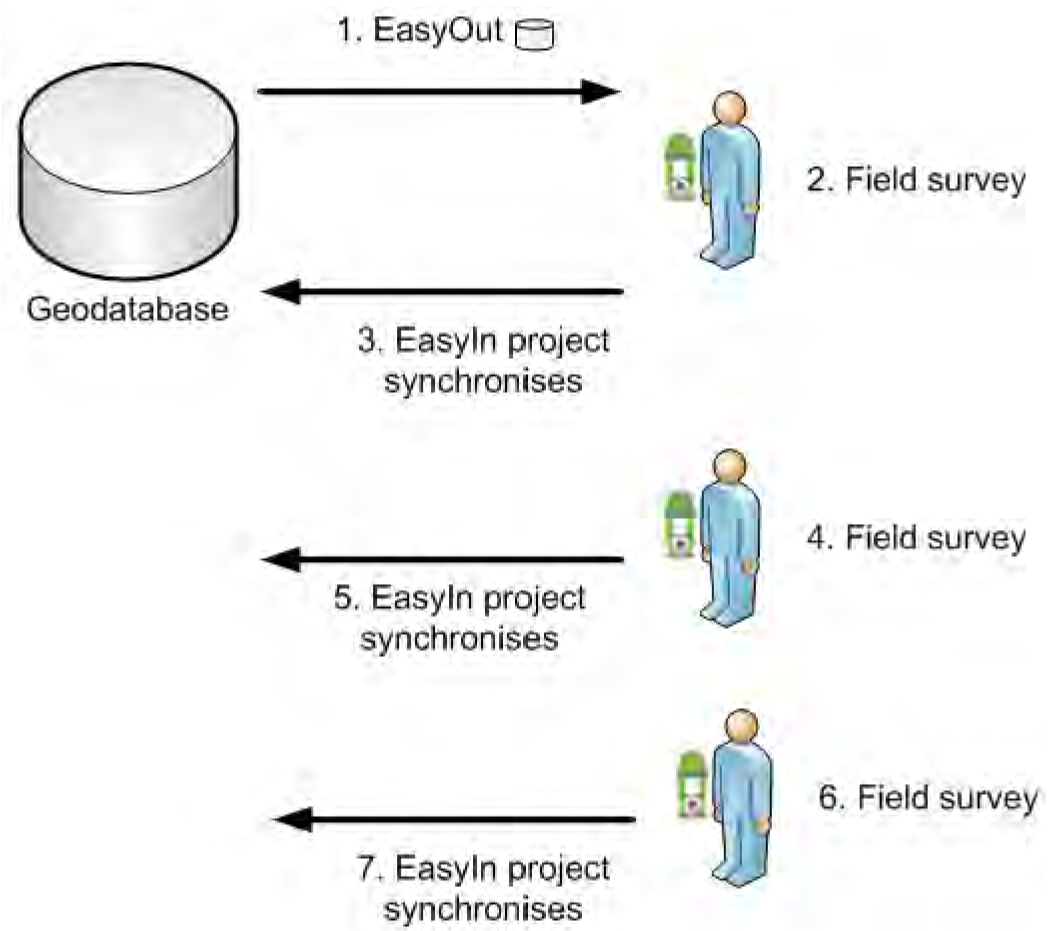


1. Use EasyOut to check out project from the database and copy it to the Zeno 10/15 field device.
2. Complete the field survey.
3. Use EasyIn to check in and post process the field work and copy to the database.

Repeat the full process for your next field project. This means for every EasyOut there is an EasyIn process.

This process can be done by multiple field crews at the same time. After the next EasyOut, the field project contains the latest state of the data in the office database.

Single EasyOut and multiple EasyIn



1. Use EasyOut to check out project from the database and copy it to the Zeno 10/15 field device.
2. Complete the field survey.
3. Use EasyIn to check in and post process the field work and copy to the database. The field project is synchronized. It is important to apply EasyIn process directly from the controller because it requires an update of the field project.
4. Complete the field survey.
5. EasyIn (directly from device, field project gets synchronized)
6. Repeat step 4 and 5 till project is complete.

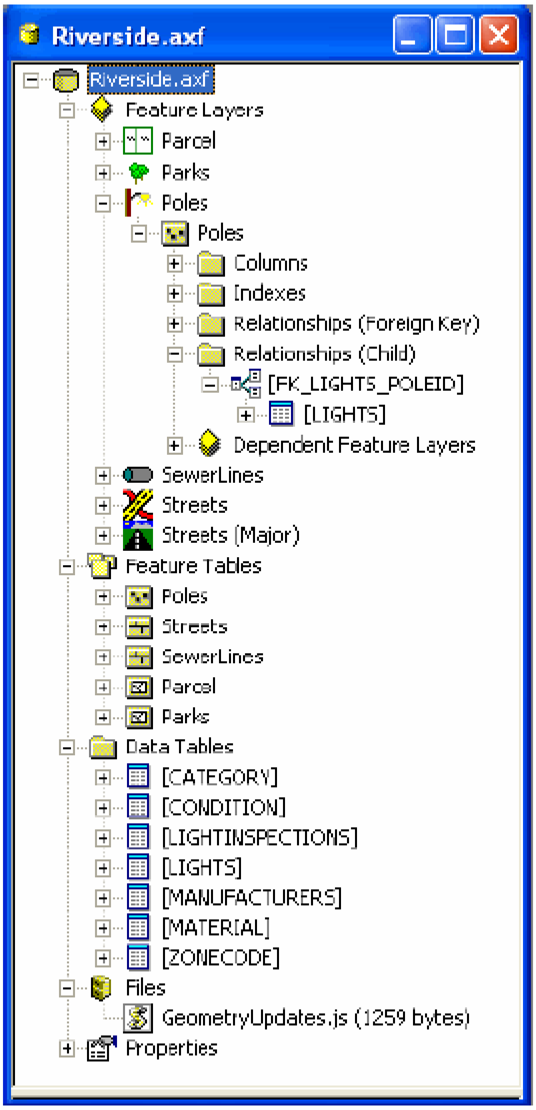
Both processes work for single or multiple field crews.

The field project created by the EasyOut can be used by multiple field crews to be updated. Multiple EasyIn bring all data back to the office.

Zeno Field Exchange Format (AXF)

Overview of Zeno Field Exchange Format (AXF)

An Zeno Field AXF file is a single file that is made up of multiple components, as shown below:



- Feature Layers, which can be thought of as a representation of the feature data. A feature layer can be considered as the equivalent of an Zeno Field Layer Definition (.APL) file associated with a shapefile. The feature layer defines the symbology, forms, layer name, layer folder (for grouping), and layer icon for a feature table. There can be multiple feature layers defined for a single feature table.
- Feature Tables, which contain all of the data for the feature class, including the geometry and attribute data. A feature table can be considered as the equivalent of a shapefile. The feature table stores the feature's geometry, attributes, and projection meta data—data that is stored in a shapefile's SHP, SHX, DBF, and PRJ files.

- Data Tables, which are data tables that have no spatial component (for example, related tables and coded value domains).
- Files, which include any external file used by the Zeno Field AXF file (for example, script files).
- Properties of the AXF file (for example, the date and time when the Zeno Field AXF file was created).

The Zeno Field file can also store the following:

- Customization for each feature layer, including custom forms and scripts
- Coordinate system meta data
- Spatial and attribute indexes, which are automatically maintained
- Icons for feature layers
- Data rules, such as subtypes, coded value domains, and range domains
- Relationships between feature tables and data tables

A Zeno Field or AXF file is a Microsoft SQL Server Compact Edition relational database. The Microsoft SQL Server Compact Edition runtime needs to be installed on your device in order for Zeno Field to recognize and use an AXF file. The runtime is automatically installed together with Zeno Field on the Zeno10/15 via the Zeno Field Deployment Manager. All data in AXF files is stored using Unicode character encoding, eliminating the need to specify a codepage for AXF files.

Creating Zeno Field AXF files

AXF files can be created using the EasyOut to Zeno Field tool in Zeno Office/ArcMap.

This tool allows you to create AXF files from selected geodatabase feature layers. These tools automatically read the geodatabase schema, including any relationship classes, and use the schema to construct the resultant AXF file. AXF files can only be created when layers are checked out from a geodatabase—and are always created when layers are checked out from a geodatabase. AXF files can be created from shapefiles or from geodatabase layers that are selected for copy out. You cannot check in the edits to you made to the copy out layers. The Get Data for Zeno Field tool also generates data input forms automatically for the checked out AXF files.

Using Zeno Field AXF files

AXF Feature Layers can be added to and removed from the Zeno Field map, just as you would do with shapefiles. Related tables are only visible in Zeno Field when you select a feature from a Feature Layer that has an associated related table. Once the AXF feature layer has been added to Zeno Field, features and related table records can be added, modified, or deleted.

Advantages of Zeno Field AXF files

AXF files provide many advantages over shapefiles, including the following:

- A single AXF file can store multiple feature classes (or feature tables) and multiple feature layers; and all of the related tables, customization, projection information, and other data associated with these feature classes and tables. In contrast, a shapefile can only store a single feature class.
- An AXF file consists of a single file, whereas a shapefile is comprised of a number of files. The single file results in more robust behavior during power interruptions or rebooting of the mobile device.
- Less memory is required for opening and working with AXF files.
- AXF files support related tables, subtypes, and domains (both coded-value and range domains). These relationships are managed at the database level—whereas with shapefiles extensive scripts and forms are required.
- All text data in AXF files is stored using Unicode character encoding, eliminating the codepage issues associated with the shapefile DBF files.
- Spatial and attribute indexes for AXF files are maintained on-the-fly during editing. This results in consistent performance when viewing or editing AXF files, and eliminates the need to rebuild the indexes after editing. In contrast, the spatial and attribute indexes for shapefiles are deleted as soon as the layer is activated for editing, resulting in much slower draw and query performance when editing shapefiles and the need to rebuild the indexes when editing is completed.
- AXF files can be encrypted, requiring a password to open and use the contents of the AXF file. This provides some level of protection of the contents of the AXF file.

Although AXF files provide many advantages over shapefiles in some situations shapefiles are preferable to AXF files. Shapefiles perform better than AXF files when shapefiles are not being edited and the spatial and attribute indexes exist. In these cases shapefiles draw faster than AXF files. As a result, shapefiles are preferred for large, read-only background or reference data. However, the performance of shapefiles slows down considerably once the shapefile has been activated for editing and the indexes have deleted.

EasyOut

EasyOut

The EasyOut tool allows you to get data for layers represented in the active data frame and transfer it directly into a mobile device for use with Zeno Field. Any feature or raster data in the active data frame can be copied out, including shapefile, coverage, geodatabase, and CAD data. You can also copy out any graphics present in the map. Data that is copied out is automatically converted into a format that Zeno Field can use.

A Zeno Field Layer Definition is created for each feature layer you choose to get. The Zeno Field Layer Definition contains the layer properties that Zeno Field supports, including symbology definition, scale dependencies, and basic labelling properties. An ArcPad Map file (.apm) referencing the selected data gets created automatically.

Geodatabase layers and their related tables can be checked out for editing in Zeno Field, providing the layers and related tables are in the same geodatabase. The geodatabase layers and related tables that are checked out are exported to a single ArcPad Exchange Format (AXF) file. Together with the feature, all linked survey points get checked out as well. They are stored in the SurveyedVertex shape file.

When checking out geodatabase layers, you can select an existing Layer Definition from a shapefile or ArcPad AXF layer to use as a template. This allows you to re-use forms, scripts, icons, and other layer definition elements.

It is recommended that you always check out from a version of your geodatabase (if you are using a versionable geodatabase), and never from the DEFAULT version. Checking out from this field version will allow you to verify all field edits that have been checked in before applying the edits back to the DEFAULT version. If you have multiple field users and your workflow allows the possibility for more than one user to edit the same feature, then it is recommended that you create a version for each user as children of the field editing version. This allows for conflict detection between field users as well as verifying all field edits before applying the edits back to the DEFAULT version.

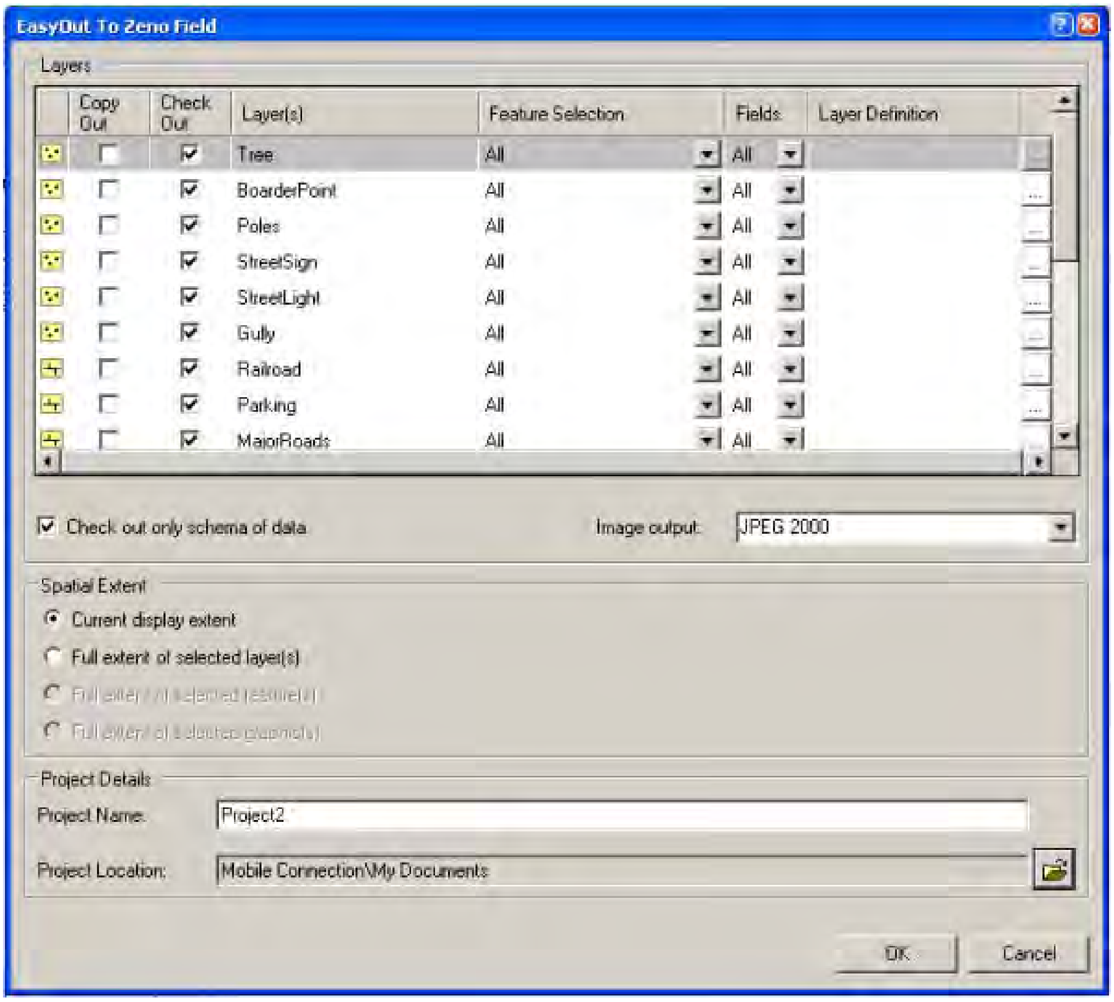
EasyOut: Step-by-step

EasyOut: Step-by-step

Step	Action
1	Start Zeno Office on your PC by clicking Start > All Programs > Leica Zeno > Leica Zeno Office or by double-clicking the Leica Zeno Office shortcut on your Desktop.
2	Open the project from which you want to extract data for your field work.
3	Define the data which should be extracted. There are 3 possibilities which require settings before you start EasyOut: • **Current display extent:** Use the pan and zoom tools or a bookmark to define the desired extent in the map from which features should be extracted. • **Full extent of selected feature(s):** Select the features you want to extract. Use Select Features to select them interactively in the map or select by attributes or location. • **Full extent of selected graphic(s):** Select one or more graphics using Select Elements . If necessary create new graphics or move/resize existing ones. This allows extracting data from several sites in just one step. Multiple selections can be done by pressing the Ctrl key.
4	Click the EasyOut button on the Leica Data Manager toolbar.
5	The EasyOut to Zeno Field dialog appears. All layers of the map are selected for check out by default.
6	Select the layers from which data should be extracted using check out or copy out in the according columns. Not checked layers will be ignored. To select all or deselect all just right click on the according column header to open a context menu. 
	Tips: • Check Out is the right choice if the changes in the field should be merged into the data of origin in the office using EasyIn. • Use Copy Out if you don't want to merge the changes with the version of origin or for background layers. Copied out layers perform faster, but can not be checked in. • The Raster layer can only be copied out. • All values of a column can be changed at once by a right click on the column header and setting the desired value using the context menu.

	• The wizard will only let you check out data from one database per transaction. By default the data source of the topmost layer in the Display tab is used to extract data from. If you need to edit multiple geodatabases, you will need to change the layer drawing order and start the wizard again to complete additional transactions.
7	Specify which feature should be extracted. Therefore change the settings in the Feature Selection column. There are the following options which can be set separately for every layer: • **All:** All features of the layer are considered • **Selected features:** Only selected features of the layer are considered • **Layer's definition query:** Only features which fulfill the definition query of the layer are considered. The layer definition query is set in the Definition Query tab of the Layer Properties dialog.
8	Specify which attribute fields should be checked/copied out. There are the following options which can be set separately for every layer: • **All:** All attribute fields of the feature class are considered. • **Visible:** Only visible attribute fields of the feature class are considered. The visible fields are defined in the Fields tab of the Layer Properties dialog. This option helps to reduce the size of the feature properties in Zeno Field.
9	Layer definition files can be browsed in the last column. Therefore click on the ... button of the according layer and browse the desired file.
10	Check the check out schema of data check box if the schema only should be checked out. This means, that empty feature classes with the same attribute fields get checked out. Use this option if you plan to collect new data in the field and existing features are not required.
11	The image output format can be defined if one or more raster layers are checked for copy out. Select one of the following settings: • **Original Format:** the output format is the same as the input format • **JPEG 2000:** • **TIFF:** Tagged Image File Format. Please note, that the output raster files can have a bigger file size than the original picture.
12	Define the data which should be extracted. There are 4 possibilities: • **Current display extent:** The display extent of the map specified in step 3. It is possible to have multiple graphics selected • **Full extent of selected layer(s):** All features included in the layer.

	• **Full extent of selected feature(s):** All selected features in the map. • **Full extent of selected graphic(s):** The extent of all selected graphics specified in step 3. It is possible to have multiple graphics selected.
13	Enter a Project Name.
14	Browse a project location. You can click the Folder icon to browse for a new folder location.
	Tip: • You can directly browse your mobile device via a mobile connection (recommended). • Alternatively browse the ActiveSync data exchange folder.
15	Click Finish to perform the transaction.



16	Click OK after the process has been completed.

EasyIn

EasyIn: Overview

The EasyIn tool allows you to check in the edits made in Zeno Field back into the geodatabase from which the data was checked out. You can also import Zeno Field graphics files into ArcMap's graphics layer.

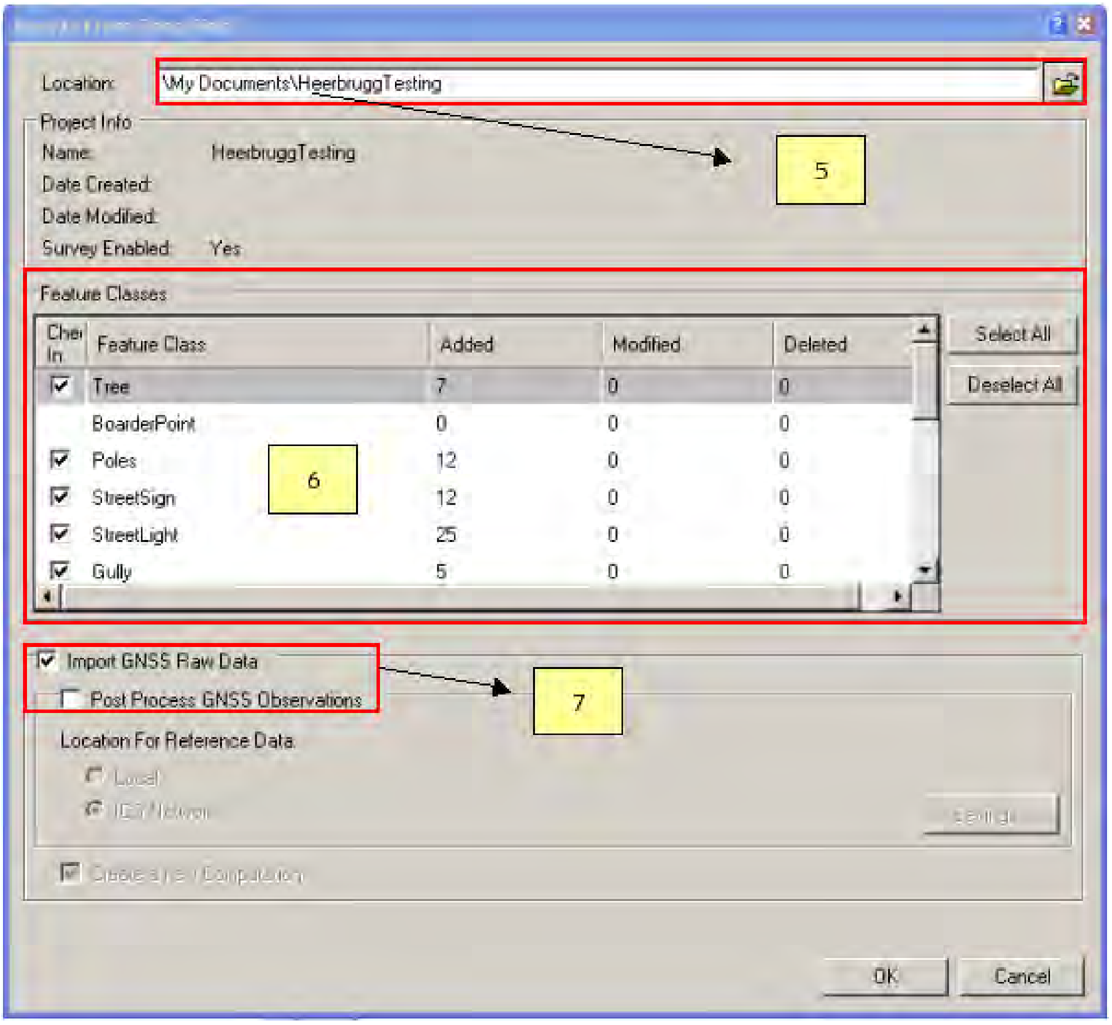
You can check in edits from one or more feature classes at a time. Just import GNSS raw data from a local source or web address and let Zeno Office post process your GNSS observations to make your data more accurate and reliable. Summaries of all added, modified, and deleted features are presented for each feature class and its related tables. All edits on related table records are checked in when their parent feature classes are checked in.

All edits that occurred in Zeno Field, including adding features and related table records, deleting features and records, modifying attribute values, and changing feature geometry can be checked back into the geodatabase. Edits are stored to the Zeno Office geodatabase in the same order as they occurred in Zeno Field.

EasyIn: Step-by-step

EasyIn: Step-by-step

Step	Action
1	Start Zeno Office on your PC by clicking Start > All Programs > Leica Zeno Office or by double-clicking the Leica Zeno Office shortcut on your Desktop.
2	Open the project from which you extracted the data for your field work using EasyOut.
3	Click Editor > Start Editing on the Editor toolbar.
4	Click the EasyIn button on the Leica Data Manager toolbar.
5	Click Browse to browse for your project file. The project file can be located directly on the Zeno device via a mobile connection .
	Tip: • It is recommended to browse the project directly on the Zeno device via a mobile connection , as the Zeno Field project will be updated with the EasyIn information.
6	All modified feature classes are selected by default for check in. Modify the default settings if necessary. The number of added, modified and deleted features is shown in the according columns
7	Check the **Import GNSS Raw Data** check box if you want to import the GNSS raw observations collected in Zeno Field during the field work. It is mandatory to import this data for post processing.
	Tip: • A later post-processing is only possible, if the raw observations where checked in. • Raw data only exists for your measurements, if you had raw data logging enabled in your field project. If you measured with real time corrections, it is usually not necessary to import raw observations.
8	Check the **Post Process GNSS Observations** check box to automatically post process your observations during the EasyIn process. The EasyIn process automatically uses the best possible processing parameters for your data.



Tips:

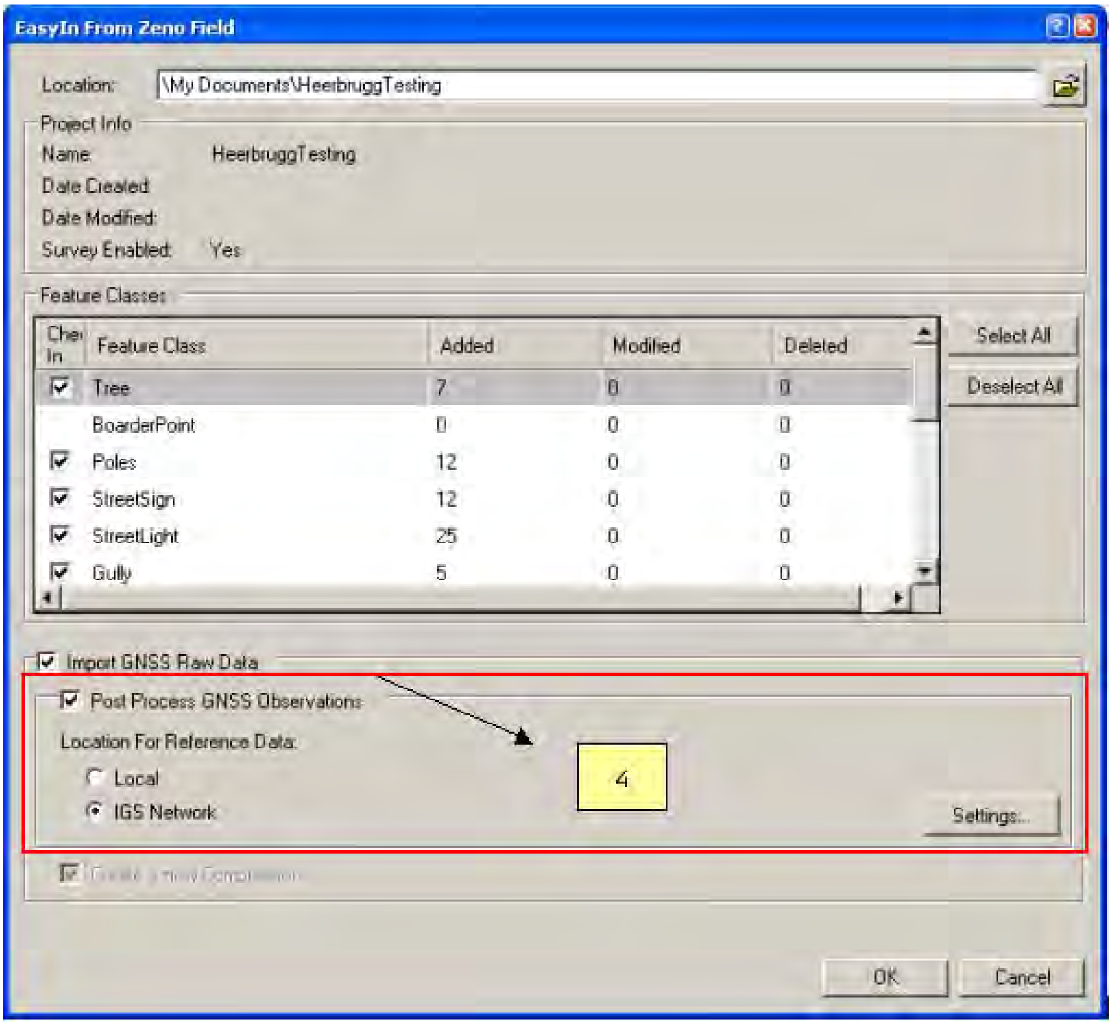
Automatically all feature classes with added, modified and deleted features are checked.

- **Added:** Displays the number of new features and records that were added to the feature class and related tables in Zeno Field.
- **Modified:** Displays the number of features and records that were modified in Zeno Field. These modifications include both geometry and attribute changes.
- **Deleted:** Displays the number of features and records that were deleted from the feature class in Zeno Field.

9 Define the location of your reference data:

- **Local:** A local folder on your PC contains the reference data for your observation period. You may have downloaded this data from your own reference station or your reference data provider.
- **IGS Network:** Automatic reference data download from a IGS server. This service is

free of charge.



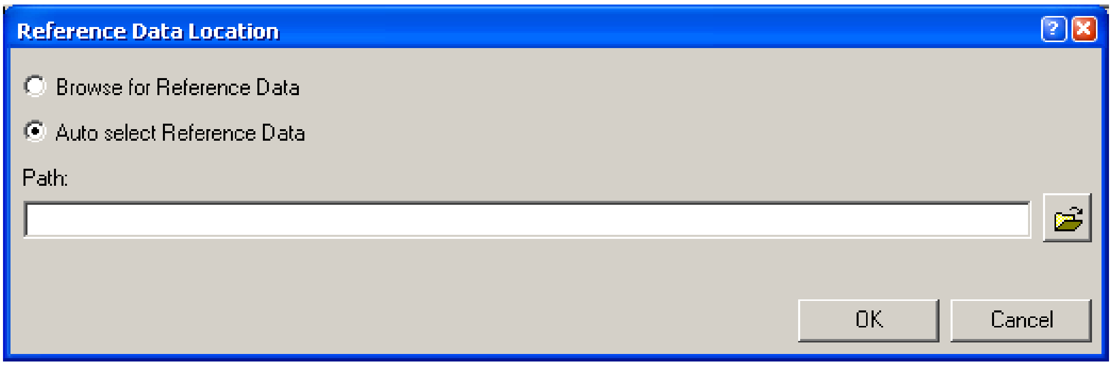
10 Click Settings…:

- **For Local:** There are two options for defining the reference data location:

    1. **Browse for Reference Data:** During the processing of EasyIn, the user will be asked to browse for the reference data file manually. Only a single file can be selected.

    2. **Auto select Reference Data:** Predefine a reference data location. The system will select the correct files automatically in this location with its sub folders. This option selects all reference data files which fit to the rover measurement intervals.

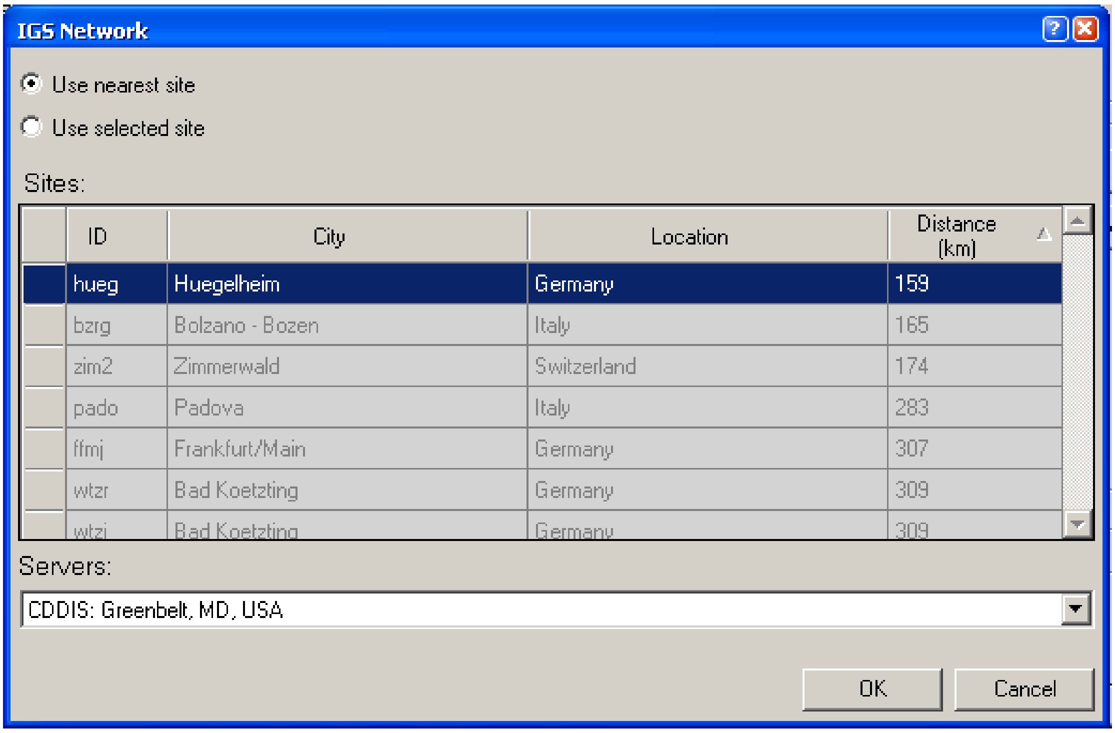
☞ Please note, that RINEX files only are supported on a local drive and no compressed RINEX formats like HATANAKA.



- **For IGS Network:** Prepare the settings for importing the reference data file for existing GNSS observations by selecting IGS Network then click Settings…

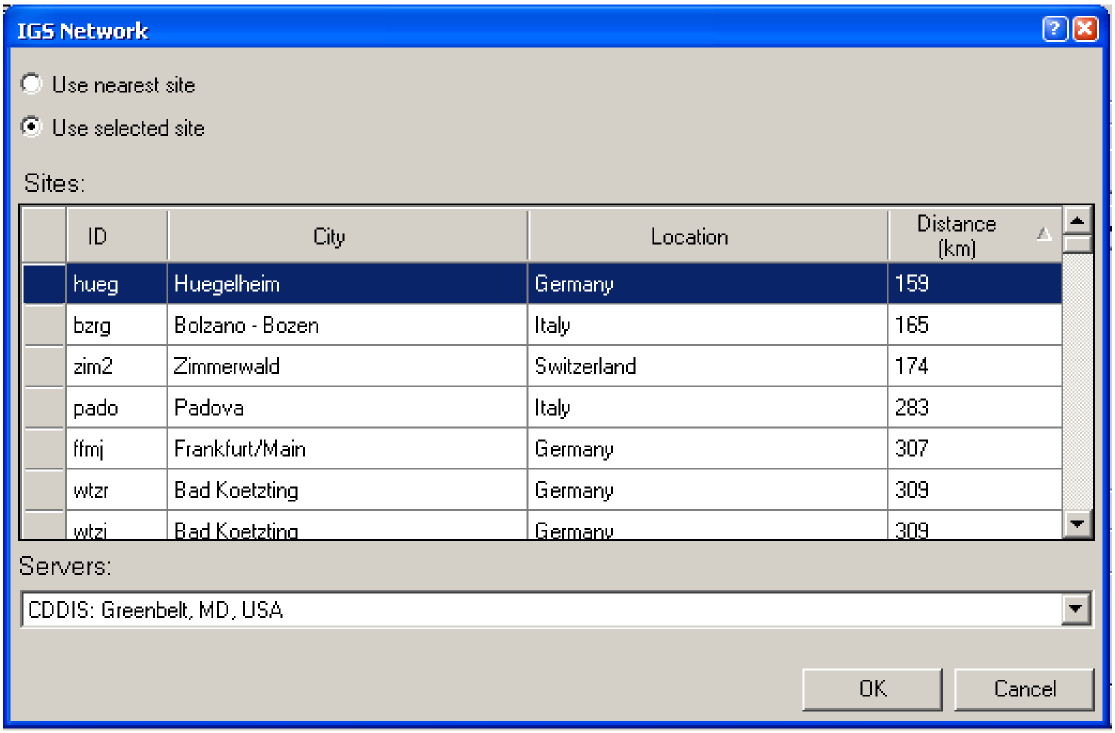
1. Select the desired server
2. There are two options for IGS Network download:

1. **Use nearest site:** EasyIn automatically selects the site with the shortest distance to your project area.



2. **Use selected site:** Using this option, you can define, from which site you would like to

<table>
<tr><td></td><td>download reference data from.


</td></tr>
<tr><td>11</td><td>Click OK</td></tr>
<tr><td>12</td><td>Click OK to start the EasyIn process.</td></tr>
<tr><td>13</td><td>The Select Reference Station Data dialog appears if you've selected Browse for Reference data. Select the desired reference station data file and click Open.</td></tr>
<tr><td>14</td><td>Then EasyIn Live Data Viewer appears. This dialog reports in real-time all steps done by the automated EasyIn process. Use the Live Data Viewer report to review your processing results.

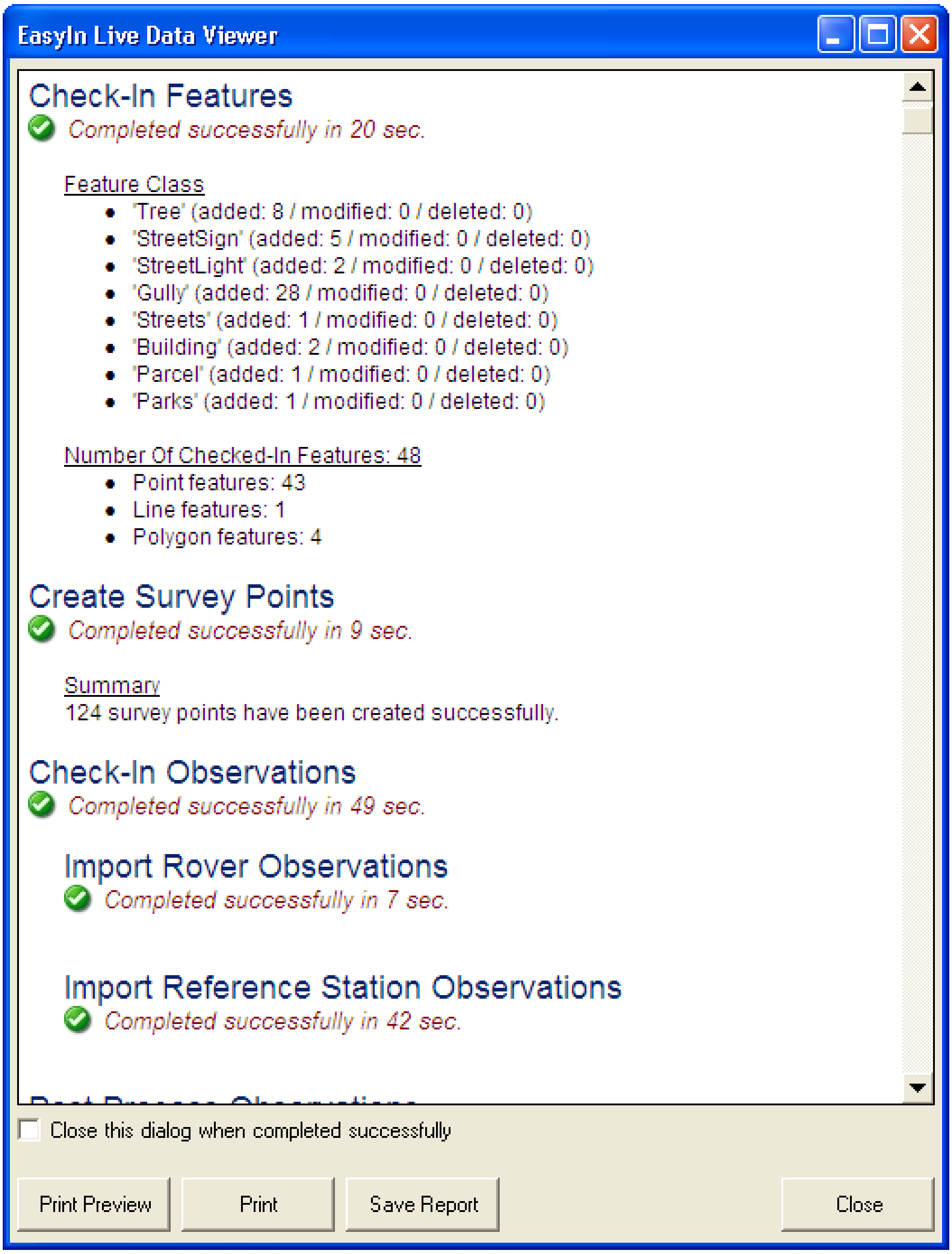
Please note the following sections:

Backup Project: An automatic backup of the field data gets created. Please note, that the backup file gets deleted automatically after 30 days. If EasyIn would fail, you can unzip the backup file and try again.
Check-In Features: Summary of all changes per feature class.
Create Survey Points: Survey Points contain the quality information of your measured points.
Post Process Observations: Accuracy summary of the processed points
Post Processing Details:

i. Processing Parameters</td></tr>
</table>

ii. Reference station details

iii. Details of every processed point including coordinate and accuracy information



15	Print or Save the report (optional).
16	Click Close. The Zeno Office project now contains the imported field data.
17	Click Editor > Save edits to persist the changes in your database.

Displaying data

Creating maps

Creating maps

In order to create efficient maps for use in the field, Zeno Field leverages existing mapping and GIS software systems and databases. There is no need to convert data to unique portable data formats. Zeno Field supports a multilayer environment with industry-standard vector map and raster image display that includes aerial photographs and satellite imagery. Maps created in the field can easily be uploaded into the master database in the office.

In addition, Zeno Field supports wireless data acquisition. Zeno Field can act as a client to ArcIMS, ESRI's Internet mapping and GIS software. Data is downloaded to Zeno Field using a TCP/IP connection, such as a wireless local area network, cellular phone, or a wireless modem.

Creating a new map

Overview of creating a new map

A map is the fundamental component you work with in Zeno Field. The Zeno Field map file (.apm) stores a list of the map layers and their properties in your Zeno Field session. A map lists all your layers together with the geographic extent and projection of the map. When you begin an Zeno Field session, you must first open an existing map or create a new map by adding layers of data or information.

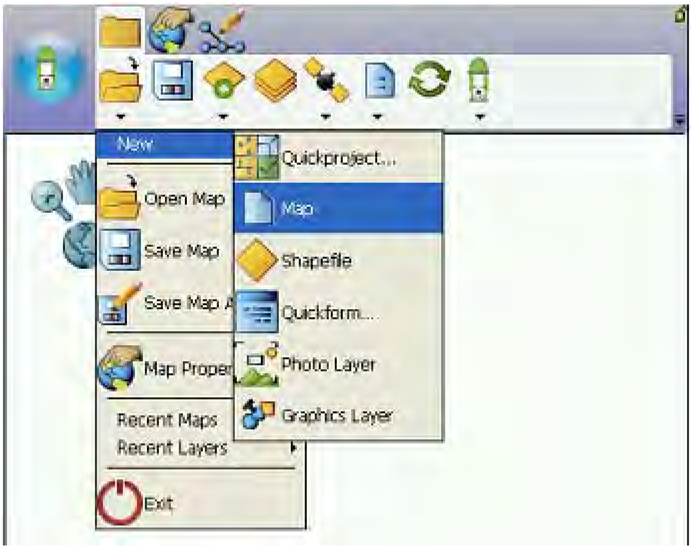
Once shapefiles, Zeno Field AXF files, images, graphics layers, photo layers, or Internet data are added to your Zeno Field map, you determine whether or not they are displayed, edited, updated, moved. Each file appears in Zeno Field as a layer in the map.

For more information about supported Zeno Field data formats, refer to the section Preparing Data

Opening a new map

Step	Action
1	Tap Start on the Windows taskbar.
2	Tap Programs
3	Tap Zeno Field You will see the Zeno Field splash screen briefly and Zeno Field will open with the Open map dialog box. Close the dialog box and you are presented with a blank map. 

Opening a new map in Zeno Field

Step	Action
1	You can also open a new map from the Main toolbar in Zeno Field. Tap the drop-down arrow below the Open Map button.
2	Tap New
3	Tap Map 
4	Zeno Field will open a new blank map. If you have another map open, Zeno Field will ask you if you would like to save any changes to the current map before closing it.
5	If you have another map open, Zeno Field will ask you would you like to save your changes.

☞ **Prepare your Data:** Use the Zeno Field Data Management tools to prepare your data for Zeno Field. With these desktop tools, you can create subsets of your data, convert data to shapefiles and Zeno Field AXF files, and export legend symbology. The Zeno Field Data Management tools also optionally creates an Zeno Field map containing the selected layers.

Adding layers

Overview of adding layers

You can display geographic information on a map as layers. Each layer represents a particular type of feature, such as streams, lakes, highways, or light posts. A layer does not store the actual geographic data; instead, it references the data contained in shapefiles, Zeno Field AXF files, images, photo layers or graphics layers.

Distinguishing layer types: The different layers supported by Zeno Field are represented by different icons. These icons are listed on the following page.

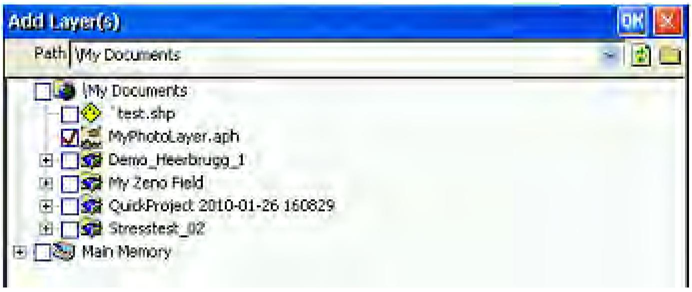
Layer projection conflicts: Only add layers with the same projection. Zeno Field will not add layers with different projections to the same map. Projection information for each layer is contained in the layer's projection (.prj) file. In addition, each map has an associated projection that can be stored in the Zeno Field map (.apm).

The exceptions to this are graphics layers. These layers are automatically projected, on-the-fly, to the projection of the current Zeno Field map.

When you select an .apm file from within the add layers dialog, you only add the layers from that .apm to your existing map. All other detail contained in the .apm is not loaded. For example, if your .apm contains bookmarks, these will not be added to your existing map.

Adding an .apm file from the add layer dialog excludes the details contained in the .apm: When an .apm file is added from the add layer dialog box, it only adds the layers from the map to your existing map. Other details like bookmarks etc are not added to your exisitng map.

Adding layers to your Zeno Field map

Step	Action
1	Tap the Add Layer(s) button on the Main toolbar. 
2	Tap the Folder button to navigate to the directory that you would like to add data from.
3	Tap the folder in the Directory Browser dialog box that contains the layers you wish to add to your map
4	Tap OK.
5	Check the check box beside the datafile(s) you would like to add.  The Add Layer(s) dialog box only displays layers that are supported by Zeno Field. A red check mark indicates selected files.
6	Tap OK. Your data layers are now added to the existing Zeno Field map.

Layer icons

Zeno Field displays icons together with layer names to make it easier to differentiate between layers. Display of layer icons can be seen throughout the Zeno Field user interface, including in the Table of Contents dialog box, Add Layers dialog box, and in the Start/Stop Editing tool.

Zeno Field uses the following standard icons for each layer type:

Icon	Description
	GPS Tracklog
	Map Grid
	Point shapefile or AXF layer with no layer definition file (.APL)
	Point shapefile or AXF layer which has an associated layer definition file. The layer definition file can include any form of customization, such as custom forms or custom symbology.
	Polyline shapefile or AXF layer with no layer definition file.
	Polyline shapefile or AXF layer which has an associated layer definition file.
	Polygon shapefile or AXF layer with no layer definition file.
	Polygon shapefile or AXF layer which has an associated layer definition file.
	Multi-feature layer, such as a graphics layer.
	Image layer.
	Photo layer.

Overview of adding shapefiles

A shapefile (.shp) is a vector file format for storing the location, shape, and attributes of geographic features. Shapefiles can support point, line, and polygon features. Attributes are held in a dBASE® (.dbf) format file.

Adding shapefiles to your Zeno Field map

Step	Action
1	Tap the Add Layer(s) button on the Main toolbar. 
2	Tap the Folder button to navigate to the shapefile you would like to add. Shapefiles have a .shp suffix. 
3	Check the checkbox beside the datafile(s) you would like to add. A red check mark indicates selected files.
4	Tap OK.
5	Your shapefiles are now added as layers to the existing Zeno Field map.

Overview of adding Zeno Field AXF layers

In addition to shapefiles, Zeno Field also supports vector data in AXF files. AXF files are databases which use the Microsoft SQL Server Compact Edition database engine. An AXF file consists of one or more feature layers—it is these feature layers which appear in the Add Layers dialog box and which can be added to the Zeno Field map.

AXF files are created by the Zeno Field Data Management tools — geodatabase feature classes which are selected for editing in Zeno Field are exported as feature layers in an Zeno Field AXF file.

Adding AXF layers to your Zeno Field map

Step	Action
1	Tap the Add Layer(s) button on the Main toolbar. 
2	Tap the Folder button to navigate to the Zeno Field AXF file you would like to add. Zeno Field AXF files have an .axf suffix.
3	Check the checkbox beside the datafile(s) you would like to add. A red check mark indicates selected files. Selecting the AXF file will add all the feature layers within the AXF file. Selecting a specific feature layer will only add that feature layer
4	Tap OK. Your Zeno Field AXF feature layers are now added as layers to the existing Zeno Field map.

Overview of adding images

Zeno Field directly supports the use of the following raster image formats: GIF, JPEG, JPEG2000, MrSID MG2 and MG3, PNG, TIFF (including GeoTIFF and LZW compression), Windows Bitmap, and CADRG raster maps.

Zeno Fieldrequires the georeferencing information and coordinate system information in order to correctly display images on a map.

Georeferencing information can be included in the header of the image, associated .aux file, or world file.

Coordinate system information can also be included in the header of the image, associated aux file, or projection (.prj) file.

Adding images to your Zeno Field map

Step	Action
1	Tap the Add Layer(s) button on the Main toolbar. 
2	Tap the Folder button to navigate to the raster image you would like to add
3	Check the checkbox beside the datafile(s) you would like to add. A red check mark indicates selected files.
4	Tap OK. Your images are now added as another layer to the existing Zeno Field map.

Adding graphics layers

Overview of adding graphics layers

Zeno Field supports graphics layer files. The Zeno Field Graphics Layer (.apg) is an XML file that can store annotation, points, lines, and polygons. It is used for redlining or to make freehand georeferenced edits in the field. Graphics layer files can be easily imported to Zeno Office.

Adding layers via the Table of Contents: The Add Layer(s) tool is also available on the Layers page of the Table of Contents.

Adding photo layers: Zeno Field photo layers (.aph) can also be added using the same method as a graphics layer. A photo layer displays a camera icon at the location of a hyperlinked photograph. See section, ‘Using your Digital Camera’, for more information.

Note: For more information about creating Zeno Field graphics layers, refer to Creating a new graphics layer

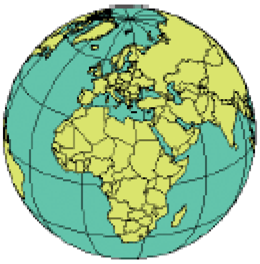
Adding graphics layers to your Zeno Field map

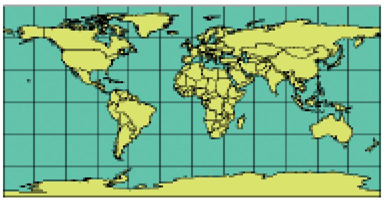
Step	Action
1	Tap the Add Layer(s) button on the Main toolbar. 
2	Tap the Folder button to navigate to the graphics layer you would like to add. Graphics layers have a .apg suffix.
3	Check the checkbox beside the datafile(s) you would like to add. A red check mark indicates selected files.
4	Tap OK.
5	Your graphics layer is now added as another layer to the existing Zeno Field map.

About coordinate systems

The features on a map reference the actual locations of the objects they represent in the real world. The positions of objects on the earth's spherical surface are measured in degrees of latitude and longitude, also known as geographic coordinates. While latitude and longitude can locate exact positions on the surface of the earth, they are not uniform units of measure; only along the equator does the distance represented by one degree of longitude approximate the distance represented by one degree of latitude. To overcome measurement difficulties, data is often transformed from the three-dimensional geographic coordinate system to the two-dimensional planar surface in a projected coordinate system. Projected coordinate systems describe the distance from an origin (0,0) along two separate axes, a horizontal x-axis representing east–west, and a vertical y-axis representing north–south.

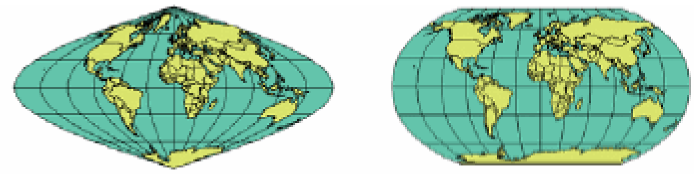
Because the earth is round and maps are flat, getting information from the curved surface to a flat one involves a mathematical formula called a map projection. A map projection transforms latitude and longitude to x,y coordinates in a projected coordinate system.





Locations are expressed as latitude and longitude on a globe and as x,y coordinates on a map.

This process of flattening the earth will cause distortion in one or more of the following spatial properties: distance, area, shape, and direction. No projection can preserve all these properties and, as a result, all flat maps are distorted to some degree. Fortunately, you can choose from many different map projections. Each is distinguished by its suitability for representing a particular portion and amount of the earth's surface and by its ability to preserve distance, area, shape, or direction. Some map projections minimize distortion in one property at the expense of another, while others strive to balance the overall distortion. As a mapmaker, you can decide which properties are most important and choose a projection that suits your needs.



Displaying the world using the Albers projection (left) and the Robinson projection (right).

Specifying a coordinate system

In order for Zeno Field to display the layers of your data correctly, they need to be in the same coordinate system or projection. Projection information is stored in a separate file named after the data source but with a .prj file extension—for example, citytrees.prj. Zeno Field AXF files and some image formats store the projection information in the file. In addition, each map has an associated projection that can be stored in the Zeno Field map (.apm).

The default projection for a new map in Zeno Field is latitude– longitude WGS84. If you have an Zeno Field.prj file in your My Documents folder, then it replaces latitude–longitude WGS84 as the default map projection.

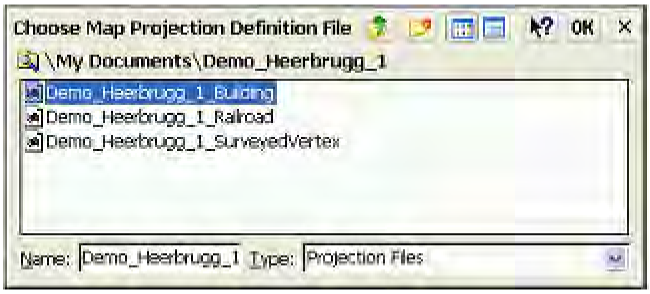
When you add a layer or map with a different projection to a new map, the data's projection replaces the default projection.

If you add a layer with no projection (.prj file) to a map with a geographic projection, Zeno Field checks if the data appears to be latitude– longitude (i.e., geographic). If it appears to be geographic, Zeno Field asks if you would like to assume the data is in the same geographic projection as the map. If it does not appear to be geographic, Zeno Field removes the default projection and the map has no projection.

Convert GPS input data: Zeno Field supports on-the-fly projection and datum conversion from the (geographic) GPS input map datum to the projection of the current map

Convert your data: Use Zeno Office to change the projection of your data before adding it to your Zeno Field map.

Steps to specify a coordinate system

Step	Action
1	Tap the Table of Contents button, on the main toolbar. 
2	Tap Choose Map Projection Definition File.
3	Navigate to the location of your projection file (.prj) on the Choose Map Projection Definition File dialog box. 
4	Select the projection file that matches the projection of the layers in your current map. The coordinate system has been specified. View the Projection page in the Map Properties dialog box to display the coordinate system of the current map.

Managing layers

Overview of managing layers

Zeno Field displays geographic information on a map as layers. Each layer represents a particular type of feature, such as streams, lakes, highways, political boundaries, or light posts. A layer does not store the actual geographic data; it references the data contained in shapefiles, Zeno Field AXF files, images, graphics and photo layers, or ArcIMS services.

As you saw in the previous sections, it is easy to add layers to a map. Once they are on your map, you will want to organize them to make your map look the way you want it to. You organize and manage layers through the Table of Contents. The Table of Contents allows you to turn a layer’s visibility on or off, change a layer’s drawing order, remove layers, select layers for editing, change a layer’s properties, and set snapping properties for editing.

Turning a layers visibility on or off

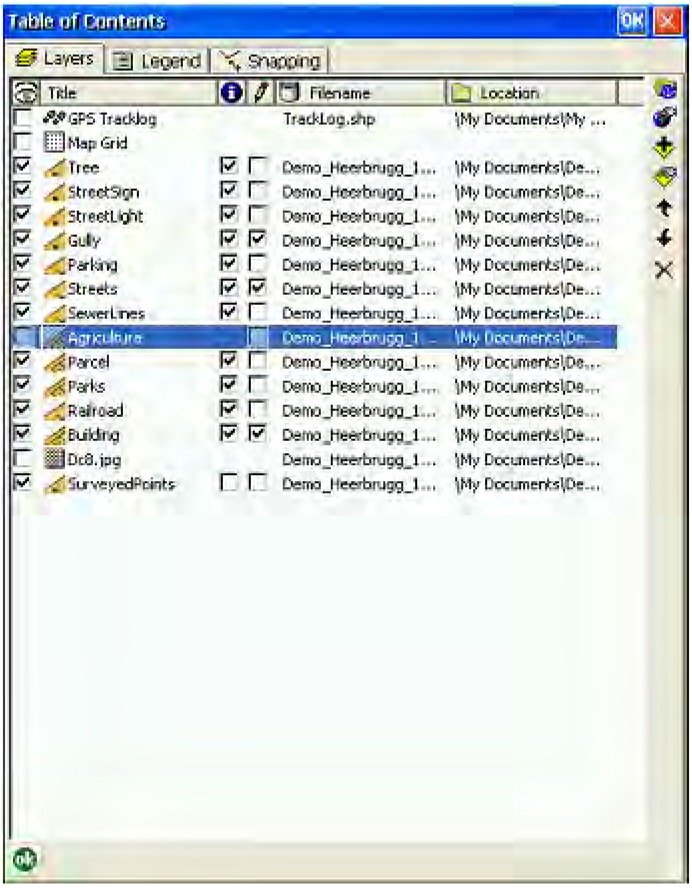
Overview of turning a layer's visibility on or off

Once a layer has been added to your map, you have the option of turning it on or off without having to completely remove it from your map. If a layer is turned off, it does not display on your map. You can, however, view a layer's properties and edit and identify a layer even if it is turned off.

Making all the layers visible: On the Layers page of the Table of Contents, tap the visible icon to make all the layers visible. Tap it again to turn off all the layers.

Editing layers are visible: If a layer is checked for editing in the Table of Contents, it is always visible. In order to turn off that layer, you must ensure that it is not checked for editing.

Steps to turn a layer's visibility on or off

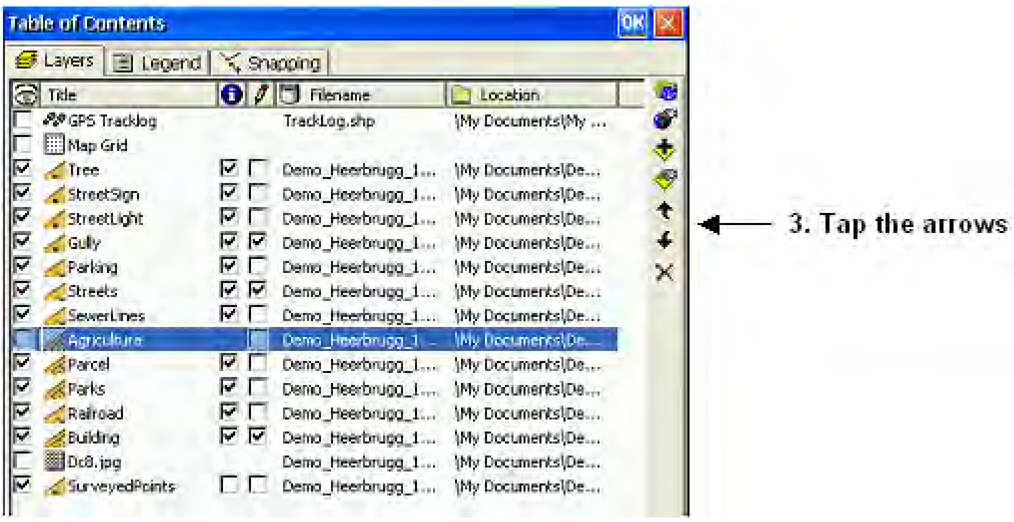
<table>
<tr><th>Step</th><th>Action</th></tr>
<tr><td>1</td><td>Tap the Table of Contents button, on the Main toolbar.
</td></tr>
<tr><td>2</td><td>The Table of Contents opens on the Layers tab and displays a list of the layers that have been added to your map.

</td></tr>
<tr><td>3</td><td>Check the visible check box to turn the layer on. Uncheck the check box if you want to turn the layer off.

Tap OK.</td></tr>
</table>

Changing a layer's drawing order

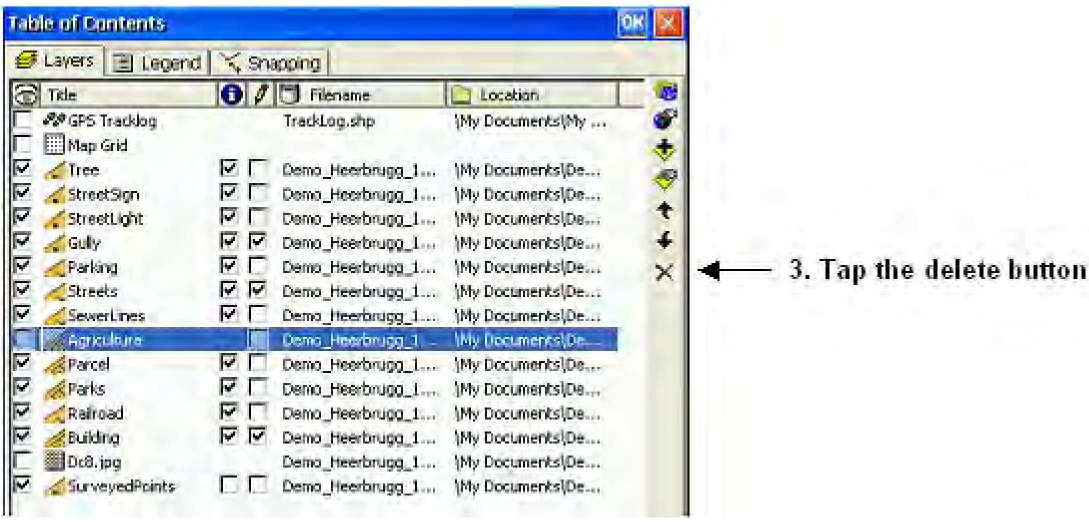
The order in which a layer appears in the Layers section of the Table of Contents corresponds to the opposite order in which it is drawn on the map. Layers at the bottom of the list are drawn first, and the layers at the top are drawn last.

By default, Zeno Field inserts point layers at the top, line layers second, and polygon layers third. Raster images are placed at the bottom of the list and hence are drawn first.

Step	Action
1	Tap the Table of Contents button.  The Table of Contents opens on the Layers page and displays a list of the layers that have been added to your map.
2	Tap the layer whose order you would like to change. 
3	Tap the arrows to change the order of the selected layer.
4	Tap OK.

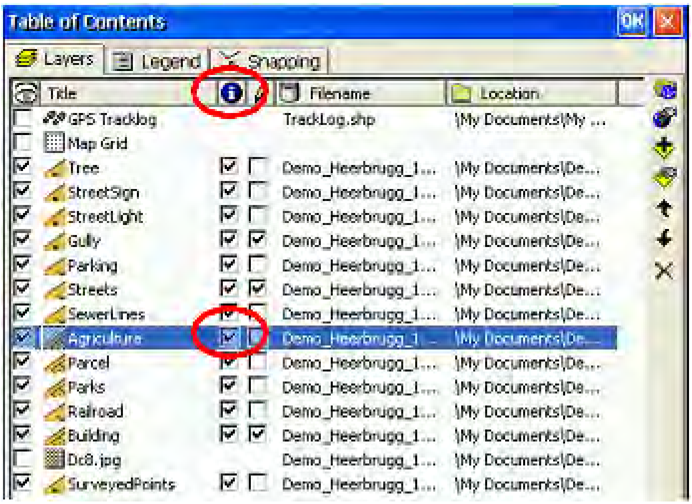
Removing a layer from the map

When you are finished using a layer, you can simply remove it from the map. In the Table of Contents, select the layer you would like to remove and tap the delete button. When you remove a layer, you are not deleting the data from your device; you are only removing it from the current map.

Step	Action
1	Tap the Table of Contents button. 
2	Tap the layer you would like to remove. 
3	Tap the delete button.
4	Tap Yes. The layer is removed from your map.
5	Tap OK.

Selecting a layer for the Identify tool

The Identify tool lets you view attribute information for a particular feature. Once a layer is selected for the Identify tool, make the Identify tool active, then tap the feature, and the Feature Properties dialog box appears. By default, the Feature Properties dialog box includes pages for Attributes, Picture, Symbology—if defined—and Geography. If a custom form exists for the feature, it will be displayed. You cannot edit your data using the Identify tool; you can only view it.

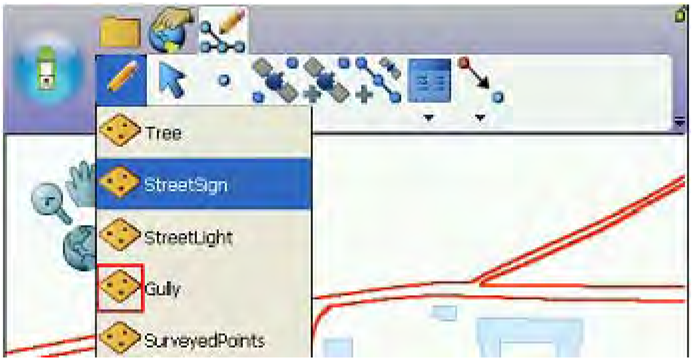
Step	Action
1	Tap the Table of Contents button.  The Table of Contents opens on the Layers page and lists all of the layers in the current Zeno Field map.
2	Check the Identify tool check box for the layer(s) you would like to retrieve information for. 
3	Tap OK.

Select all layers for the Identify tool: In the Table of Contents, tap the Identify tool to activate all layers. Tap again to deactivate all layers. Note: For more information on how to use the Identify tool, refer to Identifying features

Selecting a layer for editing

Layers are selected for editing by enabling the Start/Stop Editing tool on the Edit toolbar or by checking the layer's Edit check box on the Layers page in the Table of Contents.

In Zeno Field , you can have up to three layers active for editing— one layer for each feature type: one point layer, one line layer, and one polygon layer. These layers can be shapefiles or Zeno Field AXF layers, or a combination of these. Alternatively, if you are editing the Graphics Layer, you can only have that layer active.

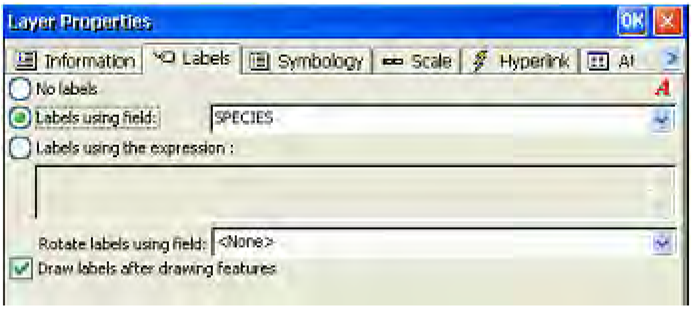
Step	Action
1	Tap the Start/Stop Editing button on the Edit toolbar. The drop-down list displays all of the editable layers in the current Zeno Field map with a corresponding icon to indicate the type of layer. 
2	Tap the layer that you want to edit. In order to select more than one layer you will need to repeat steps 1 and 2. You can select one point, one line, and one polygon layer for editing, at one time, or a graphics layer. A red box around the layer icon indicates that the layer has been selected for editing.

Determining the layer type: The different layers supported by Zeno Field are represented by different icons. These icons are listed in section Layer icons.

Refer to section Editing basics, for more information on editing your data.

Layer properties

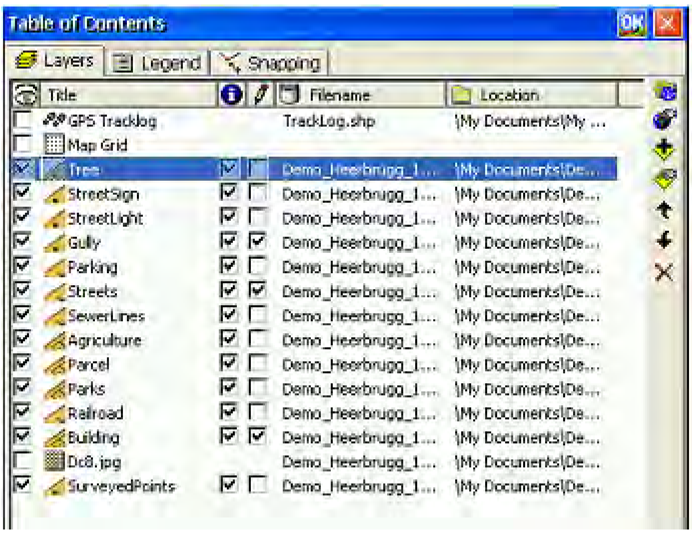
Properties for a selected layer can be defined and changed in the Layer Properties dialog box. Properties include information about the selected layer, symbology used to draw the layer's features, a hyperlink field, attributes for the layer, a display scale, transparency options for the layer, display filter, and the geographic extent of the layer.

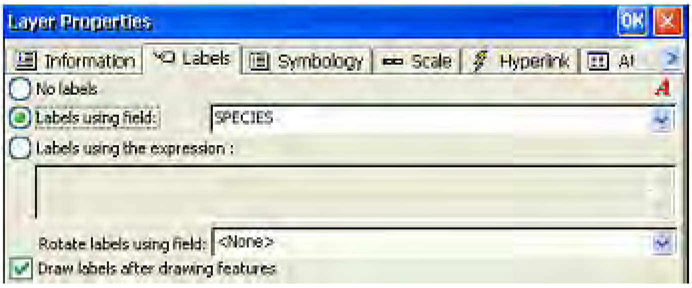


Tab	Description
Information	View simple metadata
Labels	Set labeling information
Symbology	View and edit the symbol
Scale	Specify a scale range for displaying the layer
Hyperlinks	Specify the hyperlink field
Attributes	View attribute and index information
Tansparency	Set the transparency level and color
Geography	View the geography extent of the layer.

Changing layer properties

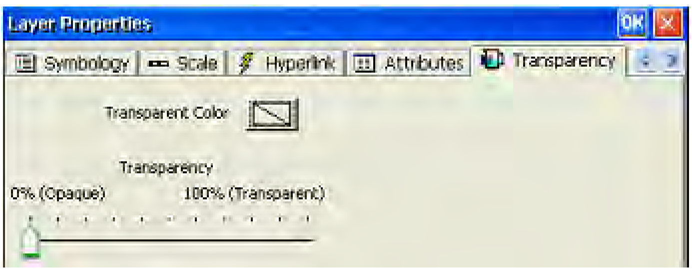
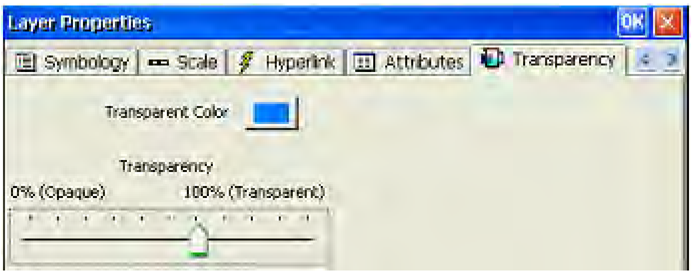
You can change the properties for a selected layer using the Layer Properties dialog box. You can set labels, specify hyperlinks, change symbology, view attribute information, set the transparency level and color, define a display filter, and specify a scale range for displaying layers.

Step	Action
1	Tap the Table of Contents button. 
2	Tap the layer of interest. 
3	Open the Layer's properties by either double-tapping the selected layer or tapping the Layer Properties button. The Layer Properties dialog box opens.
4	Scroll through the different tabs depending on what you would like to set.

	
	Refer to section, Symbolizing your data for information on labelling and symbology properties.
5	When finished, tap OK.

Creating a transparent layer

Giving a layer transparency is simple way of showing varying and overlapping information. This is crucial when you are displaying many layers in Zeno Field on a small portable screen. Transparency is set for an entire layer in the Layer Properties dialog box.

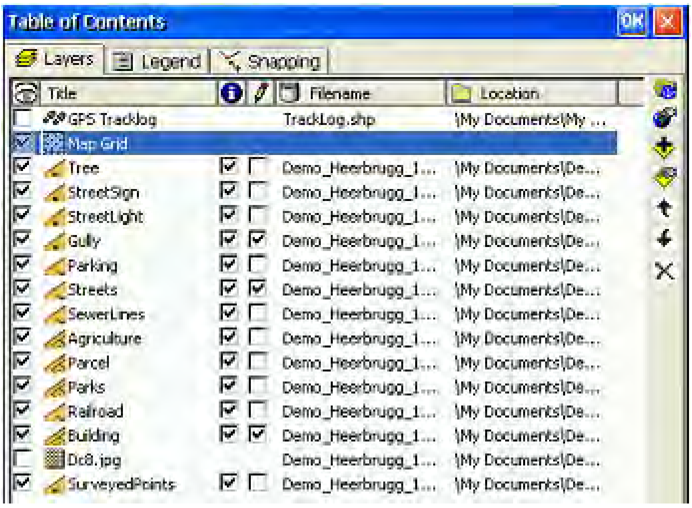
Step	Action
1	From the Layer Properties dialog box, tap Transparency. 
2	To change the transparency color, tap the color box. The Colour Designer opens and displays a selection of colors.
3	Tap the appropriate color on the Color Designer. 
4	Tap OK.
5	Use the slider bar to select the percent transparency you want for this layer. 
6	Tap OK to close the Layer Properties dialog box.
7	Tap OK to close the Table of Contents.

☞ **Setting transparency color:** Some compression techniques do not provide exact colors and therefore could alter the result of your transparency color. For optimal transparency results use pure images such as TIFF, BMP, or PNG.

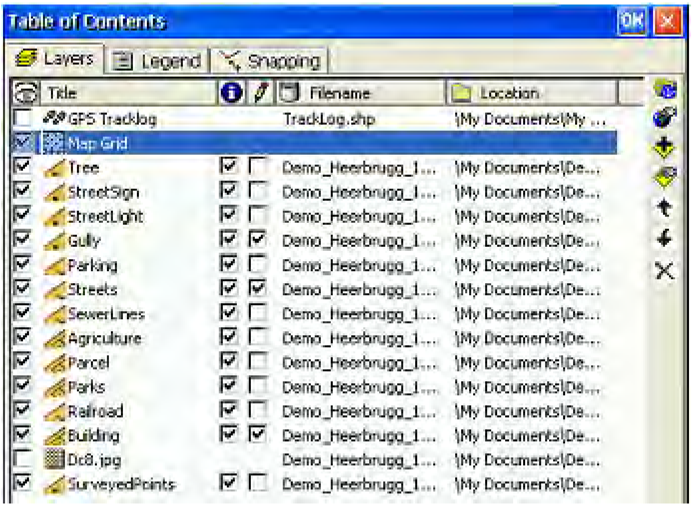
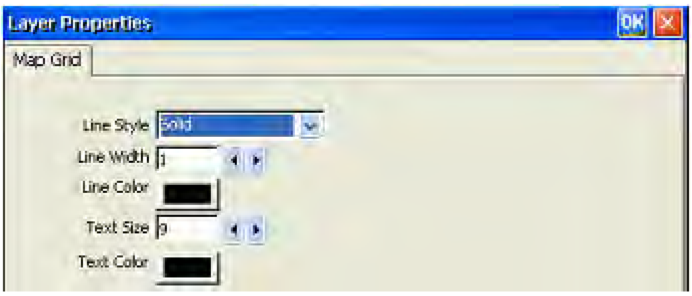
The Map Grid layer

Activating the Map Grid layer

Zeno Field allows you to include a Map Grid layer for your map. Zeno Field displays the grid based on the current map projection. The size of each grid cell is automatically calculated by Zeno Field, based on the current map scale. You can change the style of the lines and text using the Layer Properties dialog box for the Map Grid layer.

Step	Action
1	Tap the Table of Contents button.  The Table of Contents opens on the Layers page.
2	Check the checkbox for the Map Grid layer. 
3	Tap OK. The Map Grid layer is automatically generated for your Zeno Fieldmap.

Setting the style of the Map Grid layer

Step	Action
1	Tap the Table of Contents button.  The Table of Contents opens on the Layers page.
2	Tap the Map Grid layer and check its check box. 
3	Open the Map Grid layer's properties by either doubletapping on the layer or tapping the Layer Properties button.
4	Set the line and text properties for the grid layer. 
5	Tap OK.
6	Tap OK on the Table of Contents. The Map Grid layer is added using the properties you defined.

Symbolizing your data

Overview of symbology

Choosing the correct symbology for Zeno Field is important for effectively displaying your data in the field. You want to be certain that you specify symbology that has sufficient contrast for the expected field lighting conditions. The artificial light and large monitors used in an office environment enable the use of a wide range of colors and symbols; whereas, only a limited number of colors and symbols provide sufficient contrast when used in the field with small computer screens and strong sunlight.

The large range of supported symbols for Zeno Field enables you to display layers in the field using the symbology standards of your organization. The use of familiar symbology makes it easier for field users of Zeno Field to transition from using paper maps, or desktop PCs, to using mobile devices with small, quarter-VGA screens.

Zeno Field supports simple and complex symbology. Complex symbology will result in slower draw performance on a Windows Mobile device. For example, a simple red line with a width of 1 will draw quicker than a freeway line symbol that has a red line drawn over a thicker black line. To improve performance, you can select a more simple symbol and/or set display scale ranges for your layers.

How symbology works in Zeno Field

Zeno Field has two levels of symbology: simple and complex. Simple symbology refers to the basic style of the symbol. For example, a line layer's simple symbology can be set in Zeno Field as a dashed line, a thickness of three pixels, and the color red. Complex symbology refers to symbology that is specified using a choice of marker (point), line, and fill (polygon) symbols from standard Style sheets or in the Zeno Field Layer file (.apl) using the Zeno Field Data Management tools. Zeno Field supports most of the symbols available in Zeno Office therefore making the transition from your desktop GIS to the field much easier.

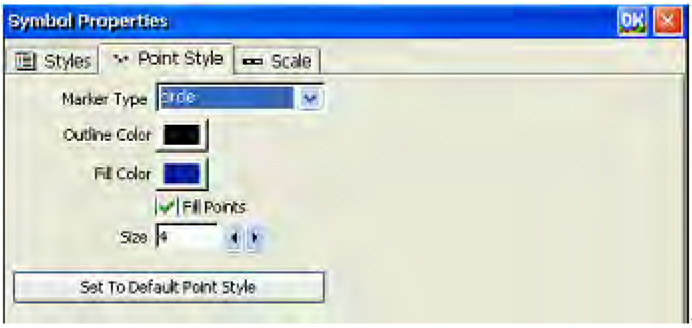
Simple symbology

Simple symbology is specified and changed in Zeno Field using the Point, Line, or Polygon Style page of the Symbol Properties dialog box. The Symbol Properties dialog box is accessed via the Legend in the Table of Contents, the Symbology tab in the Layer Properties dialog box, or via the Symbology page in the Feature Properties dialog box.

The Style page can be defined for point (marker), line, and polygon (fill) layers. Once the style is set for a layer or for a subset of features within a layer, all the features in that category will have the same symbol.

The following styles can be set depending on the type of layer:

- Point Layer: In Zeno Field, you can set the point marker to be a circle, square, triangle, cross, star, or diamond. In addition, you can set the outline color, the fill color, and the size of the marker.
- Line Layer: In Zeno Field, you can set the line style to be solid, dash, dot, dash dot, or dash dot dot. In addition, you can set the thickness and the color of the line.
- Polygon Layer: In Zeno Field, you can set the polygon to be filled or unfilled. In addition, you can set the outline style (solid, dash, dot, dash dot, dash dot dot), thickness, and color, as well as the fill color of the polygon.



Style page for a point layer

Use the Set to Default Point (Line, Polygon) Style button to clear any symbology setting for the layer before setting new simple symbology settings.

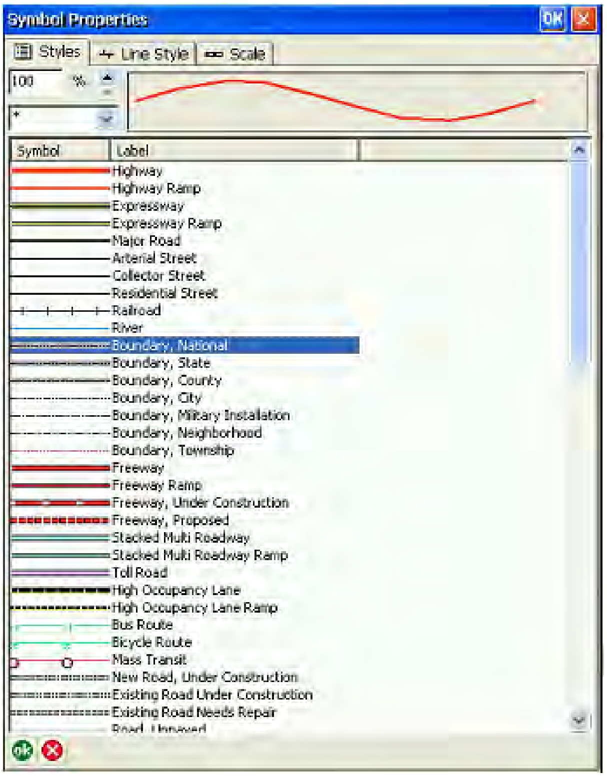
Complex symbology

Zeno Field supports a wide range of complex symbols making the transition from your desktop to the field much easier. With the capbility to use the same symbology from your desktop GIS in the field with Zeno Field, you can maintain a mapping standard across your office and mobile GIS applications.

Zeno Office includes more than 18,000 predefined symbols, the majority of which can be used in Zeno Field either via predefined styles or via styles exported with the Zeno Field Data Management tools.

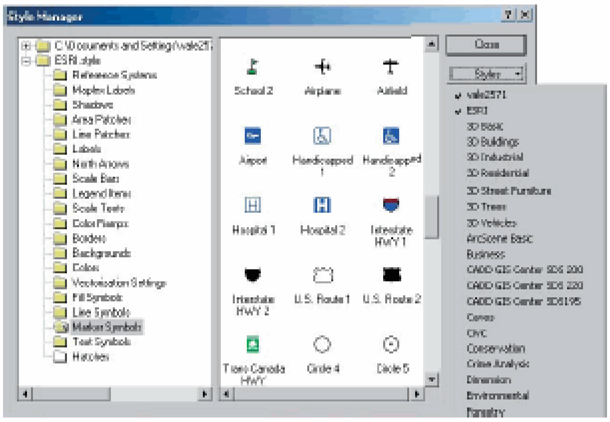
Working with styles and symbols

Styles are a collection of predefined colors, symbols, and properties of symbols that allow you to maintain a mapping standard and promote consistency in your organization’s mapping products, whether you are working on the desktop or in the field. By default, Zeno Field includes the text, marker, line, and fill symbols from the Leica Geosystems.Style, allowing you to select from an extensive list of commonly used symbols. Changes to symbology can be made directly in Zeno Field with the use of Styles.



Select from an extensive list of available symbols in Zeno Field

In addition, you can create your own styles or export any of the other styles that are available in Zeno Office including commonly used symbols for conservation, forestry, and utility applications or projects. This gives you field access to almost all of the symbology available in your desktop GIS applications.



The Style Manager in Zeno Office includes a comprehensive selection of symbols and styles which can be exported for use in Zeno Field.

Exporting symbology from Zeno Office.

Complex symbology can also be created by exporting the legend information from Zeno Office to an Zeno Field Layer file (.apl) using the ‘Export shapefile symbology for Zeno Field or the ‘Get Data for Zeno Field' tools in the Zeno Field Data Management tools. This enables a seamless integration between the maps you create on your desktop to Zeno Field and the field.

Supported symbols

Zeno Field supports the majority of the 18,000 predefined symbols that are included with Zeno Office.

Symbology categories

Simple symbology can be defined in Zeno Field and complex symbology categories can only be defined using the Zeno Field Data Management tools for Zeno Office. For point, line, and polygon layers, Zeno Field supports the following symbology categories:

- Single Symbol: Drawing your data with a single symbol gives you a sense of how features are distributed—whether they are clustered or dispersed. An extensive list of complex symbols are available to you in Zeno Field. Alternatively, you can define simple symbology in Zeno Field or you can define complex symbols using the Zeno Field Data Management tools.
- Graduated Color: When you need to map quantities of things, you might choose to use a graduated color map. Graduated color maps have a series of symbols whose colors change according to the values of a particular attribute.
- Graduated Symbol: Another way to represent quantities is to vary the size of the symbol with which a feature is drawn. Like graduated color maps, graduated symbol maps are most useful for showing rank or progression values; however, instead of using color to represent the differences in values, the size of the symbol varies.
- Unique Symbol: On a unique values map, you draw features based on an attribute value or characteristic that identifies them. Typically, each unique value is symbolized with a different color.

Displaying quality

The display quality of your symbols directly affects the speed at which Zeno Field draws them. Under certain conditions, you may want to sacrifice the display quality of your symbology in exchange for a faster drawing speed. Zeno Field uses greeking to quickly display symbols at a lower threshold of quality so that they draw faster.

Greeking is a method of displaying small text or symbols by software programs. Because some text or symbols are too small to display, more simple characters or lines are used to display that text. The color and the general shape of the symbol are maintained but the details of the symbol are simplified. Greeking for points, lines, polygons, and multipoint features can be turned on or off via the Display Quality page of the Advanced Settings dialog box. These properties are stored in the Zeno FieldPrefs.apx file.

Display Thresholds

Display thresholds or greeking can be enabled or disabled in the Advanced Settings dialog box for points, lines, polygons, and mulitpoints. You can also change the greeking thresholds by editing the Zeno FieldPrefs.apx file.

The following display thresholds exist for each geometry type:

Point

- Threshold 1: Draw as a single pixel.
- Threshold 2: Draw using the real symbol's greeking style.

Line

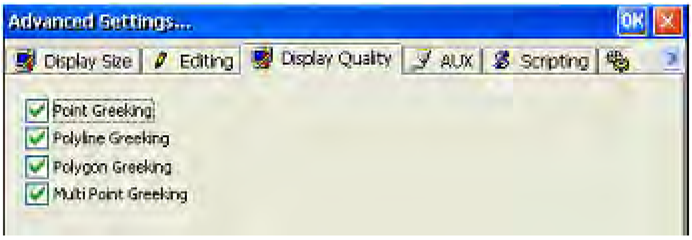
- Threshold 1: Draw as a single pixel.
- Threshold 2: Draw as a greeking colored hairline.
- Threshold 3: Draw using the real symbol's greeking style.

Polygon

- Threshold 1: Draw as a single pixel
- Threshold 2: Draw as a rectangle.
- Threshold 3: Draw as a greeking colored polygon (no outline).
- Threshold 4: Draw using the real symbol's greeking style.

Multipoint

- Threshold 1: Draw as a single pixel.
- Threshold 2: Draw using the real symbol's greeking style.



Greeking for each geometry type can be turned on or off in the Advanced Settings dialog box.

Displaying symbology

Overview of displaying symbology

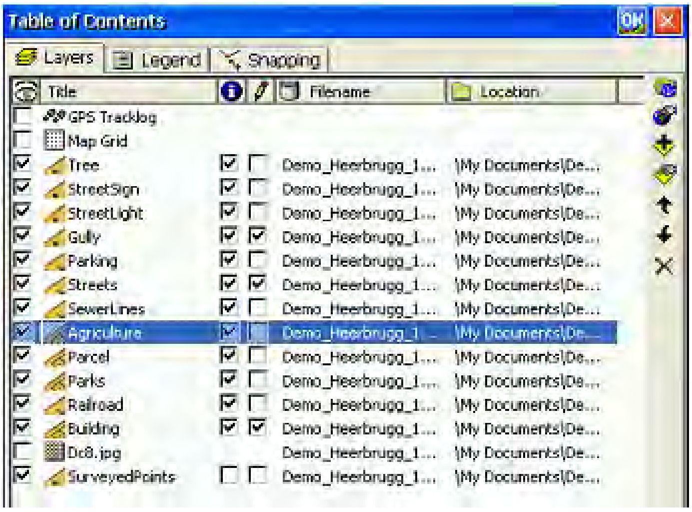
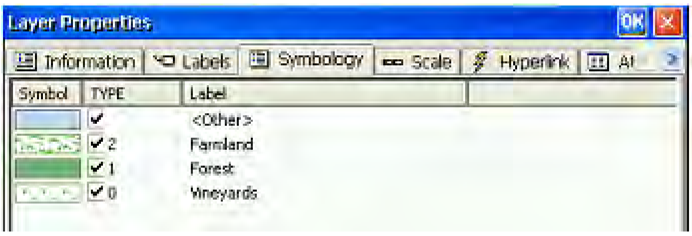
The Legend page in the Table of Contents displays the layers of the current Zeno Field map with their associated symbology. Within the Legend, you can turn layers or a subset of layers on and off based on their symbology. The Symbol Properties dialog box can be accessed via the Legend by tapping on individual symbols.

Alternatively, you can view an individual layer's symbology by selecting a layer in the Table of Contents and opening its properties, or in the Symbology page of the Feature Properties dialog box.

Displaying the current maps symbology

Step	Action
1	Tap the Table of Contents button. 
2	Tap the Legend tab in the Table of Contents.
3	To display/hide the details of a layer's symbology, tap on the plus/minus, +/-, symbol next to the layer name or double tap the layer's icon.
4	To open the legend for all layers, tap the Layers icon at the top of the legend. 
5	To view a symbol's properties, tap on the symbol. The Symbol Properties dialog box opens and enables you to define the simple or complex symbology.
6	Tap OK when you are finished.

Displaying a layers symbology

Step	Action
1	Tap the Table of Contents button. 
2	Tap the layer you wish to display symbology for. 
3	Open the Layer's properties by either double-tapping on the selected layer or tapping the Layer Properties button .
4	Tap the arrows to navigate to the Symbology page and tap on the Symbology tab. Zeno Field displays the layer's symbology.
5	Uncheck or check any of the symbol check boxes.  When checked, the symbol shown will be used to display features with the corresponding attribute values. When unchecked, no symbol will be displayed for features with the corresponding attribute value.

6	To view a symbol's properties, tap on the symbol. The Symbol Properties dialog box opens and enables you to define your simple and complex symbology.
7	Tap OK.

Adding a new legend category: You can add a new legend category by tapping the button. You can then specify the symbol, field value and label for the new category.

Tap the button to save the changes to the legend to the Zeno Field Layer file (.apl).

Deleting a legend category: You can delete a legend category by tapping the legend category to be deleted. The delete button will appear when a legend category has been selected. Tap the delete button to delete the selected legend category.

Tap the button to save the changes to the legend to the Zeno Field Layer file (.apl).

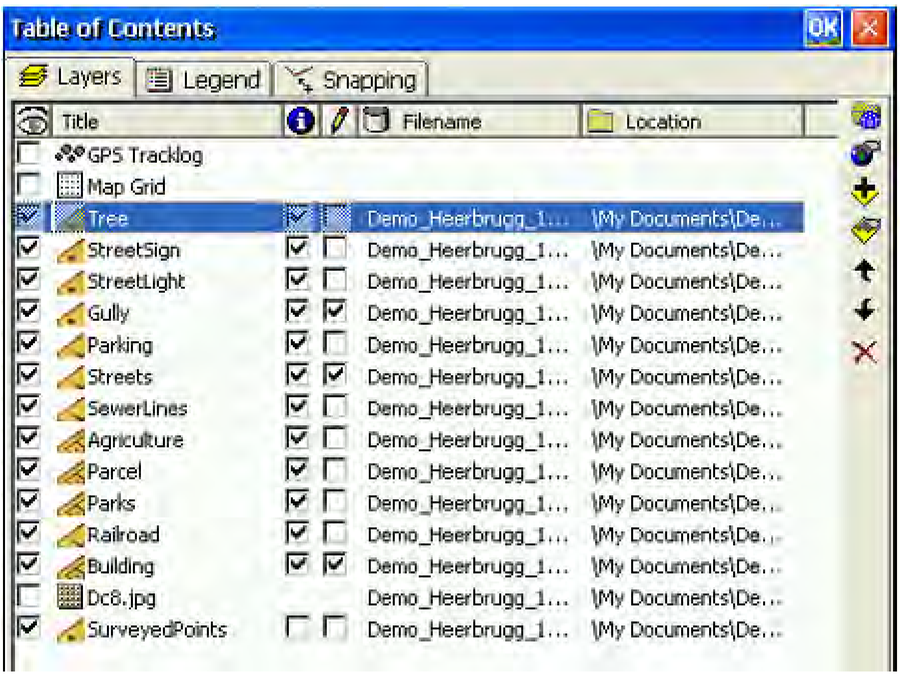
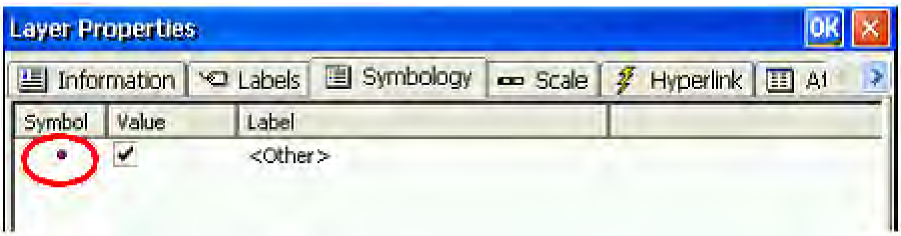
Defining simple symbology in Zeno Field

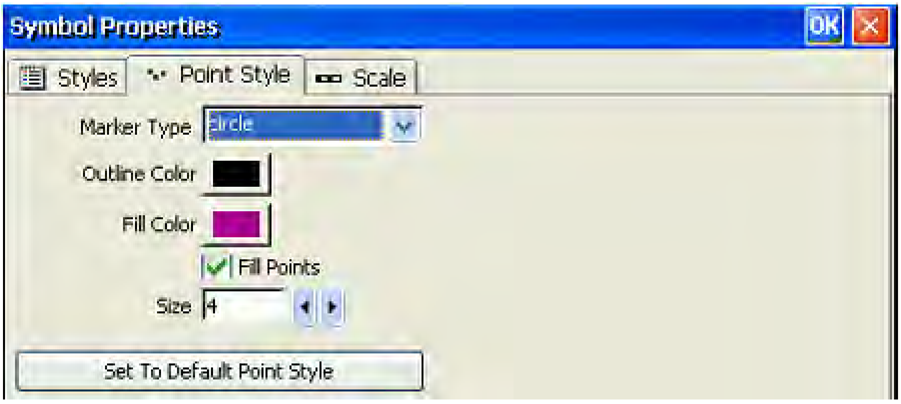
Overview of defining simple symbology in Zeno Field

Simple symbology is specified and changed in Zeno Field using the Point, Line, or Polygon Style page of the Symbology Properties dialog box. The Symbol Properties dialog box is accessed via the Legend, or the Symbology tab in the Layer Properties dialog box, or the Symbology page in the Feature Properties dialog box.

The Symbology can be defined for point, line, and polygon layers. Once the symbology is set for a layer or for a subset of features within a layer, all the features in that category will have the same symbol.

Defining a point layers simple symbology

Step	Action
1	Tap the Table of Contents button. 
2	Tap the layer you would like to set a style for. 
3	Open the Layer Properties dialog box by either doubletapping on the selected layer or tapping the Layer Properties button .
4	Tap the arrows to navigate to the Symbology page. 
5	Tap the displayed symbol. The Symbol Properties dialog box opens.
6	Tap the Point Style page on the Symbol Properties dialog box. There are also Line and Polygon Style pages to set the style for line and polygon

	layers, respectively. 
7	Select the marker type and set the outline and fill color, and the size of the point symbol.
8	Tap OK on the Symbol Properties dialog box.
9	Tap OK on the Layer Properties dialog box. Tip

Set to Default Style : If you tap Set to Default Point (Line, Polygon) Style, Zeno Field will set the point (or line or polygon) marker to the default settings. You can then make any necessary adjustments to the default.

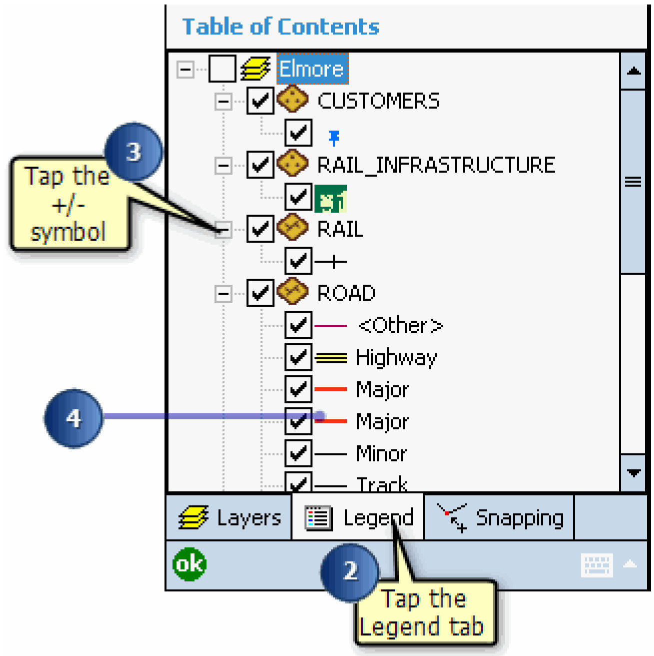
Overview of defining complex symbology in Zeno Field

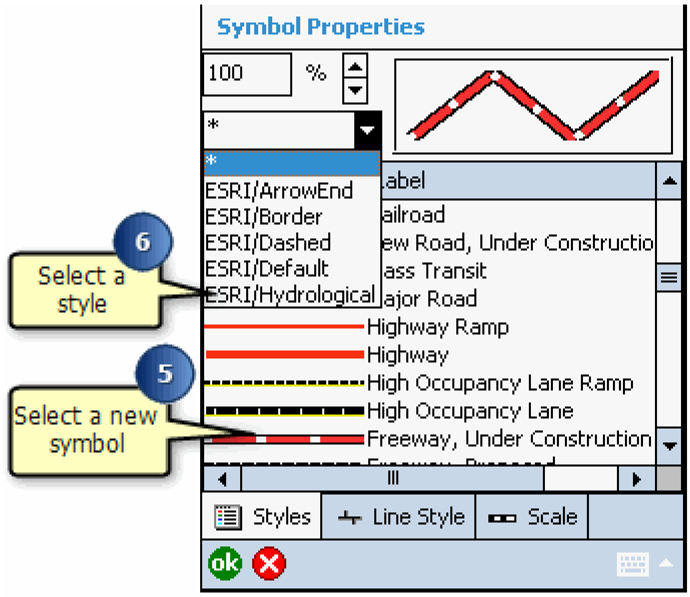
The Symbol Properties dialog box is used to define complex symbology in Zeno Field. From the Styles page, you can select from an extensive list of point, line, or polygon (fill) symbols. Zeno Field enables you to select a symbol but you cannot change the properties of a complex symbol in Zeno Field.

Complex symbols are imported into Zeno Field via the Zeno Field Data Management tools. By default, Zeno Field includes the text, marker, line, and polygon symbols from the Leica Geosystems Style sheet.

☞ **Displaying symbol properties:** You can also display the Symbol Properties dialog box by tapping on a symbol from the Symbology page of the Layer Properties dialog box, or from the Symbology page of the Feature Properties dialog box.

Steps to define complex symbology

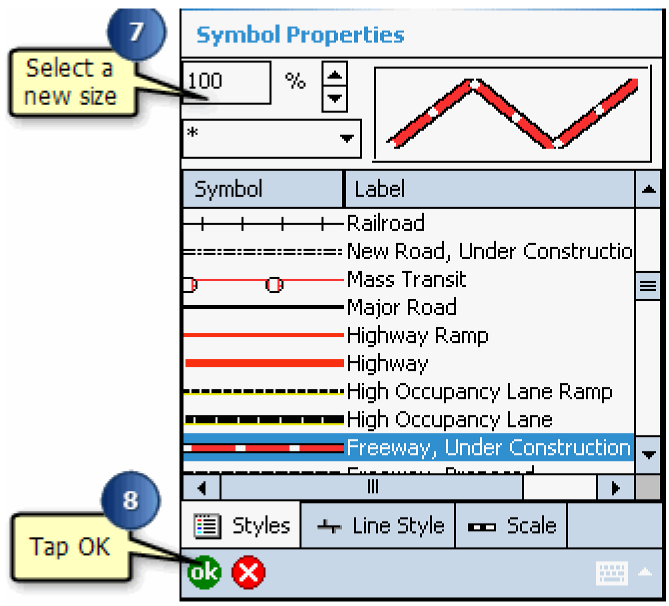
Step	Action
1	Tap the Table of Contents button.
2	Tap the Legend tab.
3	To display/hide the details of a layer's symbology, tap on the plus/minus, +/-, symbol next to the layer name. 
4	Tap the symbol you would like to change. The Symbol Properties dialog box opens and enables you to define your simple and complex symbology.
5	To select a new symbol, tap on the appropriate symbol. The new symbol is displayed in the showcase box at the top right of your screen.

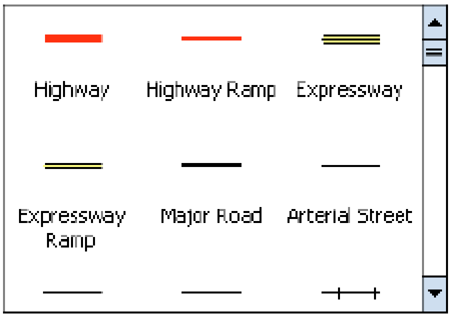


6 To view the symbols from a specific style, tap the appropriate style in the selection box.

By default, the symbols from all imported styles are displayed, designated by the * symbol.

7 The percent box illustrates what the symbol will look like at the specified size. This setting is useful if you have defined a reference scale for the layer's symbology. Use the scroll bars or type the new percentage in the given box.



	
8	Tap OK on the Styles page of the Symbol Properties dialog box.
9	Tap OK on the Table of Contents.

Arranging the list of symbols: By default, the symbols are displayed in the same order as their respective stylesheet. Tapping the Label colum heading will sort the symbols in ascending order based on the name of the label. To sort in descending order, tap the Label heading column again. Tapping the Symbol column heading will display the symbols in icon view. By default, they are displayed in list view.

Working with scale-dependent symbology

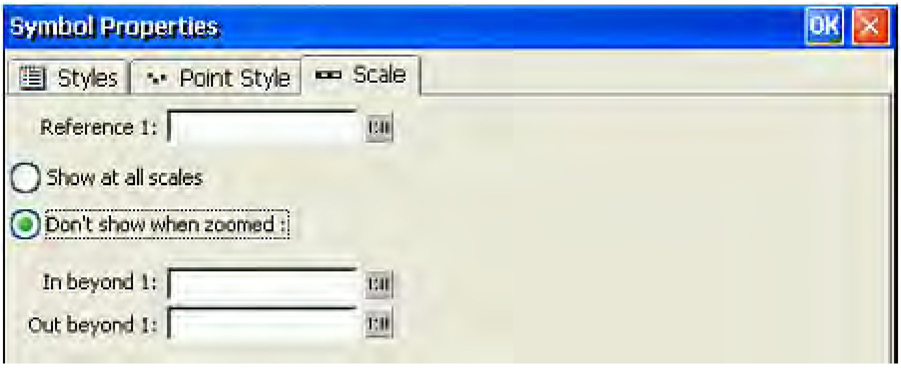
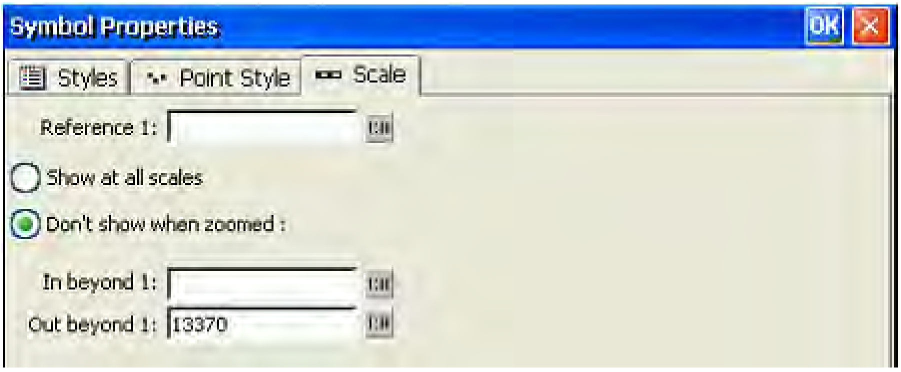
The Scale page of the Symbology Properties dialog box is used to specify the minimum and maximum display scales for a layer's symbology. When Show at all scales is selected, the layer's symbology will be displayed regardless of the current map scale. When Don't show when zoomed: is selected, the symbol will only be displayed when the map scale is within the range specified in the In beyond 1: and Out beyond 1: fields.

The Reference 1: scale specifies at which scale the symbol will be displayed at the defined size. The symbol will be shown larger when zoomed in, and smaller when zoomed out.

The 1:N scale button is used to capture the scale of the current map's view in Zeno Field.

Set scale-dependent layers and labels: You can also set minimum and maximum display scales for an entire layer and for the labels of a layer.

Defining scale dependencies to display symbology

Step	Action
1	From the Symbol Properties dialog box, tap Scale. 
2	Tap the Don't show when zoomed: radio button.
3	Tap the 1:N button to capture the current map's scale.
4	Set the minimum and maximum scale ranges, as needed. 
5	Tap OK.

Labeling features with text

Zeno Field allows you to label features with text. The Text Label field is supported for point, line, and polygon layers.

The Labels page of the Layer Properties dialog box is used to specify display settings for labels of a point, line, or polygon layer. You can specify the attribute field for the label text; the size, color, and type of font; the reference scale for the label text; the placement for point and line features; and the display scale range of the label text.

Importing text symbols from Zeno Office styles: The text symbols from the Zeno Office Styles can be imported into Zeno Field using the Zeno Field Data Management tools. See section, Zeno Field Data Management tools for ArcGIS, for more information.

Using an expression to label your features: Zeno Field enables you to use an expression to label your features. Expressions can be any valid script in the default script language (e.g., VBScript or JScript).

Following standard scripting notation, string literals must be enclosed in quotation marks, attribute fields are accessed via the [fieldname] technique, and the CStr function can be used to concatenate numeric fields. Zeno Field automatically converts any resultant expression into a string.

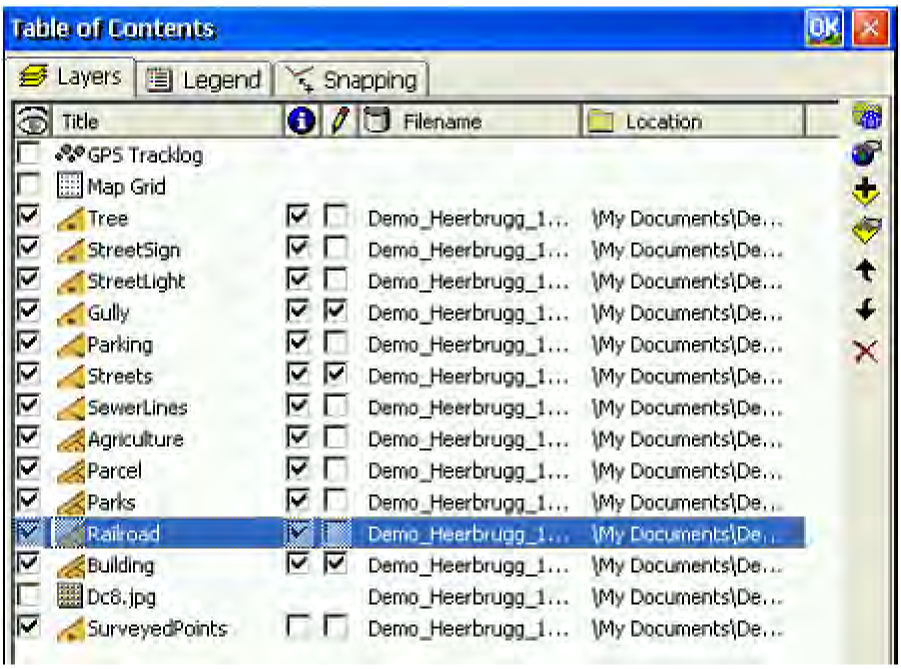
For example, the following VBScript expression will result in a stacked label of two fields, NAME and YEAR..

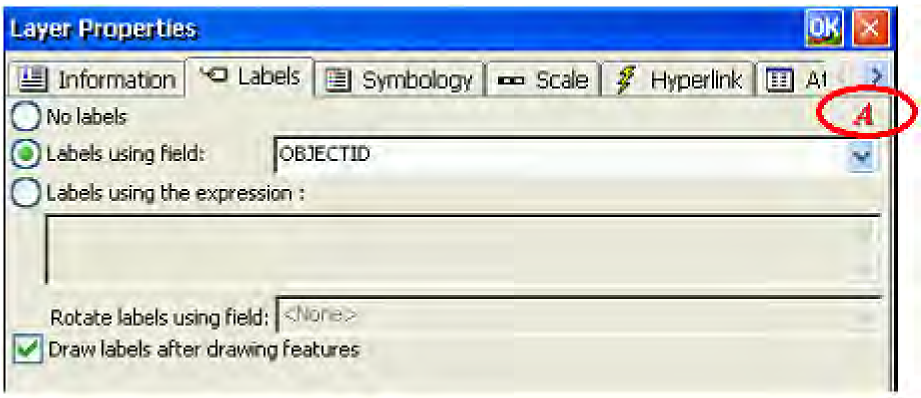
[NAME] & vbCrLf & [Year]

The following VBScript expression will result in a label showing a caption followed by the area. The area is calculated from two fields, WIDTH and LENGTH.

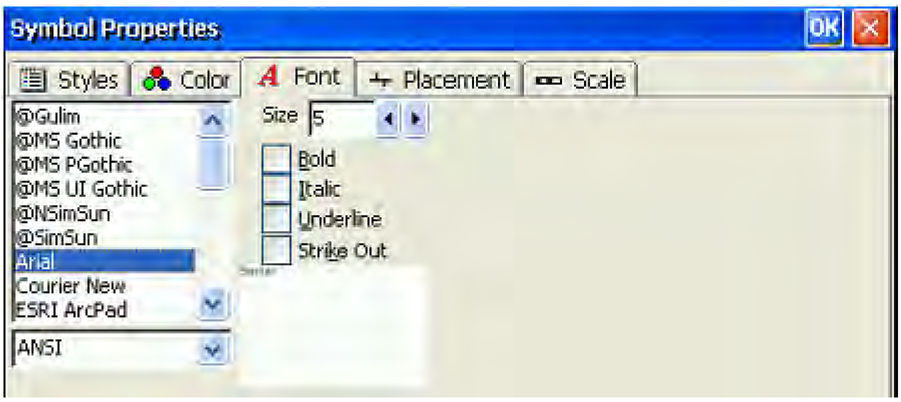
“Area=” [WIDTH] * [LENGTH]

Steps to label feature with text

<table>
<tr><th>Step</th><th>Action</th></tr>
<tr><td>1</td><td>Tap the Table of Contents button.
</td></tr>
<tr><td>2</td><td>Tap the layer you wish to label with text.

</td></tr>
<tr><td>3</td><td>Open the Layer’s properties by either double-tapping on the selected layer or tapping the Layer Properties button.</td></tr>
<tr><td>4</td><td>Tap the arrows to navigate to the Labels page and tap the Labels tab.</td></tr>
<tr><td>5</td><td>Check the Labels using field: radio button.</td></tr>
</table>

<table>
<tr><td></td><td>
</td></tr>
<tr><td>6</td><td>Select an attribute field for the label text or, optionally, enter an expression to specify your labels.</td></tr>
<tr><td>7</td><td>Tap the Label properties button.

The Label Properties dialog box opens.</td></tr>
<tr><td>8</td><td>Tap the arrows to navigate through the label properties.


</td></tr>
<tr><td>9</td><td>Set your label properties including color, font type, size, style, placement, and scale.</td></tr>
<tr><td>10</td><td>When finished, tap OK. .</td></tr>
<tr><td>11</td><td>Tap OK to close the Layer Properties dialog box</td></tr>
</table>

Querying data

Querying your data

When you are out in the field, Zeno Field gives you the ability to compare your data directly to geographic features in the form of a map. More importantly, Zeno Field provides the tools to query your data to solve problems and retrieve information directly in the field.

With Zeno Field you can:

- Discover information about features by tapping on them
- Display additional information about features through a picture, video, or voice recording
- Locate a feature within the extent of your map, label it, and zoom to it
- Find a location and zoom to it
- Measure the distance between features
- Determine the area of a polygon feature

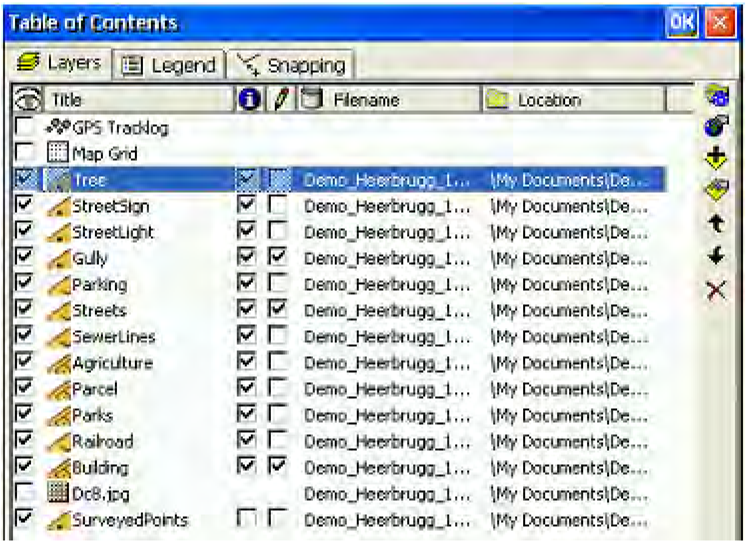
Identifying features

Overview of identifying features

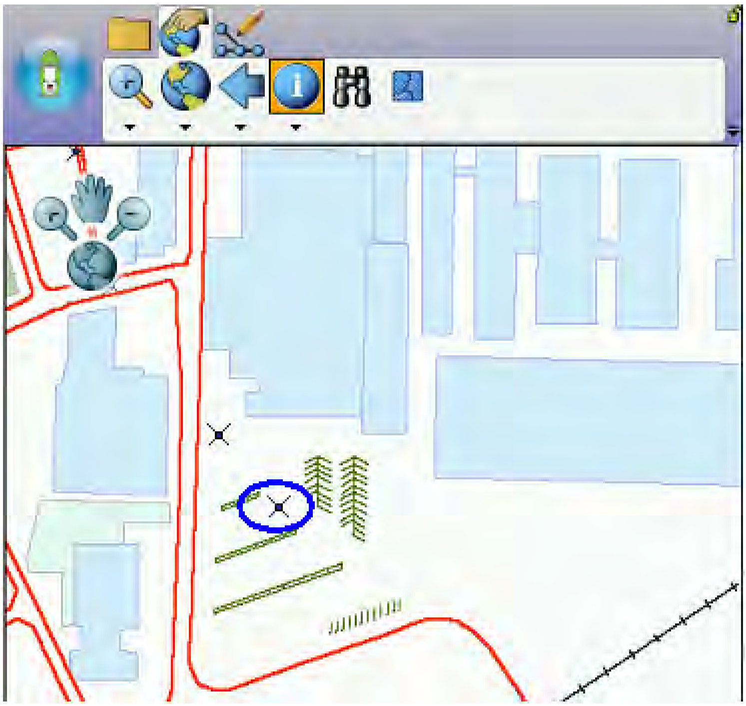
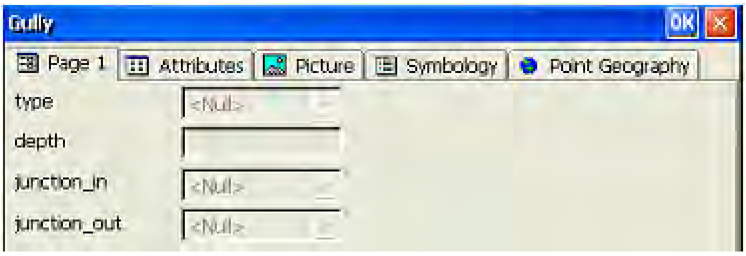
The Identify tool lets you view attribute information for a particular feature. Once a layer is selected for the Identify tool, make the Identify tool active and tap the feature, and the Feature Properties dialog box is displayed. By default, the Feature Properties dialog box includes pages for Attributes, Picture, Symbology, and Geography. If a custom form exists for the feature, it will be displayed. You cannot edit your data using the Identify tool; you can only view it.

Selecting layers for the Identify tool: Tap the Identify button on the Layers page in the Table of Contents to activate all layers. Tap again to deactivate all layers.

Selecting a layer for the Identify tool

Step	Action
1	Tap the Table of Contents button. 
2	The Table of Contents opens on the Layers page and lists all of the layers in the current Zeno Field map. 
3	Check the Identify tool check box for the layers you would like to retrieve information for.
4	Tap OK.

Using the Identify tool

Step	Action
1	Tap the Identify button on the Browse toolbar.
2	Tap the feature you would like to identify.  The Feature Properties dialog box or, if it exists, a custom form, is displayed. 
3	Tap the X button .

Increasing the pen tolerance to select features: Increase your pen tolerance if you are having difficulty selecting a feature. The pen tolerance can be set in the Display page of the Options dialog box.

What is included in the Feature Properties dialog box? : By default, the Feature Properties dialog box includes pages for Attributes, Picture, Symbology, and Geography. If a custom form exists for the feature, it will be displayed. You cannot edit your data using the Identify tool; you can only view it.

Using the Label tool

Overview of using the Label tool

The Label tool lets you place temporary labels on the map for the selected feature. When you tap the map while the Label tool is active, Zeno Field searches the layers from the top of the Table of Contents, and places a label for the first feature it finds. The layers do not have to be active for Identify in order to be labeled with the Label tool. If no feature is found, Zeno Field places a "Nothing found" message in the status bar.

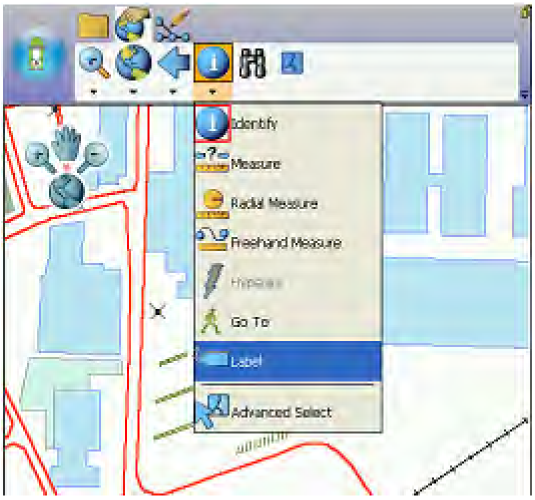
For the label title, Zeno Field searches for fields called NAME, TITLE, or ID—or the first field if none of these fields exist.

For the label comments, Zeno Field searches for fields called COMMENTS, DESCRIPTION, DESC, or DESCRIPTIO—no comment is display if none of these fields exist.

The Label tool displays a maximum of 10 labels. The first label is removed when the eleventh label is placed.

Removing all labels from the map: Tap the Clear Selected Features tool to remove all labels from the map.

Steps to use the Label tools

Step	Action
1	Tap the drop-down arrow below the Identify button. 
2	Tap Label. The Label tool is activated, and the Label button is depressed and promoted onto the toolbar.
3	Tap the feature that you want to label. Zeno Field places a temporary label for the first feature that it finds. If needed, continue to tap additional features to label.

Hyperlinks

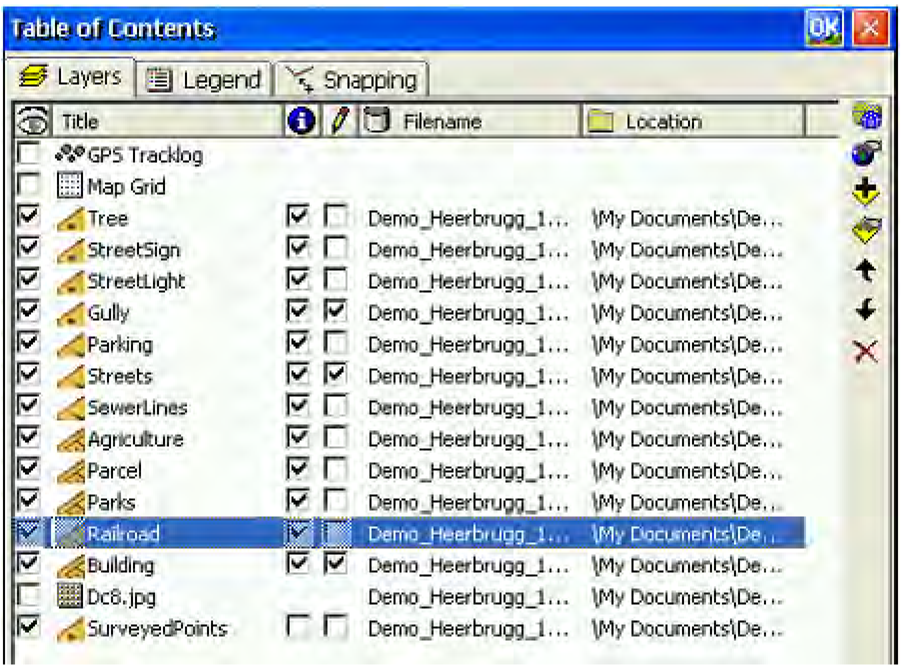
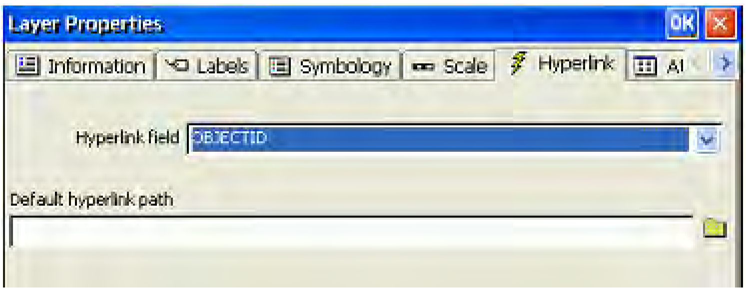
Overview of hyperlinks

Hyperlinks provide an additional way to present information about your map features. With hyperlinks, you can display photographs, play videos, and access Web pages over the Internet for a particular feature on your map.

A hyperlink is a document path and name or a Web page address stored with the feature. A hyperlink field within a layer can be any text field which contains a file name or URL. To activate a hyperlink in Zeno Field, select a field to be assigned to the Hyperlink tool in the Layer Properties dialog box.

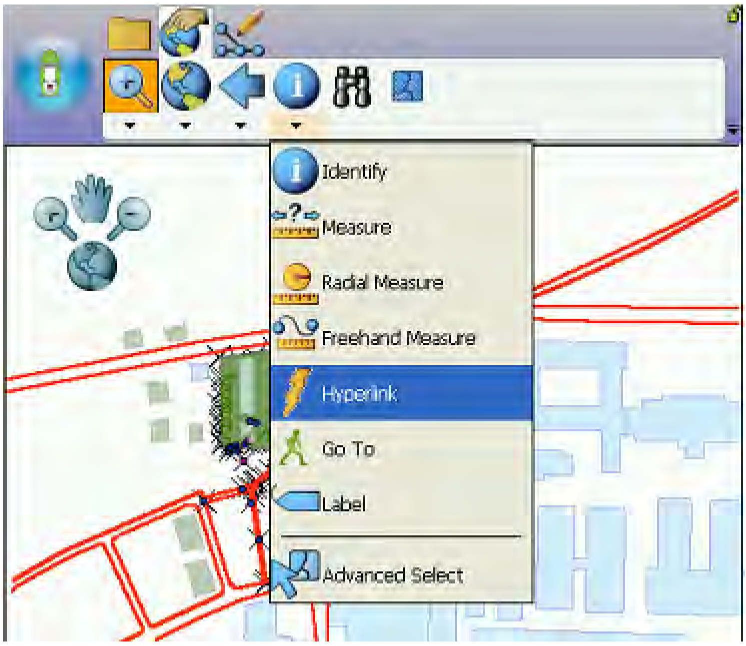
Specifying the default hyperlink path: You can specify a default hyperlink path, which is added as a prefix if the hyperlink file name does not already include a path. There is no need to specify a default hyperlink path if the hyperlink files are located in the same folder as the data for your Zeno Field map.

Activating hyperlinks

<table>
<tr><th>Step</th><th>Action</th></tr>
<tr><td>1</td><td>Tap the Table of Contents button.
</td></tr>
<tr><td>2</td><td>Tap the layer that you wish to activate a hyperlink for.

</td></tr>
<tr><td>3</td><td>Tap the Layer Properties button.</td></tr>
<tr><td>4</td><td>Tap the right arrow to navigate to the Hyperlink page.</td></tr>
<tr><td>5</td><td>Tap the Hyperlink tab.

</td></tr>
<tr><td>6</td><td>Select the Hyperlink field where the file path or Web address is stored.</td></tr>
</table>

	Optionally specify a default hyperlink path.
7	Tap OK.
8	Tap OK on the Layers page of the Table of Contents.

Using hyperlinks

Step	Action
1	Once hyperlinks have been activated for a layer, tap the drop-down arrow below the Identify button.
2	Tap Hyperlink. The hyperlink tool is activated, and the Hyperlink button is depressed and promoted onto the toolbar. 
3	Tap the feature for which you would like to display a hyperlink. Zeno Field launches the program associated with your hyperlink, and it is displayed on the screen

	
4	Tap OK to close the external application and return to Zeno Field.

Displaying hyperlinked documents: Hyperlinks in Zeno Field are links to external programs. They are not opened directly in Zeno Field. If you specify a Web address as a hyperlink, you must start the address with http://—for example, http://www.leica-geosystems.com. Zeno Field then launches your default Web browser and displays the Web page, if you are connected to the Internet. If you specify a photograph or video as a hyperlink, Zeno Field will launch the associated program that will then open the document.

Troubleshooting hyperlinks: Hyperlinks will fail to launch for one of the following reasons:

- There is no program associated with the hyperlink file.
- The associated program cannot find the file.
- The Web address does not start with http://.
- The Internet connection is unavailable.

Finding features

Overview of finding features

The Find tool can be used to select features from a layer using a search query, or to find a specific location. The Find tool consists of three default pages: Query, Results, and Location. A custom query form will also be displayed, if present.

The results of the query are displayed in a list on the Results page. Once a list of queried features is displayed, you can select a feature and perform one of the following actions on that feature:

- View information about the feature using the Identify tool.
- Edit the feature's properties through the Feature Properties dialog box or a custom form, if one exists.
- Zoom to the feature and label it.
- Select a feature and make it the current navigation target.
- Center the selected feature on the screen.
- Select the feature for editing.

The results of the query also include a distance (DST) column which shows basic navigational information for each feature relative to the current GPS position—or relative to the center of the map if there is no GPS position.

This navigational information includes a directional arrow, relative to True North; a distance, using the current display units; and an abbreviated compass direction, for example NW for northwest.

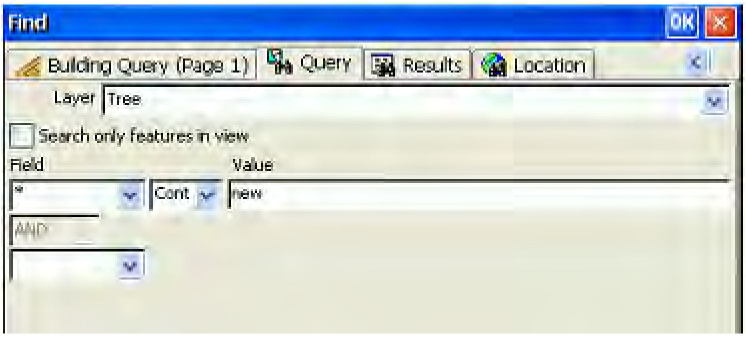
The features can be sorted by distance by tapping on the DST column heading. Tapping the DST column heading once will sort by increasing distance, tapping a second time will sort by decreasing distance.

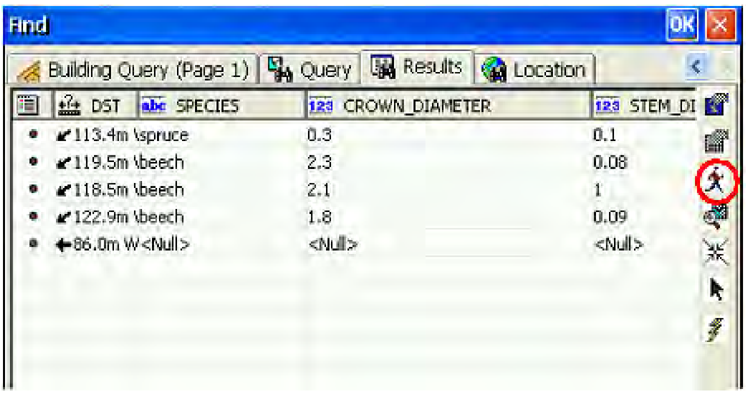
Search only features in view: Tap the 'Search only features in view' check box to limit the search to the features in the current map view.

Saving your search parameters: The search parameters that you have selected and entered are saved to the Zeno Field Layer file (.apl) when you tap the OK button on the Query page to view the results. The search parameters are not saved when you tap the Results page tab to view the results.

Search parameters are saved (and recalled) for each layer selected.

Using the Find tool to query data

Step	Action
1	Tap the Find button on the Browse toolbar.  The Find dialog box opens.
2	On the Query page, tap the Layer drop-down list to select the layer to search on.
3	Optionally tap the Field dropdown list to select the field that you wish to search on, or use the default "*" to search all fields in the layer. You can also optionally select an operator, or use the default "Contains" operator. 
4	Optionally enter in a value to search on. All the records in the layer will be returned if no value is entered.
5	Optionally select a second field to search on by tapping the second Field drop-down list. The AND/OR drop-down list is automatically enabled when a second search field is selected. You can search on up to three fields using the AND/OR operators.
6	Tap OK, or tap the Results page to execute the query and view the results of the query. The results list can be sorted by tapping any of the column headings. Tapping a column heading once will sort the column in ascending order. Tapping a second time will sort in descending order.

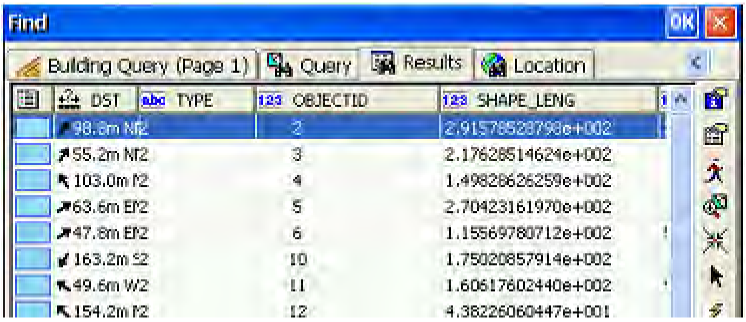
<table>
<tr><td></td><td>
</td></tr>
<tr><td>7</td><td>Tap the feature you are searching for.</td></tr>
</table>

Using a custom query form to query data

Step	Action
1	Tap the Find button on the Browse toolbar. The Find dialog box opens. Any custom query forms will be displayed, if present.
2	Enter and select any search parameters that are needed.
3	Tap OK, or tap the Results page to execute the query and view the results of the query.

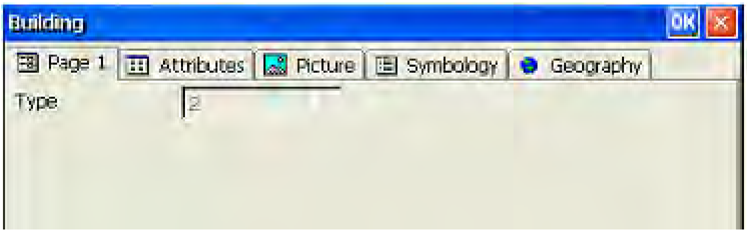
Using a Identify tool on your query

<table>
<tr><th>Step</th><th>Action</th></tr>
<tr><td>1</td><td>Tap the feature you would like to find information about.



</td></tr>
<tr><td>2</td><td>Tap the Identify tool.

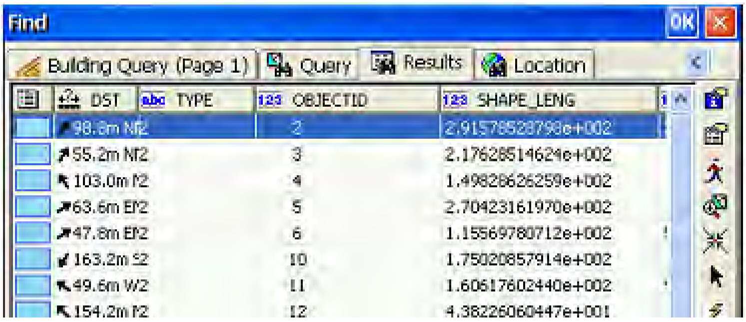
Zeno Field displays the Feature Properties dialog box for that feature or a custom form if it exists. You can simply view the information and not edit it.</td></tr>
<tr><td>3</td><td>Tap X.



Zeno Field returns to the list of queried features.</td></tr>
</table>

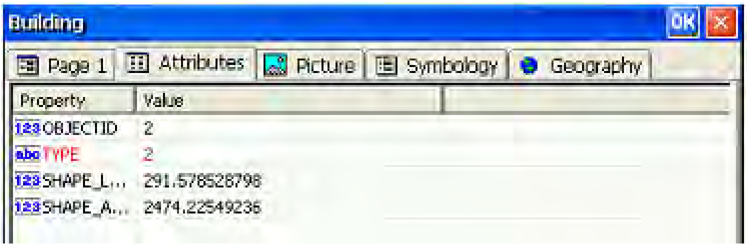
Using the Feature Properties tool on your query

<table>
<tr><th>Step</th><th>Action</th></tr>
<tr><td>1</td><td>Tap the feature for which you would like to display its properties.



</td></tr>
<tr><td>2</td><td>Tap the Feature Properties button.

The Feature Properties dialog box or custom form displays, if one exists. The feature properties can be edited through this method. the layer must be set as editable in order for the Feature Properties button to be enabled.



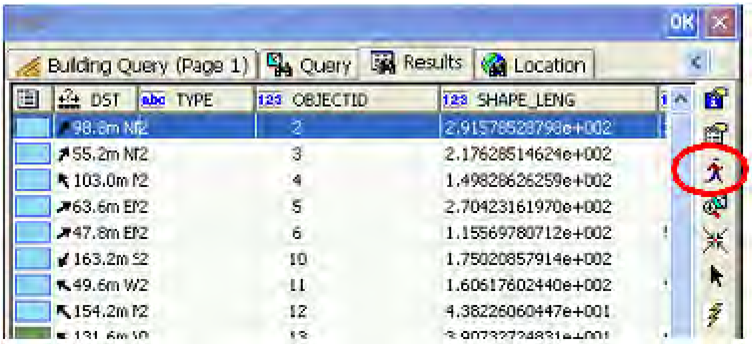
</td></tr>
<tr><td>3</td><td>Tap OK.

Zeno Field returns to the list of queried features.</td></tr>
</table>

Editing with the Find tool: If the Feature Properties button is unavailable once you have selected your feature, you have not selected this feature to be editable via the Start/Stop Editing tool on the Browse toolbar or in the Table of Contents. You can only display and edit features with the Feature Properties dialog box once the layers have been made editable.

Sorting the results: To sort the results of your search in ascending or descending order, tap the column heading on the Results page of the Find dialog box.

Using the Go To tool on your query

Step	Action
1	Tap the feature you would like to select as a destination. 
2	Tap the Go To button.
3	Zeno Field zooms to the selected feature. The feature is highlighted using the current highlight color and set as the current navigation destination. The feature is also labelled using the value of the field that was searched on. If no field was specified, then the label will use the field that has any part of the word 'name' in the field name. 

Changing the highlight color of selected features: Use the Display page of the Options dialog box to change the highlight color and thickness of the box that highlights your selected feature.

Clearing the selected feature: Tap the Clear Selected Feature tool on the drop-down list to the right of the Find button on the Browse toolbar to clear the selected destination and remove its label. The feature is not deleted, it is simply unselected and therefore unhighlighted.

Note: Refer to the section Navigating with your GPS to learn how to use the Find tool and the Go To tool to select a navigation destination for your GPS

Using other tools on your query

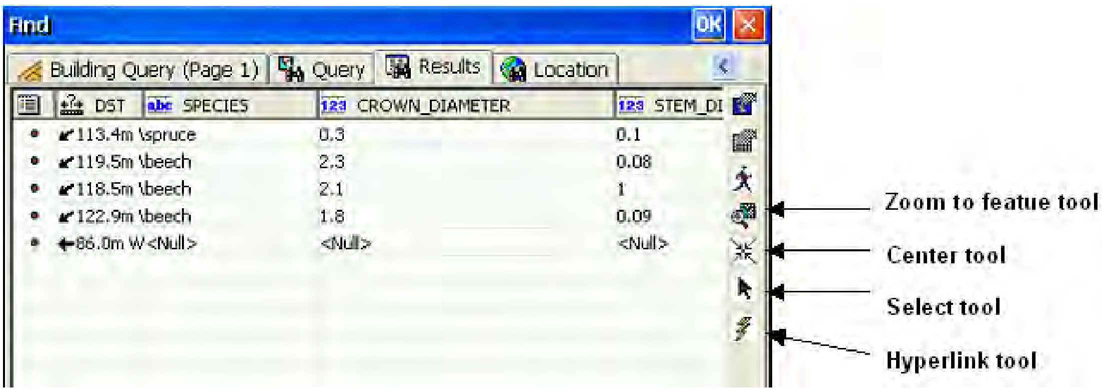
Overview of other tools

Zeno Field also includes the following tools you can perform on your query:

- Zoom to Feature: Zeno Field will zoom to the extent of the selected feature.
- Center: Zeno Field centers the selected feature on the screen. The current map scale is maintained.
- Select: The feature is highlighted— and selected—on the map.
- Hyperlink: A hyperlink for the feature is displayed. The Hyperlink button will be unavailable if the feature has no active hyperlink.

Resizing columns in the table of matched features: Tap and drag the column border in the field name row of the table to change the size of the columns.

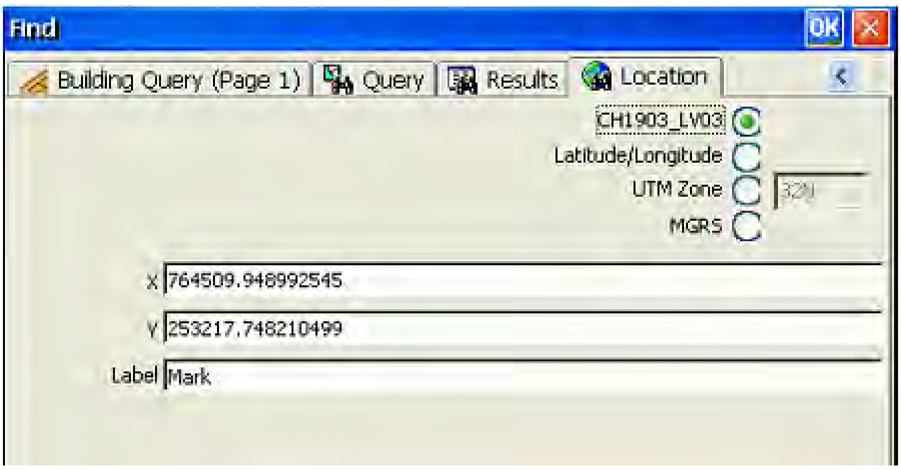
Using other tools on your query

Step	Action
1	Tap the feature you would like to query. Follow Steps 2, 3, 4, or 5, depending on what action you would like to perform.
2	Tap the Zoom to Feature tool. Zeno Field will zoom to the extent of the selected feature. 
3	Tap the Center tool. Zeno Field will center the selected feature on the screen. The current map scale is maintained.
4	Tap the Select tool. The feature is highlighted and selected.
5	Tap the Hyperlink tool. The hyperlink for the feature is displayed if there is one.

Finding a location

Using the Find tool to locate a place

The Find dialog box also enables you to find a location based on a set of coordinates. You can select from the following coordinate systems: the current map projection, Latitude–Longitude, the current UTM Zone, and MGRS. Simply enter the required information and Zeno Field will go to the location and label it. The default label is Mark.

Step	Action
1	Tap the Find button on the Browse toolbar. The Find dialog box opens. 
2	Tap the Location tab.
3	Tap the appropriate radio button for the coordinate system to be used. 
4	Enter the required coordinate information.
5	Enter a name for the label. The default is Mark.
6	Tap OK. The location is labelled on your map.

	Mark

Spatial and attribute indexes

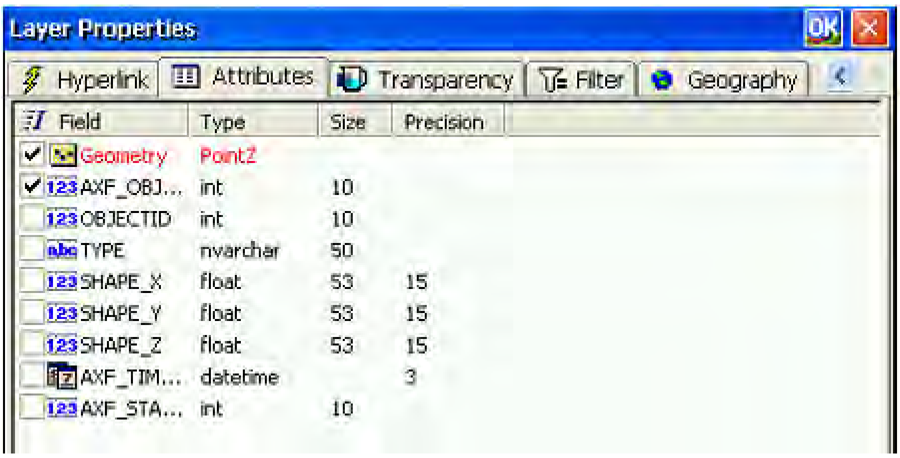
Overview of spatial and attribute indexes

An index is a data structure used to speed the search for records in a database or for spatial features in geographic datasets. Attribute indexes are used with data in tables. Spatial indexes are used with graphical queries of spatial features. Having a current spatial index ensures that a high level of performance is maintained when drawing and working with the vector layers.

Zeno Field supports spatial and attribute indexes for shapefiles and Zeno Field AXF files. The spatial index for Zeno Field AXF files are automatically created and maintained by Zeno Field. The attribute indexes are created when the AXF file is created, and are automatically maintained by Zeno Field.

You can create spatial and attribute indexes for shapefiles in Zeno Field via the Attributes page of the Layer Properties dialog box. Zeno Office is used to create spatial indexes for large shapefiles.

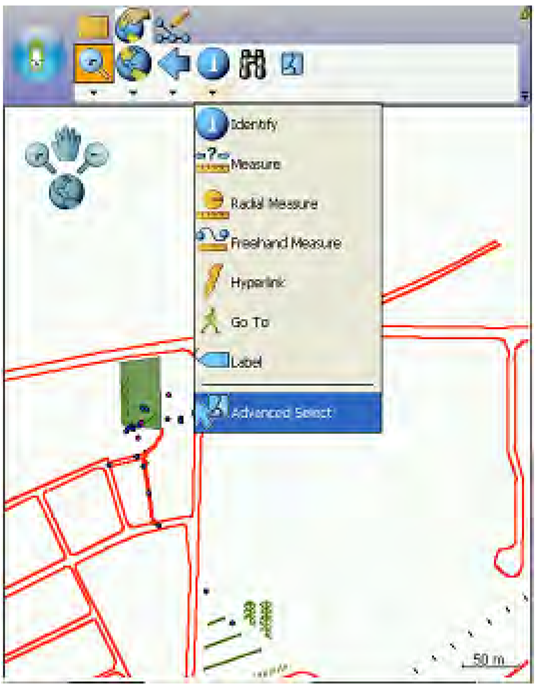
Creating a spatial and/or attribute index in Zeno Field

Step	Action
1	In the Table of Contents, select the shapefile layer you would like to create an index for.
2	Open the Layer Properties dialog box by double-clicking the layer or by tapping the Layer Properties button.
3	Tap the Attributes tab. 
4	Check the Geometry check box under the Index column to create a spatial index for the layer.
5	Check the appropriate field check box under the Index column to create an attribute index for that field.
6	Tap OK. Your indexes are created. However, the indexes are deleted when the shapefile is activated for editing. The indexes are recreated when the shapefile is deactivated for editing.

Using the Advanced Select tool

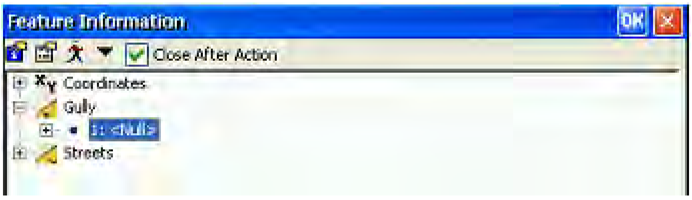
Using the Advanced Select tool

The Advanced Select tool can be used to select multiple features at once. Features are selected from the active layers for the Identify tool in the Table of Contents. One, many, or all vector layers can be activated for the Advanced Select tool. The selected features are displayed in a list.

Step	Action
1	Tap the Table of Contents button. 
2	Check the Identify check box for the layers you would like to use with the Advanced Select tool and tap OK.
3	Tap the drop-down arrow below the Identify button.
4	Tap Advanced Select. A red box around the Advanced Select tool indicates that it is active. 

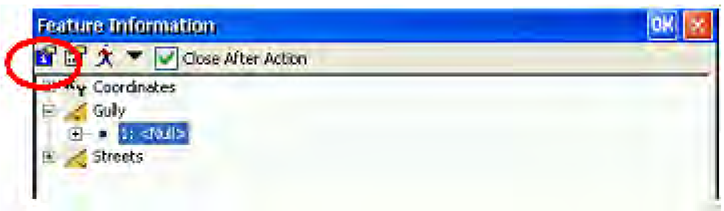
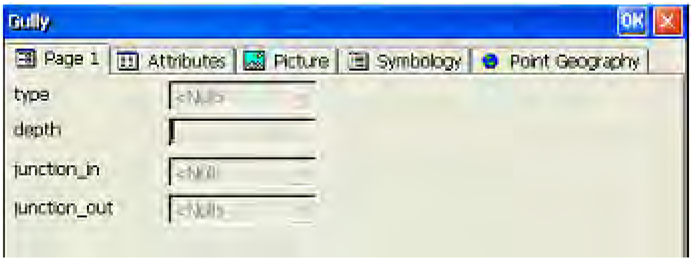
<table>
<tr><td>5</td><td>Tap the map to select a feature, or tap and drag a selection box to select multiple features from the active layers.

A list displays the coordinates where the map was tapped and the selected features. Tap the + icon to display the attributes of the selected feature.</td></tr>
<tr><td>6</td><td>Tap the feature you wish to select.

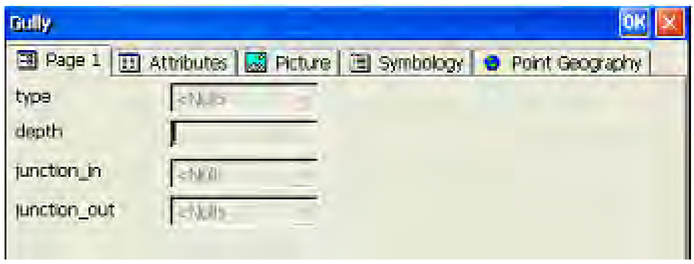

</td></tr>
</table>

Refer to the topic [Selecting a navigation destination using the Advanced Select tool]() for more information.

Using the Identify tool with the Advanced Select tool

Step	Action
1	Tap the feature you would like to find information about.
2	Uncheck the Close After Action check box if you wish to keep the Feature Information dialog box open after you Identify the feature. 
3	Tap the Identify tool. Zeno Field displays the Feature Properties dialog box for that feature or a custom form, if it exists. With the Identify form, you can only view the attribute information but you cannot edit it.
4	Tap X. 

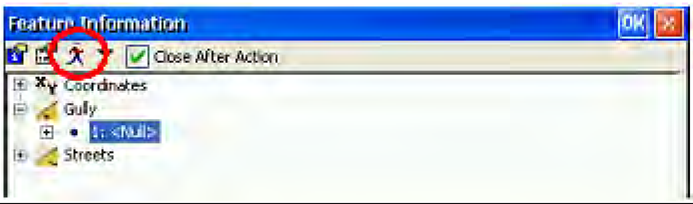
Using the Feature Properties tool with the Advanced Select tool

Step	Action
1	Tap the feature for which you would like to display its properties.
2	Uncheck the Close After Action check box if you wish to keep the Feature Information dialog box open after you view the feature’s properties. 
3	Tap the Feature Properties button. The Feature Properties dialog box or custom form displays, if one exists. The feature properties can be edited or viewed through this method. In order to edit the layer, it must be set as editable in the Table of Contents or via the Start/Stop Editing tool on the Browse toolbar.
4	Tap OK. 

Using the Go To tool with the Advanced Select tool

<table>
<tr><th>Step</th><th>Action</th></tr>
<tr><td>1</td><td>Tap the feature you would like to go to and select as a destination.</td></tr>
<tr><td>2</td><td>Check the Close After Action check box.

The Feature Information dialog box will close after you go to the feature.


</td></tr>
<tr><td>3</td><td>Tap the Go To button.

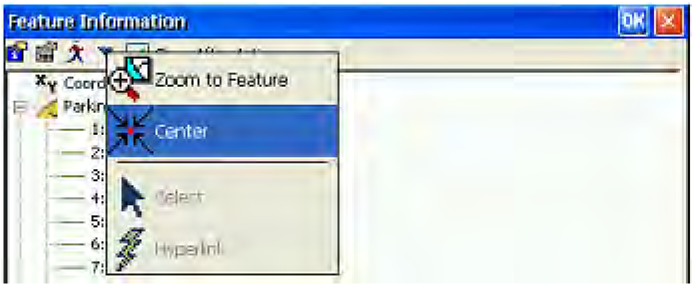
Zeno Field zooms to the selected feature.</td></tr>
<tr><td>4</td><td>The feature is highlighted using the current highlight color and set as the current navigation target.

The feature is also labeled using the value of the field that was searched on. If no field was specified, then the label will use the field that has any part of the word ‘name’ in the field name.</td></tr>
</table>

Using other tool with the Advanced Select tool

Zeno Field also includes the following tools that you can use with the Advanced Select tool:

- Zoom to Feature: Zeno Field will zoom to the extent of the selected feature.
- Center: Zeno Field centers the selected feature on the screen. The current map scale is maintained.
- Select: The feature is highlighted— and selected—on the map.
- Hyperlink: A hyperlink for the feature is displayed. The Hyperlink button will be unavailable if the feature has no active hyperlink

Step	Action
1	Tap the feature you wish to select.
2	Tap the drop-down arrow on the Feature Information dialog box. Tap Center. 
3	Zeno Field centers the selected feature on the screen. The current map scale is maintained.

Measuring distance, area and bearing on a map

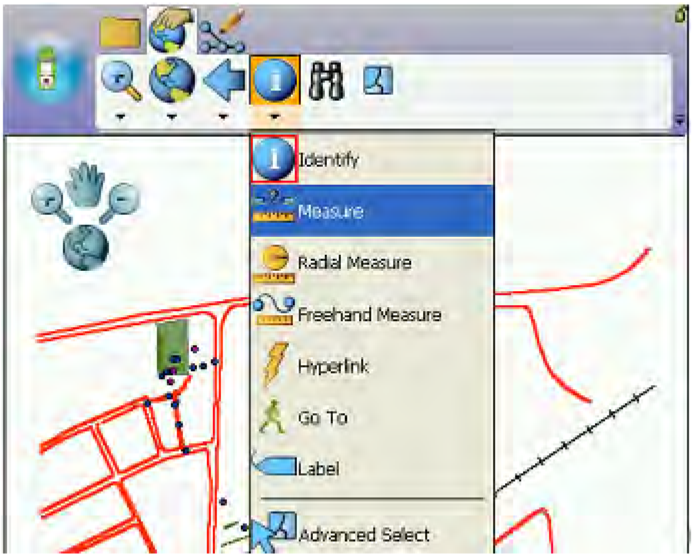
Overview of measuring

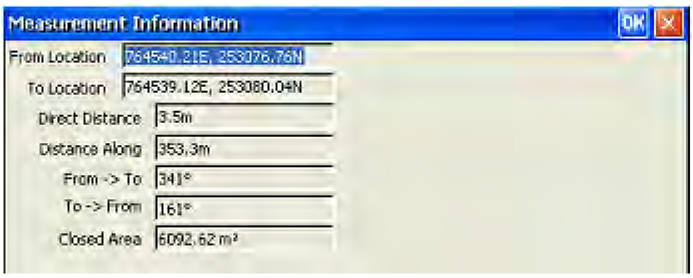
Zeno Field lets you measure distance, area, and bearings on your map. Zeno Field has three principal measuring tools: the Measure tool, the Freehand Measure tool, and the Radial Measure tool.

- The Measure tool allows you to measure distance in a straight line or a series of lines to form a polygon.
- The Freehand Measure tool enables you to draw a line or object freely on your map.
- The Radial Measure tool measures the radius of a circle.
- Each of these tools also allows you to determine area, view coordinates for the from and to locations, and measure bearings.

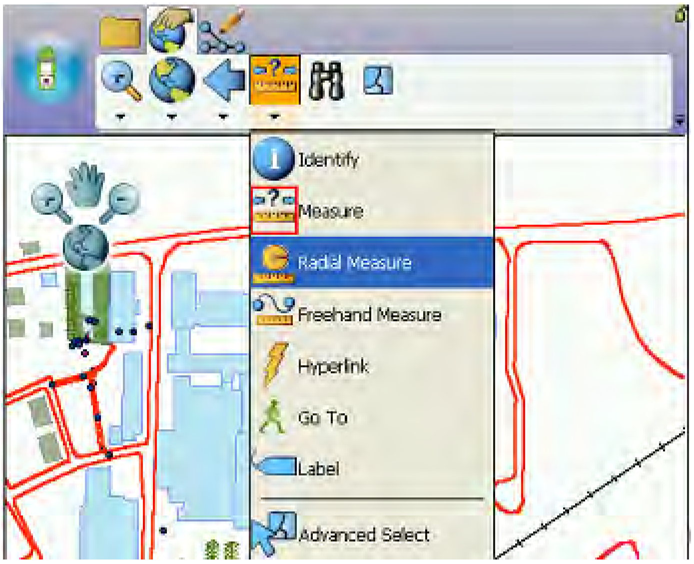
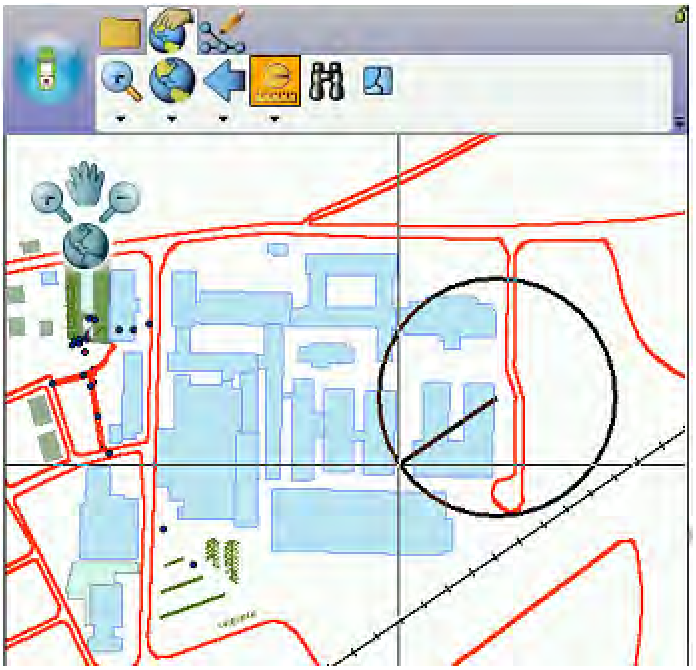
Changing measuring units: You can change the units used for measuring in the Options dialog box under the Display page.

Using the Measure tool

Step	Action
1	Tap the arrow below the Identify tool to display the drop-down list. 
2	Tap Measure. The Measure tool is activated, and the Measure button is depressed and promoted onto the toolbar. A red box around the Measure tool also indicates that it is active. The Command bar is displayed at the bottom of the map window.
3	Tap the map where you would like to begin to measure.

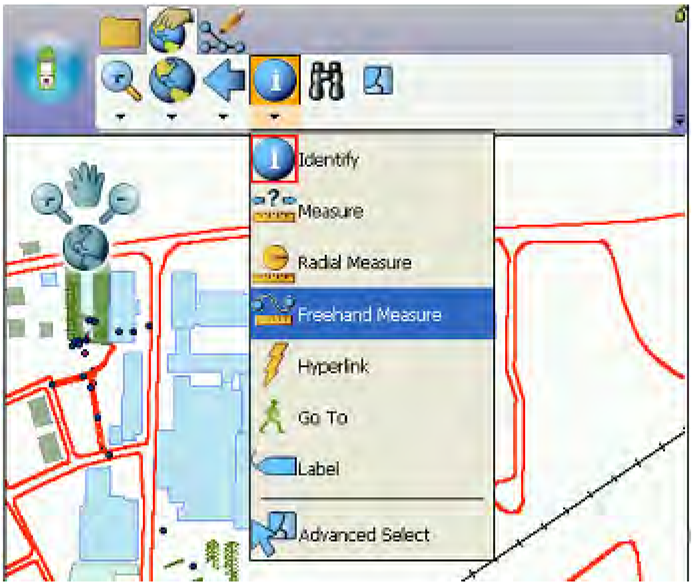
	
4	Tap again to end the distance or continue to tap to create polyline or polygon.
5	Tap the Proceed button on the Command bar when you are finished. The Measurement Information dialog box displays with the following data: the coordinates (from and to location); the direct distance (from start to end); the actual distance drawn; the bearings; and if you drew more than two vertices, the estimated closed area of the shape.
6	Tap OK to close the Measurement Information dialog box.  Undoing or cancelling your measurement reference points: Use the Undo tool  on the Command bar to go back a step to the previously captured point for your measurement or use the Cancel Edits tool  to erase all points for your measurement.

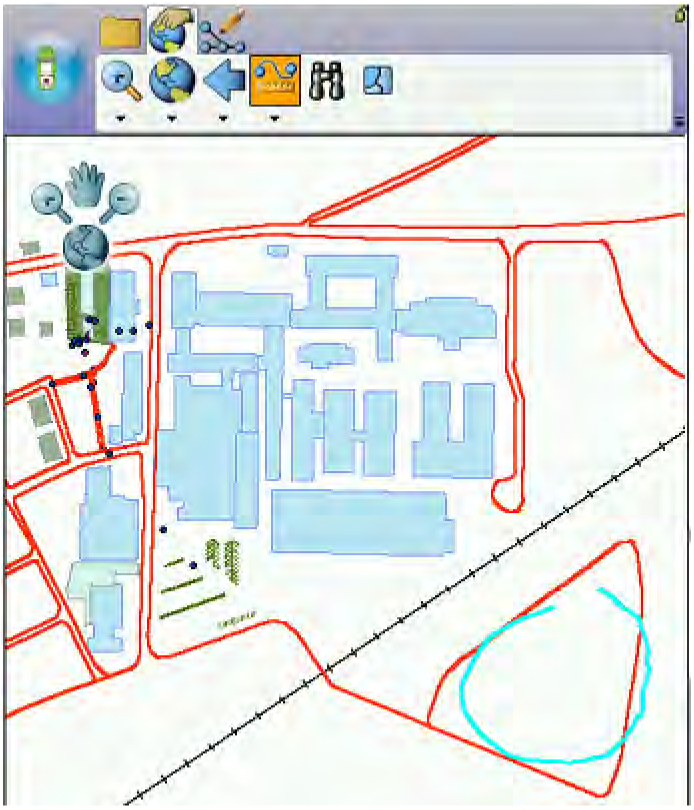
Using the Radial Measure tool

Step	Action
1	Tap the arrow below the Identify tool to display the drop-down list. 
2	Tap Radial Measure. The Radial Measure tool is activated, and the Radial Measure button is depressed and promoted onto the toolbar. A red box around the Radial Measure tool also indicates that it is active.
3	Tap and hold the radial length you wish to measure. 

	Zeno Field displays the Measurement Information dialog box with the following data: the coordinates (from and to location), the radius, the perimeter, the bearings, and the area.
4	Tap OK to close the Measurement Information dialog box. 

Using the Freehand Measure tool

Step	Action
1	Tap the drop-down arrow below the Identify button to display the dropdown list. 
2	Tap Freehand Measure. The Freehand Measure tool is activated, and the Freehand Measure button is depressed and promoted onto the toolbar. A red box around the Freehand Measure tool indicates that it is active.
3	Draw the line you wish to measure by tapping and holding the pen on the map.

	 Zeno Field displays the Measurement Information dialog box with the following data: the coordinates (from and to location), the direct distance (from start to end), the actual distance drawn, the bearings, and the area.
4	Tap OK to close the Measurement Information dialog box. 

Using data capture devices

Connecting your GNSS cap

Overview of connecting your GNSS cap

This section begins with an introduction to the global positioning system (GPS) and describes how to connect your GNSS cap to Zeno Field. This section also discusses how to use the GPS/Rangefinder Debug tool to verify or troubleshoot your GPS connection.

Introduction to GPS

GPS is a radio-based navigation system capable of providing an exact three-dimensional position (latitude, longitude, and altitude) anywhere on the earth, 24 hours a day, in any weather condition. GPS consists of three components: space, control, and user segments. The space segment is a constellation of 24 active satellites—as well as a few spares—orbiting the earth at a height of approximately 12,600 miles in six evenly distributed orbital planes. The control segment consists of five tracking stations spread out around the earth that monitor the satellites' orbits and send precise orbital data and clock corrections back to the satellites. The user segment is made up of GPS receivers and the user community. GPS was originally developed by the U.S. Department of Defense (DoD) for military use. However, GPS has also proven to be a very useful tool for civilian use and is available to anyone with a GPS receiver.

Each GPS satellite transmits signals on two frequencies: L1 (1575.42 MHz) and L2 (1227.60 MHz). The L1 frequency contains the civilian Coarse Acquisition (C/A) Code as well as the military Precise (P) Code. The L2 frequency contains only the P code. The P code is encrypted by the military—using a technique known as anti-spoofing—and is only available to authorized personnel. The encrypted P code is referred to as the Y Code. Civilian GPS receivers use the C/A Code on the L1 frequency to compute positions—although high-end survey grade civilian receivers use the L1 and L2 frequencies' carrier waves directly. Military GPS receivers use the P (Y) Code on both L1 and L2 frequencies to compute positions.

New GPS satellites also transmit on the L5 (1176.45 MHz) frequency. However it will be some time before there are sufficient GPS satellites transmitting the L5 frequency and before there are readily available GPS receivers that are capable of receiving the L5 frequency.

GPS receivers monitor these signals from multiple satellites—at least three for a two-dimensional position and at least four for a three-dimensional position—and through a process called trilateration, they compute a position. This position is accurate from about 10 to15 meters—now that selective availability, an intentional degradation of the satellite signals, has been turned off—down to a centimeter or less, depending on equipment and conditions.

GPS accuracy

Although GPS receivers give you exact positions—for example, 34° 28' 18.8765"N, 122° 15' 34.0832"W, 302.56 meters elevation—it is important to understand that there is some amount of uncertainty, or error, inherent in these positions. A number of factors contribute to this error including satellite clock drift, atmospheric conditions, measurement noise, and multipath. In addition, due to the satellite geometry, vertical accuracy (elevation) is generally one and a half to three times worse than horizontal accuracy. You should consider each GPS position as a box, and you are somewhere within that box. The size of that box depends on the overall accuracy of your GPS receiver.

Differential GPS

The accuracy of GPS receivers can be improved by using a technique known as differential correction, or differential GPS (DGPS), to reduce some of the error. DGPS involves using a stationary GPS receiver, called a base station, at a known location—an accurately surveyed point—to calculate corrections for each satellite it is tracking. The corrections can be calculated by comparing the known location of the base station to the GPS location determined by using the satellites. These corrections are then applied to the satellite data received by your GPS receiver, resulting in positions that are accurate from about five meters down to less than one meter for a civilian C/A Code receiver, depending on the receiver.

There are two approaches to DGPS: postprocessing, in which the corrections are stored and then applied to the field GPS data back at the office after the data collection is complete, and real-time, in which the corrections are broadcasted from the base station to the field GPS receiver as soon as they are calculated. Real-time DGPS allows the corrections to be applied almost instantly so that you can begin to work immediately with the more accurate GPS positions . In addition, accurate in-field GPS navigation requires real-time DGPS. Many modern GPS receivers have builtin real-time DGPS capabilities or support add-on real-time DGPS components. There are various sources of real-time DGPS signals, including Coast Guard beacons; Satellite Based Augmentation Systems (SBAS) such as the Wide Area Augmentation System (WAAS), a U.S. Federal Aviation Authority (FAA) system of equipment and software that supplements GPS accuracy, availability, and integrity; FM-based services; and satellite-based services. The U.S. Coast Guard beacons and SBAS (WAAS, EGNOS) services are free of charge. Other services may require a subscription fee.

Another way to improve the accuracy of GPS positions is by averaging multiple fixes at the same location over time. For example, instead of taking a single GPS position at a particular location, you can stand in the same position for 30 seconds and average all the GPS positions you receive during that time to produce one final position. An averaged position tends to be more accurate than one single position.

Measures of accuracy

There are several indicators of the potential accuracy of particular GPS positions. Dilution of Precision (DOP) is probably the most common indicator and is output by most, if not all, modern GPS receivers. DOP indicates the quality of the geometry of the GPS satellite constellation at a particular time. A higher DOP indicates poor satellite geometry and a potentially less accurate position than a lower DOP. There are several expressions of DOP—for example, horizontal DOP (HDOP) and time DOP (TDOP)—but position PDOP (PDOP) is the most commonly used. A PDOP value of six or less is generally acceptable. By only capturing GPS positions with a low DOP, you tend to capture more accurate positions.

Supported GPS protocols

Zeno Field supports the following protocols for communicating with GPS receivers:

- National Marine Electronics Association. (NMEA) 0183, version 2.0
- Delorme® Earthmate®
- Rockwell PLGR Protocol
- SiRF®

Any GPS receiver that outputs any of the above protocols should work with Zeno Field, as long as the GPS receiver is correctly configured and properly connected to the device being used with Zeno Field.

Accuracy:

- What accuracy do you require for your GPS positions?
- Is autonomous GPS with 2–5 meters accuracy sufficient, or do you require differential correction to achieve higher accuracy?
- Does the GPS receiver have the ability to differentially correct the GPS positions when connected to a differential receiver or using the WAAS differential system?
- How well does your GPS receiver work under a canopy or in environments that are susceptible to multipath errors?
- Do you need in addition to GPS also GLONASS? With GLONASS you can track more satellites in difficult environments.

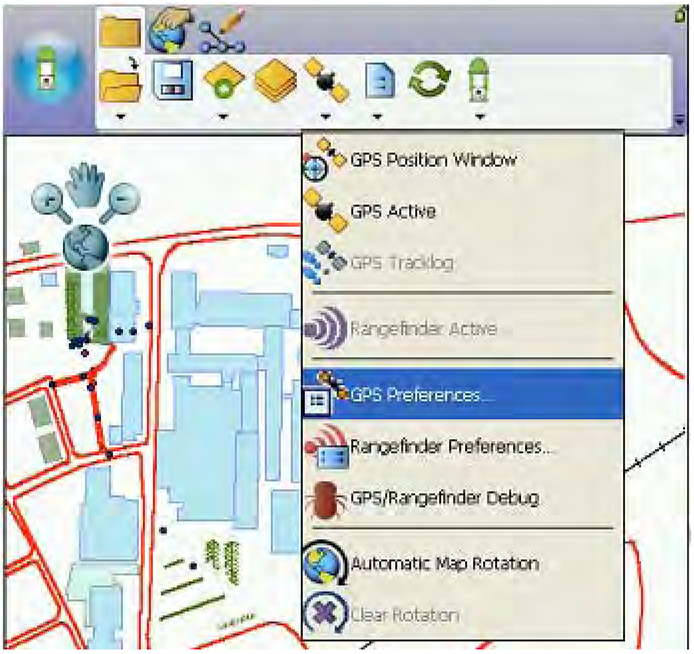
Differential correction:

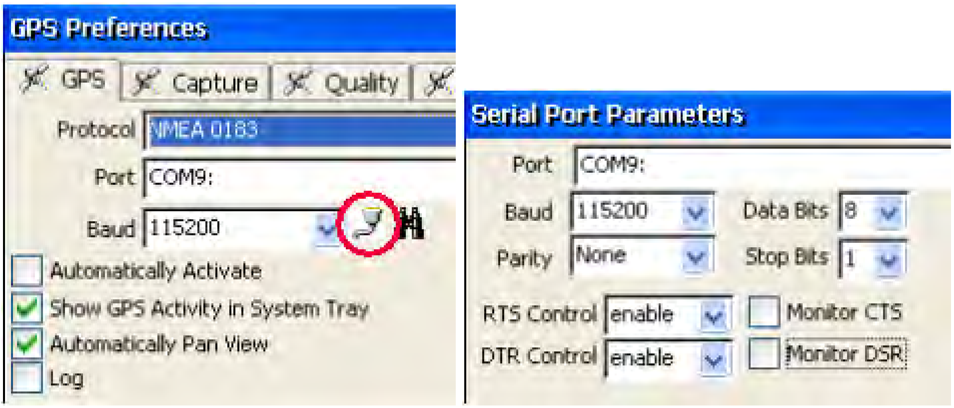
- What type of real-time differential correction is available and reliable in the area where you will be working: beacon, real-time or SBAS?

Set GNSS Settings in Zeno Field

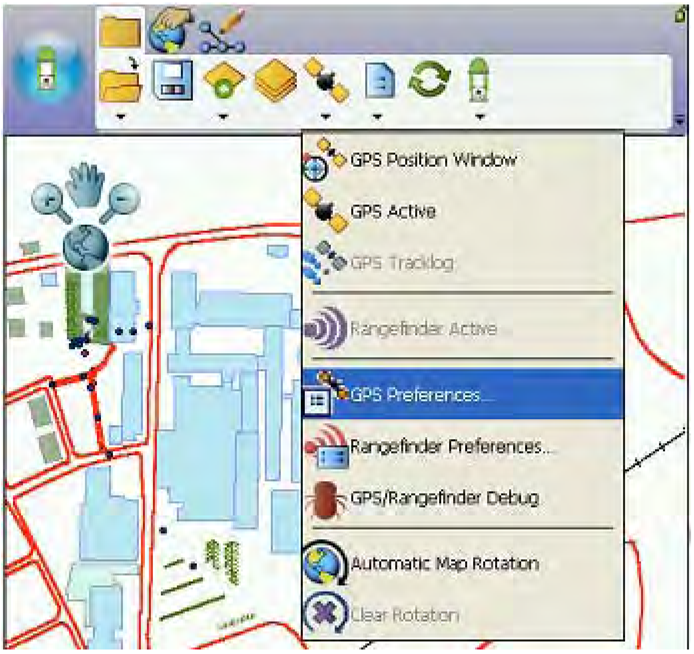
Connect to Zeno GNSS caps GS05/06

Before you can activate your GPS, you need to set the GPS communication parameters in Zeno Field to match the parameters set on your GPS receiver.

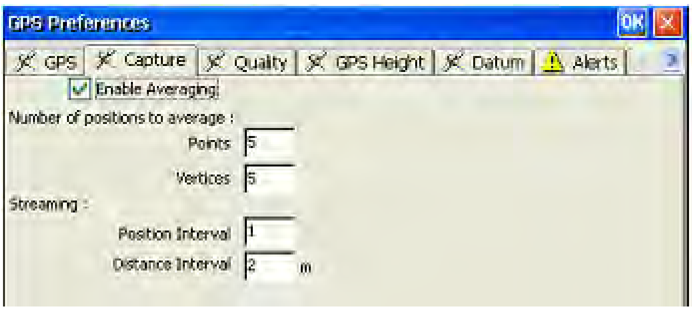
Step	Action
1	Open the GPS Preferences. 
2	Define the GPS connection settings in the GPS tab, tap on the serial port button to enter all values: • **Protocol: NMEA 0183** • **Port: COM9** • **Baud: 115200** • Parity: None • Data Bits: 8 • Stop Bits: 1 • Keep all other values as shown in the screen shot.

<table>
<tr><td></td><td>
</td></tr>
<tr><td>3</td><td>Check Automatically Activate.</td></tr>
<tr><td>4</td><td>Tap OK.</td></tr>
</table>

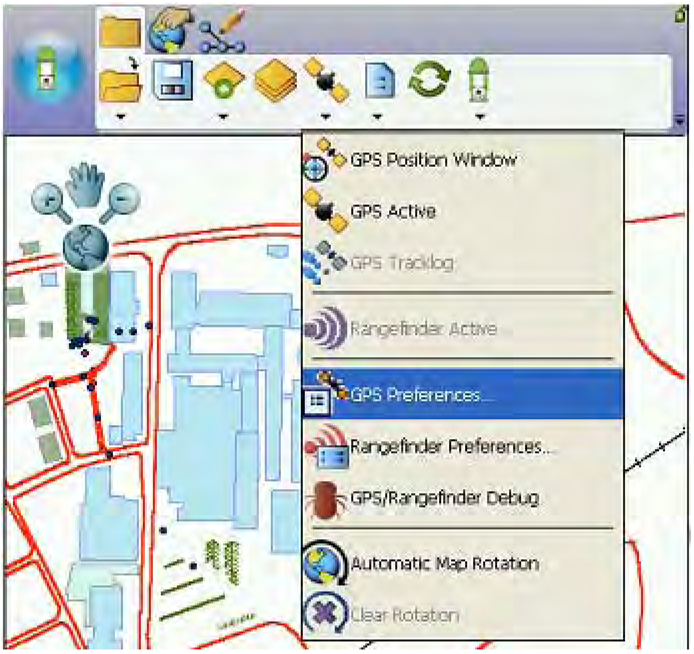
Capture settings

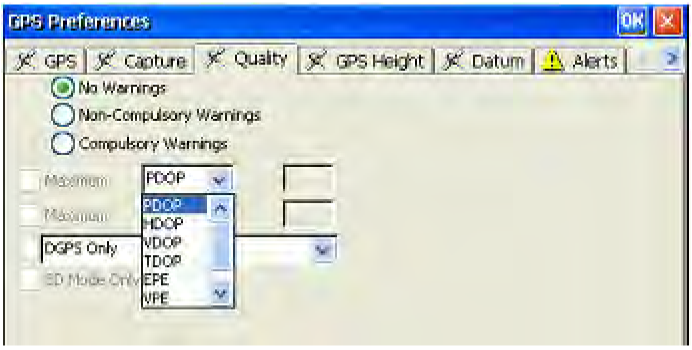
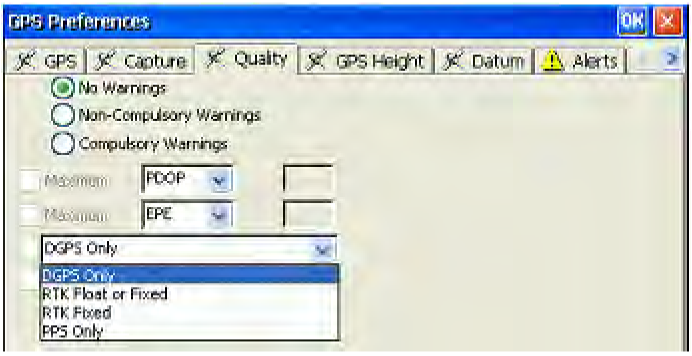
<table>
<tr><th>Step</th><th>Action</th></tr>
<tr><td>1</td><td>Open the GPS Preferences.

</td></tr>
<tr><td>2</td><td>Define the GPS capture settings in the Capture tab:
<table>
<tr><td>Enable Averaging:</td><td>Enable for multiple observations of a point feature or for each vertex of a line/polygon.</td></tr>
<tr><td>Streaming:</td><td>Used to capture continuous vertices of a polyline or polygon feature when using the Capture Vertices tool.

Position Interval: Every x GPS position will be used.

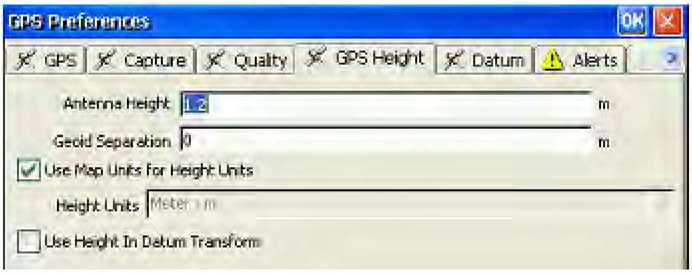
Distance Interval: A position gets captured after moving the specified distance.</td></tr>
</table>

</td></tr>
<tr><td>3</td><td>Tap OK</td></tr>
</table>

Quality settings

Step	Action
1	Open the GPS Preferences. 
2	Define the GPS quality gates in the Quality tab: a. Warnings (if position exceeds quality gate): • No Warnings • Non-Compulsory Warnings • Compulsory Warnings b. Maximum values: Choice of DOP, EPE, VPE or DAGE c. Choice of DGPS Only, RTK Float or Fixed, RTK Fixed or PPS Only (mil. Precise Positioning Service) d. 3D Mode Only: allow 3D GPS positions only

	 
3	Tap OK

GPS Height settings

Step	Action
1	Open the GPS Preferences.
2	Define the GPS Height settings in the GPS Height tab: a. Antenna Height above the ground E.g. 1m when holding the Zeno 10/15 in the hand or 2m when working with the Pole package b. Geoid Separation according your project area c. Specify the Height Units d. Use Height in Datum Transformation 
3	Tap OK.

Alert settings

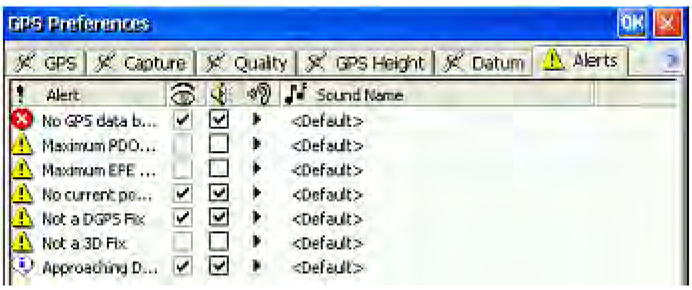
Use the Alerts tab to configure alerts that notify you about various GPS quality conditions.

<table>
<tr><th>Step</th><th>Action</th></tr>
<tr><td>1</td><td>Open the GPS Preferences.</td></tr>
<tr><td>2</td><td>Define the alerts settings in the Alerts tab:

a. Message yes/no

b. Sound yes/no

c. Sound name to define a specific .wav file


</td></tr>
<tr><td>3</td><td>Tap OK.</td></tr>
</table>

GNSS Settings toolbar

The “Leica Zeno Field Tools” menu contains five tools that allow you to connect to RTK and view the status of the connection.

Menu item	Description
GNSS Settings	Used to Setup the Real Time connection, logging raw data for post processing, and sky view settings.
Connect RTK	This option will trigger the RTK connection to start depending on the GNSS settings.
Disconnect RTK	This option will turn off the RTK connection depending on the GNSS settings.
Show GNSS Status Bar	Show/hide GNSS Status Bar on the bottom of the screen to display GNSS status information like GNSS accuracy,
About Zeno Field	Open the About dialog to show information on the software release, CCP and GS05/06 settings.

Configure Zeno Field for RTK survey

Sky View Slider

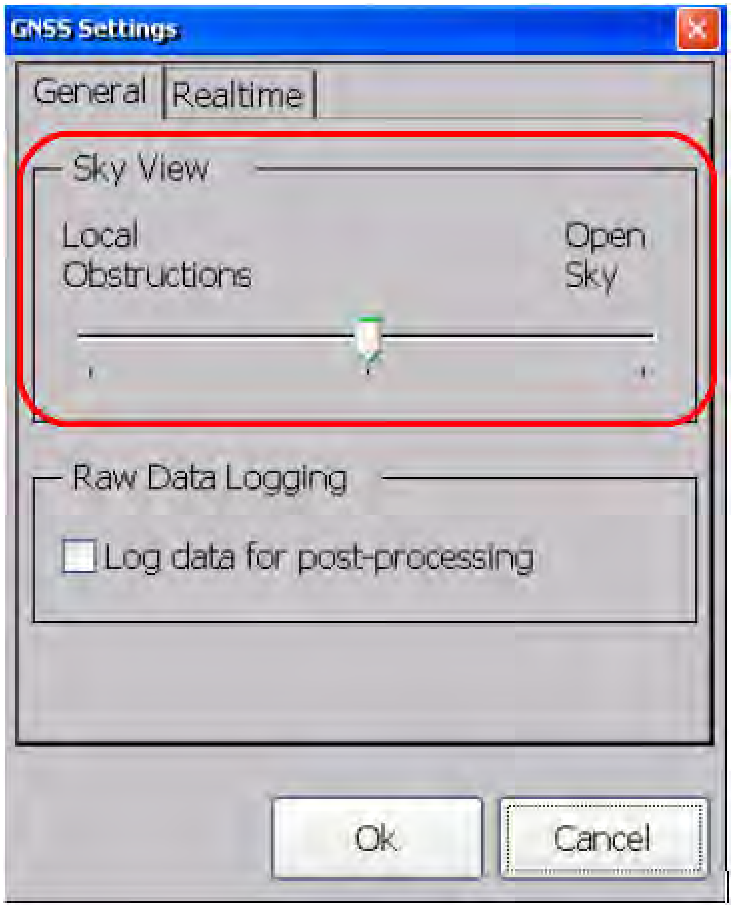
Sky View Slider overview

The Sky View slider is used to enhance the GNSS data collection process Depending on the survey area, the user can define a sky view setting, e.g. open sky or local obstructions. Zeno Field sets the GNSS settings accordingly for best position accuracy in areas with open sky and for maximum position availability in areas with local obstructions.

How to change the GNSS Sky View Settings

Sky View settings

How to change the GNSS Sky View Settings

Step	Action
1	Tap the Zeno drop down.
2	Tap GNSS Settings
3	Slide the slider to the required position according to your project area. 
4	Tap OK.

Sky View settings

Depending on the GS sensor type, the sky view settings like cut off angle and channel configuration are set. The available GS sensor types are:

- GPS + GLONASS
- GPS only

Settings for GPS + GLONASS sensors

Local obstructions:

8 GPS

6 GLONASS

0 SBAS

Cut off: 5°

Middle:

10 GPS

3 GLONASS

1 SBAS

Cut off: 10°

Open Sky:

13 GPS

0 GLONASS

1 SBAS

Cut off: 12°

Setting for GPS only sensors

Local obstructions:

13 GPS

0 GLONASS

1 SBAS

Cut off: 5°

Middle:

13 GPS

0 GLONASS

1 SBAS

Cut off: 10°

Open Sky:

13 GPS

0 GLONASS

1 SBAS

Cut off: 12°

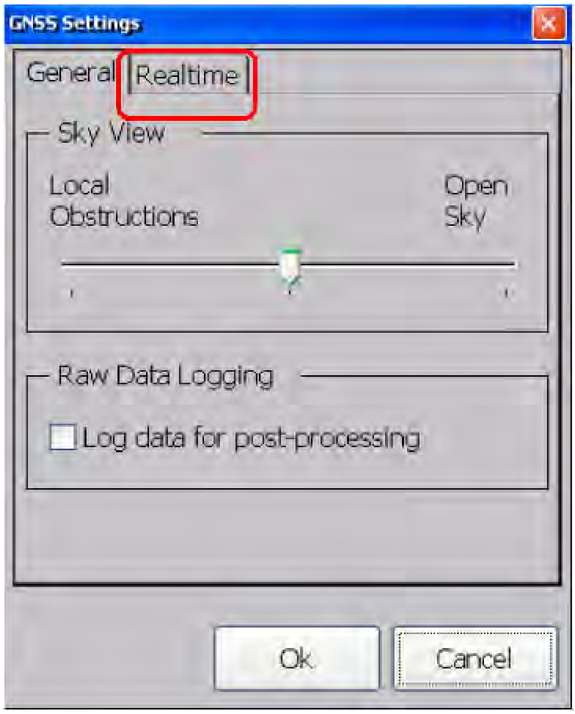
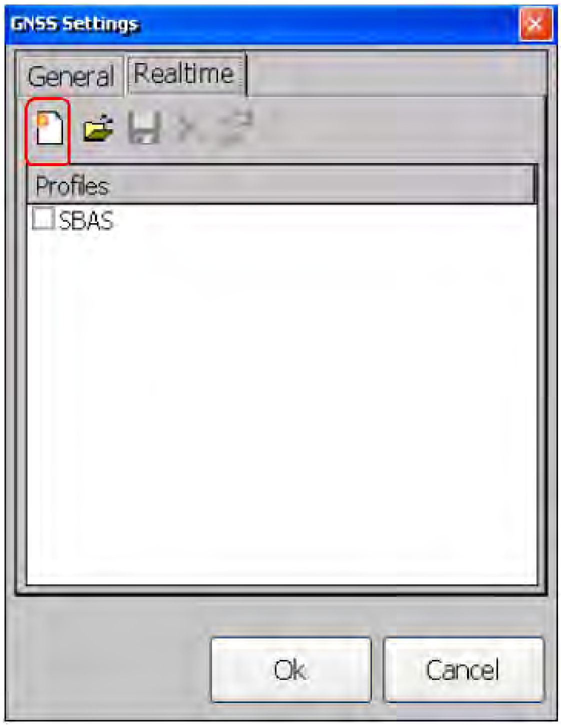
Configure Zeno Field for RTK survey

There are different ways the user can receive corrections for real time survey:

- Internet
- Dial up
- Beacon (Radio)

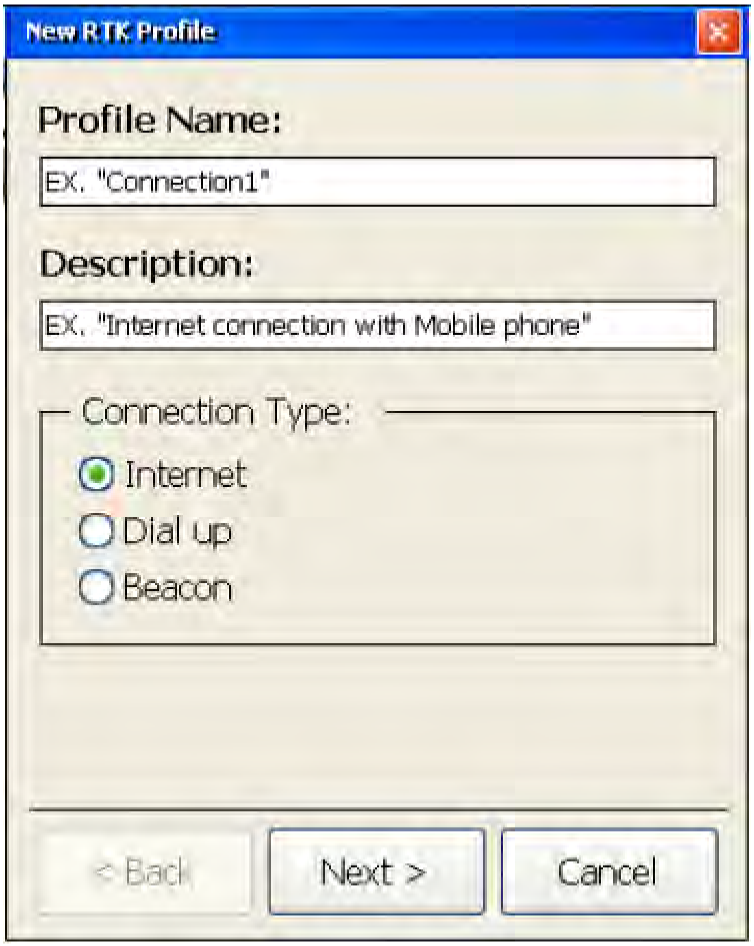
Start the real time configuration wizard

Step	Action
1	Tap the Zeno drop down.
2	Tap GNSS Settings. 

3	Change to the Realtime tab. 
4	Tap the new profile button to start the New RTK Profile wizard. 

Internet

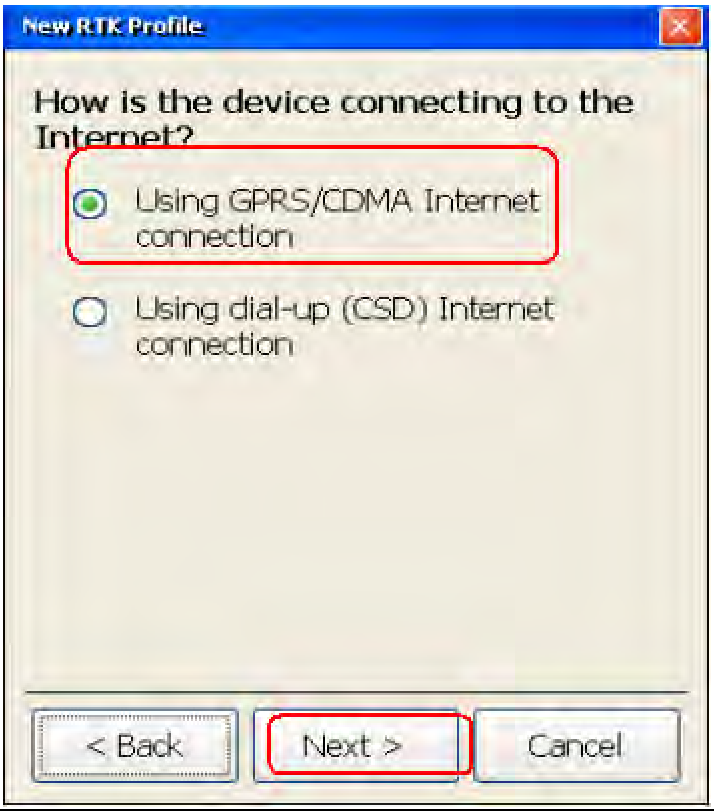
To establish an internet connection for receiving real time corrections, a Bluetooth mobile phone capable for connecting to the internet is necessary.

Step	Action
1	Enter the profile name and description to save the connection setup for later use.
2	Select Internet as connection type, then tap next twice. 
3	Ensure that your mobile phone is switched on, Bluetooth is enabled, and the device is ready to be found.
4	Tap Search to search for a mobile device. All Bluetooth phones found will be listed.
5	Select your phone and tap Next.

	
6	Provide any passkey, e.g. 123 and tap the next button. Confirm the passkey in the mobile device. 
7	A successful connection massage will be shown. Tap Next.
8	Select the type of internet connection you want to use. You have the choice between

	GPRS/CDMA or dial-up CSD. Go to GPRS / CDMA Connections setup or Dial-up (CSD) Internet Connection.

GPRS / CDMA Connections setup

Step	Action
1	Select the GPRS/CDMA internet connection option and tap Next. 
☞	Depending on your mobile phone, it can be necessary to confirm the connection on the phone. Adding your Zeno 10/15 to the known device list on your phone will prevent this in most cases.
2	Enter the APN of your internet service provider, for example gprs.swisscom.ch. Tap Next.

	
3	Enter your user ID and password for your internet connection. Tap Next.

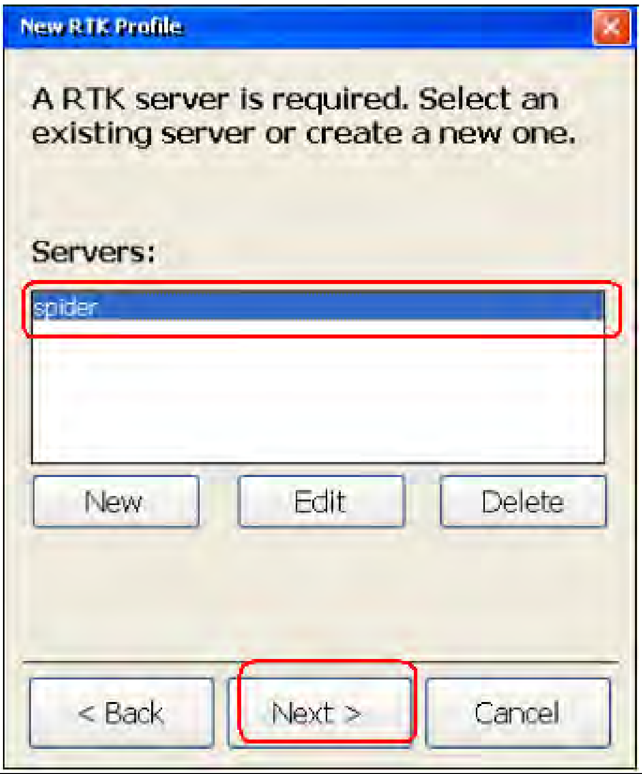
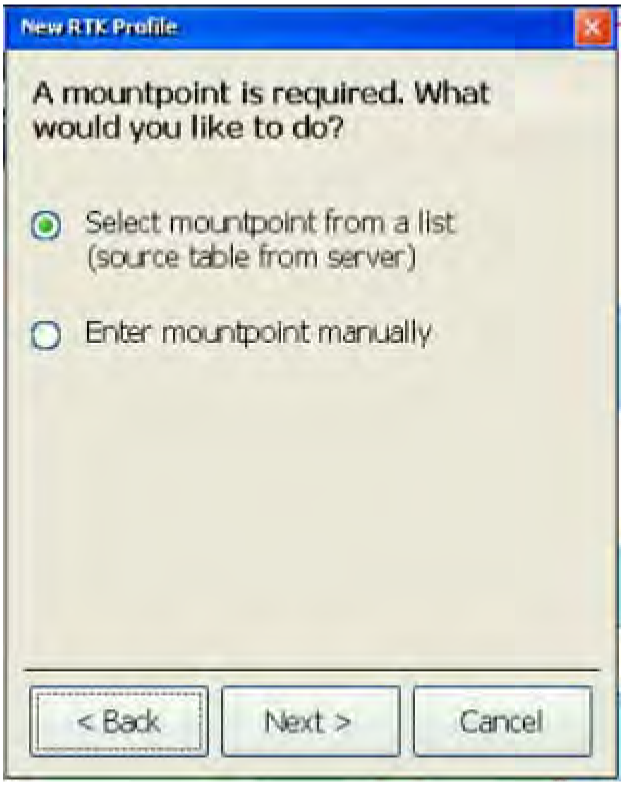
	
4	Select an existing RTK Server on the list if available or create a new Server by tapping the new button.

	
5	Enter the RTK server details. Check the NTRIP check box if you like to use NTRIP. Tap Next.

<table>
<tr><td></td><td>
</td></tr>
<tr><td>☞</td><td>

- The sever details can be obtained from your RTK service provider.
- You can also edit or delete an existing RTK server configuration.

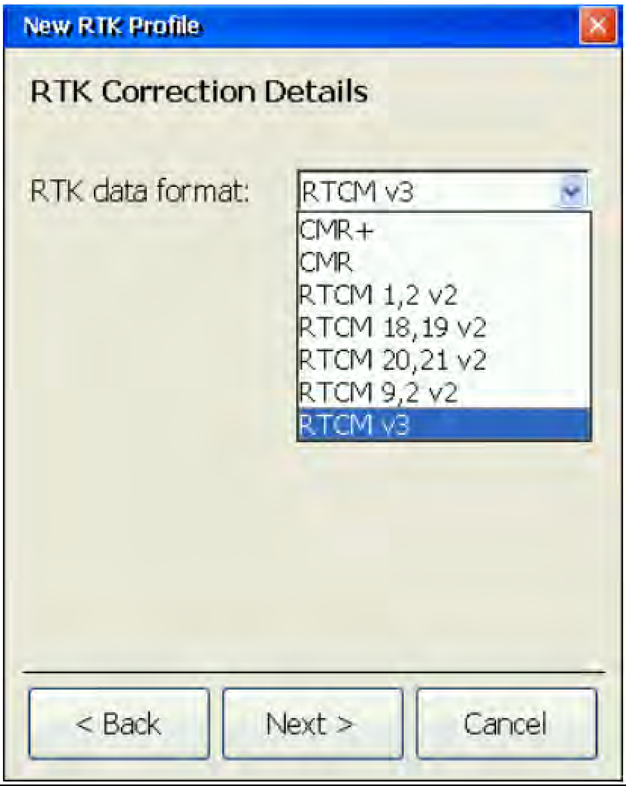
</td></tr>
<tr><td>6</td><td>Highlight the new created server and tap Next.</td></tr>
</table>

<table>
<tr><td></td><td>
</td></tr>
<tr><td>7</td><td>Select either selecting the mountpoint form a list or entering it manually. In most cases, the first option will be the preferred setting. Tap Next.


a. Choose the desired mountpoint from the list. Tap next.</td></tr>
</table>

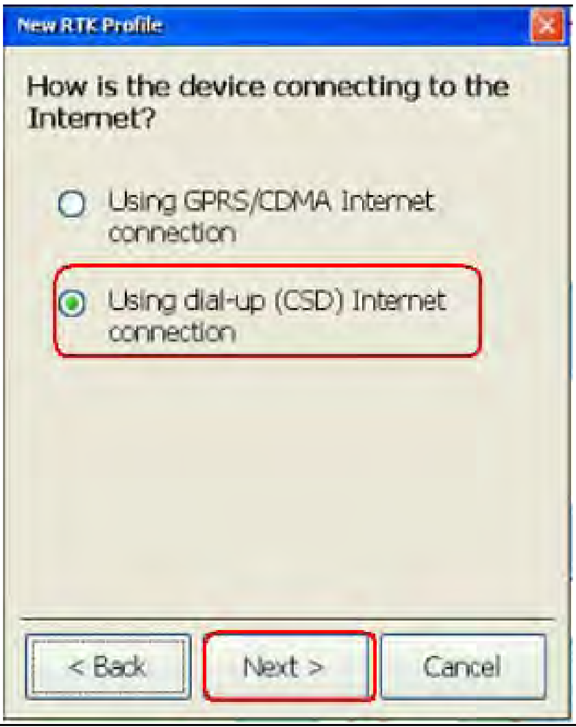
b. Manually type in the name of the mountpoint and tap Next.

8	Select the RTK data format for the RTK server based on the required configuration

	from your RTK service provider. Tap Next. 
9	The connection status dialog appears checking all required parts of the configuration. • Tap Finish after a successful connection test. • Tap Back to correct any mistakes in your configuration.

Dial-up (CSD) Internet Connection

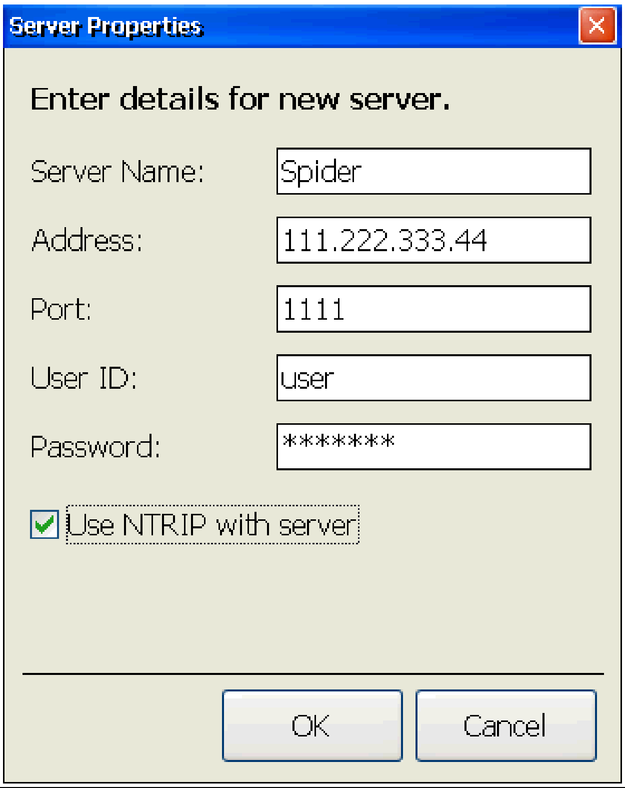
Step	Action
1	Select Using dial-up (CSD) Internet connection and tap Next.

<table>
<tr><td></td><td>
</td></tr>
<tr><td>2</td><td>Provide a name to save the dial up station information for later use. Enter the internet provider phone number and type of protocol used for connection and tap next.

</td></tr>
<tr><td>☞</td><td>• The dial-up station details can be obtained from your RTK service provider.</td></tr>
</table>

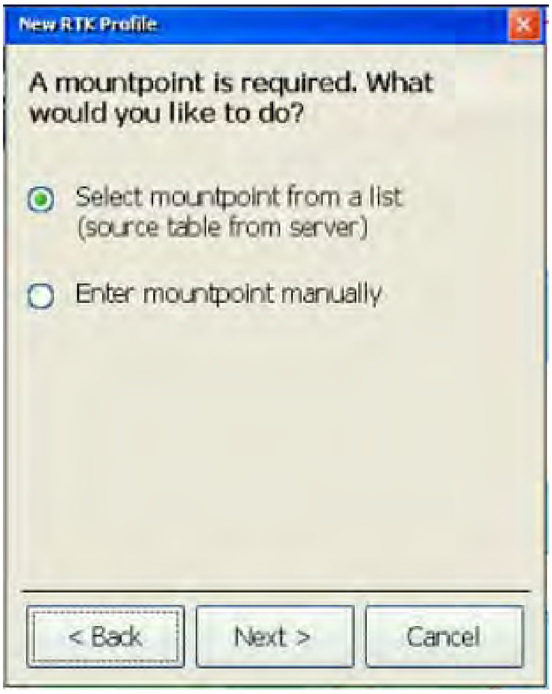
	• You can also edit or delete an existing dial-up station.
3	Enter the User ID and Password for your dial-up internet connection and tap Next. 
4	Select an existing RTK Server on the list if available or create a new Server by tapping the new button.

5 Enter the RTK server details. Check the NTRIP check box if you like to use NTRIP. Tap Next.



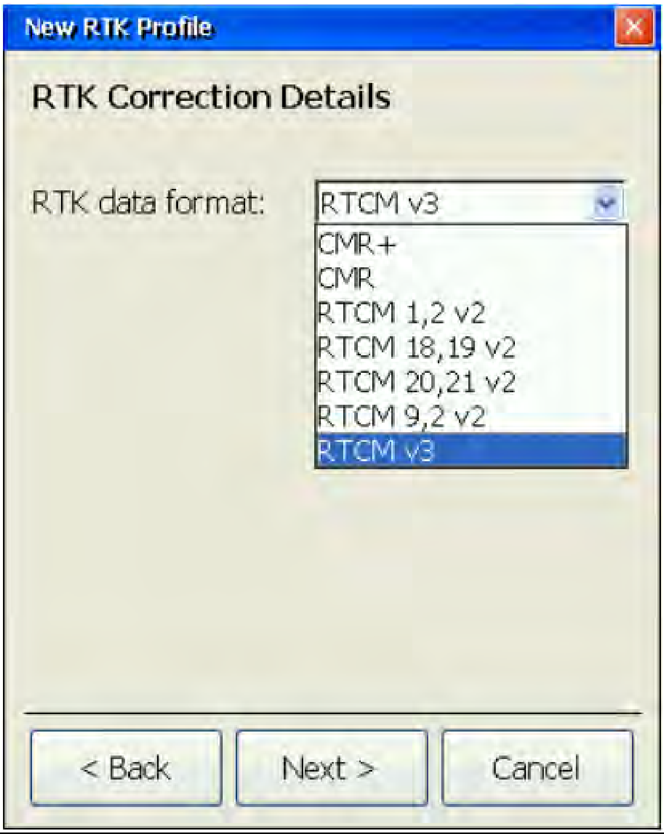
- The sever details can be obtained from your RTK service provider.
- You can also edit or delete an existing RTK server configuration.

<table>
<tr>
<td>6</td>
<td>Highlight the new created server and tap Next.


</td>
</tr>
<tr>
<td>7</td>
<td>Select the mountpoint form a list or enter the mountpoint manually. In most cases, the first option will be the preferred setting. Tap Next.


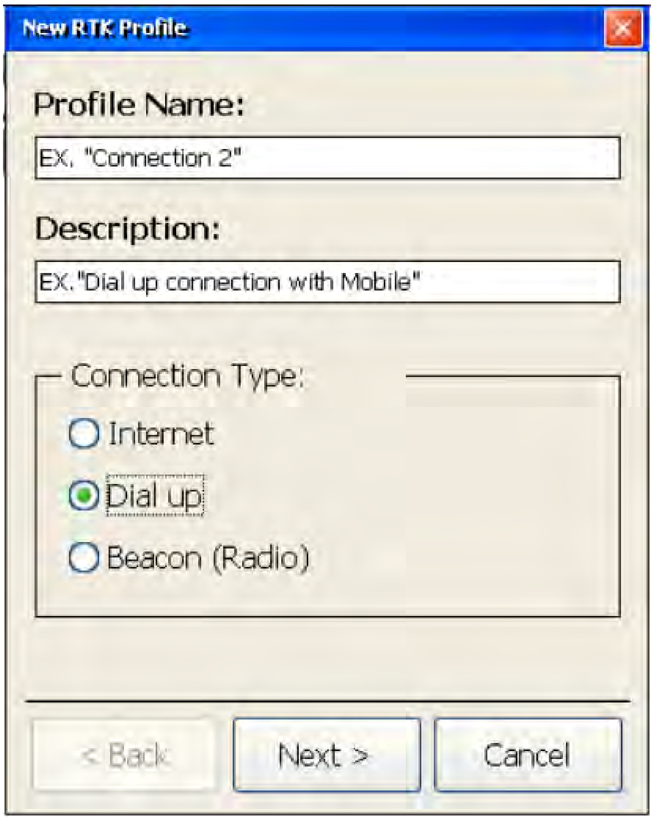
a. Choose the desired mountpoint from the list. Tap next.</td>
</tr>
</table>

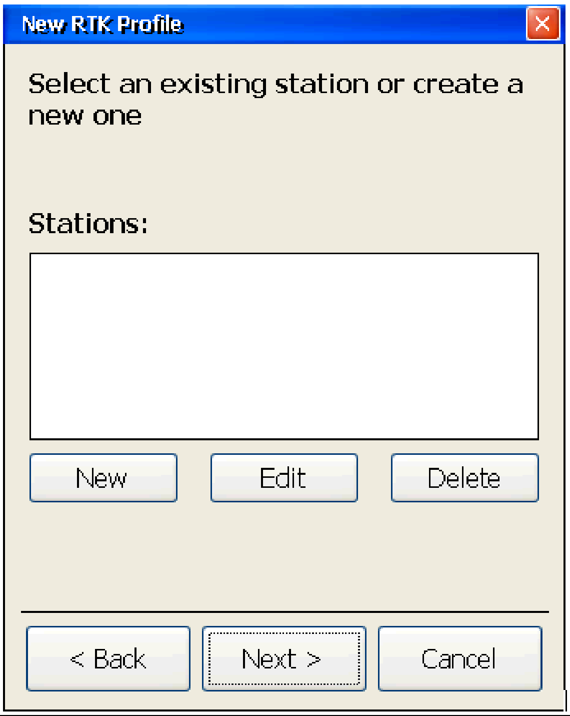
	 b. Manually type in the name of the mountpoint and tap Next. 
8	Select the RTK data format for the RTK server based on the required configuration from your RTK service provider. Tap Next.

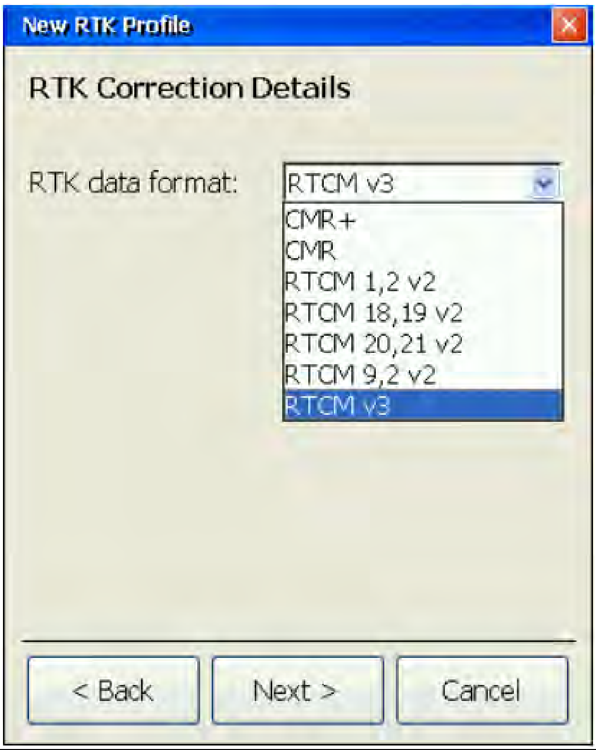
	
9	The connection status dialog appears checking all required parts of the configuration. • Tap Finish after a successful connection test. • Tap Back to correct any mistakes in your configuration. 

Dial-up connection

The dial-up connection is used if a reference station is equipped with a modem and a dial-up connection to this station can be established directly.

Step	Action
1	Enter the Profile name and Description to save the connection setup for later use.
2	Select Dial Up as connection type, then tap Next twice. 
3	Ensure that your mobile phone is switched on, Bluetooth is enabled, and the device is ready to be found.
4	Tap Search to search for a mobile device. All Bluetooth phones found will be listed.
5	Select your phone and tap Next.

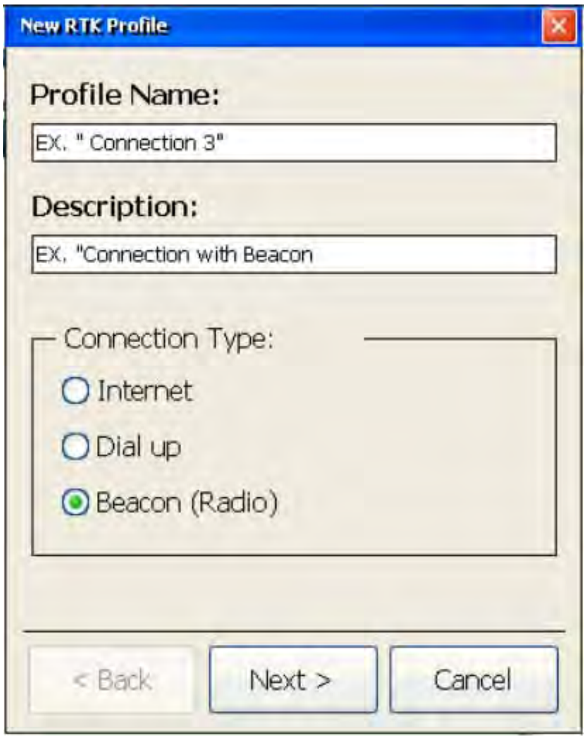
<table>
<tr><td></td><td>
</td></tr>
<tr><td>6</td><td>Select an existing station on the list if available or create a new station by tapping the new button.

</td></tr>
<tr><td>7</td><td>Enter the station name and the Dial Up number for the modem of the RTK station and select the type of connection e.g. Analog.</td></tr>
</table>

	
8	Highlight the new created station and tap Next.
9	Select the RTK data format for the RTK station based on the required configuration from your RTK service provider. Tap Next. 
10	The connection status dialog appears checking all required parts of the configuration. a. Tap Finish after a successful connection test.

b. Tap Back to correct any mistakes in your configuration.

Beacon (Radio) connection

In this type of connection the RTK corrections are received using a Beacon or other radio modem.

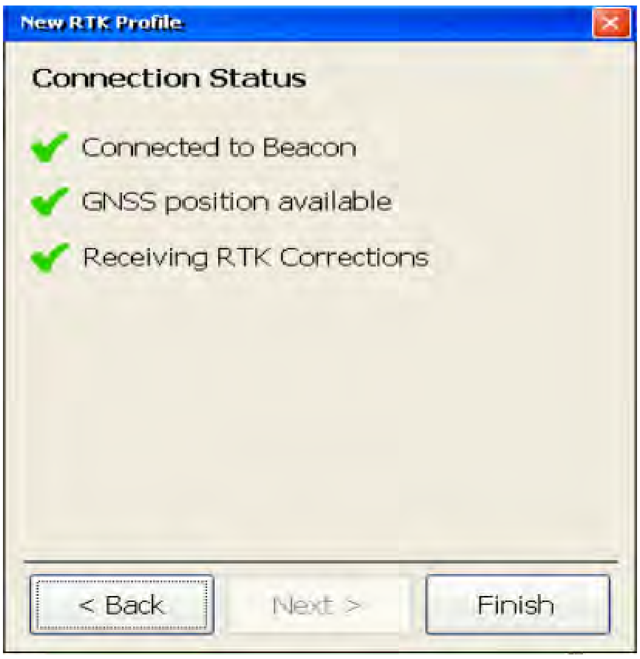
Step	Action
1	Select Beacon (Radio) for the Connection Type then tap Next twice.
2	Enter the profile name and description to save the connection setup for later use. Tap Next. 
3	There are two ways a user can establish a connection with a Beacon device. This is either wireless via Bluetooth or via cable (RS232, Lemo, USB). Continue with Connect a Beacon/Radio via Bluetooth or Connect a Beacon/Radio via cable

Connect a Beacon/Radio via Bluetooth

Step	Action
1	Select Wireless for the type of connection with the beacon.

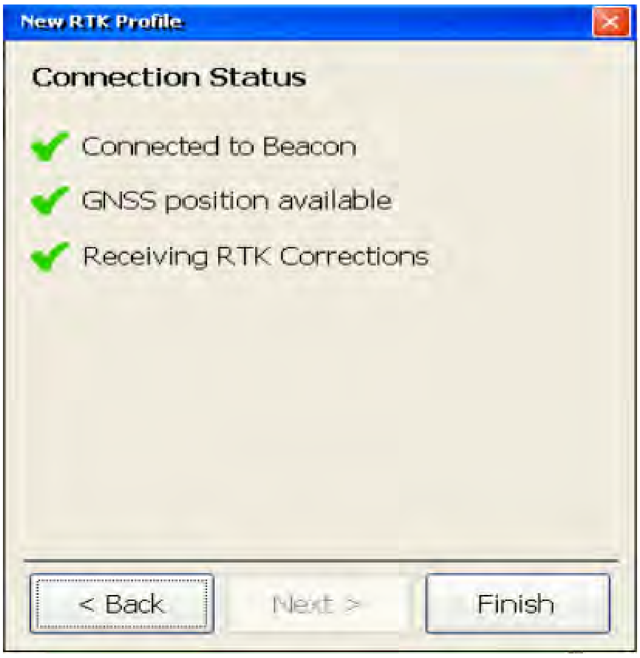
	
	• A Beacon connection via Bluetooth always works with RTCM v2. • If you would like to connect a radio via Bluetooth, it needs to be set to the hardcoded Beacon settings: Baud: 4800 Data bits: 8 Stop bits: 1 Parity: none Format: RTCM v2 If you would like to use other settings, a cable connection is necessary.
2	Ensure that your Beacon device is switched on, Bluetooth is enabled, and the device is ready to be found.
3	Tap Search to search for your Beacon.
4	Select your device and tap Next.

<table>
<tr><td></td><td>
</td></tr>
<tr><td>5</td><td>Enter a passkey if required for your device and Tap next.</td></tr>
<tr><td></td><td>Check your Beacon documentation, if a passkey is required or not.</td></tr>
<tr><td>6</td><td>The connection status dialog appears checking all required parts of the configuration.

Tap Finish after a successful connection test.
Tap Back to correct any mistakes in your configuration.

</td></tr>
</table>

Connect a Beacon/Radio via cable

Step	Action
1	Select Cable for the type of connection with the Beacon/radio modem. 
2	Enter the required settings depending on the Beacon or radio device communication settings. Tap Next. 
	• RS232 port on your Zeno 10/15: COM1 • USB port on your Zeno 10/15: COM5
3	The connection status dialog appears checking all required parts

	of the configuration. • Tap Finish after a successful connection test. • Tap Back to correct any mistakes in your configuration. 

SBAS

SBAS systems (Satellite Based Augmentation Systems) are of geo-stationary satellite system that improves the accuracy, integrity, and availability of the basic GPS signals. WAAS, EGNOS, and MSAS are SBAS systems. Please note, that the local availability depends on your position on earth.

Zeno Field contains a predefined SBAS profile. This profile cannot be changed or deleted.

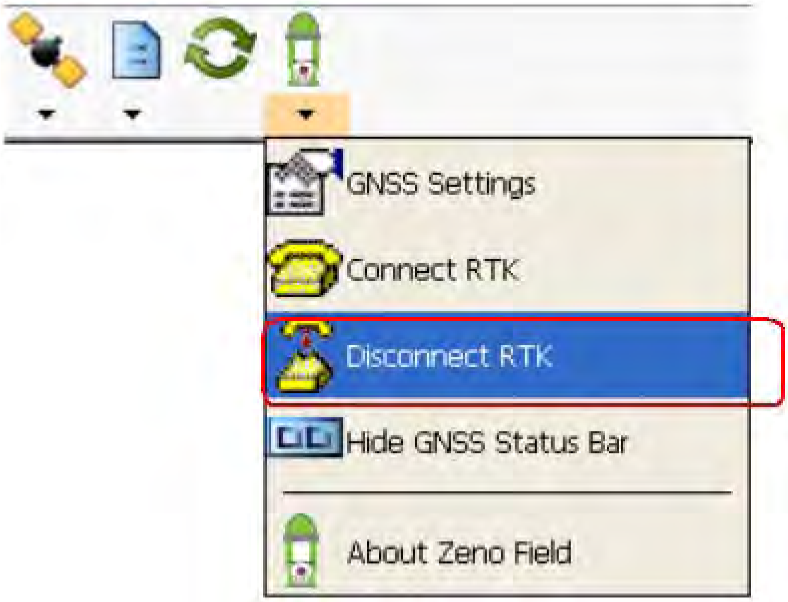
There will be no GLONASS satellites used in a position using SBAS because the SBAS corrections do not support GLONASS satellites.

Connect RTK

Step	Action
1	Tap GNSS Settings in the Zeno drop down.
2	Activate the real time tab.
3	Check the Realtime profile you want to use.
4	Tap OK.
5	Activate GPS by taping GPS Active.
6	Tap Connect RTK in the Zeno drop down. Zeno Field connects to the selected real-time source. The Connection Status dialog appears giving feedback about the connection steps. 
☞	All Internet and Dial up connections cause costs dependent on the service provider. Always remember to disconnect the RTK connection after the fieldwork has been completed.

Disconnect RTK

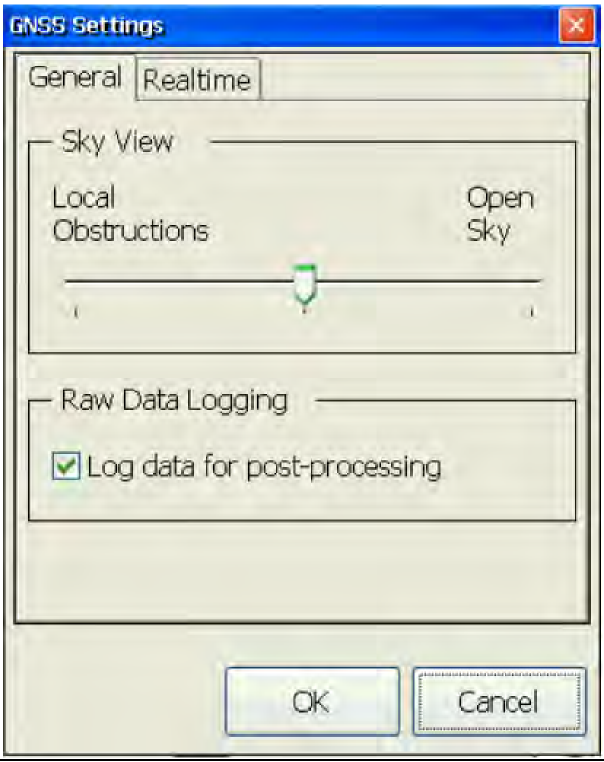
After the completion of the data collection session it is recommended to disconnect the RTK connection to avoid unnecessary costs.

Step	Action
1	Tap Disconnect RTK in the GNSS settings drop down menu. 

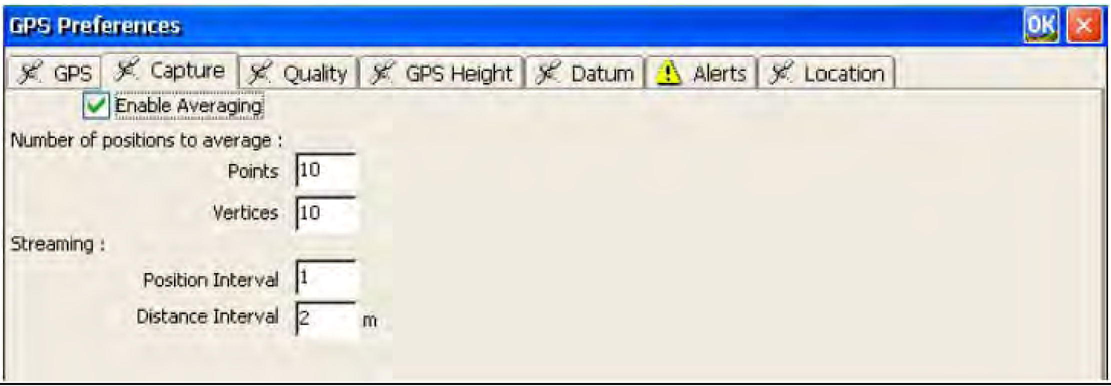
Configure Zeno Field for Post-Processing

Enable raw data logging

Raw data logging is an option, the user can select if he requires a post processing solution. This setting allows logging of GNSS observation that can be used in EasyIn for post processing.

Step	Action
1	Tap GNSS Settings in the Zeno drop down to open the GNSS Settings dialog.
2	Check the Log data for post-processing check box. 
3	Tap OK.
	Raw data logging will start automatically as soon as you measure your first point.

Data collection for post-processing

Step	Action
1	Ensure, that raw data logging has been enabled. This is indicated by the raw data logging symbol on the GNSS Status bar.
2	For reliable results, every point should be measured about 10 seconds. To check the GPS capture settings, tap GPS Preferences… in the GPS drop down. 
3	Select the Capture tab.
4	Enable the Averaging check box.
5	Enter 10 for both, vertices and points. 
6	Tap OK.
7	You can now continue with your field survey. After post-processing you will usually achieve at least the shown estimated post-processed accuracy.
☞	

Stop and Go

This process is used to achieve an ambiguity fix after post-processing for highest accuracy. A 10 minute initialization phase (static measurement for 600 positions) is required to achieve an estimated post-processed accuracy at cm level. This accuracy level is available until a loss of lock. After that, a new initialization has to be done.

Step	Action
1	Ensure that raw data logging has been enabled. This is indicated by the raw data logging symbol on the GNSS Status bar.
2	Change the capture settings in the GPS Preferences… for points to 600. This is the time required for the initialization.
3	Setup you Zeno with external antenna on any point and tap the capture point button. Please note how the estimated post-processed accuracy on the GNSS Status bar gets better and better. It should indicate cm level at the end of the 600 epochs. You're now initialized for Stop & Go.
4	Change the capture settings in the GPS Preferences… for points and vertices to 10. This is the recommended observation time.
5	You can now continue with your field survey. After post-processing you will usually achieve at least the shown estimated post-processed accuracy in cm level.
	Recommended setup: • Use an external antenna (e.g. AS05) to achieve a phase solution. • After the initialization, every point should be observed for 10 seconds or more. • The reference station should be closer than 10 km. • The internal antenna GS05/06 is not recommended for Stop & Go. • Stop & Go is recommended in areas with open sky only to prevent frequent loss of locks. • To achieve a code solution with an internal antenna, the distance to the reference station can be up to multiple 100 km. The observation time on each point should be 5 seconds or longer.

Setting communication parameters

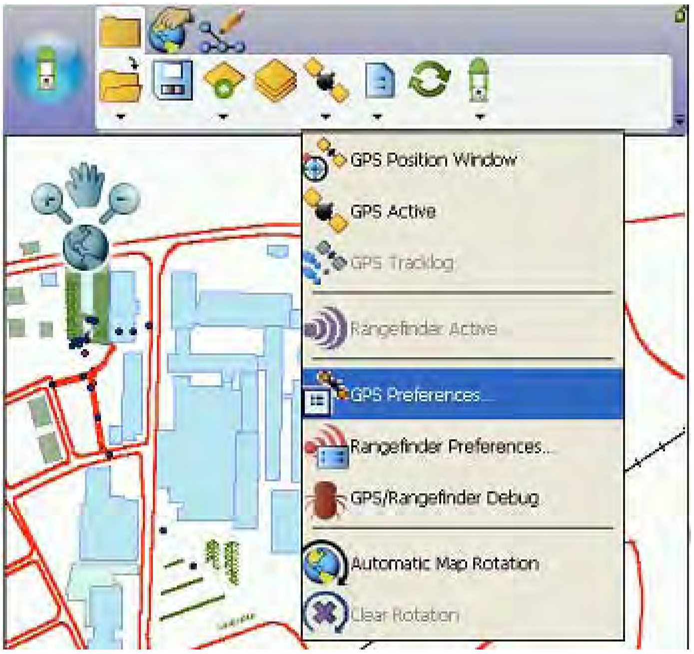
Overview of setting communication parameters

Before you can activate your GPS, you need to set the GPS communication parameters in Zeno Office to match the parameters set on your GPS receiver. The most common communication parameters are located in the GPS page of the GPS Preferences dialog box. Less common communication parameters are located in the Serial Port Parameters dialog box, which is opened by tapping the Serial Port Parameters button, .

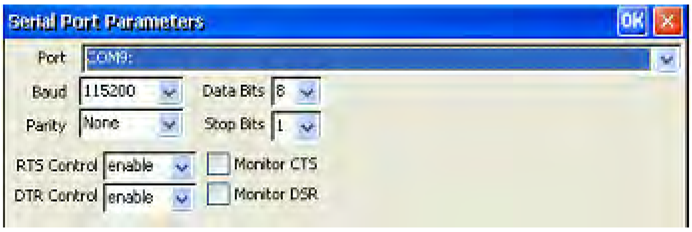
You can use the Find GPS tool, to search for your GPS if you do not know which port on your mobile device your GPS is connected to. However, you need to make sure that your GPS is connected and turned on in order for the Find GPS tool to detect your GPS. The Port and Baud drop-down list options will be updated as the Find GPS searches for a connected GPS.

Note: Refer to the Leica Zeno 10/15 User manual for information on how to set the output GPS protocol and port communication parameters on the GPS receiver.

Setting the GPS protocol, port, and baud rate

Step	Action
1	Tap the arrow below GPS Position Window button, on the Main toolbar, to display the drop-down list. 
2	Tap GPS Preferences to open the GPS Preferences dialog box. The GPS page is the first page displayed. 
3	Tap the Protocol drop-down arrow to select the protocol used by your GPS receiver to output data.
4	Tap the Port drop-down arrow to select the port used by your GPS receiver to output data.
5	Tap the Baud drop-down arrow to select the baud rate used by your GPS receiver to output data.

Setting the advanced serial port parameters

Step	Action
1	Tap the Serial Port Parameters button  on the GPS page of the GPS Preferences dialog box, to open the Serial Port Parameters dialog box. The Port and Baud rate selected in the GPS page will automatically be selected in the Serial Port Parameters dialog box.
2	Tap the Data Bits drop-down arrow to select the number of data bits used by your GPS to output data. 
3	Set the remaining communication parameters to match the settings on your GPS receiver.

Overview of activating GPS

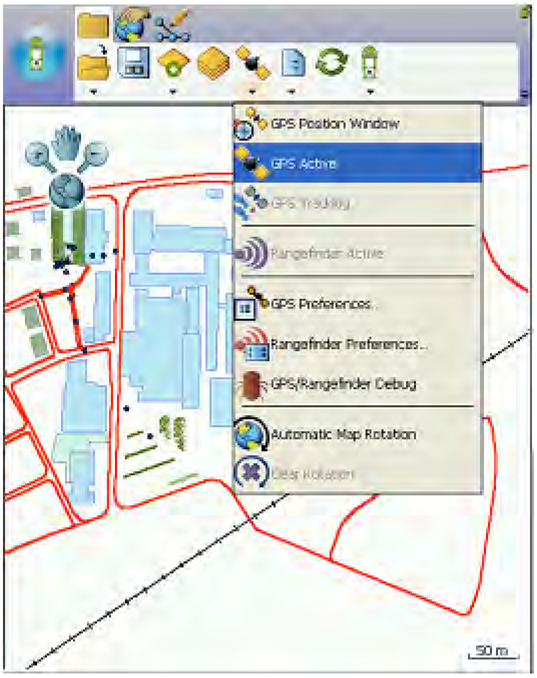
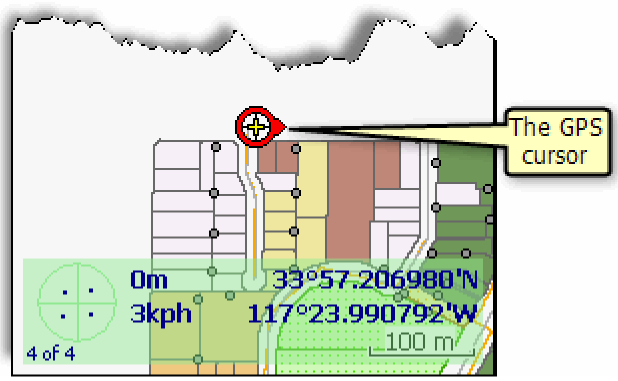
Before you activate your GPS in Zeno Field, you need to ensure that the GNSS cap is correctly connected to your device and that the GPS protocol and communication parameters in Zeno Field match the settings on the GNSS receiver.

The GPS can only be activated if there is a projection defined for the current Zeno Field map. The GPS Active tool is disabled if the current Zeno Field map does not have a projection defined. The default projection in Zeno Field is latitude–longitude using the WGS84 datum. The default projection can be changed by placing an Zeno Field.prj file in your My Documents folder.

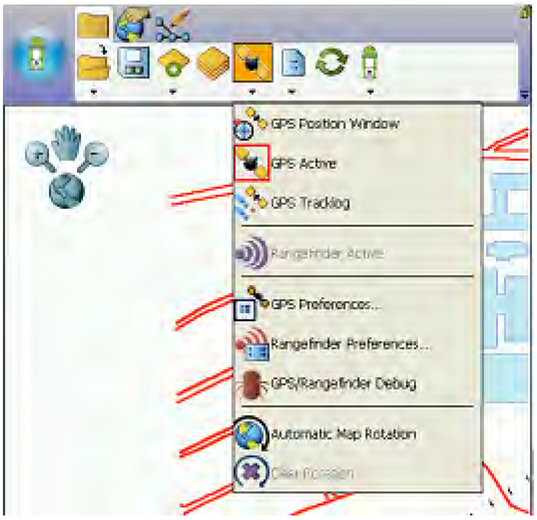
Activating your GPS with the GPS Position Window button: You can also activate the GPS by tapping the GPS Position Window button. A message box will be displayed if the GPS is not active. Tap Yes to activate the GPS and open the GPS Position Window.

Deactivating your GPS: If the GPS is activated, you can deactivate it by tapping GPS Active.

Steps to activate your GPS

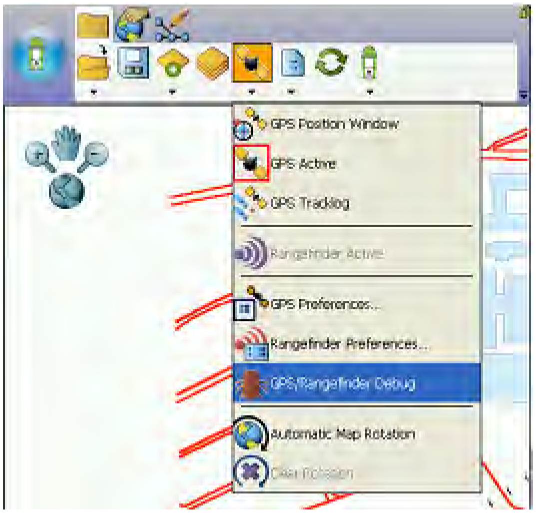
Step	Action
1	Plug your GNSS cap onto your device.
2	Set the GPS Protocol and communication parameters in the GPS Preferences dialog box to match the settings on the GPS receiver.
3	Tap the arrow below the GPS Position Window button to display the dropdown list. 
4	Tap GPS Active. The GPS cursor is displayed when the GPS is active and is initially located at the last known or current GPS position. The GPS cursor is shown with a slash when using the last known GPS position. 

The GPS Active icon is also highlighted with a red box when the GPS is active.



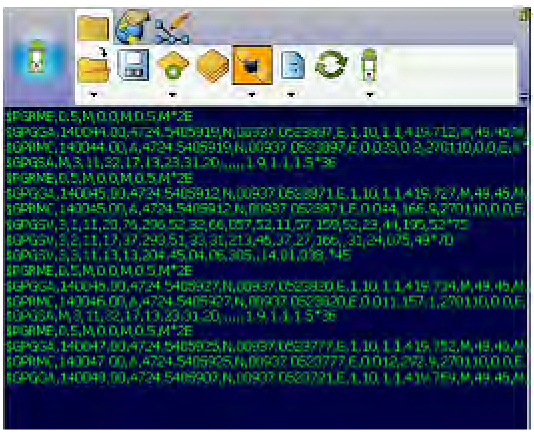
The GPS/Rangefinder Debug tool

GPS/Rangefinder Debug is a useful tool for troubleshooting GPS connection problems. The GPS/Rangefinder Debug tool is opened by tapping the arrow to the right of the GPS Position Window button and then tapping GPS/Rangefinder Debug. The GPS Debug tool is only opened when a GPS or rangefinder is currently active.



The GPS/Rangefinder Debug tool opens a window that displays data from either the GPS receiver or rangefinder, or both. Zeno Field uses the settings for the GPS and rangefinder communication parameters to parse, or interpret, the GPS and/or rangefinder data being received on the serial port of your device. The information displayed in the GPS/Rangefinder Debug window is dependent of the GPS and rangefinder protocols being used to communicate with your GPS receiver or rangefinder. Zeno Field then displays information in the GPS/Rangefinder Debug window that indicates the status of the GPS and/or rangefinder connection.

Valid GPS data is displayed in green text, and valid rangefinder data is displayed in blue text. Invalid data is displayed in red text. Valid data is data that is constructed properly, in accordance with the selected GPS or rangefinder protocol, and has a valid checksum.



The GPS/Rangefinder Debug window for NMEA 0183 GPS and rangefinder data. Valid GPS data is displayed using green text, and valid rangefinder data is displayed using blue text.

‘Using your rangefinder’, includes a section on using the GPS/Rangefinder Debug tool for troubleshooting your rangefinder connection. This section will focus on using the tool for troubleshooting your GPS connection.

No information displayed in the GPS\Rangefinder Debug window

Irrespective of which GPS protocol is being used, the first observation to make when opening the GPS/Rangefinder Debug window is whether any information is being displayed at all. No information displayed in the GPS/Rangefinder Debug window indicates a GPS connection or configuration problem. Problems are caused by any one of the following factors:

- The GPS Protocol selected in the GPS Preferences dialog box does not match the protocol being used by your GPS receiver to output data. For example, your GPS receiver may be configured to output data using the TSIP protocol, but the NMEA 0183 protocol has been selected in the GPS Preferences dialog box.
- The GPS port communication parameters selected in the GPS Preferences dialog box do not match the communication parameters defined for the Zeno GNSS caps.

Test each of these factors one by one to isolate the problem and determine why no information is being displayed in the GPS/ Rangefinder Debug window.

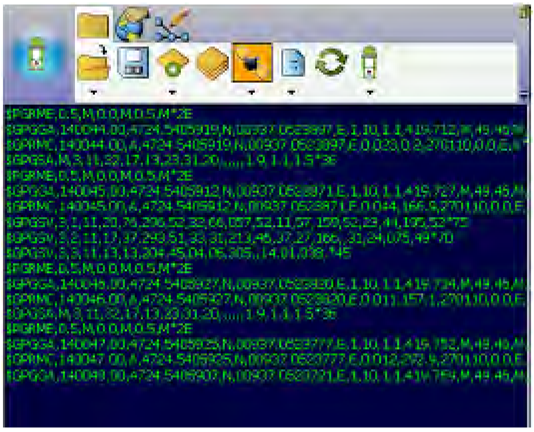
Illegible information displayed in the GPS\Rangefinder Debug window

In some instances you may see illegible characters displayed in the GPS/Rangefinder Debug window. This is usually caused by GPS port communication parameters selected in the GPS Preferences dialog box that do not match the serial communication parameters set on your GPS receiver.

GPS Debug information for the NMEA 0183 protocol

If you are using the NMEA 0183 protocol, you should see the NMEA 0183 sentences displayed in the GPS/Rangefinder Debug window as ASCII text. Each NMEA sentence that Zeno 10/15 reads from the serial port is displayed in the GPS Debug window. Valid GPS data is displayed using green text, while invalid GPS data is displayed using red text.

The displayed NMEA 0183 sentences can be used to troubleshoot your GPS connection. In the following example, a number of the NMEA 0183 sentences are displayed showing empty fields with commas and no preceding information.



The GPS/Rangfinder Debug window for NMEA 0183 GPS data.

For instance, the $GPGGA sentence (in the middle of the GPS/ Rangefinder Debug window) is displayed as: $GPGGA,,,,,,0,03,,,M,,M,,*65

The $GPGGA NMEA 0183 sentence includes the GPS fix data, with the first field containing the UTC time, the second and third fields containing the latitude, the fourth and fifth fields containing the longitude, the sixth field containing the fix quality, and the seventh field containing the number of satellites being tracked. In the above example $GPGGA NMEA 0183 sentence, the UTC time, latitude, and longitude values are empty. The fix quality field is 0, which means there is no GPS fix. The number of satellites being tracked is 3, which is insufficient to calculate a position (4 satellites are needed to calculate a position. So the absence of latitude and longitude values and the fix quality of 0— that is, no fix—indicate that the GPS receiver has not locked on to sufficient satellites to calculate a GPS position and consequently is not outputting a GPS position to Zeno Field. This would explain why, in this situation, Zeno Field does not display a GPS position in the GPS Position Window.

Similarly, empty fields in other NMEA 0183 sentences can explain why the corresponding information is not displayed in the GPS Position Window.

“Error 55 opening COM1” message when activating the GPS

This error may occur when Zeno Field attempts to open the serial port, such as COM1, when the port has already been opened by another application. Any application that uses the serial port could be responsible for this situation. On Windows CE devices, however, the application is usually Microsoft ActiveSync, drivers for keyboards, or programs used to configure GPS receivers.

This error message may also occur on PCs that have Microsoft ActiveSync running in the background. The solution in this case is to open the Connection Settings dialog box in ActiveSync and uncheck the Allow serial or infrared connection to this COM port check box. This will disable ActiveSync from locking the serial port.

NMEA 0183 sentences supported by Zeno Field

Zeno Field supports a number of protocols for communicating with GPS receivers, one of which is the NMEA 0183 version 2.0 standard protocol defined by the National Marine Electronics Association. The NMEA 0183 standard definition is available from http://www.nmea.org.

The NMEA 0183 standard defines sentences that are used to transmit data. These sentences consist of printable ASCII text (plus carriage return and line feed). Each sentence consists of the following data sequence:

- A $ always starts an NMEA 0183 sentence.
- A two-letter talker ID—for example, GP for global positioning system receiver.
- A three-letter sentence ID—for example, GGA.
- Several data fields separated by commas.
- An optional checksum to terminate the sentence and a carriage return or line feed.

The NMEA 0183 standard allows individual manufacturers to define proprietary sentence formats. These sentences start with $P, then a 3-letter manufacturer ID, followed by data from the manufacturer that follows the general format of the standard sentences.

A sample NMEA 0183 sentence for the GPS fix data might be as follows:

$GPGGA,121505,4807.038,N,01131.324,E,1,08,0.9,133.4,M,46.9,M, , *42

where

- $GPGGA is the NMEA 0183 sentence ID for the GPS fix data.
- 121505 is the fix taken at 12:15:05 UTC.
- 4807.038,N is latitude 48° 07.038' N.
- 01131.324,E is longitude 11° 31.324' E. 1 is the fix quality.
- The fix quality can have a value between 0 and 3, defined as follows:
  - 0 = no fix
  - 1 = GPS or standard positioning service (SPS) fix
  - 2 = DGPS fix
  - 3 = Precise positioning service (PPS) fix
- 08 is the number of satellites being tracked.
- 0.9 is the horizontal dilution of position (HDOP).
- 133.4,M is the altitude, in meters, above mean sea level.
- 46.9,M is the height of the geoid (mean sea level) above the WGS84 ellipsoid.
- (empty field) is the time in seconds since the last DGPS update.

- (empty field) is the DGPS station ID number.
- *42 is the checksum field.

The NMEA 0183 version 3.0 standard adds the following additional values for the $GPGGA fix quality, which Zeno Field recognizes:

- 4 = Real Time Kinematic (RTK) fixed solution
- 5 = Real Time Kinematic (RTK) float solution
- 6 = Estimated dead reckoning
- 7 = Manual input mode
- 8 = Simulation mode

Zeno Field recognizes the following NMEA 0183 version 2.0 or higher sentences:

Sentence	Description
$GPGGA	GPS fix data
$GPGLL	Geographic position, latitude and longitude
$GPGSA	GPS Dilution of Precision (DOP) and active satellites
$GPGSV	GPS satellites in view
$GPRMC	Recommend minimum specific GPS/TRANSIT data
$GPRRE	Range residual error
$GPVTG	Track made good and ground speed
$GPZDA	Time and date
$PGRME	Estimated error information (Garmin Proprietary)
$PGRMT	Sensor Information (Garmin Proprietary)
$PMGNVER	GPS hardware and software version numbers (Magellan Proprietary)
$PASHR,POS	Position information (Ashtech Proprietary)
$PASHR,SAT	GPS satellite tracking status information (Ashtech Proprietary)
$PRWIRID	Version Information (Rockwell Proprietary)
$PRWIZCH	Channel Status (Rockwell Proprietary)
$SDDPT	Depth, in meters
$SDMTW	Water Temperature, in degrees Celcius

Most GPS receivers output a limited number of NMEA 0183 sentences. Zeno Field uses data from a number of NMEA 0183 sentences to display all of the information in the GPS Position Window as well as to populate the fields associated with the GPS Tracklog. When information is not displayed in the GPS Position Window it is usually the result of Zeno Field not receiving the required NMEA 0183 sentence from the GPS receiver.

Using the GPS Position Window

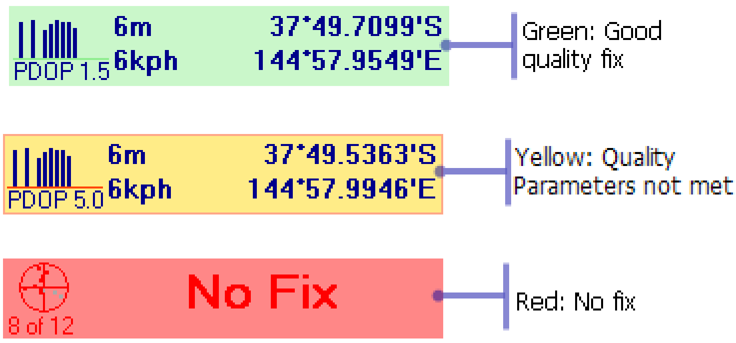
Overview of GPS Position Window

The GPS Position Status Bar and Position dialog are used to display information about the GPS satellites and the GPS position, as well as navigational information. Most of the information displayed in the GPS Position Window is calculated by the GPS receiver and output to Zeno Field via the selected GPS protocol. Although many GPS receivers also display this information on the receiver's screen, it is useful and convenient to use the Zeno Field GPS Position Window. Using Zeno Field reduces the need to view information on two different devices. In addition, the GPS Position Window provides a means of displaying key information if the GPS receiver has no display screen.

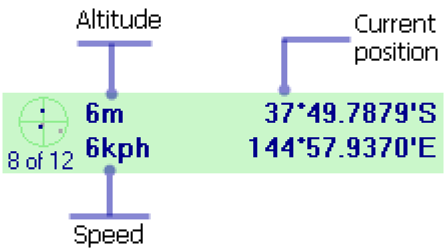
The GPS Status Bar

The GPS status bar is a translucent window that displays over the top of your map.

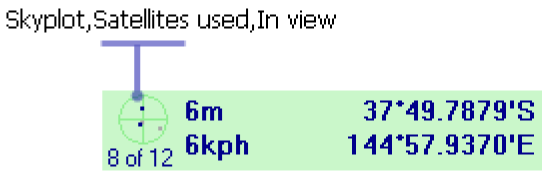
The background color of the GPS Status Bar indicates the current conditions of the GPS measurements according to the alerts that have been defined in Zeno Field. A GREEN background indicates that the quality is acceptable according to the set alerts (alerts are set in the GPS properties dialog),YELLOW indicates that the quality parameters are not met, and RED indicates no fix.

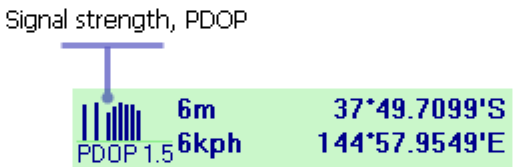


The GPS Status Bar also shows current position, current speed and altitude (if applicable).

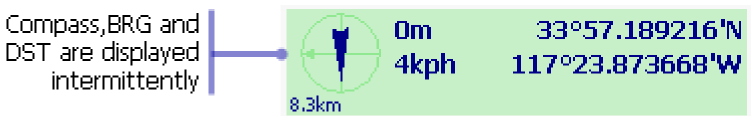


On the left hand side, the graphical area cycles every few seconds to display skyplot and satellites alternately, signal strength and PDOP are displayed in view





If a destination feature is selected in the map (either by using the Go To tool or by selecting features with the find tool), a compass, distance to the feature and bearing are dispalyed intermittently.

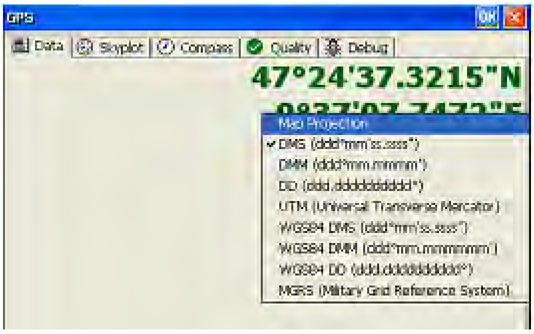


The GPS Position Window

The GPS Position window displays a rich variety of information about the GPS satellites, position coordinates, and navigational information. The information is spread across four tabs: Data, Skyplot, Compass and Quality.

Some of the display fields have context or tap menus; if you tap the field, a menu list will be displayed with alternative information or data formats, to be displayed in the associated field.

In the following example, the position coordinate display field has been tapped, using the cursor or stylus, to display the menu of coordinate systems. The current selection in the tap menu is indicated by a check mark to the left of the selection—for example, DMS in the screenshot below.



The GPS Position Window displays the following information:

GPS Mode

The GPS Mode displays the type of position being calculated by the GPS receiver. There are three groups of GPS modes that can be displayed: NOFIX, 2D/3D, and differential modes.

NOFIX

NOFIX indicates that Zeno 10/15 is not receiving a position from the GPS receiver. No position coordinate will be displayed if the initial GPS Mode is NOFIX. Also, the 2D/3D or differential modes will not be displayed during the NOFIX mode.

2D/3D

2D indicates that only three satellites are available and are being used to calculate the x,y position coordinates. 3D indicates that at least four satellites are available and are being used to calculate the x, y, and z (elevation) position coordinates.

Differential

DGPS indicates that real-time differential correction is being used to calculate the x, y, and z position coordinates.

SBAS indicates that a real-time differential correction from a Satellite Based Augmentation System (SBAS) is being used to calculate the x, y, and z position coordinates. The Wide Area Augmentation System in the United States is an example of an SBAS real-time differential source.

RTK fix indicates that a real-time kinematic (RTK) fixed solution is being used to calculate the x, y, and z position coordinates.

RTK flt indicates that a real-time kinematic (RTK) float solution is being used to calculate the x, y, and z position coordinates.

PPS indicates that a Precise Positioning Service is being used.

Multiple GPS modes can be displayed simultaneously; for example, the 2D or 3D mode can be displayed simultaneously with the differential DGPS or PPS modes.

Position Coordinates

Position Coordinates is a tap and hold menu field; tapping and holding on the coordinates displays the following menu list of alternate coordinate systems, or projections, to be used for displaying the current GPS position:

Map Projection: the projection of the current map, which may be in latitude–longitude or UTM—or any other projection supported by Zeno 10/15.

DMS: latitude–longitude in degrees, minutes and decimal seconds (ddd°mm'ss.ss").

DMM: latitude–longitude in degrees and decimal minutes (ddd°mm.mmmm').

DD: latitude–longitude in decimal degrees (ddd.dddddddd°).

UTM: the current UTM (Universal Transverse Mercator) coordinates and zone.

WGS84 DMS: latitude–longitude in degrees, minutes, and decimal seconds (ddd°mm'ss.ss"), using the WGS84 datum.

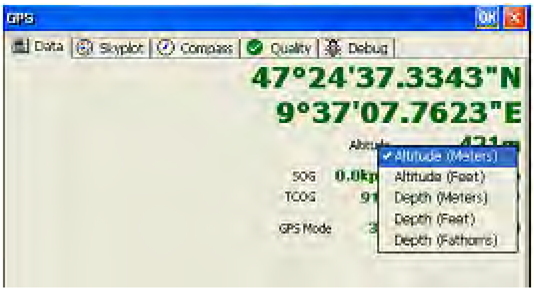
WGS84 DMM: latitude–longitude in degrees and decimal minutes (ddd°mm.mmmm'), using the WGS84 datum.

WGS84 DD: latitude–longitude in decimal degrees (ddd.dddddddd°), using the WGS84 datum.

MGRS: The Military Grid Reference System coordinate.

Elevation

Elevation is a tap menu field; tapping on the elevation displays the following menu list of altitude or depth units to show in the elevation field, as shown below



Altitude (Meters)

Altitude (Feet)

Depth (Meters)

Depth (Feet)

The depth information is obtained from the standard NMEA message $SDDPT which provides the depth below the transducer and the offset of the transducer to the water line. This NMEA message is typically output by marine GPS devices such as depth sounders.

Navigation Information

The Navigation Information displays the following information:

SOG: Speed Over Ground, as calculated by the GPS. SOG is the actual speed the GPS receiver is moving over the ground.

COG: Course Over Ground, as calculated by the GPS. COG is the direction the GPS receiver is moving and corresponds to the direction of the black Compass arrow.

DST: The distance from the current GPS position to the selected destination. The DST is calculated by Zeno 10/15.

BRG: The bearing from the current GPS position to the selected destination. The BRG corresponds to the red destination direction on the Compass. The BRG is calculated by Zeno 10/15.

COG is also a tap and hold menu field that provides the option of displaying the COG in one of the following formats:

TCOG: True North Course Over Ground

MCOG: Magnetic North Course Over Ground

Position Measure of Quality

Position Measure of Quality is a tap menu field. Tapping on the Position Measure of Quality displays the following menu list of information to be displayed in the field:

PDOP: Position Dilution of Precision.

DOP: Horizontal Dilution of Precision.

VDOP: Vertical Dilution of Precision.

TDOP: Time Dilution of Precision.

HPE: Estimated Horizontal Position Error.

VPE: Estimated Vertical Position Error.

EPE: Estimated Position Error.

SATS: Satellites used in solution. The number of satellites used by the GPS receiver to calculate the GPS position.

DAGE: Differential data age. The age, in seconds, of the differential signal and correction used by the GPS receiver to differentially correct the GPS position.

DSID: Differential reference station ID. The ID of the differential reference station used by the GPS receiver.

Satellite Skyplot and Signal Chart

The satellite skyplot and signal chart are shown on their own tab. The Satellite Skyplot shows the almanac of which satellites should be visible or available to the GPS receiver. Each satellite is uniquely coloured and the PRN (PseudoRandom Noise) number and position of each satellite is displayed.

Satellite use is distinguished by:

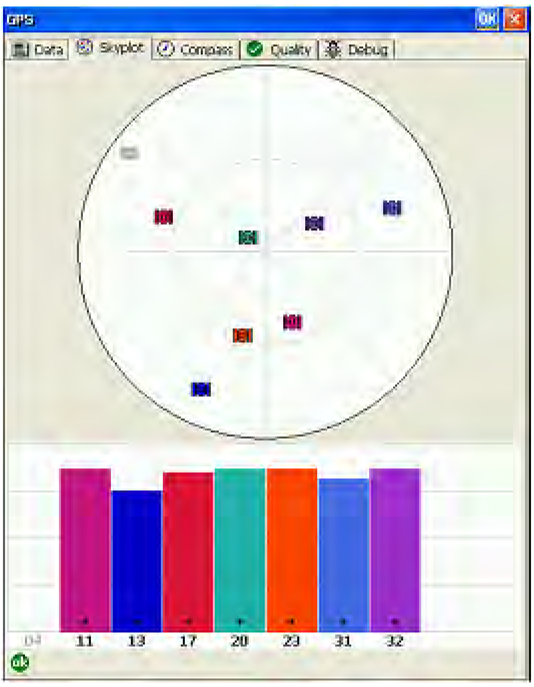
A Black outline for satellites available and used for calculating the GPS position.

Satellites available but not used are simply colored.

Grey satellites are unavailable.

The Satellite Skyplot view shows a bird’s-eye view of the position of each satellite according to the satellite almanac. The outer circle represents the horizon (north is up); the inner circle represents 45° above the horizon; and the center point represents what is directly overhead.

The Signal Chart shows a bar chart of the PRN numbers and relative signal strengths of the satellites in the almanac. A red bar indicates that the satellite is unavailable.



Compass

The compass is displayed on its own tab in the GPS position window along with important navigational information.

The Compass shows the GPS direction with a black arrow and the direction to the selected destination in red. The GPS direction corresponds to the COG (Course Over Ground) direction, and the direction to the destination corresponds to the BRG (bearing).

Bearing: Speed over ground (SOG), True North Course over ground (TCOG), distance (DST) and bearing (BRG) are also displayed on the Compass tab.

Quality

All of the quality parameters that you can choose to display on the data tab (in place of the default PDOP) are listed on the quality tab.

Debug

Shows the GPS data being received from GPS.

Opening and closing the GPS Position Window

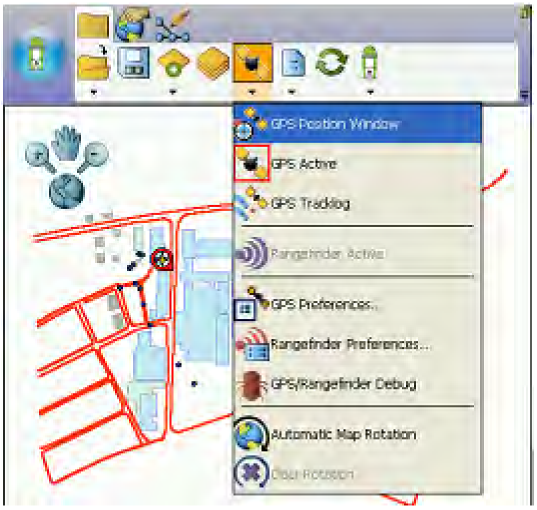
Overview of opening and closing the GPS Position Window

The GPS Position Window can only be opened if the GPS has been activated. The GPS Position Window can be opened, moved, and closed at any time—as long as the GPS remains active. The GPS Position Window is automatically closed when the GPS is deactivated.

Activating the GPS: The GPS can only be activated if there is a projection defined for the Zeno Field map.

See Also: Refer to section Activating your GPS , for help on activating the GPS.

Opening the GPS Position Window

Step	Action
1	Tap the GPS Position Window tool on the GPS Menu, to open the full screen GPS Position Window.  A message box will be displayed if the GPS is not active.
2	Tap Yes to activate the GPS and open the GPS Position Window.

Closing the GPS Position Window

1. Tap OK at the bottom of the dialog or on the taskbar at the top of the screen

Overview of selecting the position coordinate system

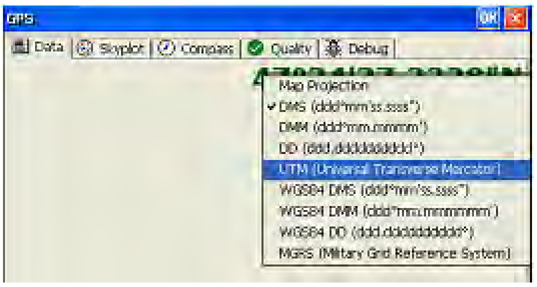
The GPS Position Window displays the current GPS position coordinates in one of a number of different projections or coordinate systems.

The latitude–longitude position is obtained from the GPS messages, while the other projection coordinates are calculated by Zeno Field.

Tapping and holding the Position Coordinate lists a menu of coordinate systems to be used for displaying the current GPS position.

☞ **GPS Position Window coordinates:** The GPS Position Window coordinates are for display only; changing the displayed coordinate system does not affect the projection of the coordinates used for GPS data capture.

Steps to select the position coordinate system

Step	Action
1	Tap the GPS Position button to open the GPS Position Window. By default, the position coordinate display shows the position in DMS—latitude and longitude in degrees, minutes and decimal seconds.
2	Tap and hold the position coordinate display field to display the menu list of available coordinate systems. 
3	Tap the required coordinate system to be used for displaying the current GPS position—for example, UTM. 
4	The current GPS position will be displayed using the selected coordinate system. 

Overview of selecting the position measure of quality

GPS receivers calculate various measures of position quality to quantify the accuracy of the GPS position. Most GPS receivers only calculate a limited number of these quality measures, and not all measures are output by the GPS receiver via the selected GPS protocol—for example, NMEA. The GPS Position Window simply displays the measure received from the GPS. N/A indicates that no value for the corresponding measure has been received by Zeno Field from the GPS.

Dilution of precision (DOP) is a measure of the receiver–satellite geometry quality (i.e., the number of satellites received and where they are relative to each other) on a scale of one to 10. The lowest numbers are the best quality, and the highest numbers are the worst quality.DOP is a description of the purely geometric contribution to the uncertainty in a position fix.

Important: Refer to the Zeno 10/15 User Manual to determine which measures of quality the GPS receiver outputs.

Steps to select the position measure of quality

<table>
<tr><th>Step</th><th>Action</th></tr>
<tr><td>1</td><td>Tap the GPS Position button to open the GPS Position Window.

By default, the position measure of quality shows the current PDOP value (Position Dilution of Precision) if available.</td></tr>
<tr><td>2</td><td>Tap and hold the position measure of quality field to display the menu list of available measures of quality.


</td></tr>
<tr><td>3</td><td>Tap the required measure of quality to be displayed.


</td></tr>
<tr><td>4</td><td>The selected measure of quality will be displayed in the GPS Position Window.


</td></tr>
</table>

Navigating with your GPS

Overview of navigating with your GPS

Zeno Field offers two methods for basic navigation when using a GPS connected to Zeno Field.

First, Zeno Field provides navigational information from the current GPS position to the destination. This information includes the distance and bearing to the destination (calculated by Zeno Field) and the speed and course over ground, which Zeno Field obtains from the GPS receiver.

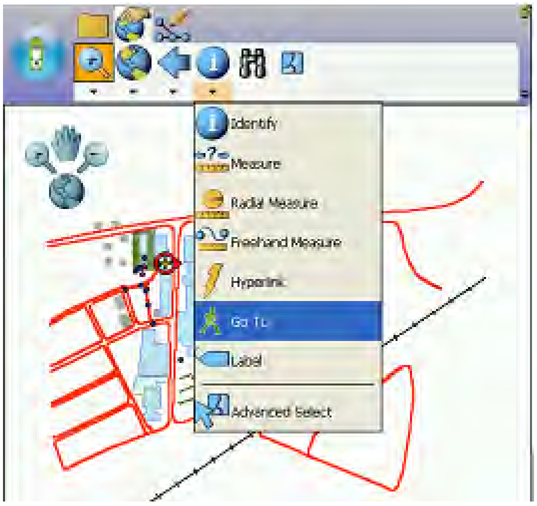
The term navigation destination is similar to the term waypoint used by the GPS industry, with the exception that waypoints generally refer to destination points, whereas Zeno Field navigation destinations can include coordinates on a map as well as point, line, or polygon features. Zeno Field provides four tools for selecting a navigation destination:

- Go To tool
- Find tool
- Advanced Select tool
- Go To Selected Feature tool

The second basic navigation method that Zeno Field provides is a GPS Tracklog. A GPS Tracklog is an electronic breadcrumb trail that illustrates the path you have traveled. The GPS Tracklog can help you backtrack from your current GPS position to your starting point.

Selecting a navigation destination using the Go To tool

The Go To tool can be used to select a navigation destination. Simply activate the tool and tap anywhere on the map to select your destination.

Step	Action
1	Tap the arrow below the Identify button to display the drop-down list. 
2	Tap Go To.
3	The Go To button is displayed on the Browse toolbar and is depressed to indicate that the tool is active.
4	Tap the map to select a navigation destination. 

	The destination is displayed with a Mark label.
5	Use the GPS Position Window to view the distance (DST) and bearing (BRG) from your current GPS position to your selected destination

Activating the GPS: It is not necessary to activate the GPS before selecting a navigation destination. However, the GPS does need to be activated in order to open the GPS Position Window and view the distance and bearing to the destination.

Clearing the selected destination: To clear the selected destination and remove the destination Mark label, tap the Clear Selected tool located on the drop-down list below the Find Features button on the Browse toolbar. The Mark label is displayed when a destination has been selected.

Note: Refer to section, Activating GPS, for help on activating the GPS.

Selecting a navigation destination using the Find tool

Overview of Find tool

The Find tool can be used to select features from a layer using a search query. The results of the query are displayed in a list. The Go To button in the Find dialog box can be used to select a feature as the navigation destination.

The results of the query include a distance (DST) column which shows basic navigational information for each feature relative to the current GPS position—or relative to the center of the map if there is no GPS position.

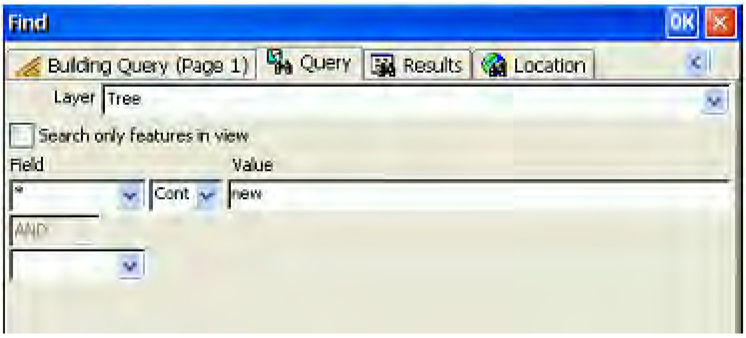
This navigational information includes the following:

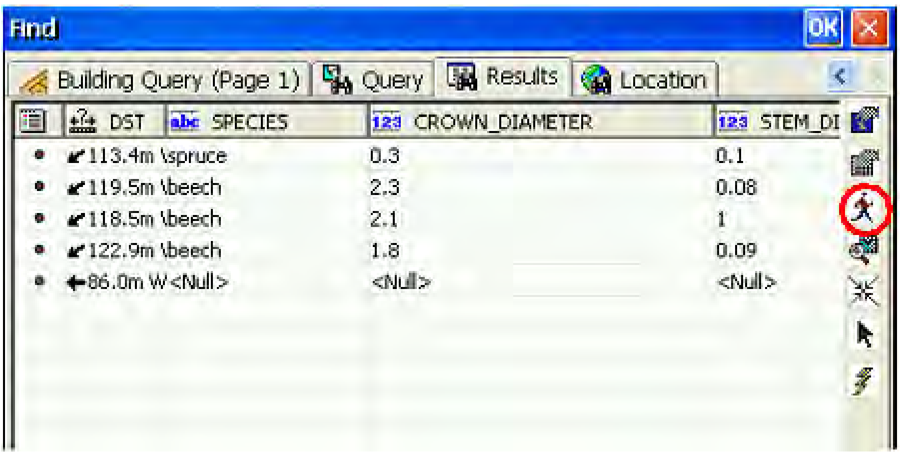
- A directional arrow, relative to True North
- A distance, using the current display units
- An abbreviated compass direction, for example NW for northwest

The features can be sorted by the distance to the GPS position—or center of the map—by tapping on the DST column heading. Tapping the DST column heading once will sort by increasing distance, tapping a second time will sort by decreasing distance.

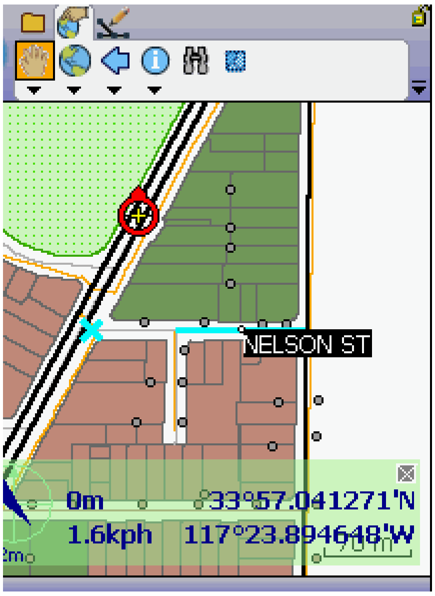
Note: Refer to topic Finding features in section, 'Querying your data', for help on using the Find tool.

Steps to select a navigation destination using the Find tool

Step	Action
1	On the Browse toolbar, tap the Find button to open the Find dialog box. 
2	Tap the Layer drop-down list on the Query page and select the layer to search on.
3	Optionally tap the Field dropdown list and select the Field to search on. Zeno Field will search all fields in the layer if you do not select a specific field. 
4	Use the Soft Input Panel or keyboard to type the value that you want to search for in the Value box. If you leave the Find box blank, Zeno Field will list all features in the selected layer.
5	Tap the Results tab to execute the search. A table is displayed listing all of the selected features.
6	Tap the feature that you want to navigate to.

<table>
<tr><td></td><td>
</td></tr>
<tr><td>7</td><td>Tap the Go To button to make the selected feature your destination.</td></tr>
<tr><td>8</td><td>The selected feature is highlighted using the current highlight color.

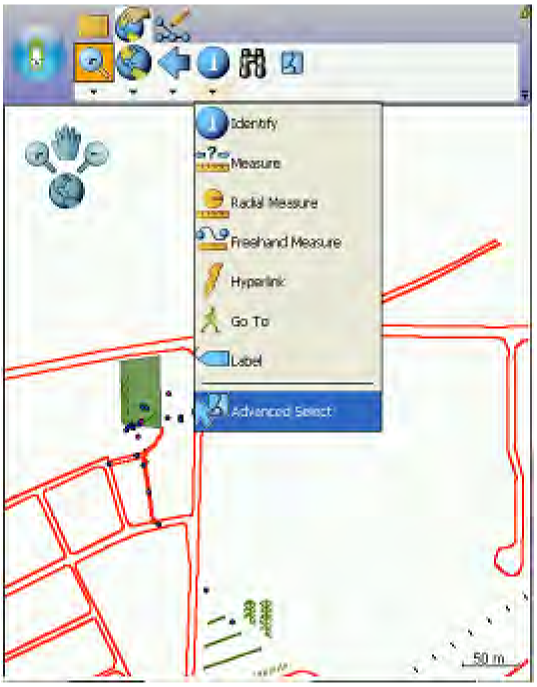
The destination is displayed and labeled using the value of the field that was searched on. If no field was specified, the label will use the value of the first field that has any part of the word ‘name’ in the field name.


</td></tr>
<tr><td>9</td><td>Use the GPS Position Window to view the distance (DST) and bearing (BRG) from your current GPS position to your selected destination.</td></tr>
</table>

Changing the highlight color: You can change the highlight color of a selected feature on the Display page of the Options dialog box.

Selecting a navigation destination using the Advanced Select tool

The Advanced Select tool can be used to select multiple features. Only layers that have been activated for the Identify tool will be selected. Layers are activated for the Identify tool in the Layers page of the Table of Contents dialog box. The selected features are displayed in a list. The Go To button in the Advanced Select dialog box can be used to select the coordinate or feature as the navigation destination.

Step	Action
1	Tap the drop-down arrow below the Identify button to display the drop-down list. 
2	Tap Advanced Select.
3	The Advanced Select button is displayed on the Browse toolbar and is depressed to indicate that the tool is active.
4	Tap the map to select a feature or tap and drag a selection box to select multiple features from the active layers. A list is displayed showing the coordinates and the selected features where the map was tapped. The + icon can be tapped to display the attributes of the selected feature. 

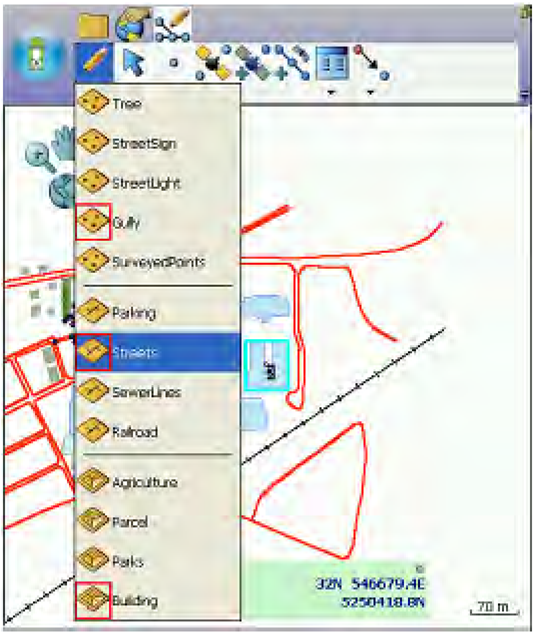
5	Tap the feature that you want to navigate to.
6	Tap the Go To button to make the selected feature your destination.
7	The destination is displayed and labeled with the same feature attribute shown in the Advanced Select list.
8	Use the GPS Position Window to view the distance (DST) and bearing (BRG) from your current GPS position to your selected destination.

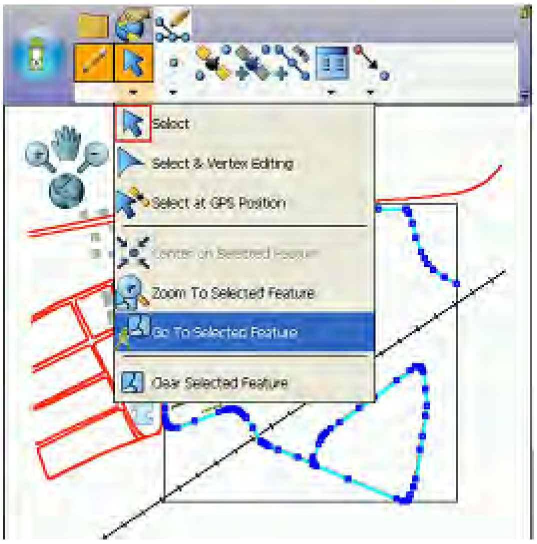
Selecting the coordinates for the navigation destination: The coordinates displayed at the top of the Advanced Select list can also be selected for the navigation destination. Tap the Coordinates label, then tap the Go To button.

Note: Refer to topic Using the Advanced Select tool in section, ‘Query

Selecting a navigation destination using the Go To Selected Feature tool

The Go To Selected Feature tool can be used to select a navigation destination by using the Select tool on the Edit toolbar. Select a feature from an editable layer and tap the Go To Selected Feature tool.

Step	Action
1	Tap Start/Stop Editing button on the Edit toolbar.
2	Activate a layer for editing, by selecting it from the available list. 
3	Tap the Select tool on the Edit toolbar. 
4	Tap the feature on the map that you want to select for your navigation destination.

	The selected feature is highlighted with a dashed box, showing the extent of the feature.
5	Tap the arrow below the Select button to display the drop-down list. 
6	Tap Go To Selected Feature.
7	The destination is displayed with a Mark label.
8	Use the GPS Position Window to view the distance (DST) and bearing (BRG) from your current GPS position to your selected destination.

Selecting vertical or horizontal lines: Increase the Pen Tolerance if you are having difficulty selecting a horizontal or vertical line feature. The Pen Tolerance can be set in the Display page of the Options dialog box.

Displaying the Edit toolbar: The Edit toolbar is automatically displayed when a layer is checked for editing. You can also open the Edit toolbar by using the Toolbars list, located on the drop-down list to the right of the Tools button on the Main toolbar.

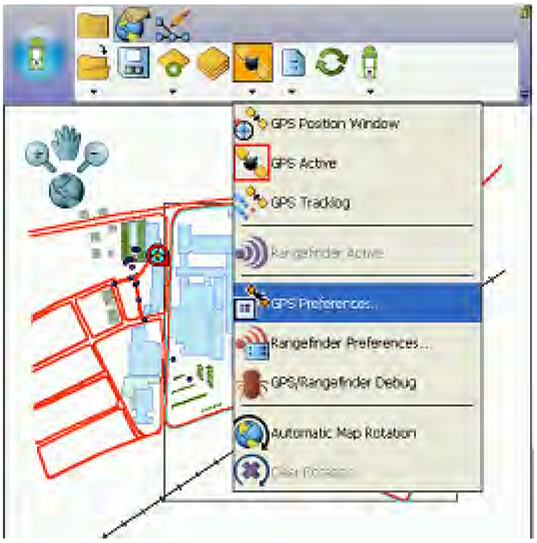
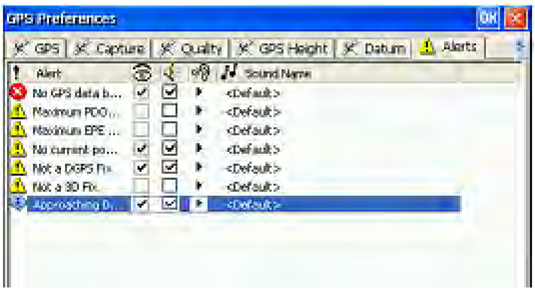
Note: Refer to section 'Editing basics', for more information on the editing tools and editing features.

Overview of setting the distance alert

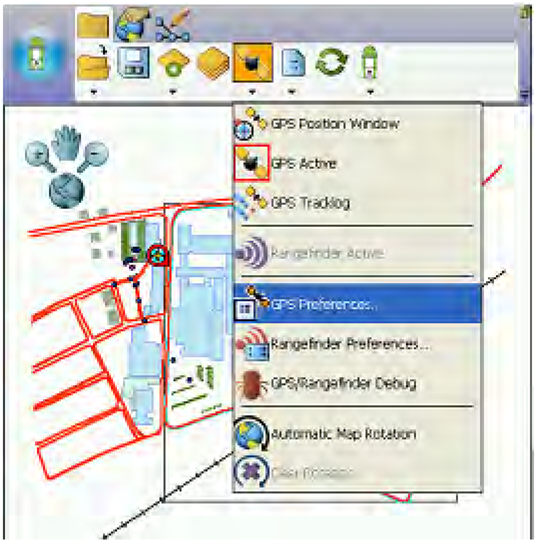
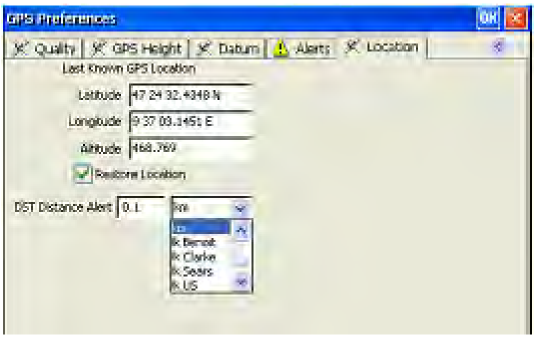
You can set an alert message— and sound—to be displayed when the distance from the current GPS position to the selected destination is less than a specified distance. The alert message and sound are specified in the Alerts page of the GPS Preferences dialog box. The distance is specified on the Location page of the GPS Preferences dialog box.

☞ **Creating a custom alert message:** You can create your own Alert message by creating a .wav file on your Zeno 10/15. To activate it, go to the Alerts page in the GPS Preferences dialog box.

Setting the alert message and sound

Step	Action
1	Tap the arrow below the GPS Position Window button to display the dropdown list. 
2	Tap GPS Preferences.
3	In the GPS Preferences dialog box, tap the right arrow button until the Alerts tab is displayed.
4	Tap the Alerts tab to display the Alerts page. 
5	Check the Visible check box for the Approaching Destination alert to display a message box, when the alert is activated. Check the Sound check box to play a sound when the alert is activated.
6	If the Visible check box is checked, the Approaching Destination message box will be displayed when the distance to the destination is less than the specified alert distance.
7	Tap OK.

Setting distance alert

Step	Action
1	Tap the arrow below the GPS Position Window button to display the dropdown list. 
2	Tap GPS Preferences.
3	In the GPS Preferences dialog box, tap the right arrow button until the Location page is displayed.
4	Tap the Location tab to display the Location page. 
5	Enter a distance value to be used for the Approaching Destination alert in the DST Distance Alert input field.
6	Select the type of units you would like to use for your destination value.
7	Tap OK.

Displaying the distance and bearing to the destination

The GPS Position Window displays the distance (DST) and bearing (BRG) from the current GPS position to the selected navigation destination.

Step	Action
1	Activate your GPS if you have not already done so.
2	Select a destination using the Go To, Find, Advanced Select, or Go To Selected Feature tools.
3	Tap the GPS Position Window button to open the GPS Position Window. The GPS Position Window displays the distance (DST) and bearing (BRG) from the current GPS position to the selected destination. 

Changing the distance units: The distance is displayed in the units specified for the display units. You can change the units on the Display page of the Zeno Field Options dialog box.

Note: Refer to section ‘Connecting your GPS receiver’, for help on activating the GPS.

Displaying the bearing on the compass

The compass in the GPS Position Window displays the GPS direction, or course over ground (COG), with a black arrow and the direction or bearing from the current GPS position to the selected destination with a red line.

Step	Action
1	Activate your GPS if you have not already done so.
2	Select a destination using the Go To, Find, Advanced Select, or Go To Selected Feature tools.
3	Tap the GPS Position Window button to open the GPS Position Window.
4	Tap the GPS Position Window Satellite Skyplot twice to toggle to the Compass display. 
5	The GPS Position Window displays the GPS COG with a black arrow and the bearing to the selected destination with a red line.

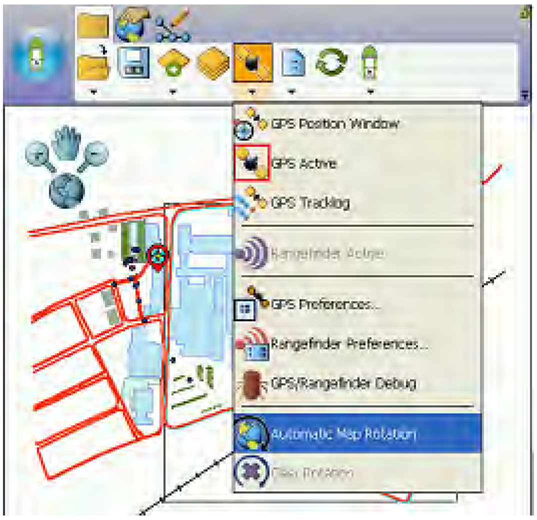
Using the Automatic Map Rotation tool

Overview of Automatic Map Rotation tool

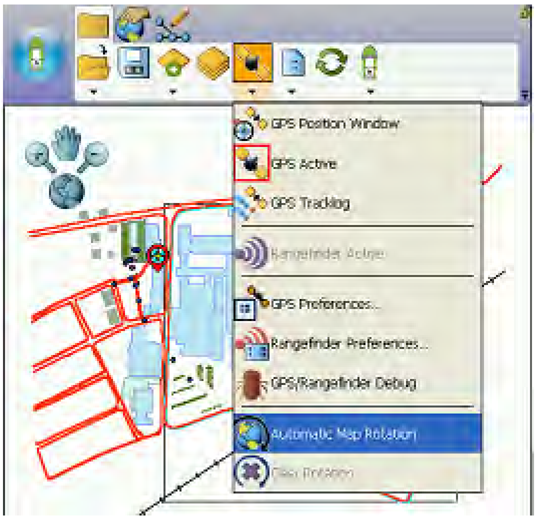
By activating the Automatic Map Rotation tool, Zeno Field will reorientate the map based on the direction of travel. With the Automatic Map Rotation tool active, Zeno Field redraws the map as you move and change your orientation so that the direction of travel is always up. The GPS must be active to use this tool.

Rotating the map orientation: Use the Map Rotate tool to orientate the map without the use of the GPS receiver. See section Zeno Field basics', for more information.

Activating the Automatic Map Rotation tool

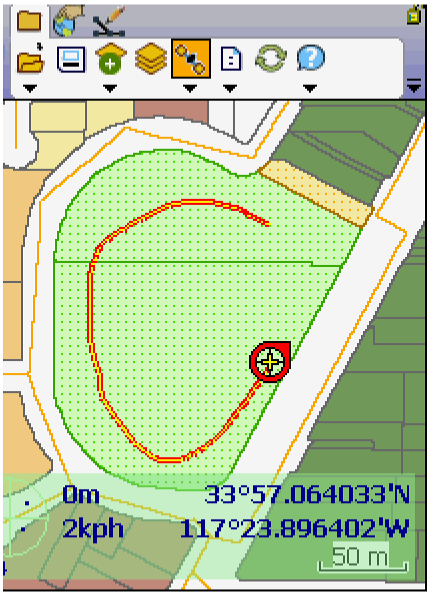
Step	Action
1	Activate your GPS if you have not already done so.
2	Tap the drop-down arrow below the GPS Position Window button.
3	Tap Automatic Map Rotation.  As you begin to travel and change directions, Zeno Field will automatically redraw the map so that the direction of travel is always up.

Stopping or clearing automatic map rotation

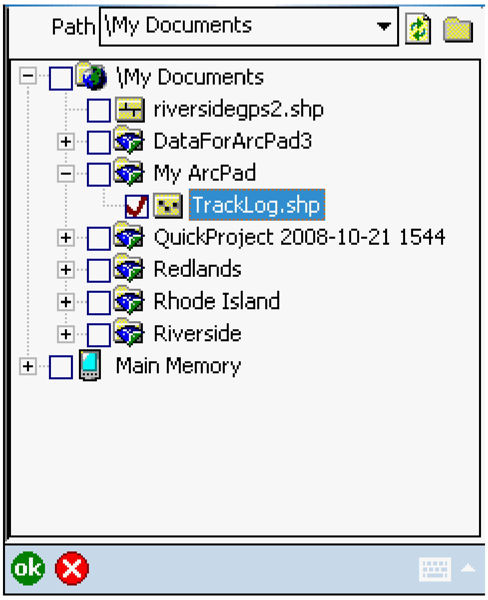
Step	Action
1	Tap the arrow below the GPS Position Window button to display the dropdown list. 
2	Tap Automatic Map Rotation to disable the tool.
3	To clear the map rotation and set it back to its original northern orientation, tap Clear Rotation .

The GPS Tracklog

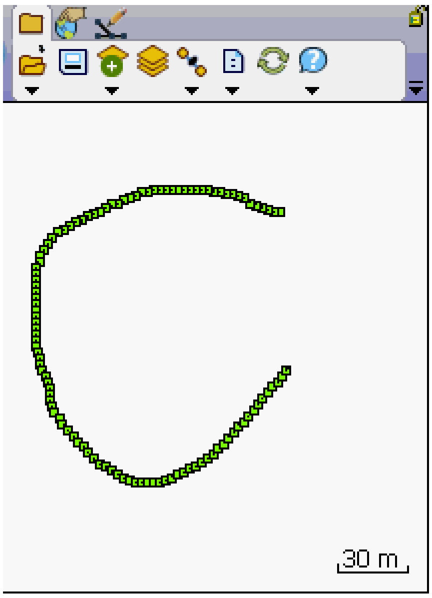
The GPS Tracklog in Zeno Field is stored in a shapefile format. The GPS Tracklog can be started or activated when the GPS is active. Zeno Field automatically records each GPS position it receives as a point feature in the GPS Tracklog shapefile, as long as the GPS Tracklog is running and the GPS is active. The GPS Tracklog is an electronic breadcrumb trail that shows the path that you have traveled. Zeno Field uniquely displays these GPS positions, or points, in the tracklog as a red line.



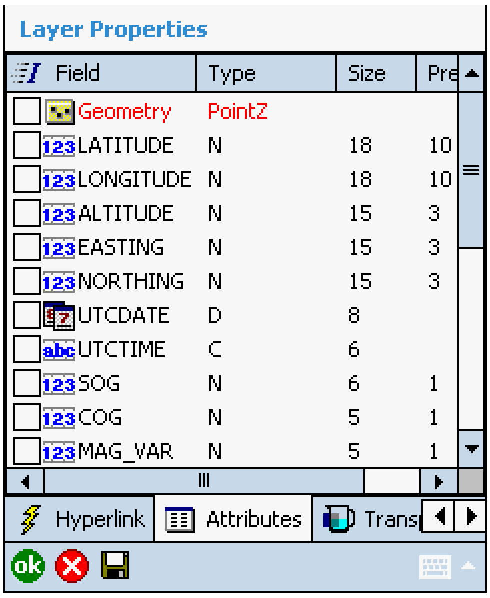
The GPS Tracklog points are always captured in latitude and longitude degrees using the WGS84 datum. Zeno Field automatically projects the tracklog points using the projection of the current Zeno Field map when displaying the tracklog. Although Zeno Field treats the GPS Tracklog point shapefile in a unique way, the tracklog is still a standard PointZM shapefile that can be used in the same way as other PointZM shapefiles. The Tracklog shapefile can be added to an Zeno Field map by using the Add Layer(s) dialog box.



When adding the tracklog shapefile with the Add Layer tool, Zeno Field treats the shapefile as a standard point shapefile. Zeno Field displays the points as points and does not perform on-the-fly projection of the tracklog's point data—which is in latitude and longitude degrees using the WGS84 datum.



For each point in the tracklog shapefile, Zeno Field captures an x, y, and z coordinate with a user-specified m value. Zeno Field also captures a variety of information received from the GPS receiver and stores this information in the attributes associated with the point. These attributes can be viewed by using the Add Layer tool to add the tracklog shapefile to an Zeno Field map and then by using the Identify tool to display the selected point's attributes.



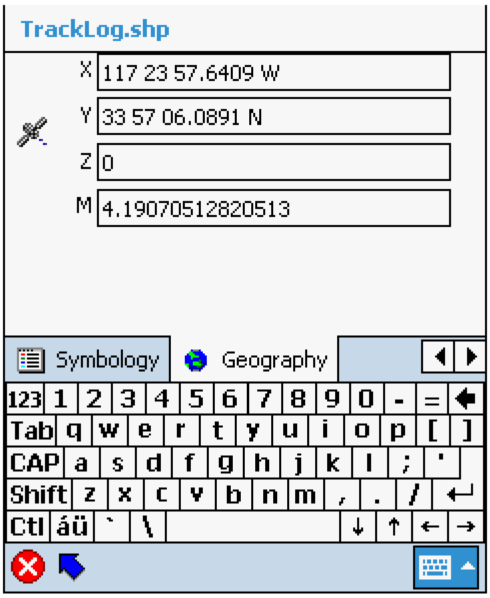
The GPS information captured for each point in the tracklog, and the associated field, is as follows:

	Description
LATITUDE	Latitude in the datum of the GPS receiver
LONGITUDE	Longitude in the datum of the GPS receiver
ALTITUDE	Altitude in the datum of the GPS receiver (in meters)
EASTING	UTM easting
NORTHING	UTM northing
UTCDATE	UTC date
UTCTIME	UTC time
SOG	Speed over ground (in km/h)
COG_TRUE	True Course Over Ground (in decimal degrees)
COG_MAG	Magnetic Course Over Ground (in decimal degrees)
SATS_USED	Number of satellites used
HPE	Horizontal position error (in meters) (only when using a Garmin GPS receiver)
VPE	Vertical position error (in meters) (only when using a Garmin GPS receiver)
EPE	Estimated position error (in meters) (only when using a Garmin GPS receiver)
HDOP	Horizontal Dilution of Precision
VDOP	Vertical Dilution of Precision
PDOP	Position Dilution of Precision

QUALITY	GPS fix quality, where: 0 represents no fix. 1 represents GPS or SPS (Standard Positioning Service) fix. 2 represents DGPS (Differential GPS) fix. 3 represents PPS (Precise Positioning Service) fix.
DIFF_AGE	Age of DGPS fix (in seconds)
DIFF_ID	ID of DGPS station used
DEPTH	Depth (in meters)
DEPTH_OFF	Depth offset (in meters)
WATERTEMP	Water temperature (in degrees Celsius)

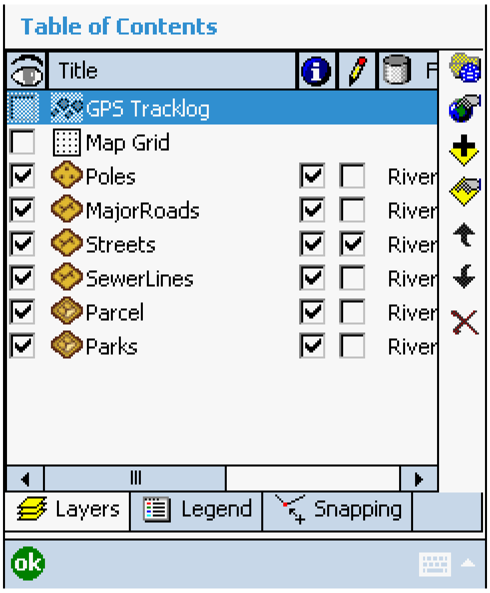
The size of the GPS Tracklog shapefile's dBASE® table can get fairly large if the Tracklog is active for a long period of time. You can reduce the size by deleting fields from the tracklog shapefile's dBASE (*.dbf) table. You can use Zeno Office to delete fields in the shapefile's dBASE table.

The x, y, and z coordinates, together with the m value, can be viewed by using the Geography tab of the point feature's properties.

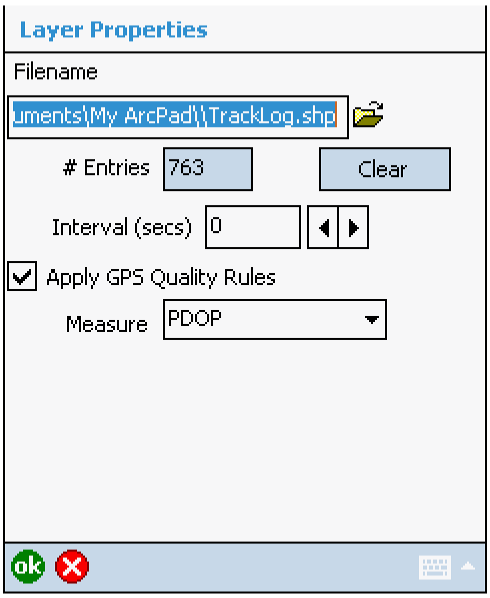


The GPS Tracklog points can be captured simultaneously while using the incoming GPS positions to capture other point, line, or polygon features. Consequently, the GPS Tracklog captures points independently from the Zeno Field editing tools.

The GPS Tracklog layer is always displayed as the first layer on the Layers page of the Table of Contents.



The GPS Tracklog layer can be displayed, or made visible, whether the GPS is active or not. The GPS Tracklog has its own set of unique properties, which can be displayed by using the Layer Properties button in the Table of Contents.



Using these properties you can:

- Change the name and location of the Tracklog shapefile.
- View the number of GPS positions or points in the tracklog.
- Clear or delete all of the points in the tracklog.
- Specify the interval to be used by Zeno Field when recording the GPS positions in the tracklog. An interval of 2, for example, means that Zeno Field will only use every second incoming GPS position to record a tracklog point.
- Specify whether or not Zeno Field must use the GPS Quality rules when capturing points in the Tracklog. The GPS Quality rules are specified on the Quality page of the GPS Preferences dialog box.
- Select which GPS information Zeno Field must use to store in the tracklog point's measure value. Available options are PDOP, HDOP, VDOP, TDOP, EPE, HPE, VPE, TIME, DEPTH, and SOG.

Any changes to the tracklog properties only take effect the next time the tracklog is started. Changes do not take effect if the tracklog is currently running.

Overview of starting and stopping the GPS Tracklog

The GPS Tracklog is started and stopped by tapping the GPS Tracklog tool from the GPS tools drop-down list. Starting the GPS Tracklog automatically sets the tracklog layer’s display status to visible.

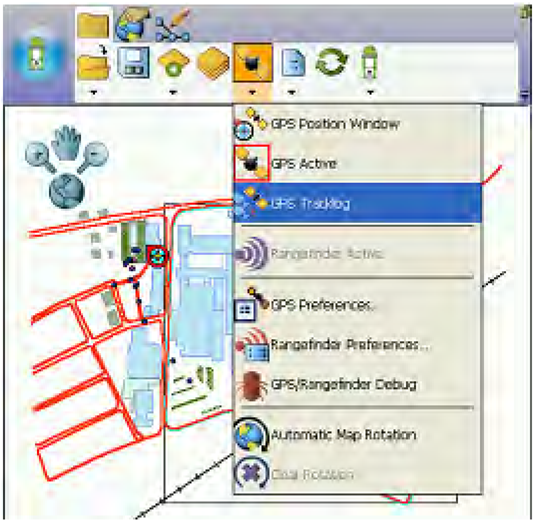
GPS positions are automatically saved as points in the GPS Tracklog point shapefile, according to the interval specified in the GPS Tracklog’s layer properties.

Disabled or grayed-out GPS Tracklog tool: The GPS Tracklog tool, in the GPS tools drop-down list, will be disabled or unavailable if the GPS is not active. The GPS Tracklog button is enabled when the GPS is activated.

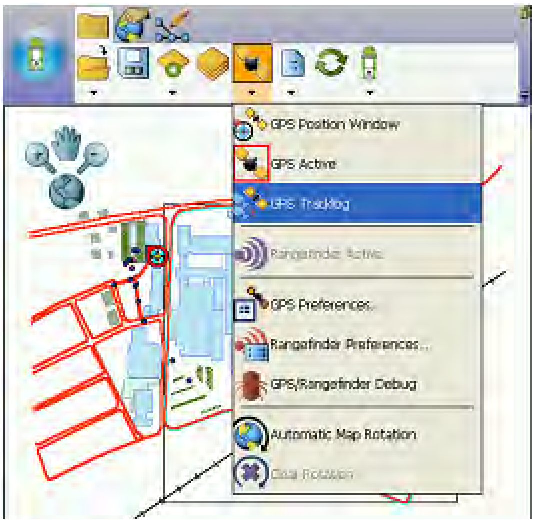
Starting a new GPS Tracklog: Use the Clear button in the GPS Tracklog’s layer properties to delete any previous tracklog points or to start a new tracklog shapefile. You can also type a new filename to capture a new GPS Tracklog.

Deactivating the GPS while the GPS Tracklog is running: Deactivating the GPS while the GPS Tracklog is running will automatically stop the GPS Tracklog.

Starting the GPS Tracklog

Step	Action
1	Activate your GPS if you have not already done so.
2	Tap the arrow below the GPS Position Window button to display the dropdown list. 
3	Tap GPS Tracklog to start capturing the tracklog. The GPS Tracklog layer display status is automatically changed to visible when the GPS Tracklog is started. New GPS Tracklog positions are captured in the Tracklog shapefile and added to any previous points that may exist. The tracklog positions are captured as a point shapefile; however, Zeno 10/15 displays the tracklog points as a red line

Stopping the GPS Tracklog

Step	Action
1	Tap the arrow below the GPS Position Window button to display the dropdown list.
2	Tap GPS Tracklog to stop capturing the tracklog points. 

Using your rangefinder

Introduction to rangefinders

Zeno Field v1.0 does not support Bluetooth connection of rangefinders. Only cable connection is supported.

Rangefinders are devices which, at a minimum, measure distance from a rangefinder, or observer, to a target. There are a variety of rangefinders available for different purposes, including rangefinders for measuring distances for construction, golf shots, speeding vehicles, and GIS data collection. Rangefinders are also known as laser rangefinders, distancemeters, and laser locators. In Zeno Field, the term ‘rangefinder’ will be used for ease of communication.

In addition to different terms used for rangefinders there are also different terms used for the measurements made by rangefinders. Distance is also referred to as range, and can also be more accurately described as horizontal distance, slope distance, or vertical distance. Bearing is also referred to as azimuth or angle. Bearing can be relative to Magnetic north or True north. Inclination is also often referred to as pitch. In Zeno Field, we will use the terms distance, bearing, and inclination.

Rangefinders are typically used for GIS data collection for the following situations:

- When mapping the location of an object which is inaccessible, either because it is difficult to get to or it is not safe to get to the object. For example, a tree on an island, or a manhole in the middle of a busy road.
- When mapping the location of an object where it is not possible to get a GPS signal, or a GPS position of sufficient accuracy. For example, under a large tree or in a narrow street or ‘urban canyon’.

Rangefinders designed for GIS data collection typically measure distance and inclination, while more expensive rangefinders also measure bearing. With Zeno Field, you can use a rangefinder which only measures distance, or which measures a combination of distance plus inclination and/or bearing. You can also use a ‘rangefinder’ which only measures bearing—also known as a compass!

Rangefinders are used to take measurements that are then used to calculate the offset of the target relative to one or two known reference points. The offset is used to calculate the location, or coordinates, of the target based on the coordinates of the rangefinder or observer. Inclination is used to calculate the vertical distance, or elevation difference, between the observer and the target. The vertical distance can then be used to calculate the Z-coordinate of the target—based on the Z-coordinate of the observer's reference point.

The easiest rangefinders to use for GIS data collection are those that measure distance and bearing. In this case only a single distance and bearing measurement is needed to compute the location of the target. Inclination is also needed if the Z-coordinate of the target is to be calculated. This is referred to as a distance-bearing offset measurement. However, rangefinders which measure both distance and bearing tend to be more expensive than rangefinders which only measure distance (and, optionally, inclination).

Rangefinders which only measure distance or only measure bearing can also be used to map the offset location of an object. In this case, two distance (or bearing) measurements are needed to compute the location of the target, from two known reference points to the target. This is referred to as a distance-distance (or bearing-bearing) offset measurement.

Rangefinder accuracy

Although rangefinders report measurements to at least one decimal place it is important to understand that there is some amount of error inherent in these measurements. A number of factors contribute to this error, including the quality of the rangefinder, the distance to the target, stability of the rangefinder when taking the measurement, magnetic interference, charactersitics of the target, poor weather, and daytime solar conditions. Some rangefinders have options to minimize error, such as a poor weather setting to minimize the impact of rain, snow, smoke, or airborne dust particles. The best approach to minimizing errors, however, is to be aware of the above factors, and to select a rangefinder that is appropriate for your application needs.

The three most important factors for introducing error are:

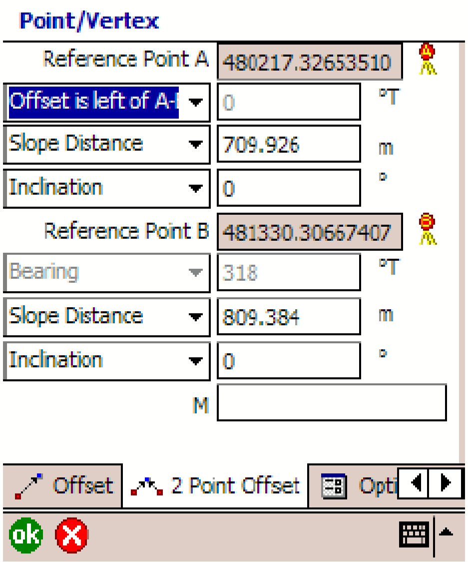
- The quality of the rangefinder: The quality of the rangefinder is directly proportional to the cost of the rangefinder. More expensive rangefinders use better quality components and as a result provide more accurate measurements at greater distances. Less expensive rangefinders provide less accurate measurements, and are only suitable for measuring shorter distances.
- The distance to the target: The measurement error increases as the distance from the observer to the target increases. For example, a compass error of 1 degree for a bearing measurement results in a horizontal error of 1.75 feet at a distance of 100 feet, and 8.73 feet at a distance of 500 feet.
- The pointing stability: To achieve maximum accuracy, it is recommended that you use a rangepole, monopole, or tripod to stabilize the rangefinder—especially when measuring large distances. It can sometimes be difficult to target small objects at

large distances when holding the rangefinder in your hand without any stabilizing support.

Working with rangefinders

Rangefinder measurements are used by Zeno Field in the Point/ Vertex dialog box to calculate the coordinates of the target object. Rangefinders output distance and angle (bearing or inclination) measurements using different units. When Zeno Field receives data from the rangefinder, it converts all distance measurements to meters, and all angle measurements to degrees. Zeno Field then displays the distance measurements using the units of the current map projection, or the display units for Geographic projections. The rangefinder protocol and communications parameters are set in the Rangefinder Preferences dialog box.

When Zeno Field receives data from the connected and activated rangefinder, a sound is played to notify the user. Zeno Field also automatically opens and populates the Point/Vertex dialog box if the point, polyline, or polygon tools are active and the corresponding Offset Point, Linear Traverse, or Radial Traverse modes are enabled.



The 2 Point Offset page of the Point/Vertex dialog box is automatically displayed and populated if Reference points A and B have been specified. The first measurements from the rangefinder will be used to fill in the measurement fields for Reference point A. The next set of measurements received from the rangefinder will be used to fill in the measurement fields for Reference point B. At any time you can edit the measurements in the fields in the Point/Vertex dialog box. Tap OK when you are satisfied with the measurements and are ready to use them to create a point or vertex.

Supported rangefinder protocols

Zeno Field supports rangefinder protocols rather than specific rangefinders. In practice, however, most rangefinders use proprietary protocols that are not supported by other vendors' rangefinders. Consequently, many of the rangefinder protocols supported by Zeno Field are often used by a single vendor's rangefinders.

Zeno Field supports the following rangefinder protocols:

- Leica DISTO interface protocal
- Leica Vector/Laser Locator data transfer format
- Laser Atlanta $LA1KA (original)
- Laser Atlanta $LA1KD (extended)
- Laser Atlanta $LA1KC (CMT, Corvallis MicroTechnology)
- LaserCraft Contour $PLCI
- Laser Technology Criterion 400 format ($PLTIT)
- Measurement Devices Ltd. $PMDLA

Any rangefinder that outputs any of the above protocols should work with Zeno Field, as long as the rangefinder is correctly configured and properly connected to the device being used with Zeno Field.

Connecting your rangefinder

Connecting your rangefinder to Zeno Field is a simple process that involves the following steps:

1. Determine what cables, adapters, and gender changers, if any, are needed to connect your rangefinder to the mobile device being used to run Zeno Field.
2. Connect the rangefinder to the mobile device.
3. Configure the rangefinder.
4. Set the Rangefinder Preferences in Zeno Field .

There is no standard method for connecting a rangefinder to Zeno Field since most rangefinders have unique configurations. By using this section and the documentation for your rangefinder and mobile device, it is fairly easy to successfully connect your rangefinder to Zeno Field .

Determining what items are needed

In general, you will need one or more of the following items to connect your rangefinder to the mobile device being used to run Zeno Field :

- A serial cable to connect to the rangefinder
- A serial cable to connect to the mobile device
- A male-to-male gender changer
- A null modem adapter

You will not need any of the above items if you are connecting your rangefinder to your mobile device via Bluetooth.

Many rangefinders and mobile devices have unique fittings for their serial ports and require their own proprietary serial cables.

Many serial cables that connect to the rangefinder on one end are designed to connect directly to a PC serial port on the other end using a standard DB9 serial connector. This is not true when connecting to many Windows CE devices since these devices usually have nonstandard, proprietary serial ports. Consequently, a proprietary serial cable is usually required when connecting a rangefinder to a Zeno 10/15 device. This dependency on proprietary serial cables makes Bluetooth an attractive option for connecting serial devices, including rangefinders, to Zeno 10/15 devices—although not all Zeno 10/15 devices support Bluetooth.

Most rangefinder serial cables and Zeno 10/15 device proprietary serial cables have 9-pin DB9 female connectors on the ends that need to be connected together. Consequently, a 9-pin male-to-male gender changer is required to connect the two female serial cables. Finally, a null modem adapter or cable is usually needed when connecting a rangefinder to a Zeno 10/15, using the device's sync cable.

Connecting your rangefinder

Using the information in the preceding discussion you should now be able to determine which cables, null modem adapters, and gender changers you will need to connect your rangefinder to the device that is running Zeno Field . Assemble and connect the required items before moving to the next step of configuring your rangefinder. No assembly of cables and adapters is needed if you are using Bluetooth. Also, make sure that the batteries on your rangefinder are fully charged.

Configuring your rangefinder

You need to configure your rangefinder to output data in a protocol supported by Zeno Field . You also need to verify the communication parameters that your rangefinder is configured for, specifically the baud rate, parity, data bits, and stop bits. You will need this information for the next step of setting the Rangefinder Preferences in Zeno Field .

If you are using Bluetooth, you will need to use the Bluetooth Manager on your mobile device to discover the rangefinder, and possibly to pair your rangefinder with your mobile device. Consult the documentation for your rangefinder and mobile device for more information on connecting via Bluetooth.

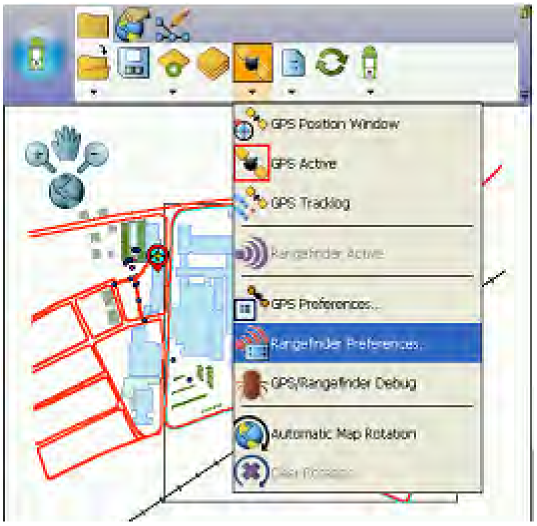
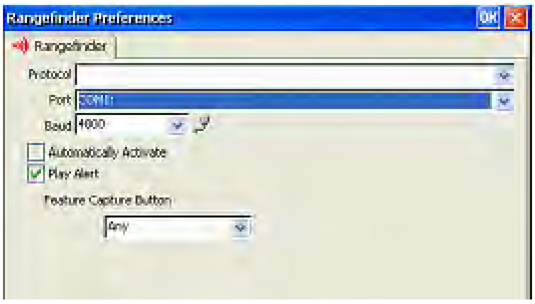
Setting the Rangefinder Preferences in Zeno Field

In order to activate your rangefinder, you first need to set the rangefinder communication parameters in Zeno Field to match the parameters on your rangefinder. The rangefinder protocol and communication parameters are set in the Rangefinder Preferences dialog box.

The task later in this section describes how to set the communication parameters in Zeno Field .

Setting communication parameters

In order to activate your rangefinder, you first need to set the rangefinder communication parameters in Zeno Field to match the parameters on your rangefinder. The communication parameters are set in the Rangefinder Preferences dialog box.

<table>
<tr><th>Step</th><th>Action</th></tr>
<tr><td>1</td><td>Tap the arrow below the GPS Position Window button, on the Main toolbar, to display the drop-down list.

</td></tr>
<tr><td>2</td><td>Tap the Rangefinder Preferences tool to open the Rangefinder Preferences dialog box.</td></tr>
<tr><td>3</td><td>Tap the Protocol drop-down arrow to select the protocol used by your rangefinder to output data.

</td></tr>
<tr><td>4</td><td>Tap the Port drop-down arrow to select the serial port on your mobile device, which is connected to your rangefinder.</td></tr>
<tr><td>5</td><td>Tap the Baud drop-down arrow to select the baud rate of your rangefinder's output.
Tip</td></tr>
</table>

Setting advanced serial port parameters: You can tap the Serial Port Parameters button to open the Serial Port Parameters dialog box in order to set advanced port parameters.

Note: Refer to section, 'Connecting your GPS receiver', for information on how to set the advanced Serial Port Parameters.

Activating your rangefinder

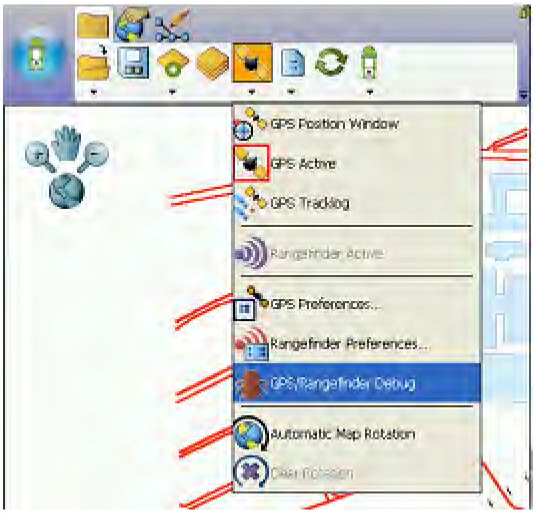
In order to activate your rangefinder in Zeno Field, you first need to ensure that the rangefinder is correctly connected to your mobile device and that the rangefinder protocol and communication parameters in Zeno Field match the settings on the rangefinder. You also need to turn your rangefinder on before activating it in Zeno Field.

Step	Action
1	Configure your rangefinder to output data using one of the rangefinder protocols supported by Zeno Field.
2	Connect your rangefinder to your mobile device using the appropriate cables, null modem adapters, and gender changers, or Bluetooth communication settings.
3	Set the rangefinder protocol and communication parameters in the Rangefinder Preferences dialog box to match the settings on the rangefinder.
4	Tap the arrow to the right of the GPS Position Window button to display the dropdown list.
5	Tap Rangefinder Active. The Rangefinder Active icon is highlighted with a red box when the rangefinder is active.

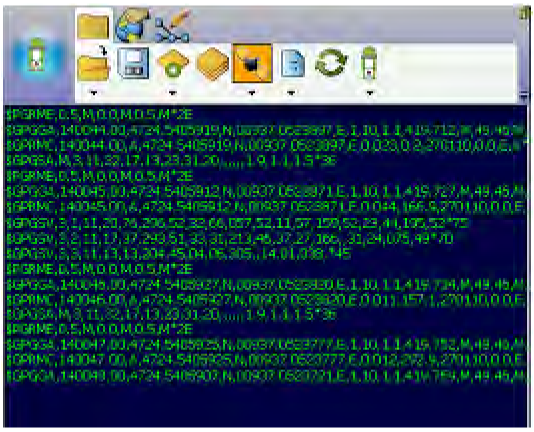
Deactivating your rangefinder: If the rangefinder is activated, you can deactivate it by tapping Rangefinder Active.

The GPS/Rangefinder Debug tool

GPS/Rangefinder Debug is a useful tool for troubleshooting GPS and rangefinder connection problems. The GPS/Rangefinder Debug tool is opened by tapping the arrow below the GPS Position Window button and then tapping GPS/Rangefinder Debug. The GPS/Rangefinder Debug tool is only opened when a GPS or rangefinder is currently active.



The GPS/Rangefinder Debug tool opens a window that displays data from either the GPS receiver or rangefinder, or both. Valid GPS data is displayed in green text, and valid rangefinder data is displayed in blue text. Invalid data is displayed in red text. Valid data is data that is constructed properly, in accordance with the selected GPS or rangefinder protocol, and has a valid checksum.



Connecting your GPS receiver includes a section on using the GPS/Rangefinder Debug tool for troubleshooting your GPS connection. This section will focus on using the tool for troubleshooting your rangefinder connection.

Zeno Field uses the settings for the rangefinder Protocol and port communication parameters to parse, or interpret, the rangefinder data being received on the specified serial port of your device. Zeno Field then displays information in the GPS/Rangefinder Debug window that indicates the status of the rangefinder connection.

No information displayed in the GPS\Rangefinder Debug window

Irrespective of which GPS protocol is being used, the first observation to make when opening the GPS/Rangefinder Debug window is whether any information is being displayed at all. No information displayed in the GPS/Rangefinder Debug window indicates a GPS connection or configuration problem. Problems are caused by any one of the following factors:

- Your rangefinder is not turned on or has not been configured to output data in the protocol specified in the Rangefinder Preferences.
- The cable connection between your rangefinder and the device running Zeno Field may be incorrect. Add a null modem adapter if you are not using one, or remove the null modem adapter if you are using one.
- The rangefinder port communication parameters selected in the Rangefinder Preferences dialog box do not match the serial communication parameters set on your rangefinder. For example, your rangefinder may be set to output at a baud rate of 4800, while a baud rate of 9600 has been selected for the rangefinder port settings in Zeno Field.
- If using Bluetooth, your Bluetooth connection to your rangefinder is not defined correctly. Make sure that you can connect to your rangefinder from the Bluetooth Manager on your mobile device.

Test each of these factors one by one to isolate the problem and determine why no information is being displayed in the GPS/ Rangefinder Debug window.

Illegible information displayed in the GPS\Rangefinder Debug window

In some instances, you may see illegible characters displayed in the GPS/Rangefinder Debug window. This is usually caused by rangefinder port communication parameters selected in the Rangefinder Preferences dialog box that do not match the serial communication parameters set on your rangefinder.

Rangefinder Debug information

Most rangefinders output data as ASCII text. Some rangefinders output data using the NMEA 0183 protocol, which is also an ASCII based protocol. In either case, you should see the data from the rangefinder displayed in the GPS/Rangefinder Debug window as ASCII text. Each data string or NMEA sentence that Zeno Field reads from the serial port is displayed in the GPS/ Rangefinder Debug window. Valid rangefinder data is displayed using blue text, and invalid rangefinder data is displayed using red text.

The displayed data can be used to troubleshoot your rangefinder connection. In the example on the previous page, a number of NMEA 0183 sentences from a GPS and a LaserCraft Contour XLR rangefinder are displayed. For instance, the rangefinder $PLCI sentence is displayed in blue text as:

$PLCI,,,250.0,D,M,057.4,D,,,,,,,, *5A

Using the documentation for the LaserCraft Contour XLR, we can determine that the bearing is 250.0 degrees, and the inclination, or pitch, is 057.4 degrees. The fields for distance, or range, are empty indicating a possible problem with the measurement taken with the rangefinder. In this case, the distance fields are empty because the target was within the minimum range.

Studying the rangefinder data displayed in the GPS/Rangefinder Debug window can help to explain why information is not displayed in the Offset dialog box when using a rangefinder.

Using your digital camera

Supported digital cameras

Zeno Field v1.0 does not support Bluetooth connection of cameras. Only cable connection is supported.

Zeno Field supports digital photos at three levels:

- The filename for a digital photo can be stored as a feature attribute. The associated photo can be viewed in the Picture page of the Feature Properties dialog box, or the photo can be viewed via the Hyperlink tool.
- Georeferenced, or geotagged, photos can be displayed as a photo layer.
- Zeno Field provides a Camera tool which can be used to capture photos with a camera which is connected to your mobile

Digital photos which have GPS coordinates embedded in the EXIF header of the image can be displayed on the Zeno Field map as a photo layer. These georeferenced photos can be created with any camera which can interface with a GPS, such as the Ricoh 500SE camera. There are also software tools available which can insert GPS coordinates into the EXIF header. This is typically done by matching the time and date of the photo with the time and date of positions captured by a GPS. When creating a photo layer, Zeno Field reads the GPS coordinates in the EXIF header, and automatically projects the latitude and longitude coordinates into the projection of the current Zeno Field map. For more information on the EXIF header of digital photo image files, visit www.exif.org.

Zeno Field includes drivers for cameras which are connected directly to a mobile device.

Support for additional connected cameras can be provided via custom camera extensions.

The Camera tool in Zeno Field is used to take a photo with a connected camera. The camera tool is located in two places in Zeno Field: on the Tools drop-down menu, and on the Picture page of the Feature Properties dialog box. When taking a photo with the Camera tool, Zeno Field verifies if you have a GPS active and a valid GPS position. If there is a valid GPS position then Zeno Field will insert the GPS coordinates into the EXIF header of the resultant photo image file. These georeferenced photos can then be viewed as a photo layer in Zeno Field. Whether or not a photo is georeferenced, photos that are associated with a feature can be viewed via the Picture page of the Feature Properties dialog box or by using the Hyperlink tool.

Overview of camera options

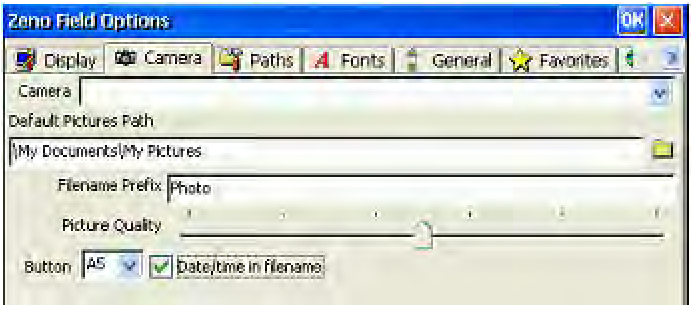
In order to use a digital camera with Zeno Field, you must first select the appropriate driver for the camera. The drop-down list on the Camera page in the Options dialog box only displays supported cameras for your mobile device.

You can also set the following camera options:

- Default path for standalone photos captured with the camera tool.
- Prefix, and date/time suffix, for the output image file when using the Camera tool to capture photos that are not associated with a feature.
- Picture quality for the output JPEG photo files. The slider ranges from a quality of 50% to 100%. Higher picture quality settings use less compression for the output JPEG photo file.
- Hardware button to launch the camera tool. This button is specific for each device.

The hardware button labels and assignments vary across devices. On Zeno 10/15 devices, you can view and change the button labels and assignments by tapping Settings, Personal, and then Buttons.

Setting camera options

Step	Action
1	On the Main toolbar, tap the options button to open the Zeno Field Options dialog box.
2	Navigate through the tabs and tap the Camera tab.
3	Tap the Camera drop-down arrow to select the driver for the camera connected to your mobile device. 
4	Optionally enter a prefix for Zeno Field to use for naming the image files created with your digital camera.
5	Optionally set the picture quality for the output JPEG photo files.
6	Optionally check the Date/ time in filename checkbox for Zeno Field to use a date and time suffix for naming the image files created with your digital camera.
7	Tap OK.

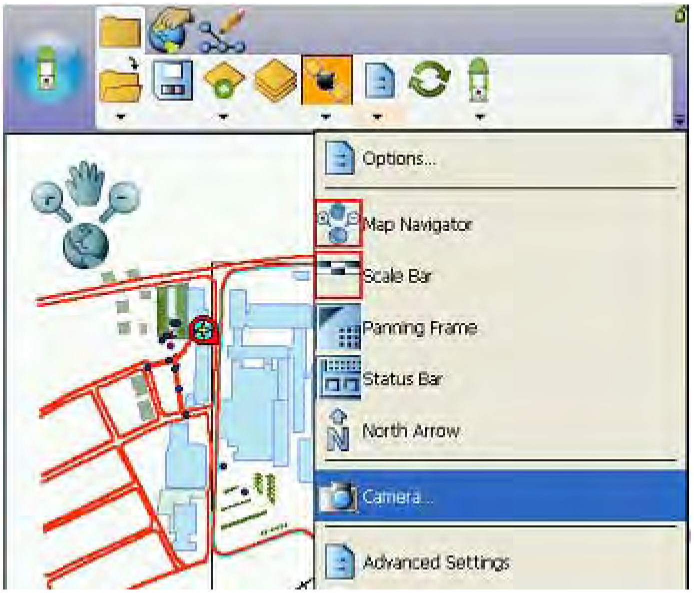
Overview of taking a photo

In Zeno Field, there are two methods to take a photo with the digital camera connected to your mobile device:

- By using the Camera tool located on the Tools dropdown menu, on the Main toolbar. This Camera tool is used to take a stand alone photo, that is a photo which is not associated with a feature.
- By using the Camera tool located on the Picture page of the Feature Properties dialog box. This Camera tool is used to take a photo which is associated with a feature. The photo filename is stored as an attribute in the selected field of the feature.

When activated, both of the Camera tools open the same dialog box for interacting with your digital camera and for taking the photos. The camera dialog box will vary according to the camera driver selected in the Options.

Taking a standalone photo

Step	Action
1	On the Main toolbar, tap the Options drop-down menu. 
2	Tap the Camera icon to open the camera tool. You can also use the hardware button, specified in the Camera page of the Options, to launch the Camera tool. Proceed to Taking a photo with the camera tool.

Taking a photo associated with a feature

Step	Action
1	Open the Feature Properties dialog box for the feature that you want to associate the photo with. The Feature Properties dialog box is automatically displayed after a new feature is created. To display the Feature Properties dialog box for an existing feature, use the Select tool to select the feature and tap the Feature Properties button on the Edit toolbar.
2	Navigate through the tabs and tap the Picture tab.
3	Tap the Field drop-down list to select the field to be used for storing the filename of the photo to be taken. The selected field name will be used as the prefix for the photo's filename.  You can use the folder button to select an existing photo on your device to associate with the feature. Once a photo has been captured, you can use the rotate left or rotate right buttons to change the orientation of the photo.
4	Tap the Camera icon to open the camera tool.

	Proceed to the following task describing how to use the camera tool.

The Picture page is missing: If you are using a custom form, your Feature Properties dialog box may not show the Picture page. Custom input forms can optionally hide the default pages of the Feature Properties dialog box, including the Picture page.

Creating field names for photo filenames: Zeno Field automatically populates the Field dropdown list with field names which appear to be suitable for storing photo filenames. To do this, Zeno Field looks for any text field—in the shapefile's dBase® table or in the Zeno Field AXF file— which has a name that contains the words photo, image, or picture. The text field also needs to have a minimum length of 20 characters.

Taking a photo with the camera tool

Step	Action
1	Tap the available camera tools to set any options for the camera and resultant photos.
2	Tap the hardware button on your mobile device to capture the photo, or press enter from the Soft Input Panel (SIP).

My camera tool looks different to the camera tool shown: The tools available in the camera tool are dependent on the camera driver selected, as well as the capabilities of the camera connected to your mobile device.

Specifying photo filenames: For standalone photos, the photo filename will use the prefix specified in the Camera page of the Options. The photo filename will also include a unique number, or if specified in the Options, the date and time at which the photo was taken.

For photos associated with a feature, the photo filename will use the selected field name in the Picture page of the Feature Properties dialog box. The photo filename will also include a unique number, or if specified in the Options, the date and time at which the photo was taken.

Creating a photo layer

Overview of creating a photo layer

Zeno Field supports photo layers. A photo layer is a file that contains photos with GPS coordinates in the EXIF header of each photo file. The photo layer file, which has an .APH extension, specifies how the photo layer should be displayed in Zeno Field.

To create a new photo layer you use the Photo Layer tool in the New sub-menu. Once a photo layer has been created it can be added to the Zeno Field map in the same way that other layers are added.

The Identify and Hyperlink tools can be used with the photo layer.

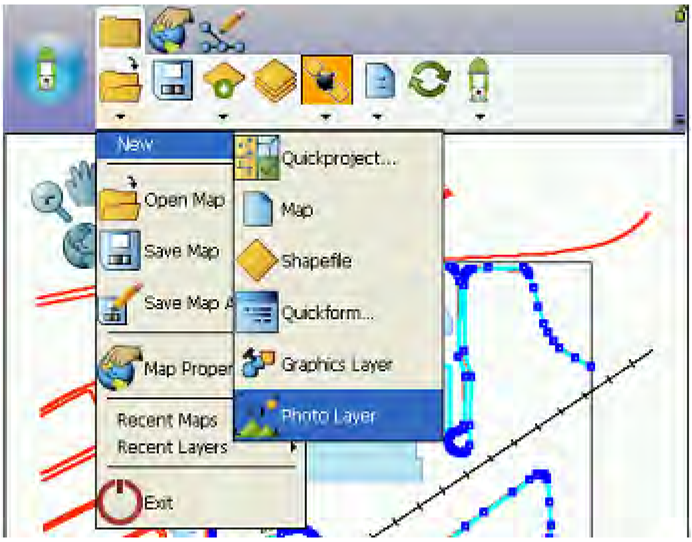
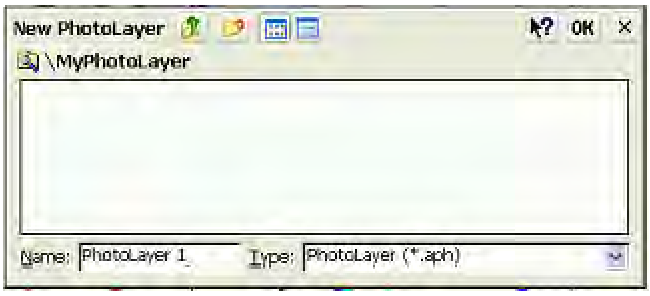
The Identify tool displays the photo's attributes, or EXIF information, in the Feature Information dialog box.

The Hyperlink tool displays the photo, using the external application associated with JPEG files

Changing the symbol and label settings for the photo layer: A photo layer is an XML file, with an .APH extension, that can be edited with a text editor. You can specify the symbol used to display the location of the photos by editing the .APH file. You can also specify whether or not the symbol is labeled with the photo filename.

Note: Visit www.exif.org for more information on EXIF, the Exchangeable Image File Format

Steps to create a photo layer

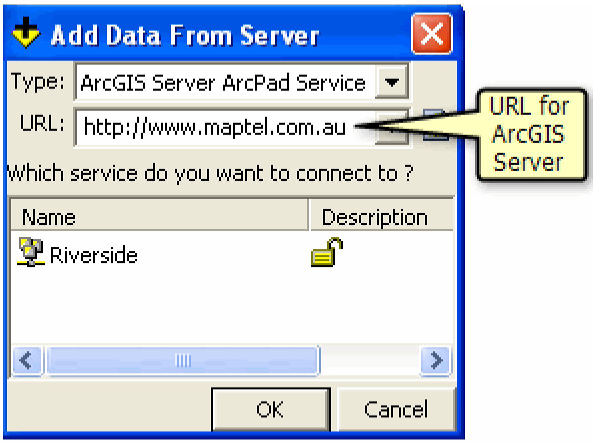
Step	Action
1	On the Main toolbar, tap the drop-down menu, below the Open map button.
2	Tap New to open the New sub-menu. 
3	Tap Photo Layer. The Save As dialog box will be displayed.
4	Enter the name for your new photo layer in the Name input field.
5	Tap the Folder drop-down list to select the folder on your device which contains the photos for your photo layer. 
6	Tap Save when you have entered all the necessary information. The new photo layer will be added and displayed on the map. By default, a camera symbol is used for each photo position, and is labeled with the photo file name. Optionally use the Identify tool to select a photo and view the photo's attributes in the Feature Information dialog box.

Using ArcGIS Server data in Zeno Field

Using Data from ArcGIS Server

To download published data to your mobile device, open the ‘Add Data from Server’ dialog in Zeno Field.

Long time Zeno Field users should recognize this dialog, in previous versions of Zeno Field it was called the ‘Add Internet Server’ dialog and was used to add IMS data to your map.



The dialog still allows you to add an IMS Service, but it also allows you to browse for ArcGIS Server ArcPad Services. Enter the URL of your ArcGIS Server (which contains published Zeno Field data), and choose the data from the list. That data will be downloaded to your mobile device, unpacked and added to your map.

Edit your data in the same way you would any other data. To synchronize your edits with the enterprise geodatabase, simply create a connection to your network (via WIFI, phone, or USB connection to your pc and network) and choose the ‘Synchronize Data with ArcGIS Server’ menu item in Zeno Field.

The Zeno Field sync window displays messages that describe the synchronization process.

Publishing Data to ArcGIS Server

An Zeno Field Project is published in a similar manner to any other ArcGIS Server Map Service in ArcCatalog. If you have not already, you must first copy the .mxd together with the associated .apo files to place that is accessable by the ArcGIS Server. It is recommended that you create the folde c:\MXD to store your mxd's. The “Add New Service” option on the right click context menu of the ArcGIS Server (in ArcCatalog) provides you with the option to create an Zeno Field enabled Map Service, as shown below

Follow the steps of publication as you would for any other Map Service. On the add GIS Service page of the wizard, select Zeno Field.

If your ArcGIS Server environment uses a reverse proxy server, you should add the server's url on the GIS Service page of the wizard.

When you ‘Finish’ the wizard, an Zeno Field enabled Map Service is created, which you can immediately preview in ArcCatalog or ArcMap as you would any other Map Service. Also created on the server are the Zeno Field files for deployment.

After an Zeno Field project is published to the ArcGIS Server successfully, a zip file and a .cab file are also created on the Server. If you wish to disseminate your data to a large group of field users, you can download the cab via your desktop web browser and email or distribute as required. The zip and cab files are stored on the ArcGIS Server.

Editing Data

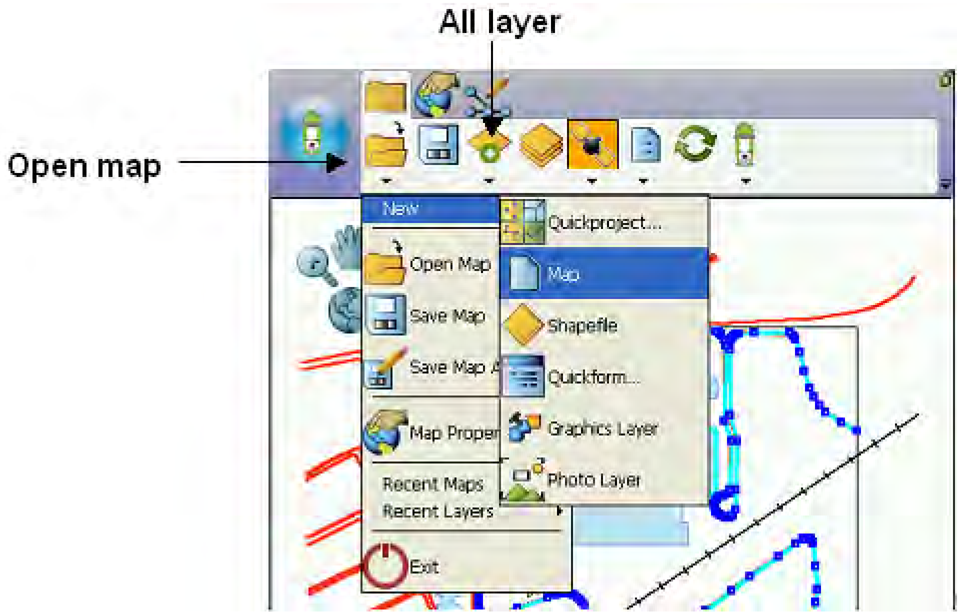
Editing basics

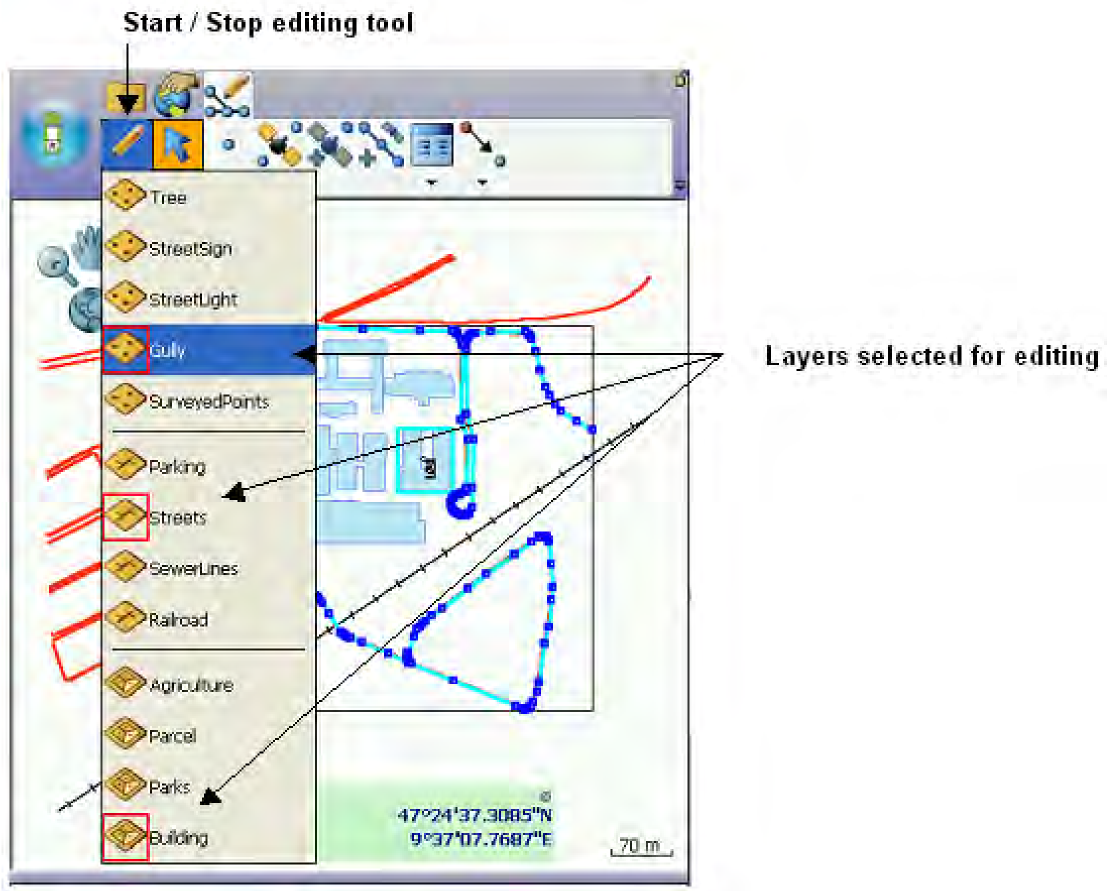
In addition to displaying and querying spatial data, Zeno Field allows you to create and edit spatial data using input from either the mouse pointer, pen, global navigation satellite system (GNSS), or rangefinder.

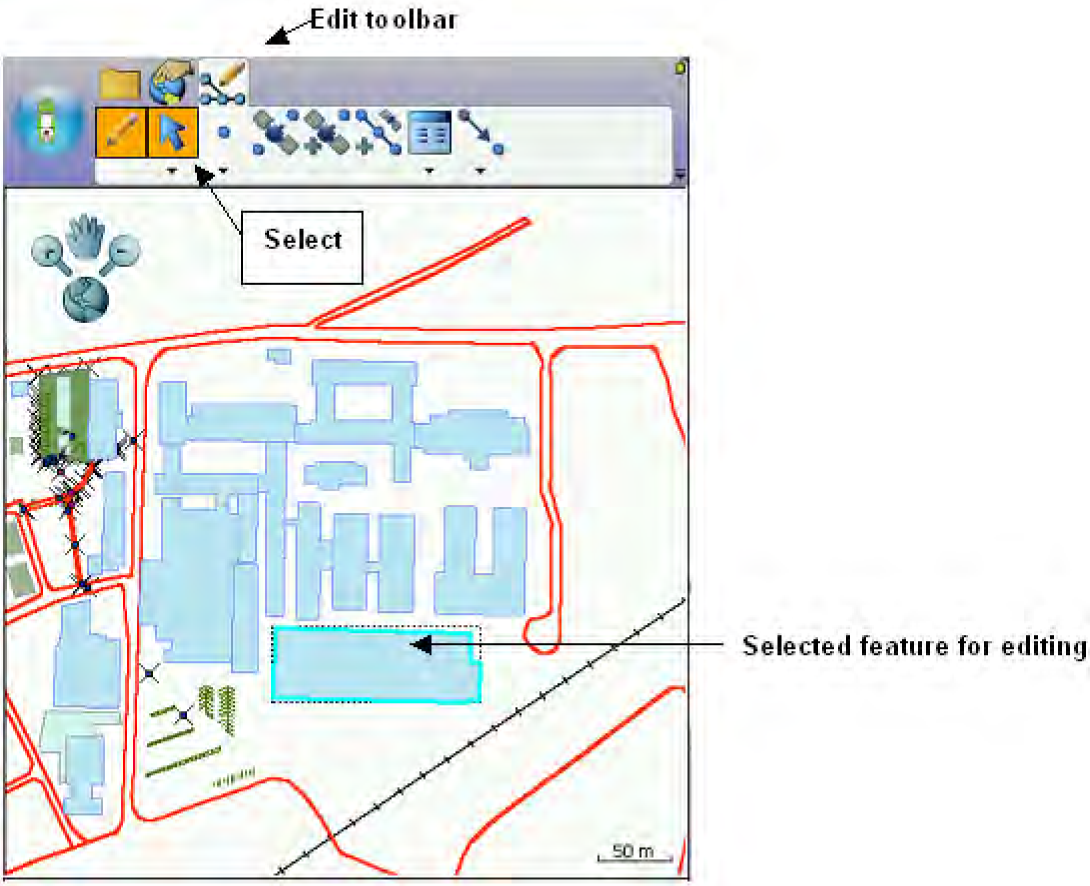
This section provides an introduction on how to edit in Zeno Field and describes the basic tasks you need to know before you can start to create and edit spatial data. This chapter includes information on basic editing tasks, such as displaying the Edit toolbar and Command bar; and selecting, moving, and deleting features.

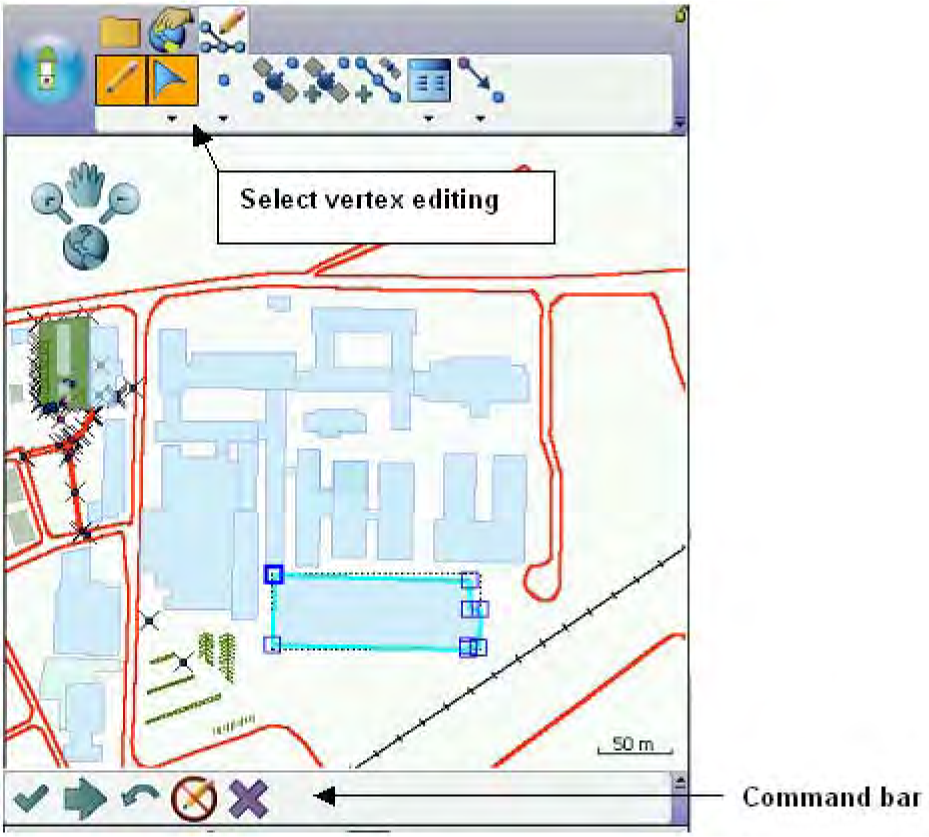
An overview of the editing process

The following is a general overview of how to use Zeno Field, the Edit toolbar, and the Command bar to edit your data. Each of the following steps is outlined in detail in this section or other sections in this user guide:

Step	Action
1	Start Zeno Field.
2	Create a new map, browse for data, or open an existing map.
3	Add data to your map. 
4	Select the shapefile or Zeno Field AXF layers that you want to edit. You can only select one layer of each feature type (point, line, or polygon) for editing at a time. Alternatively, the Graphics layer can be selected for editing. The Start/Stop Editing tool displays a menu of the layers that are available for editing.

	
5	Display the Edit toolbar and the Command bar The buttons on the Edit toolbar and the Command bar will only be enabled if a layer has been selected for editing. The GPS buttons will only be enabled if the GPS has been activated.
6	Select the feature that you want to edit or select a feature type to create a new feature. The GPS buttons will only be enabled if the GPS has been activated and the selected feature type is point, polyline, or polygon. You can activate the GPS whenever you want to use the GPS coordinates for creating or modifying features.

	
7	Create or modify features and their attributes.
8	Commit geometry changes or undo changes made to a feature.



The Command bar is also displayed at the bottom of the screen when a polyline or polygon layer is selected for editing. Once a change has been made, it enables you to commit geometry changes, capture attribute information for a new feature, and undo and cancel edits to a recently edited feature.

There is no need to save your edits; all edits are made directly on the original or source shapefile or Zeno Field AXF file. Once you have commited your changes, there is no undo function. Your edits have been made. Prior to committing your changes, you can still undo changes step by step with the Undo tool or all at once with the Cancel tool.

Editing using a GPS

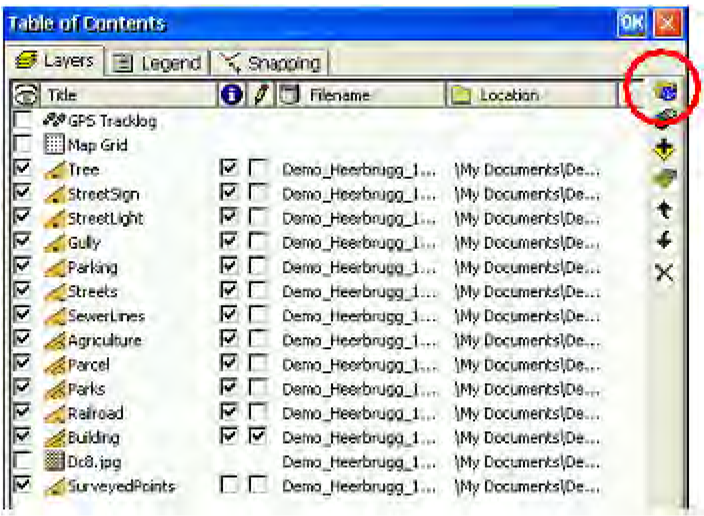
Editing in Zeno Field with GNSS measurement is very similar to editing with the mouse pointer, pen, or stylus; the main difference is that the GNSS is the source of coordinates instead of the mouse pointer. Using the incoming GNSS coordinates, you can capture point, polyline, and polygon features. You can also move existing points and vertices to the current GNSS position.

There are, however, some differences when using the GPS coordinates to capture and edit with Zeno Field:

- Your Zeno Field map needs to have a projection defined before you can activate the GPS.

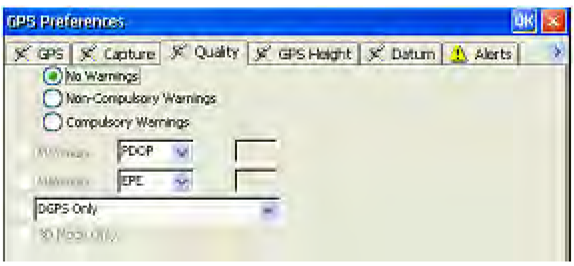
The projection can be defined using two methods:

1. Associate a projection file (.prj) with each layer in your Zeno Field map
2. Use the Select Projection button in the Table of Contents to select a projection file on your computer that matches the projection of the data in your Zeno Field map.

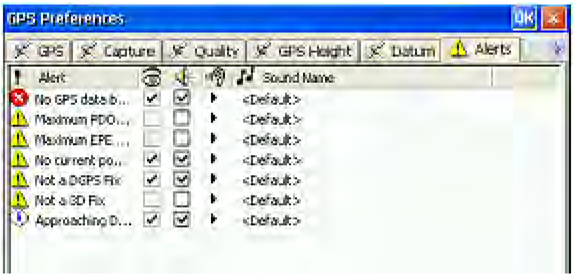


- The GPS needs to be activated before any of the GPS buttons on the Edit toolbar are enabled. Furthermore, the GPS Point button is only enabled when a point layer is active for editing. The Add GPS Vertex and Add GPS Vertices Continuously buttons are only enabled when either the polyline or polygon feature type has been selected.

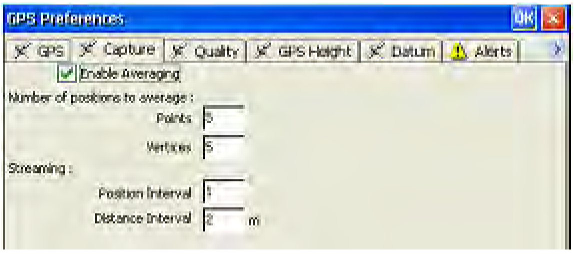
- Optionally, you can specify various quality control parameters to filter out less accurate GPS coordinates. For example, you can specify maximum PDOP or EPE values or limit Zeno Field to only use 3D or DGPS GPS coordinates.



- You can also specify alert messages and sounds, which Zeno Field displays and plays, respectively, when the specified quality control parameters have been exceeded.



- You can optionally use the average x,y, and z coordinates of multiple GPS positions to capture point features or vertices of polyline or polygon features.

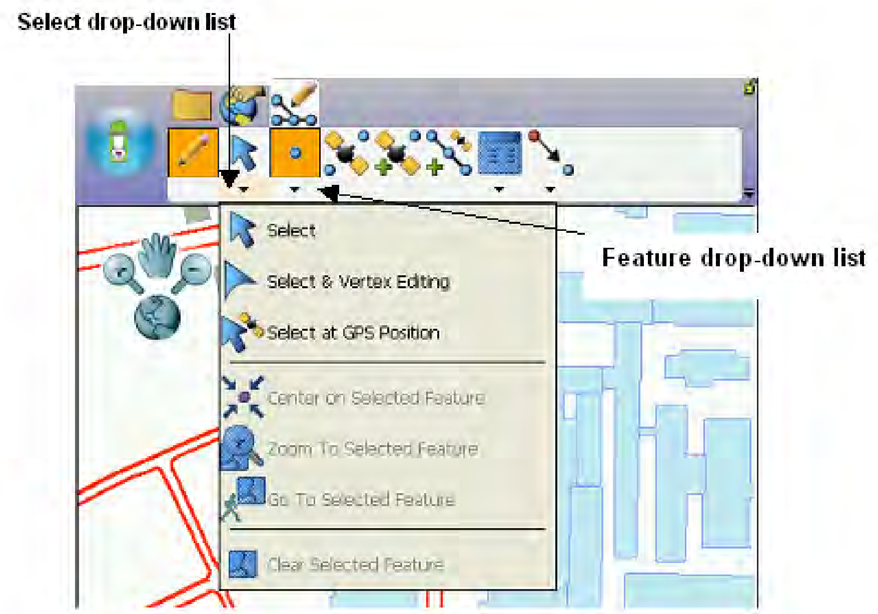


You can also specify the position interval, or frequency, and distance interval of GPS position coordinates for Zeno Field to use when capturing polyline or polygon vertices in streaming mode.

Zeno Field automatically does on-the-fly projection and datum transformation of the incoming GPS coordinates to the projection and datum of your map data.

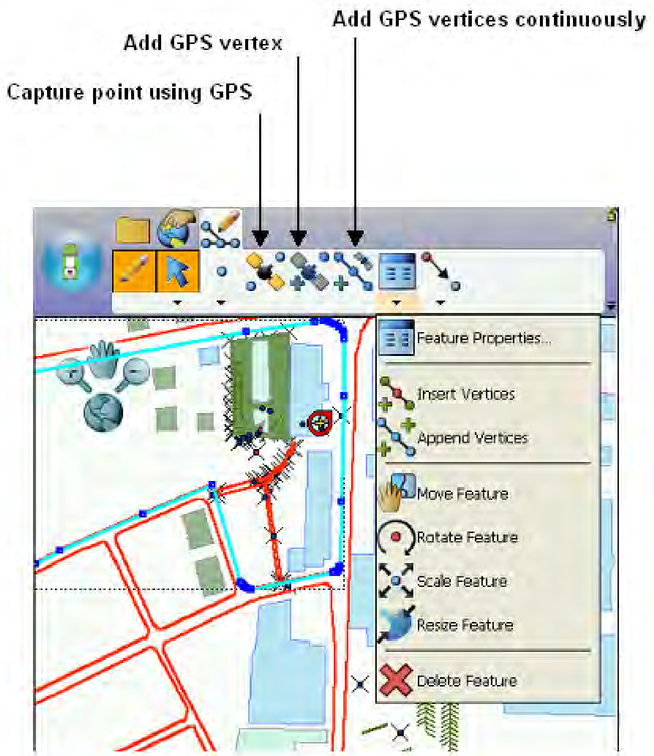
The Edit toolbar

The screenshots below explains the menus and sub-menus on the Edit toolbar:



Select drop-down list: Tools to select features using the pointer or GPS and navigation tools for the selected feature.

Feature drop-down list: Sets the feature type for data capture.

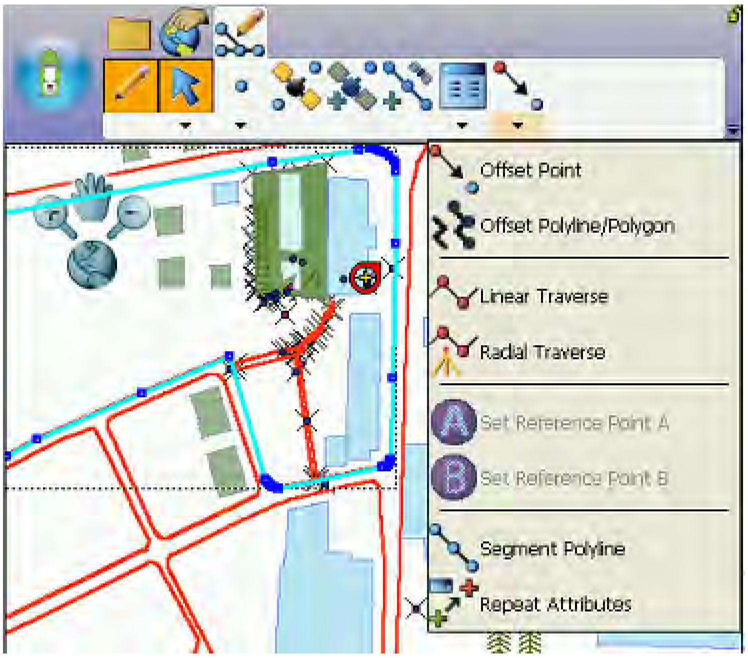


Capture a point using GPS: Captures a point feature in the editble point layer using the current GPS position.

Add GPS vertex: Captures a single vertex in the selected line or polygon feature using the current GPS position.

Add vertices continuosly from a GPS position: Continuously captures vertices in the selected line or polygon feature using the current GPS position.

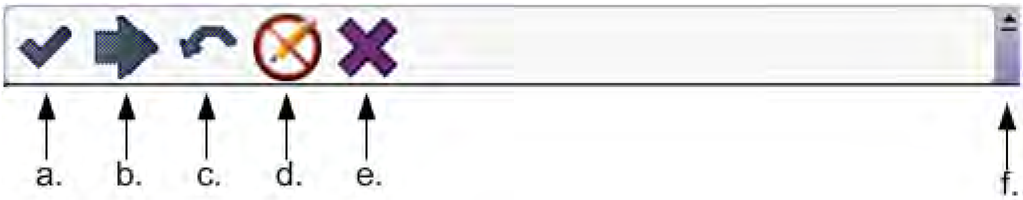
Selected feature drop down list: Tools to select features using the pointer or GPS and navigation tools for selected feature.



Offset Point drop down list: Tools that let you work with offsets, traverses, segments and repeated attributes.

The Command Bar

The screenshot below explains the different tools on Command bar.



a. **Commit geometry changes tool:**

Once a change has been made to your feature, use this tool to save your change.

b. **Proceed tool:**

Completes the new polyline/polygon and enables you to capture attribute information for the feature.

c. **Undo tool:**

Use to undo the last step performed prior to committing your changes.

d. **Toogle pen tool:**

Toggle pen active for data capture.

e. **Cancel feature edits tool:**

If you do not want to commit your changes, use this tool to cancel all recent edits to the selected feature.

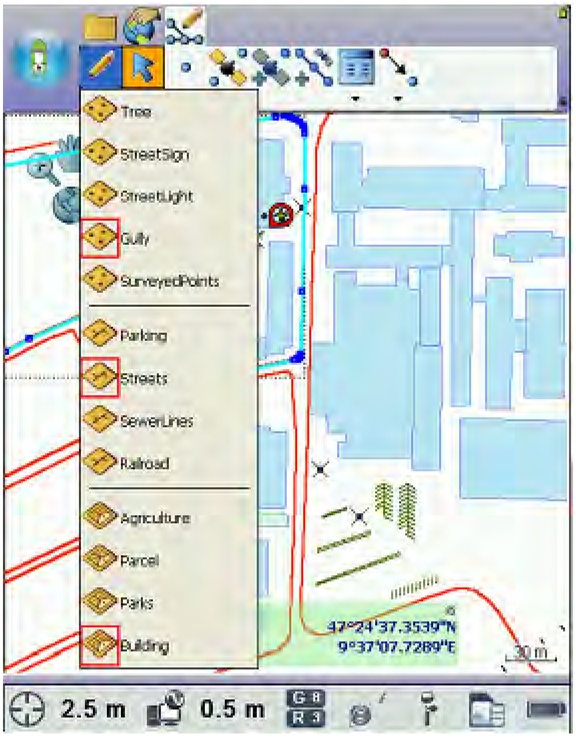
f. **Toolbar Access:**

Minimize or dock the Command to any side of the screen

Selecting a layer for editing

Layers are selected for editing by enabling the Start/Stop Editing tool on the Browse toolbar or by checking the layer's Edit check box on the Layers page in the Table of Contents.

In Zeno Field, you can have up to three shapefile or AXF layers active for editing—one layer for each feature type: one point, one line, and one polygon layer. If you select the Graphics Layer for editing, all previously selected layers are deselected. However, with the Graphics layer selected, you can select up to two shapefile or AXF layers for editing. The shapefile and Zeno Field AXF layers take precedence when editing, but you can still add sketches and notes to the Graphics layer.

Step	Action
1	Tap the Start/Stop Editing button on the Browse toolbar. A drop-down list displays all of the editable layers in the current Zeno Field map, with a corresponding icon to indicate the type of layer. 
2	Tap the layer that you want to edit The Edit toolbar and the Command bar will be displayed if they are not already displayed. In order to select more than one layer you will need to repeat steps 1 and 2. You can select one point, one line, and one polygon layer for editing, at one time, or the

	graphics layer. A red box around the layer icon indicates that the layer has been selected for editing.

Determining the layer type: Zeno Field allows you to edit point, line, and polygon shapefiles and Zeno Field AXF layers, and graphics layers. The layer type is indicated by the following icons:

 for point layers

 for line layers

 for polygon layers

 for graphics layers

Selecting features for editing

Overview of features

A feature needs to be selected before certain operations can be performed on it. For example, before you move, edit, or delete a feature, you must select it.

You can select a feature for editing by using the Select, Select & Vertex Editing, or Select at GPS Position tools. The Select tools are located on the Edit toolbar. In addition, the Select tool is located on the Advanced Select dialog box and the Find tool dialog box.

The Select and Select at GPS Position tools are used to change a feature's attributes; insert and append vertices; and move, rotate, scale, resize, and delete features.

The Select and Vertex Editing tool is used to move (by pen, GPS, or offsets) and delete a feature's vertices.

A layer must be made editable before a feature in that layer can be selected using any of the Select tools.

Selecting vertical or horizontal lines: The Select tool uses the Pen Tolerance for the search radius when selecting features. The default pen tolerance may be too small when selecting vertical or horizontal lines, making it difficult to select these features. You can increase the pen tolerance on the Display page of the Options dialog box.

The Select at GPS Position tool is grayed out: The Select at GPS Position tool will be unavailable if the GPS is not active. Activate the GPS to use the Select at GPS Position tool.

How do I know if I have selected a feature?: Using the Select and Select at GPS Position tools, the selected feature is highlighted using the specified highlight color and with a rectangle, using a dashed line, outlining the geographic extent of the feature. However, the bounding box rectangle may not always be visible if the feature's extent is outside of the current view's extent.

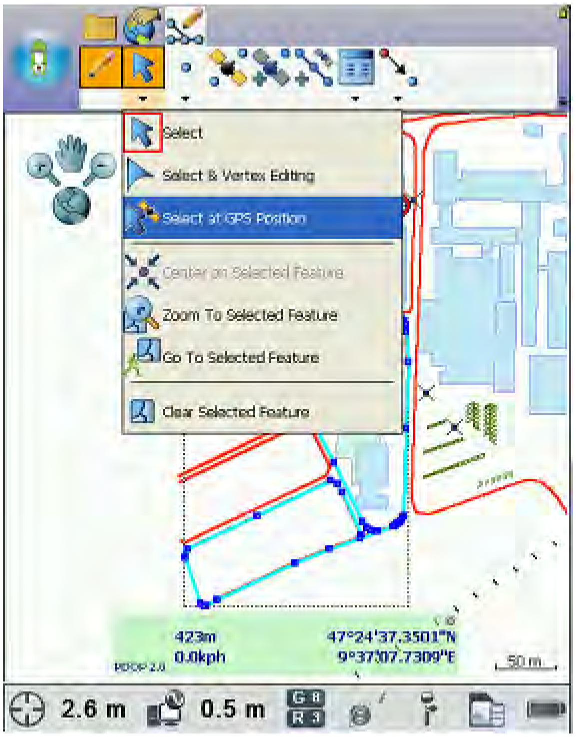
Using the Select and Vertex Editing tool, the extent of the selected feature is highlighted and each vertex of the feature is shown using a blue square.

The highlight color can be selected on the Display page of the Options dialog box.

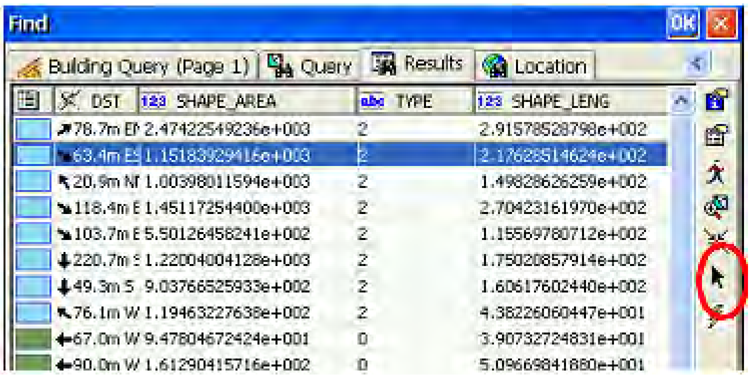
Select features for editing using the Select tool

Step	Action
1	Select the layer for editing in the Start/Stop Editing tool drop-down list—as described in the previous task.
2	Tap the Select button. 
3	Tap the feature that you want to select for editing. The selected feature is highlighted using the specified highlight colour (cyan) and with a rectangle using a dashed line, outlining the geographic extent of the feature.
4	Tap the Clear Selected Feature button  located on the drop-down list under the Select tool to clear the selected feature.

Selecting features for editing using the Select at GPS Position tool

Step	Action
1	Tap the drop-down arrow below the Select button to display the drop-down list.
2	Tap Select using GPS. The selected feature is highlighted with a rectangle, using a dashed line, outlining the geographic extent of the feature. 
3	Tap the Clear Selected button  located on the drop-down list under the Select tool to clear the selected feature.

Selecting features for editing using the Find tool

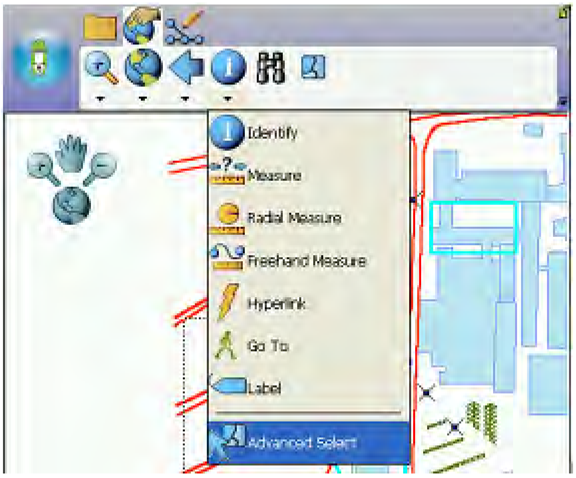
Step	Action
1	Tap the Find button to open the Find dialog box. 
2	Tap the Layer drop-down list on the Query page and select the layer to search on. Optionally tap the Field dropdown list and select the field to search on.
3	Use the Soft Input Panel to type in the value that you want to search for in the Value box.
4	Tap the Results tab to execute the search and view the results. A table is displayed listing all of the found features. 
5	Tap the feature that you want to select for editing.
6	Tap Select. The selected feature is highlighted using the Display Highlight color and a rectangle is displayed, outlining the geographic extent of the feature.

☞ **Changing the Display Highlight color:** You can change the Highlight color of selected features in the Display page of the Options dialog box.

☞ **The Select tool is not responding:** The Select tool  in the Find dialog box will be unavailable if the layer has not been set as editable. Note: Refer to the section, Querying data, for help on using the Find tool.

Selecting features for editing using the Advanced Select tool

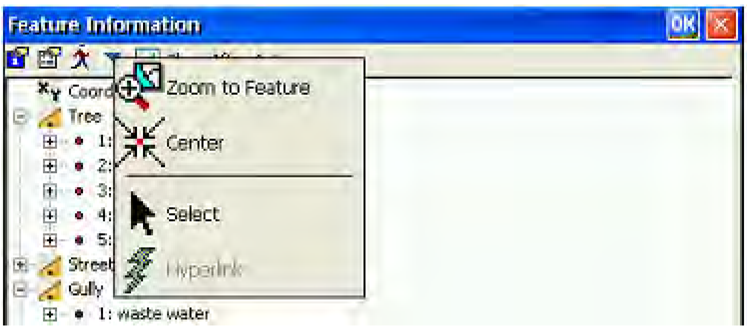
<table>
<tr><th>Step</th><th>Action</th></tr>
<tr><td>1</td><td>Tap the drop-down arrow below the Identify button to display the drop-down list.


</td></tr>
<tr><td>2</td><td>Tap Advanced Select.

Notice that the Advanced Select tool has been activated on the Browse toolbar.

</td></tr>
<tr><td>3</td><td>Tap the map to select a feature or drag a selection box to select multiple features from the active layers.

A list is displayed showing the coordinates where the map was tapped and the selected features. Tap the + icon to display the attributes of the selected feature.</td></tr>
<tr><td>4</td><td>Tap the feature you want to select for editing.</td></tr>
<tr><td>5</td><td>Tap the Drop-down Arrow button to display the additional tools


</td></tr>
<tr><td>6</td><td>Tap Select.</td></tr>
</table>

	The selected feature is highlighted using the Display Highlight color and a rectangle is displayed, outlining the geographic extent of the feature.

Selecting the layers for the Advanced Select tool to search: The Advanced Select tool operates on all layers checked for Identify in the Table of Contents. The Select tool in the Advanced Select dialog box is only enabled for layers that have been checked for editing. Note

Refer to the section, Querying data, for more information about using the Advanced Select tool.

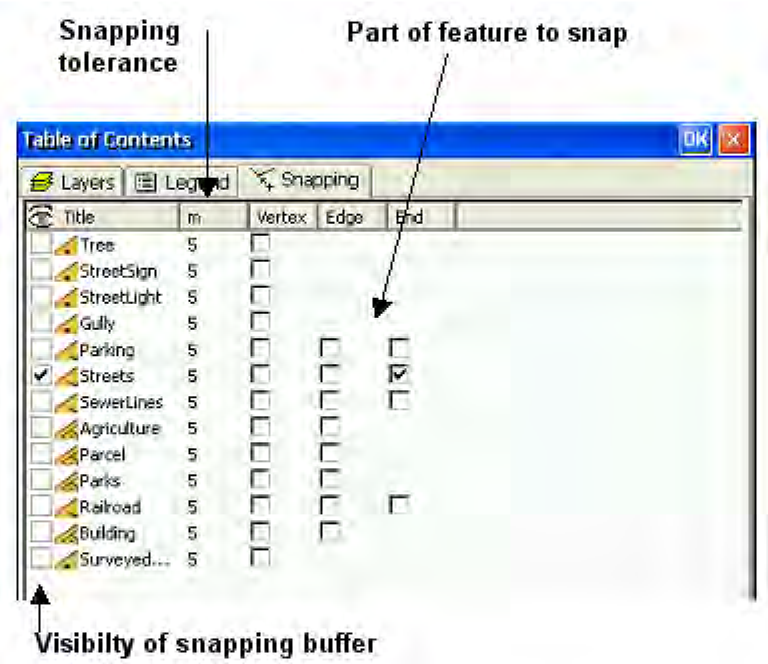
Refer to the section, Querying data, for more information about using the Advanced Select tool.

Selecting snapping properties

Overview of snapping

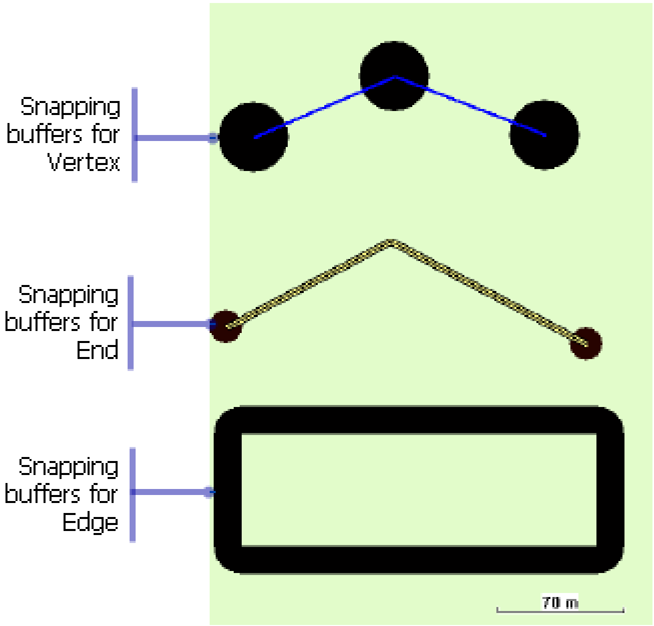
Snapping is an automatic editing operation in which points or features within a specified distance or tolerance of other points or features are moved to match or coincide exactly with each other's coordinates.

The Snapping page of the Table of Contents dialog box is used to specify which layers will be used to snap to when creating or editing features, and which part of the layer's features will be snapped to. You can also specify whether or not the snapping buffers will be displayed, and the snapping tolerance for individual layers.



The snapping tolerance is used for the radius of the snapping buffer.

The snapping tolerance can be set in the Snapping page of the Map Properties dialog box. The snapping tolerance set in the Map Properties dialog box is used for all layers in the map that do not have a snapping tolerance set in the Snapping page of the Table of Contents. The snapping tolerance units are the display units specified in the Display page of the Options dialog box.



Snapping can be set for three parts of polylines and polygons: vertex, edge, or end. The end option is used for snapping to points. When the vertex, edge, or end are checked, points of the corresponding point shapefile or AXF layer and parts of the corresponding polyline or polygon shapefile or AXF layer will be used to snap to, using the snapping tolerance. When the Vertex option is checked, any existing vertex in the corresponding polyline or polygon layer will be used for snapping.

When the Edge option is checked, any part of the corresponding polyline or polygon layer will be used for snapping. When the End option is checked, only the start and end vertices of the corresponding polyline or polygon layer will be used for snapping, and the points of the corresponding point layer will be used for snapping.

The snapping environment can help you create points or vertices at more exact locations relative to other features. When you use the snapping environment in Zeno Office, you must choose which part of the existing features—vertex, edge, or end point—you want your feature to snap to. These choices are called layer snapping properties.

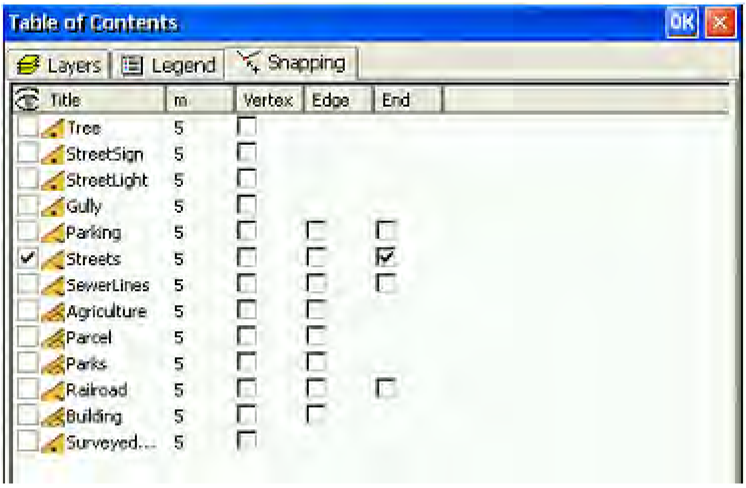
In Zeno Office, you can select to snap to an existing point, the vertex of a line or polygon, edge of a line or polygon, or the end point of a line.

Snapping properties are selected under the Snapping tab in the Table of Contents.

☞ **Specifying the snapping tolerance for all layers in the map:** The global snapping tolerance for all layers in the map is specified on the Snapping page of the Map Properties dialog box.

☞ **Snapping shortcut key:** To display the snapping buffers, tap the center button. With this tool active, you are also forcing all pen actions for the following tools to also be snapped: Identify, Measure, and Advanced Select.

Using the snapping environment to create new features

Step	Action
1	Tap the Table of Contents button. 
2	Tap the Snapping tab on the Table of Contents. A list of editable layers is displayed.
3	Check the Edge check box for the Streets layer. The Streets layer is the target layer that we want our new feature to snap to. 
4	Tap OK.
5	Make a layer editable using the methods described in this and the other editing chapters.
6	Display the snapping buffers by tapping the center button on the Zeno 10/15.
7	Create a new point feature or vertex using the methods described in this and the other editing sections. Points and vertices are snapped to other points, vertices, edges, or ends of existing features as specified on the Snapping page of the Table of Contents.

Moving features

Overview of moving features

To move a feature, you must first select it using one of the Select tools. With the Select and Select at GPS Position tools you can move the feature by dragging it. In order to move a point feature or vertex to a specific x, y coordinate or to the current GPS position, you must use the Select & Vertex Editing tool. Once changes have been made, you must commit the changes before they are saved. These steps eliminate the possibility of accidentally moving features in the field.

You can move features and vertices in three different ways:

1. Drag the feature.
2. Type in new x,y coordinates.
3. Move to the current GPS position coordinates.

Dragging is the easiest way to move a feature. Use this method when you have a general idea of where you want to move the feature. You can drag point, line, or polygon features.

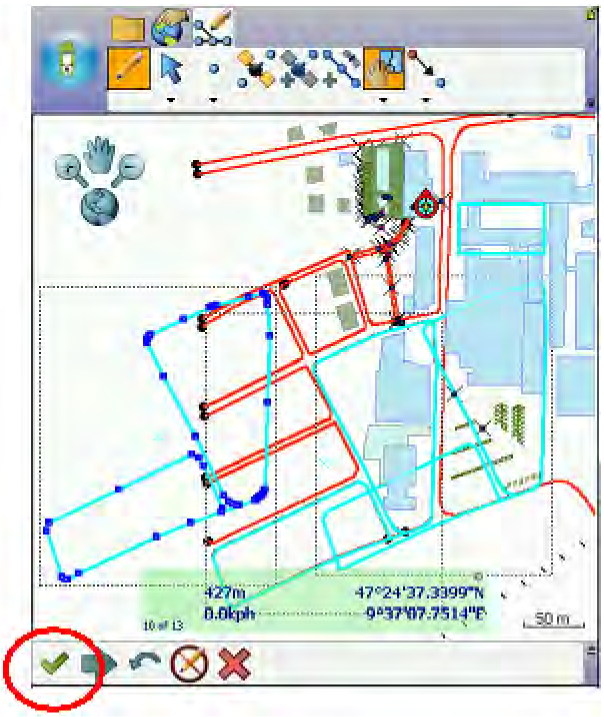
You can type in new x,y coordinates or use the current GPS position coordinates when you want to move a point feature or line and polygon vertices to a precise location.

Changing the size of the vertex symbols: Vertices are displayed using a square symbol. You can change the size of the square by changing the Pen Tolerance in the Display page of the Options dialog box.

Cancel feature move: Use the Cancel Feature Edits tool to undo any changes you have made, such as dragging a feature. You can only use the Cancel Feature Edits tool before you tap the Commit Geometry Changes button. Note: Refer to the topic, Moving a vertex, for more information on moving a vertex of line or polygon features.

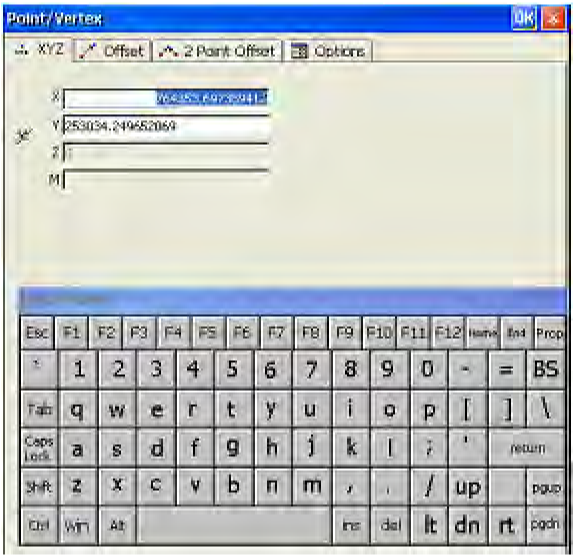
Note: Refer to the topic, Moving a vertex, for more information on moving a vertex of line or polygon features.

Dragging a feature

Step	Action
1	Select the feature using the Select or Select at GPS Position tool.
2	Tap the drop-down arrow below the Feature Properties button to display the drop-down list.
3	Tap Move Feature to enable feature dragging. The Move Feature button will be promoted to the Edit toolbar and be depressed while it is active. To deactivate it, activate another tool in its place.
4	Tap and drag the selected feature to the desired location. The feature's bounding box is displayed while the feature is being dragged. The selected feature is displayed in its new location.
5	Tap the Commit Geometry Changes button on the Command bar.  The selected feature is now moved to the new location. Once you commit your changes, they cannot be undone. To undo the change, prior to tapping the Commit Geometry Changes button, tap the Cancel Feature Edits button.

Moving a point feature to an x, y location using Move to

Step	Action
1	Tap the drop-down below the Select button to display the drop-down list
2	Tap Select & Vertex Editing. If you already have a feature selected using one of the methods described earlier in this chapter, tapping the Select and Vertex Editing button will display the point or vertices of your already selected feature using a blue square. Skip to task step 4.
3	Tap the feature you would like to select. The point symbol or vertices of your line and polygon feature will be displayed using a blue square. 
4	Tap and hold within the blue square to display the Move To menu.
5	Tap Move To. If you have a GPS connected and activated, tap Move to GPS, to move the point feature to the current GPS position.
6	Type the desired coordinates.

	
7	Tap OK.
8	Tap the Commit Geometry Changes button on the Command bar. The selected point feature is moved to the specified coordinates.

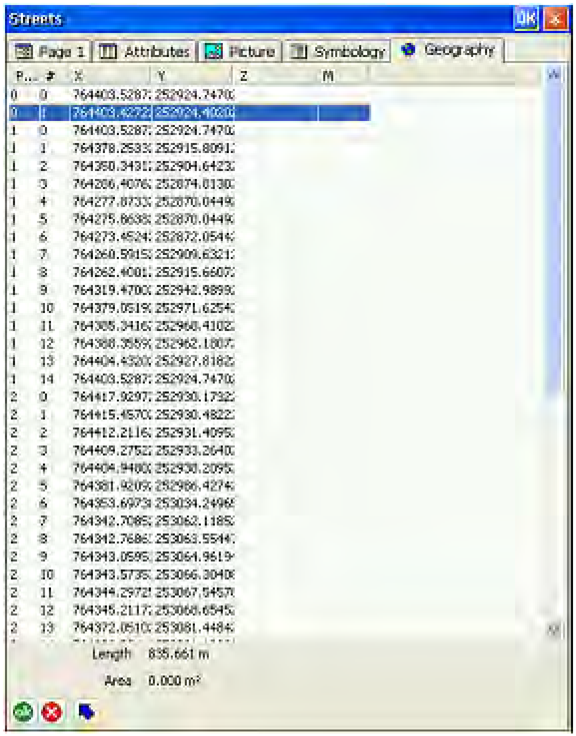
Using the Move To GPS tool: Tap the Move To GPS tool in the Move To menu to move the selected point to the current GPS position.

Using the Move To Menu with line and polygon vertices: The Move To and Move To GPS tools can be used to move line and polygon vertices to a new position. Use the Select & Vertex Editing tool to select a feature. A blue square is displayed around each vertex of the selected feature. Tap and hold (on a desktop PC, use the right mouse button click) within the blue square to display the Move To menu. Use the methods described for moving point features to move your vertices.

Moving a point to the current GPS position: Tapping the GPS button, , on the Vertex dialog box or the Geography page of the Feature Properties dialog box will move the selected point feature to the current GPS position.

Using offsets to move a point to a new location: You can use one point and 2 point offsets to move point features to a new location.

Moving a point feature to an x, y location using the Geography page of the Feature Properties dialog box

Step	Action
1	Select the feature using one of the methods described earlier in this section. The Feature Properties button is enabled once a feature is selected. 
2	Tap the Feature Properties button—or double-tap the feature—to open the Feature Properties dialog box.
3	Tap the Geography tab to display the Geography page.
4	Type the desired coordinates. 
5	Tap OK.
6	Tap the Commit Geometry Changes button on the Command bar. The selected point feature is moved to the specified coordinates.

Displaying the Geography page tab: The Geography page is used to display and edit the coordinates of point features or vertices of line and polygon features. The layer that you are editing may have an associated custom input form. The Custom Form dialog box will have additional tabs displayed to the left of the Attributes tab, as well as Left and Right arrow buttons for navigating between the tabs. Tap the Right arrow button until the Geography tab is displayed. The Geography tab is always the last tab displayed.

What if the Geography tab does not exist? : The layer that you are editing may have an associated Custom Input Form that hides the Attributes or Geography pages of the Feature Properties dialog box. If this is the case, then you will need to use the Move To tool to move the point to an x,y location

Undoing and cancelling edits

You can undo edits made to the geometry of a feature using the Undo and/or the Cancel Feature Edits tools. The Undo and Cancel Feature Edits tools can only be used prior to saving your changes using the Commit Geometry Changes tool. All these tools are located on the Command bar.

The Undo tool goes back to the previous change. If you make several changes to a line vertex, the Undo tool enables you to go back one step. You can keep stepping back until all your edits are undone.

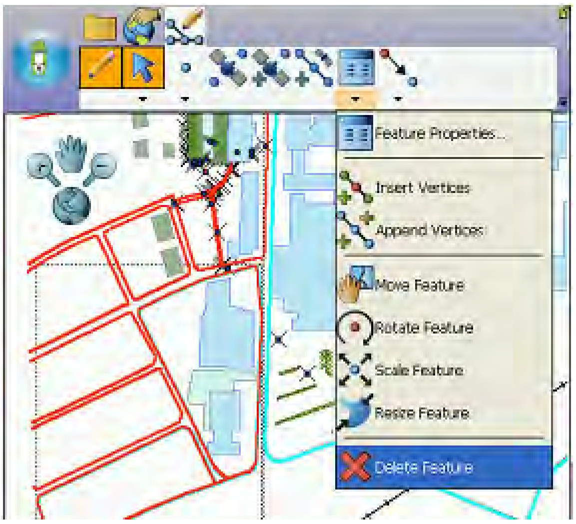
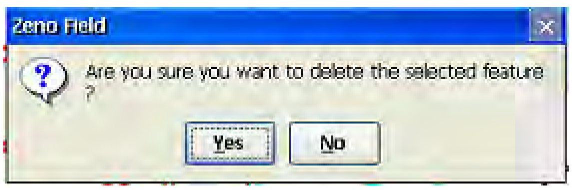
The Cancel Feature Edits tool goes back to the original shape of the feature you modified.

Step	Action
1	Begin editing your feature using the methods described earlier in this section. The Undo and Cancel Feature Edits tools are activated once you have made your first change such as insert vertex or move feature.
2	Tap the Undo button to undo the last change.
3	Tap the Cancel Feature Edits button to revert back to the original shape or location of the feature. 

Deleting features

To delete a feature from the map and from your dataset, use the Delete Feature tool on the Feature Properties button dropdown list. Zeno Field edits the original, or source, shapefile or AXF file; it does not operate on a copy of the file. Once a change has been committed, you cannot undo it.

When a feature is deleted, Zeno Field converts the feature to a null shape and then subsequently ignores the null shape.

<table>
<tr><th>Step</th><th>Action</th></tr>
<tr><td>1</td><td>Select the feature using one of the methods described earlier in this chapter.</td></tr>
<tr><td>2</td><td>Tap the drop-down arrow below the Feature Properties button to display the drop-down list.

</td></tr>
<tr><td>3</td><td>Tap Delete Feature.</td></tr>
<tr><td>4</td><td>Tap Yes to confirm that you really want to delete the selected feature.


The selected feature is deleted.</td></tr>
</table>

Packing shapefiles: In order to pack a shapefile, or permanently delete the features, use the Utilities>Pack Shapefile utility located under the Tools dropdown menu on the Main toolbar. In order to successfully pack your shapefile and remove the null shapes, there must be sufficient free memory on your mobile device for Zeno Field.

Deleting features using the Delete key: You can also press the Delete key on your keyboard—or Soft Input Panel on a pen-based computer— to delete the selected feature.

Creating new features

Creating point features

Overview of creating point features

You can create point features using the mouse pointer, pen, or incoming GPS coordinates. Creating a point feature involves the following steps:

Step	Action
1	Select a point layer for editing using the Start/Stop Editing tool.
2	Tap the Point button, or the GPS Point button, on the Edit toolbar.
3	Tap the map to create a new feature.
4	Type in attributes for the new point feature.

The Feature Properties dialog box lets you view and edit the attributes of the feature you have selected. The Feature Properties dialog box is automatically displayed once any new feature is created.

By default, the Feature Properties dialog box includes pages for Attributes, Picture, Symbology, and Geography; a custom edit form will also be displayed if it exists. The custom edit form may change the title of the Feature Properties dialog box. For example, “Trees”.

Enabling the Point button: The Point button on the Edit toolbar is only enabled if a point layer has been selected for editing. You can select a layer for editing via the Start/Stop Editing tool or in the Table of Contents.

Note: Refer to, Creating point features, for more information on using incoming GPS coordinates to capture a point feature.

Creating point features with the pen

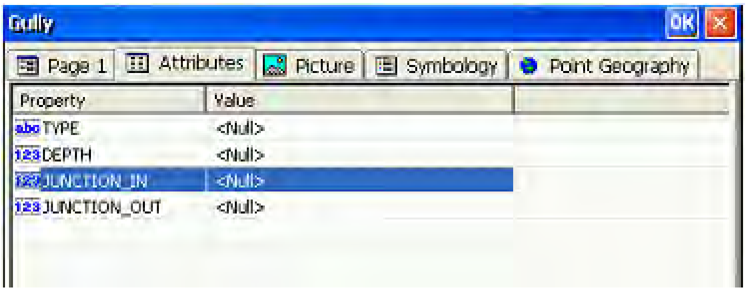
<table>
<tr><th>Step</th><th>Action</th></tr>
<tr><td>1</td><td>Tap the Point button on the Edit toolbar.

The Point button is now active, and Zeno Field is in point capture mode. Any tap on the screen will create a new point feature at the corresponding coordinates.

</td></tr>
<tr><td>2</td><td>Tap the map at the location where you want to create the new point feature.

The Feature Properties dialog box is automatically displayed after the new point feature has been created.

If the customs edit form exists for a particular feature,it will be displayed. Otherwsie the Feature Properties dialog box will open on the Attributes page.


</td></tr>
<tr><td>3</td><td>On the Attributes page, tap the Property field to open the associated Value text box for typing in attribute data.

For example, tapping the Property field JUNCTION_IN will open the associated Value text box for typing in the house number value of “2”.

The Soft Input Panel is displayed when a Value text box is opened. If is not displayed, tap the SIP icon on the Command bar to activate it.

The Feature Properties dialog box will display the custom edit form if it exists.</td></tr>
<tr><td>4</td><td>Tap OK to save the attributes, close the edit form, or the Feature Properties dialog box, and complete the capture of the new point feature.

You can also tap the X button if you want to cancel the capture of the new point</td></tr>
</table>

	feature. The point feature, and any attributes that have been typed in, will be deleted.
	Creating custom edit forms: Custom edit forms can be created using Zeno Field. In Zeno Field , custom edit forms can be created with either the QuickForm or QuickProject tools. Custom forms are saved in an Zeno Field Layer file, which is associated with a shapefile (*.apl) or stored inside the Zeno Field AXF file. Custom edit forms can have multiple tabs, or pages, each with multiple controls. These controls can include text boxes, date controls, and list boxes. Scripts associated with the form perform initialization and validation, enforcing correct data entry before continuing to another page or closing the form. Scripts cannot be added to forms from within Zeno Field.
5	The new point feature is created and displayed using the selected symbology. The point feature is also selected for editing, as indicated by the dashed selection box and the activated Feature Properties button. The Point button is still active for capturing additional point features when it is displayed in depressed mode.
	Deactivating the Point button: The Point button is active when it is displayed in a depressed mode. Tapping any other tool in its place will deactivate the Point button.
	Working with scaledependent layers: If you add a feature to a layer that has a scale-dependency set, it may not be visible if you are zoomed out beyond the set extent. In order to see the feature, whether you are adding a new or displaying an existing feature, you will need to zoom in beyond the set scale. Scale dependencies are set on the Scale page of the Layer Properties dialog box. You will also need to zoom in beyond the set scale in order to see the features if a @##MAPSCALE## filter has been applied to an Zeno Field AXF layer.

Creating line features

Overview of creating line features

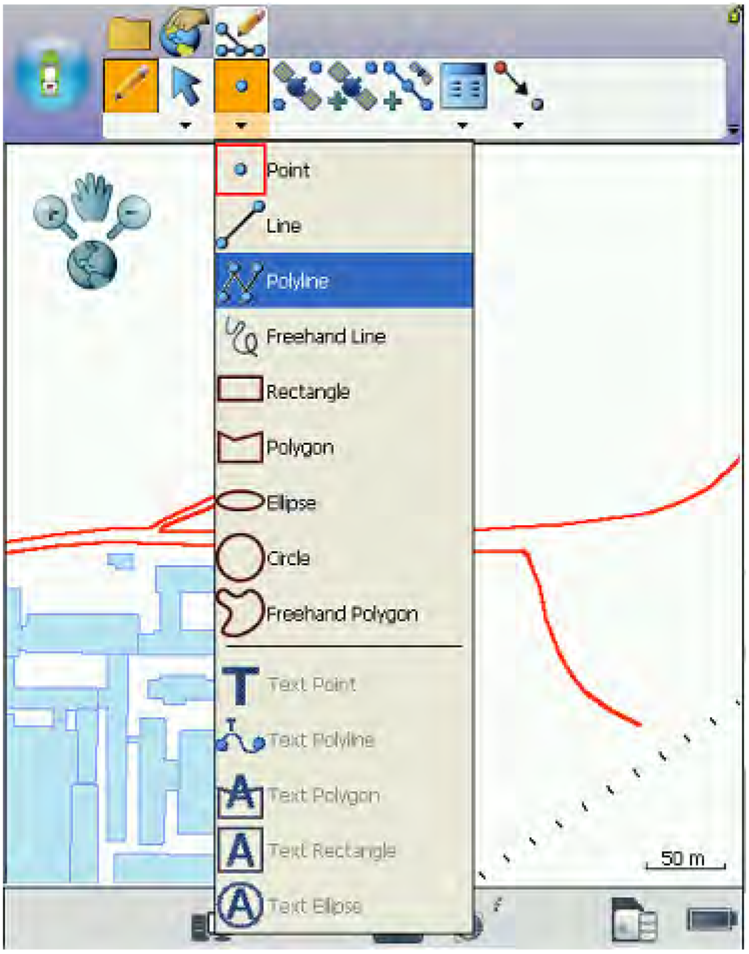
Zeno Field has the following tools for creating line features:

1. Line: This tool creates a straight line joining the coordinates from where the pen first touches the screen and ends where the pen is lifted.
2. Polyline: This tool captures a vertex each time the pen taps the screen or each time the Add GPS Vertex button is tapped. The Add GPS Vertices Continuously button can also be used to capture vertices continuously from the GPS. Offsets can also be used to create vertices for a polyline. The line is completed when the Proceed tool on the Command bar is tapped.
3. Freehand Line: This tool creates a sketch based on the line drawn with the pen. The line is completed when the pen is lifted.

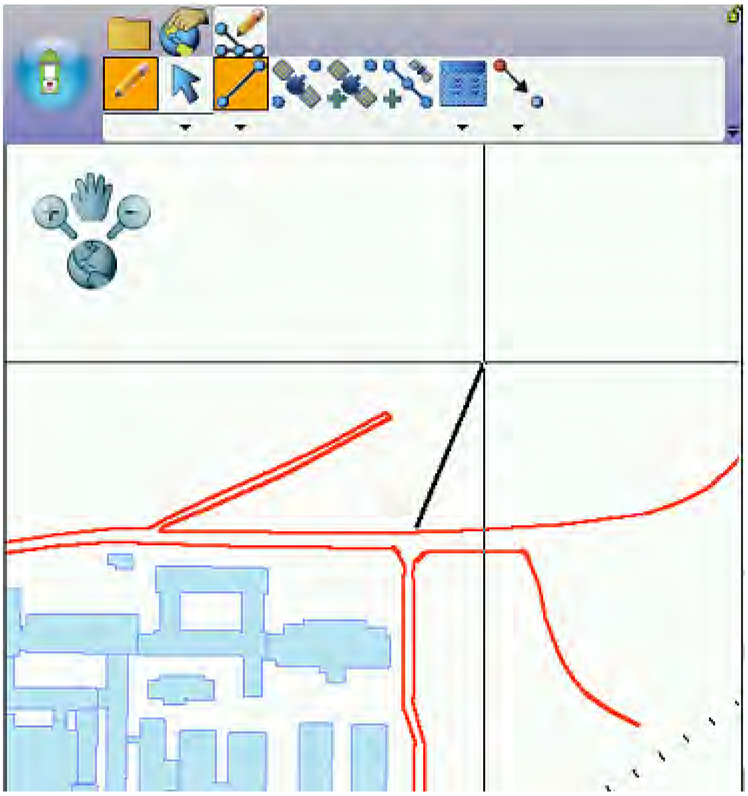
The Line, Polyline, and Freehand Line tools can be used with the mouse pointer or pen. The Polyline tool can also be used with the incoming GPS coordinates or with offsets.

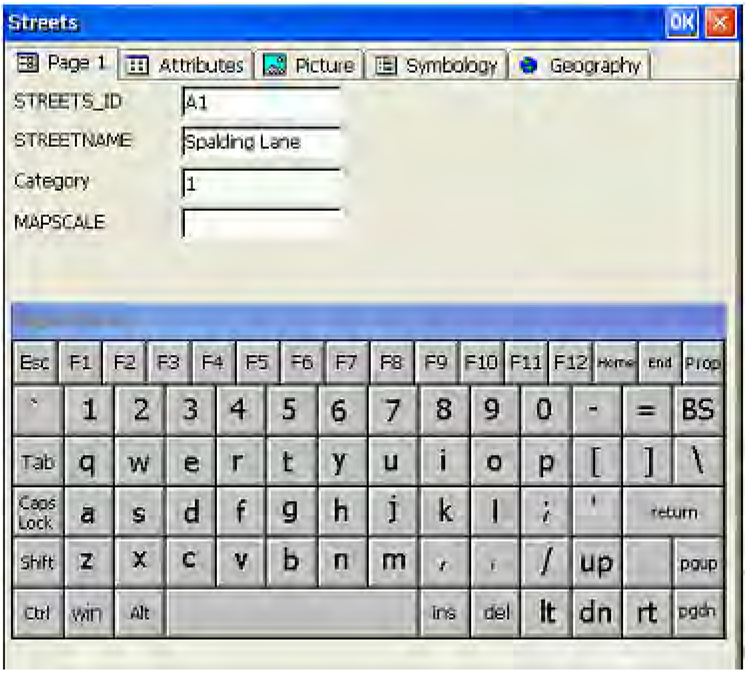
All of the line features are created in a line layer—a shapefile, an Zeno Field AXF layer, or a graphics layer. The new line feature is stored as x,y, and, optionally, z coordinates.

Selecting the line feature tool

Step	Action
1	Tap the drop-down arrow below the feature button to display the drop-down list of feature types. By default, the Point feature button is displayed on the Edit toolbar. 
2	Tap the required line feature type—for example, Polyline. The selected feature type will be highlighted with a red square, and the feature's button will be displayed and depressed on the Edit toolbar.

Creating a line feature using the Line tool and the pen

Step	Action
1	Tap the arrow below the feature tool to display the drop-down list. Tap the Line feature tool.
2	Tap the map and while still holding the pen on the map —or screen—drag the pen to where the line should end. 
3	Lift the pen to create the new line feature. The Feature Properties dialog box or custom edit form is automatically displayed after the new line feature has been created.

	
4	On the form, type the required information or on the Attributes tab, tap the Property field to open the associated Value text box for typing in attribute data.
5	Tap the Symbology tab to select the appropriate symbol for your new line.
6	Tap OK when you are finished. Your new line is drawn using the symbology you defined.

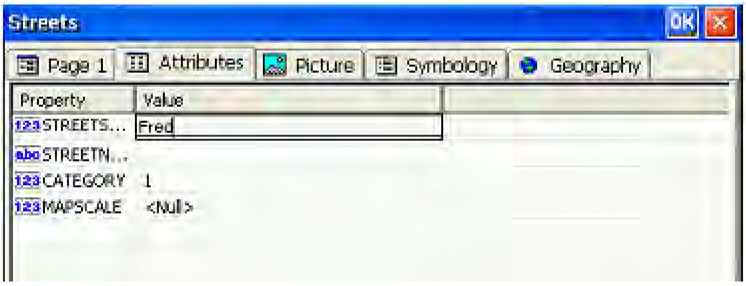
Deactivating the feature button: The selected feature button is active when it is displayed in a depressed mode. Tapping any other button or tool will deactivate the selected feature button.

Using the snapping options: Set snapping options in the Table of Contents to snap new features or vertices to existing ones.

Creating a line feature using the Polyline tool and the pen

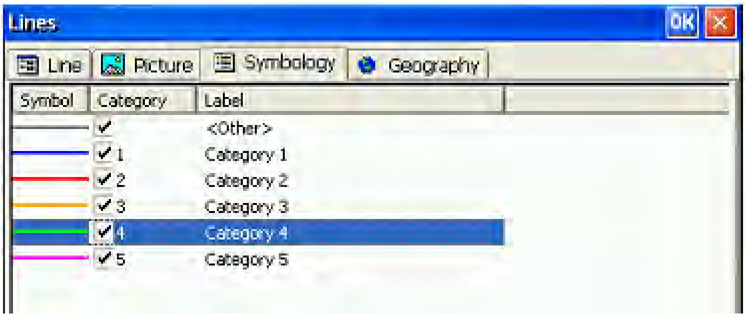
Step	Action
1	Tap the arrow below the feature tool to display the drop-down list. Tap the Polyline feature tool.
2	Tap the map to specify the position for the first vertex of the new line. The vertices are drawn with a blue box. 
3	Tap the map again to specify the position for the second vertex of the new line. Continue to tap the map to capture additional vertices. Go to Step 7 to complete the capture of the new line feature, or continue to Step 4 to use the capture menu to add more vertices.
	Using the Undo tool: Use the Undo tool on the Command bar to delete the last vertex captured. You can continue to delete all the vertices that have been captured for the line feature.

4	At any time, you can tap and hold anywhere on the map to display the Capture menu. 
5	Tap Absolute X,Y to display the Vertex dialog box for typing in the x,y coordinates and, optionally, the z coordinate and m value for the next vertex.
6	Type the coordinates for the next vertex or if the GPS is active, tap the GPS button on the Vertex dialog box to use the current GPS position. 
7	Tap the Proceed button on the Command bar to complete the capture of the new line feature. The Feature Properties dialog box or custom edit form is automatically displayed after the new line feature has been created.

8	On the Attributes page, tap the Value field to open the associated Value text box for typing in attribute data. For example, tap the Value field for the NAME Property to open the associated Value text box and type the street name value of “Fred”. 
9	Tap OK when you are finished entering your attribute and symbology information.
	Determining the length of a line feature: You can determine the length of a selected line feature by opening the Geography page of the Feature Properties dialog box. Zeno Field dynamically calculates the length of the selected line and displays it in the Geography tab using the Display Units. The length is not stored with the feature’s attributes.

Creating a line feature using the Freehand Line tool

Step	Action
1	Tap the arrow below the feature tool to display the drop-down list. Tap the Freehand Line feature tool.
2	Tap the map and while still holding the pen on the map —or screen—drag the pen to where the line should end. 
3	Lift the pen to end the new line feature. The Feature Properties dialog box or custom edit form is automatically displayed after the new line feature has been created.
4	On the Attributes tab, tap the Value field to open the associated Value text box for typing in attribute data.
5	On the Symbology tab, select the symbol for the new line feature. Symbology is based on the attribute value, therefore by selecting the symbology, you are also selecting the associated attribute value for this feature.

	
6	Tap OK when you are finished entering the required information.

Overview of polygon features

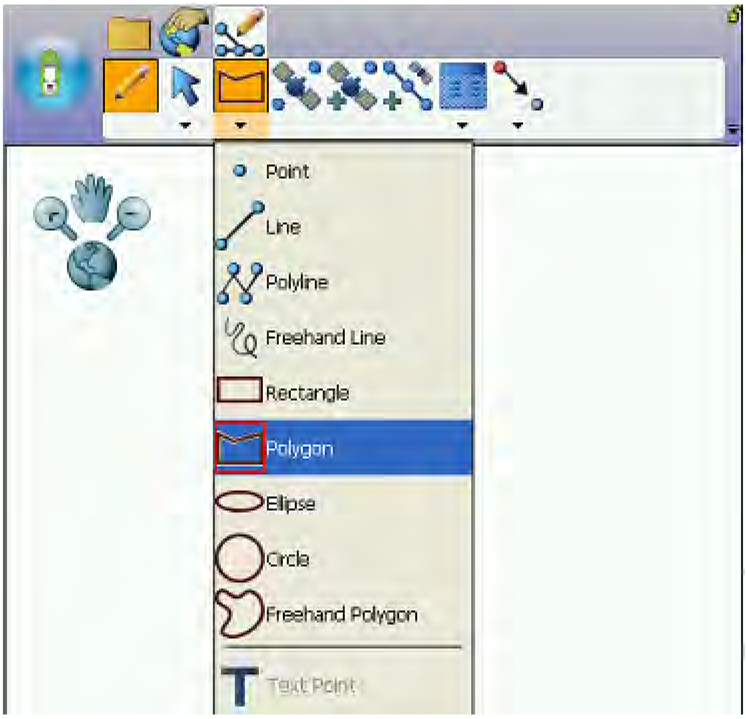
Zeno Field has the following tools for creating polygon features:

- **Rectangle:** This tool creates a rectangle using the coordinates from where the pen first touches the screen to where the pen is lifted. The rectangle is automatically completed when the pen is lifted.
- **Polygon:** This tool captures a vertex each time the pen taps the screen or each time the Add GPS Vertex button is tapped. The Add GPS Vertices Continuously button can also be used to capture vertices from the GPS. Offsets can also be used to create vertices for a polygon. The polygon is completed when the Proceed tool on the Command bar is tapped.
- **Ellipse:** This tool creates an ellipse using the coordinates from where the pen first touches the screen (the origin) to where the pen is lifted (the radius). The polygon is automatically completed when the pen is lifted.
- **Circle:** This tool creates a circle using the coordinates from where the pen first touches the screen (the origin) to where the pen is lifted (the radius). The polygon is automatically completed when the pen is lifted.
- **Freehand Polygon:** This tool creates a sketch polygon based on the line drawn with the pen. The polygon is automatically completed when the pen is lifted.

All of the polygon tools can be used with the mouse pointer or pen. The Polygon tool can also be used with the incoming GPS coordinates or with offsets.

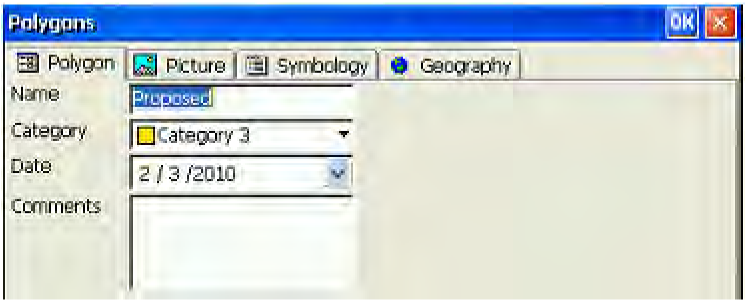
All of the polygon features are created in a polygon layer—a shapefile, an Zeno Field AXF layer, or a graphics layer. The new polygon feature is stored as x,y and, optionally, z coordinates.

Selecting the polygon feature tool

Step	Action
1	Tap the drop-down arrow below the feature button to display the drop-down list of feature types—by default, the Point feature button is displayed on the Edit toolbar.
2	Tap the required polygon feature type—for example, Polygon.  The selected feature type will be highlighted with a red square, and the feature's button will be displayed and activated on the Edit toolbar.

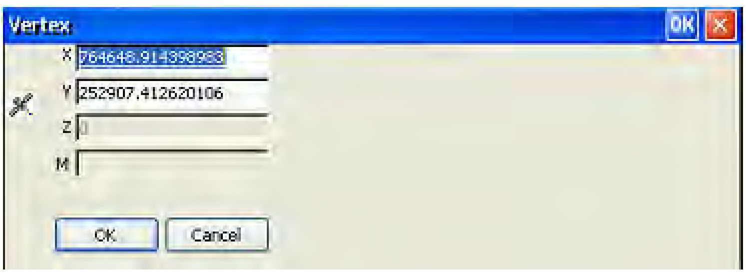
Creating a polygon feature using the Rectangle, Ellipse, Circle or Freehand tool

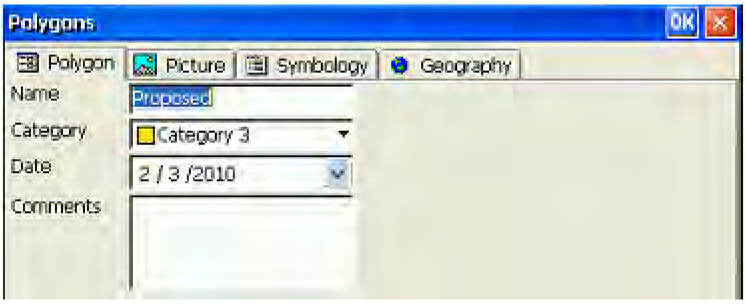
Step	Action
1	Tap the arrow to the right of the feature tool to display the drop-down list. Tap one of the polygon tools, such as the Rectangle feature tool. 
2	Tap the map to specify the position for the origin of the polygon—whether you are creating a rectangle, ellipse, circle, or freehand polygon.
3	While still holding the pen on the map—or screen—drag the pen to select the position of the opposite corner of the rectangle, to increase the radius of the ellipse or circle, or to use the pen to draw the freehand polygon.
4	Lift the pen to create the new polygon feature The Feature Properties dialog box or custom edit form is automatically displayed after the new polygon feature has been created.
5	On the Attributes tab, tap the Property field to open the associated Value text box for typing in attribute data. For example, tap the Value field associated with the NAME Property to open the

	associated Value text box and type the school name value of “Proposed”. 
6	On the Symbology tab, select the symbol for the new feature. Symbology is based on the attribute value, therefore by selecting the symbology, you are also selecting the associated attribute value for this feature.
7	Tap ok when you are finished capturing the feature properties for your new polygon. Tapping the X button cancels the creation of your new feature.

Creating a polygon feature using the Polygon tool and the pen

Step	Action
1	Tap the arrow below the feature tool to display the drop-down list. Tap the Polygon feature tool.
2	Tap the map to specify the position for the first vertex of the new polygon. The vertices are drawn with a blue box, and a line joins the vertices.
3	Tap the map again to specify the position for the second vertex of the new polygon. Continue to tap the map to capture additional vertices.  Go to Step 7 to complete the capture of the new polygon feature, or continue to Step 4 to use the capture menu to add more vertices.
	Using the snapping options: Set snapping options in the Table of Contents to snap new vertices to existing features.
	Using the Undo tool: Use the Undo tool on the Command bar to delete the last vertex captured. You can continue to delete all the vertices that have been captured for the polygon feature.

4	At any time you can tap and hold anywhere on the map to display the Capture menu. 
5	Tap Absolute X,Y to display the Vertex dialog box for typing in the x,y coordinates and, optionally, the z coordinate and m value for the next vertex.
6	Type the coordinates for the next vertex or tap the GPS button—if the GPS is active— on the Vertex dialog box to use the current GPS position.
7	Tap the Proceed button on the Command bar to complete the capture of the new line polygon. Zeno Field will automatically close the polygon by adding a final vertex with the same coordinates as the first vertex. The Feature Properties dialog box or custom edit form is automatically displayed after the new polygon feature has been created.
8	On the custom edit form, type in the required elements. If an edit form does not exist, on the Attributes page, tap the Value field to open the associated Value text box and type in attribute data. Use the Symbology page to select a symbol for your new feature. 
9	Tap OK when you are finished entering your attribute and symbology information. Tapping the X button cancels the creation of your new feature.

	
	Determining the perimeter and area of a polygon feature: You can determine the perimeter— or length—and area of a selected polygon feature by opening the Geography page of the Feature Properties dialog box. Zeno Field dynamically calculates the perimeter and area of the selected polygon and displays it in the Geography tab using the Display Units. The perimeter and area are not stored with the feature’s attributes.

Working with graphics layers

Overview of graphics layer

Zeno Field supports graphics layer files. The Zeno Field Graphics Layer (.apg) is an XML file that can store text, points, lines, and polygons. It is used for redlining or to make freehand georeferenced edits in the field. Graphics layer files can be easily imported into Zeno Office.

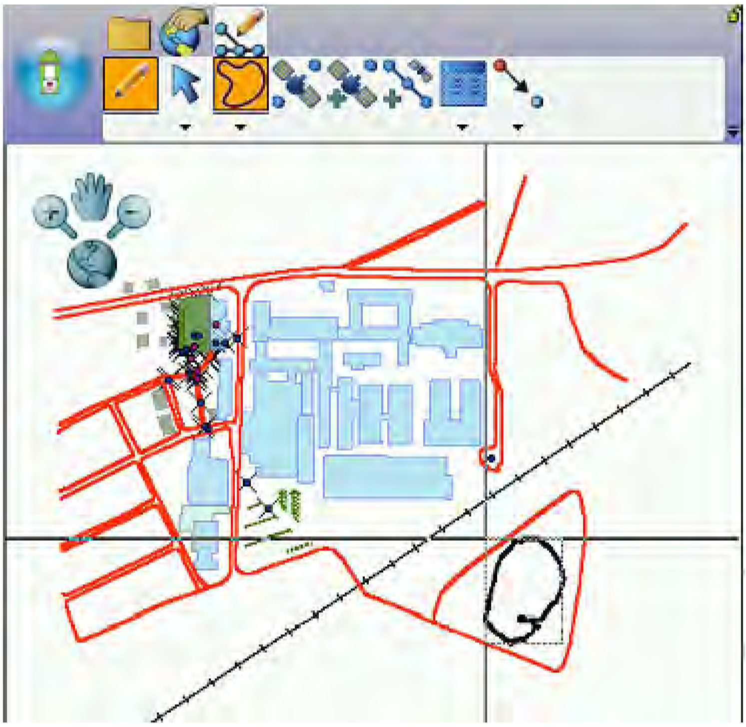
If you select the Graphics Layer for editing, all previously selected layers are deselected. However, with the Graphics Layer selected, you can then select up to two shapefiles or Zeno Field AXF files for editing. In this case, the shapefiles or Zeno Field AXF files take precedence over the Graphics Layer when editing, but you are still able to add sketches and notes to your Zeno Field map while adding or updating features.

A graphics layer is different than a shapefile or Zeno Field AXF file. You can have many features of different types in one layer such as a point feature, a freehand polygon feature, a line feature, and text.

When editing a graphics layer, you can use any of the feature types—point, line, polyline, freehand line, rectangle, polygon, ellipse, circle, freehand polygon—to create features for your layer.

In addition, you can associate text to any feature you create in your graphics layer including - text point, text line, text polygon, text rectangle, and text ellipse

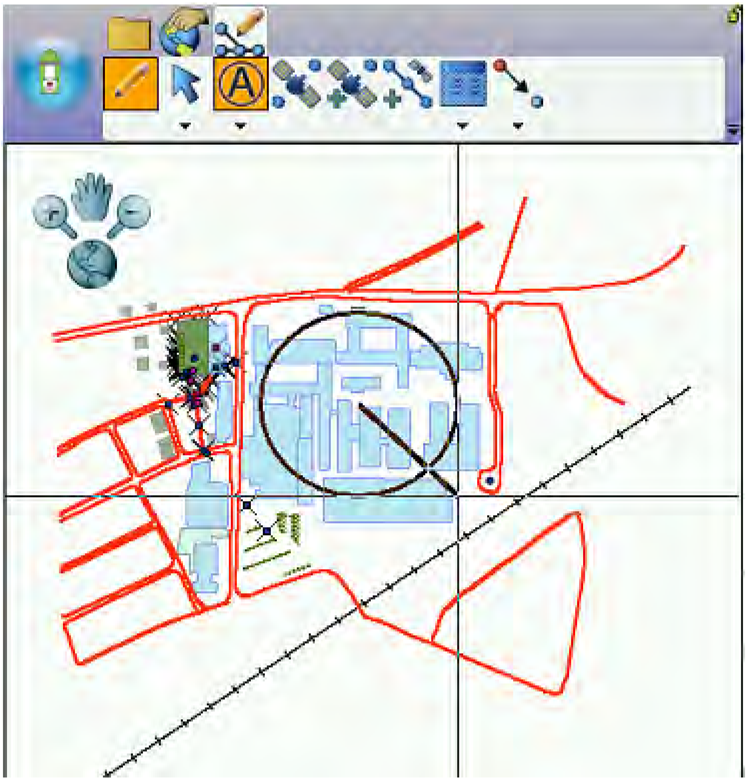
Creating a feature in your graphics layer

<table>
<tr><th>Step</th><th>Action</th></tr>
<tr><td>1</td><td>Use the Start/Stop Editing tool to make the graphics layer editable if it is not already.
</td></tr>
<tr><td>2</td><td>Select the feature type from the drop-down list, such as Freehand Polygon.</td></tr>
<tr><td>3</td><td>Draw the feature using the methods described in this section.

For Freehand Polygon, use the pen to draw the polygon, while still holding the pen on the map, or screen.</td></tr>
<tr><td>4</td><td>Lift the pen to create the new feature in your graphics layer.

Your polygon feature is created as a graphic.
</td></tr>
</table>

Using text on a feature in your graphics layer

Step	Action
1	Use the Start/Stop Editing tool to make the graphics layer editable if it is not already. 
2	Select the text feature type (text point, text line, text polygon, text rectangle, text ellipse) from the drop-down list, such as text ellipse.
3	Draw the feature using the methods described in this section.
4	Lift the pen to create the new feature in your graphics layer. A text dialog box is displayed for the feature.
☞	**Using the editing tools on features in your graphics layer:** Use any of the feature editing tools, such as move, rotate, resize, scale, and delete, on the features in your graphics layer. Use the vertex tools, such as insert and append vertices, on your polyline and polygon features in your graphics layers. Offsets and traverses can also be used on your features. In order to use these feature editing tools on your graphics layer; the graphics layer can be the only selected layer for editing.
☞	**Note: Refer to the sections on creating point, line, and polygon features in this section for help creating features in your graphics layer.**

5	Type the text you would like to include with your feature. 
6	Uncheck the No Feature Symbol checkbox to apply symbology to the graphic.
7	Tap the box for the feature symbol. Use the Symbology Properties dialog box to select the symbol for your graphics feature.
8	Uncheck the No Text Symbol checkbox.
9	Tap the box for the text symbol. Use the Labelling Properties dialog box to select the font type for the feature.
10	Tap OK
11	Your feature is created using the text and feature symbology you selected.

	
	Creating polyline and polygon features in your graphics layer: When you create a polyline or polygon feature for your graphics layer, you will need to use either the Commit Geometry Changes to create the feature without text or the Proceed button to display the Text dialog box. Both these buttons will become enabled on the Command bar once you have captured your first vertex.
	Adding text to your polyline and polygon features in your graphics layer: Zeno Field gives you the option to add text to your polyline and polygon features created in your graphics layer. Select the text polyline or text polygon tool from the feature type drop-down list before creating your feature. Alternatively, select any graphic, open the feature properties dialog box for the graphic, and add text using the dialog displayed.
	Note: Refer to section, [Symbolizing your data](#), for help using the Symbology and Labeling

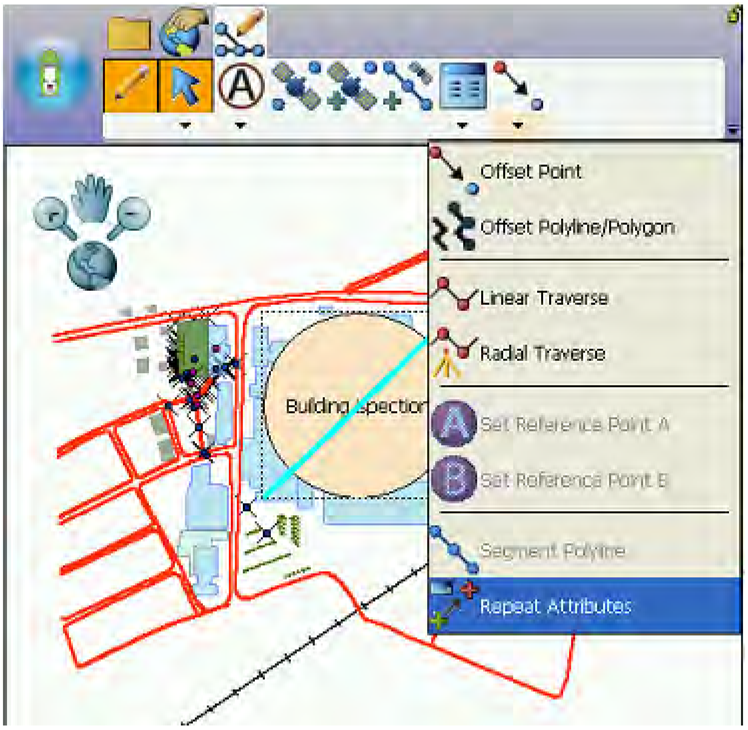
Overview of repeated features

Zeno Field enables you to create a new feature, or a series of features, based on the attribute information of another feature. This capability is very useful for capturing a series of new features that have attribute information in common.

Using the Repeat Attributes button, Zeno Field will populate the attribute information of any new feature you create using the attribute information of a previously selected feature. The Repeat Attributes button can be used on any feature type.

It is not necessary to use the Repeated Attributes tool with a previous feature of the same feature type. For example, you can capture points and polygons, both with an Inspection_date field. All common fields for the new point features will be repeated for the polygon features, and vice versa.

Steps to create repeated features

Step	Action
1	Create a new feature or select a feature whose attributes you would like repeated when creating new features.
2	Tap the drop-down arrow to the right of the Offset Point button to display the dropdown list.
3	Tap Repeat Attributes. A red box around the button indicates that the tool is active. 
4	With the feature type selected, such as the Point feature button, tap the screen to create a new point feature.
5	The Feature Properties dialog box, or custom edit form, is displayed and the attribute information is populated with the previously selected feature's information.
6	Make any necessary changes to the edit form or the Attribute page.
7	Tap OK. Your new feature is created.

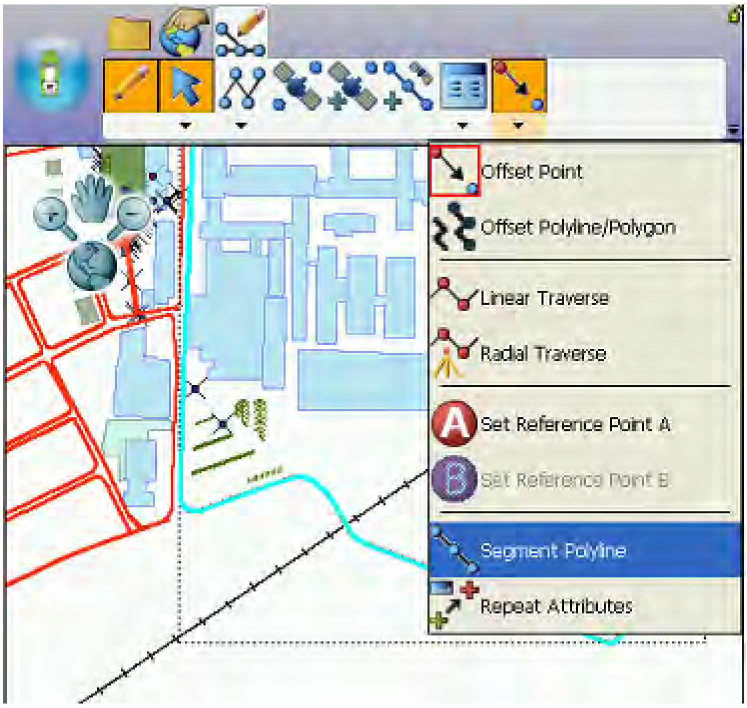
Creating segmented polyline features

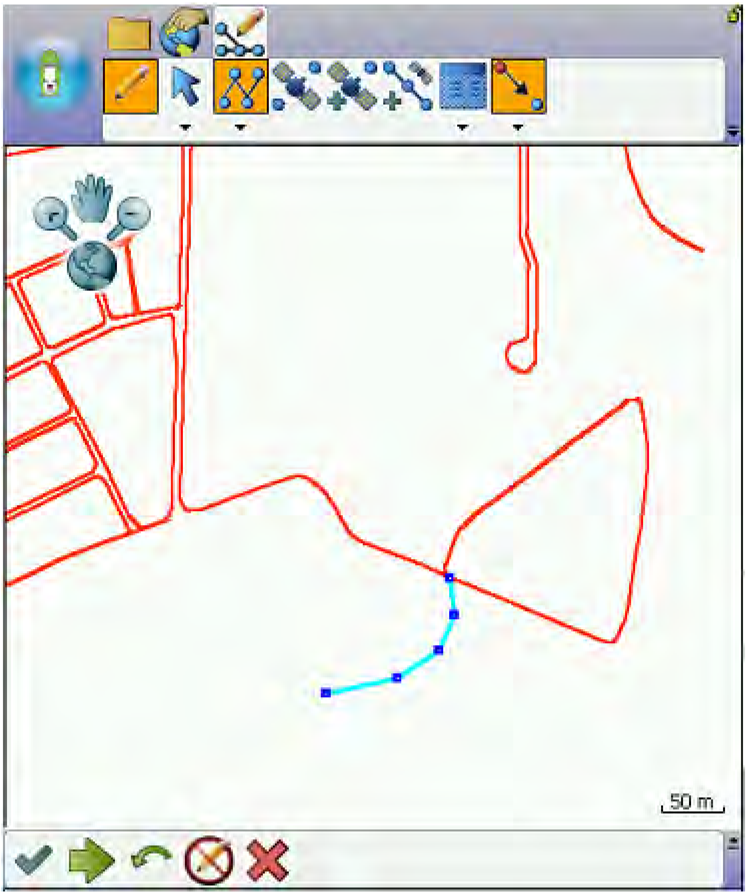
Overview of segmented polyline features

Zeno Field enables you to create segmented polyline features. With the Segment Polyline button activated, any new polyline feature you create begins at the end of your previously selected line feature. This capability is very useful for capturing line features in succession that may have different attributes. For example, using the Segment polyline feature you can easily capture a continuous road that has been segmented based on its pavement conditions. This tool is only available on the Polyline feature type.

Refer to section , Creating new features with a GPS and rangefinder for help using the Segment Polyline tool with the Add GPS Vertex and Add GPS vertices continuously buttons.

Steps to create segmented polyline features

Step	Action
1	Select the line feature whose end you would like to be the start of your new feature.
2	Tap the drop-down arrow to the right of the Point feature type button to display the drop-down list and tap Polyline.
3	Tap the drop-down arrow to the right of the Offset Point button to display the dropdown list.
4	Tap Segment Polyline. The Segment Polyline tool is promoted to the Edit toolbar. 
5	The last vertex of the previously selected feature is highlighted using a blue box. This is the start vertex of your new feature.
6	Tap the map at the location of the next vertex or vertices.

	
7	Tap Proceed to finish the line segment.
8	Enter the information for the segment using the Feature Properties dialog box. If a custom edit form exists, it will be displayed. You can also select the symbology for the line feature or segment.
9	Tap OK. The Segment Polyline tool will be enabled on the Edit toolbar.
10	Tap the Segment Polyline tool.
11	Repeat Steps 5–10 to continue your segmented polyline. Each time you capture a segmented feature, the next feature will begin at the end of the previously created, or selected, feature.

Working with offsets

Offsets are used for GIS data collection in the following situations:

- When mapping the location of an inaccessible feature because it is either difficult to reach or it is in not safe to reach. For example, a tree on an island, or a manhole in the middle of a busy road.
- When mapping the location of a feature where it is not possible to get a GPS signal, or a GPS position of sufficient accuracy. For example, under a large tree or in a narrow street or 'urban canyon'.

Offsets combine the use of distance, bearing (or angle), and/or inclination (or slope) to determine the location of features. In Zeno Field, there are two types of offsets: simple and complex.

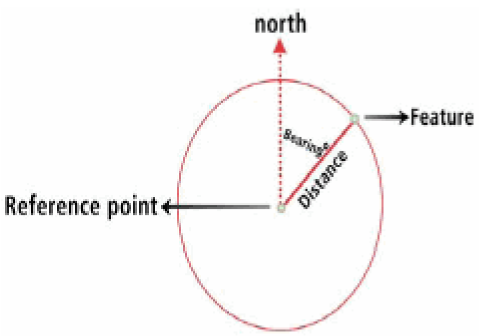


Diagram illustrating how distance from a known reference point to a feature and bearing to the feature in relation to north are calculated.

Simple offsets

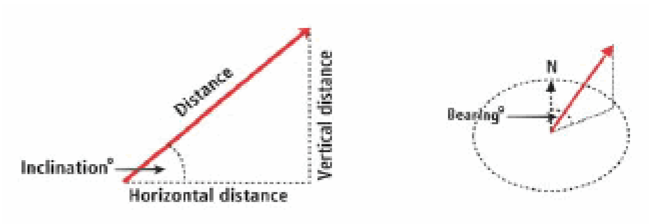
A simple offset is performed on a polyline or polygon and only uses a distance measurement. Using a simple offset, you would map a feature that is a constant distance away from a polyline captured via pen or GPS. You would also specify whether the new feature is left or right of the captured polyline. For example, you could map the distance of a new sidewalk to the left of and at a distance of 5 meters from the center of an existing road.

Complex offsets

Complex offsets can be used for point features and vertices of polylines and polygons. Complex offsets use a combination of distance, bearing, and inclination measurements. Zeno Field supports 1 point offsets and 2 point offsets. A 1 point offset uses distance and bearing measurements (distance-bearing) to determine the offset. A 2 point offset uses either 2 distance measurements (distance-distance) or 2 bearing measurements (bearing-bearing) to calculate the offset. Inclination can be used in combination with any of these offsets, if a height value is known and you are storing your results in a shapefile that supports a z value.

1 point offset

A 1 point offset enables you to create a point or vertex offset from a single reference point. The reference point can be set using a pen, GPS, or manually entered coordinates. A 1 point offset uses bearing and two other parameters such as slope distance, horizontal distance, vertical distance, or inclination to calculate the offset. Refer to the diagrams below for an illustration of the distance and bearing parameters.



Illustrations of how the three distance parameters (left) and bearing (right) measurements are calculated for a 1 point offset.

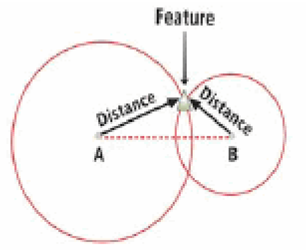
Typically you would select a 1 point offset if you were using a rangefinder that included a built-in compass. For example, you could capture a tree (target) that was a distance of 15m and had a bearing of 45 degrees from True North from your location, a known reference point.

2 point offsets

A 2 point offset enables you to create a point based on two reference points (A & B). The reference points can be set using a pen, GPS, or manually entered coordinates. There are two variations available in Zeno Field for the 2 point offset: distance– distance and bearing–bearing. Typically, you would use a 2 point offset to calculate point features rather than vertices for a polyline or polygon.

Distance-distance

A distance-distance offset is used when the bearings are not known from the reference points but the distances are. For example, when you are using a rangefinder without a compass. The distance between the feature and the two reference points A & B are used to calculate the location of the feature. The feature’s location is at the point where the two circles centered around reference points A and B intersect. Without a bearing, there are two possible solutions to this type of offset. You must, therefore, determine (and set) if the offset point is to the left or right of an imaginary line between Reference points A & B. Vertical distance or inclination are required if a correct 3-dimensional solution is to be calculated.



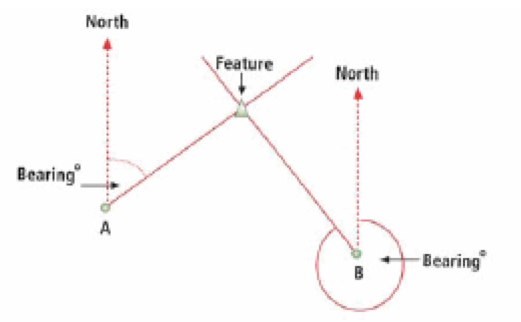
With a distance offset, the feature is located at the point where two circles centered on reference points A & B intersect.

M or Measure field

The Offset and 2 Point Offset pages in the Point/Vertex dialog box include a box to enter a measure, or M, value for the target point. The x, y, and optionally z coordinates are calculated automatically but the M value needs to be entered manually. The M field is not a default field in a shapefile, and therefore must be created when the shapefile is created. Data can only be entered in this input box if the editable shapefile contains an M field.

Bearing–bearing

A bearing–bearing offset is used when two bearings are known for the reference points but the distances are not. For example, when you are using a compass without a rangefinder. The bearing from north from each of the two reference points A & B is used to calculate the location of the feature. The feature’s location is at the point where the two bearing lines intersect. Vertical distance or inclination are required if a correct 3-dimensional solution is to be calculated.



With a bearing-bearing offset, the feature is located at the point where if two lines, extended from the bearing angles for reference poitns A & B, intersect.

By default, a 2 Point Offset in Zeno Field is bearing–bearing. To activate the distance–distance solution, tap the bearing dropdown and set the location of the offset point. The distance– distance solution requires that you nominate which side of the A–B line the offset point lies. Once activated, the distance fields can be completed. With a rangefinder active, the fields are automatically populated.

Working with traverses

Traverses in Zeno Field enable you to create polylines and polygons using offsets. In Zeno Field, there are two types of traverses: Linear Traverse and Radial Traverse.

Linear Traverse

A linear traverse enables you to capture the vertex of a polyline or polygon from a known point as you walk along a traverse. In other words, you begin at point A, capture point B, move to point B, capture point C, move to point C, and so on. With a linear traverse, you are always using a moving reference point, that is, the last point you captured.

You can capture points in a linear traverse using foresight or backsight. With foresight, you are standing at a known coordinate, such as reference point A, and you are shooting the target, such as the vertex of your feature. With backsight, you are standing at your target, such as the vertex of your feature, and you are shooting back to a known coordinate, such as reference point A. Use the Options page in the Point/Vertex dialog box to set foresight or backsight.

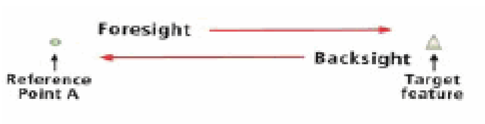


Illustration of foresight and backsight when performing a linear traverse.

Radial Traverse

A radial traverse uses 1 or 2 fixed reference points and creates a traverse relative to those fixed points. In other words, you begin at point A and capture the points around the perimeter of A. You are always standing at the same fixed point while you are capturing multiple vertices. The diagram below shows how a vertex in a line is calculated using a linear traverses versus a radial traverse, using 1 or 2 reference points.

Illustration of linear traverse and radial traverse.

Other options for offsets

When working with offsets you can set other options or parameters on the Options page in the Point/Vertex dialog box or in the GPS Preferences. These parameters are typically considered constants versus the parameters that you would set to calculate individual offset such as slope distance, vertical distance, horizontal distance, and inclination.

Constant parameters might be set at the beginning of a data collection task and only changed as needed. The following are set on the Options page of the Point/Vertex dialog box:

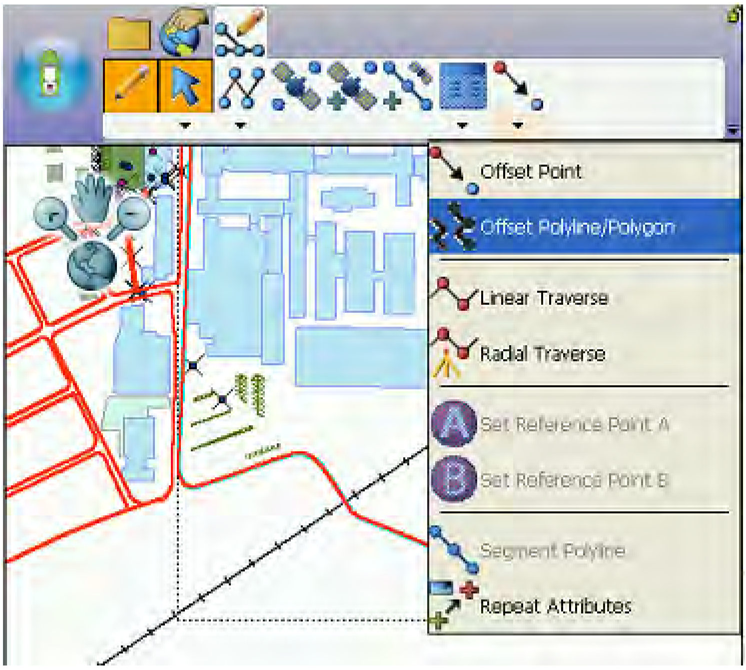
- Foresight: Looking forward to and shooting at your target from a known reference point.
- Backsight: Looking back at and shooting from your target to a known reference point.
- North Reference: Set your bearing to be calculated from True north or Magnetic declination read from a GPS (if available).
- Observer Height: Height of rangefinder in relation to a reference point at ground level.
- Target Height: Height of target above ground. By default, the target height is 0 or unknown. If the target height is known and specified, the resulting coordinate will be the XYZ value of the feature at ground level; the target height is subtracted. If the target height is not known (value of 0), the resulting coordinate will be the XYZ value of the actual target.
- For example, if you are capturing insulators on power poles that always have a fixed height, you have two options. If you do not specify a target height, then the height stored with the feature is the height of the insulators. If you specify the target height, the captured feature (insulators) would have the coordinates of the power pole at ground level.
- In another scenario where you are capturing treetop heights, the target height would be set to 0 since the height of the trees is always changing. The captured heights of the treetops would therefore be the height of the treetops above ground.
- GPS Height: Height of GPS in relation to ground level. The GPS Height is set in the GPS Preferences dialog box.

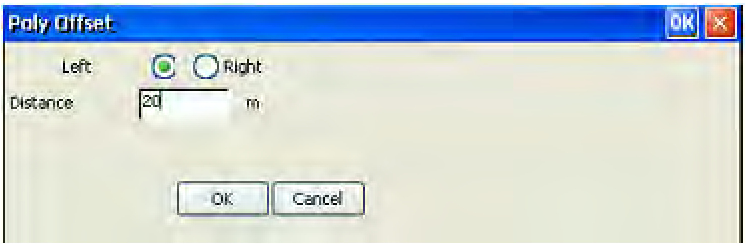
Performing simple offsets

Using simple offsets to create new polyline and polygon features

A simple offset is performed on a polyline or polygon and uses a specified offset distance. The offset distance can be based on an existing feature or other criteria such as distance from a the current GPS position.

Using a simple offset, you could, for example, map a line feature that is a given distance away from an existing line feature. You would then specify whether the new feature is left or right of the captured line.

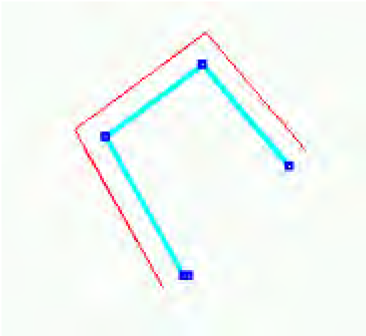
Step	Action
1	Make the target layer editable using the Start/Stop Editing tool.
2	Tap the drop-down arrow to the right of the Offset Point button.
3	Tap Offset Polyline/Polygon. A red box around the Offset Polyline/Polygon button indicates that it is active. The Poly Offset dialog box is displayed. 
4	Tap the left or right checkbox to determine the relative position of the offset.
5	Specify the Distance value.
6	Tap OK.

<table>
<tr><td></td><td>
</td></tr>
<tr><td>7</td><td>Tap the polyline—or polygon—button from the Feature Type drop-down list.</td></tr>
<tr><td>8</td><td>Tap the screen where you want to begin your new feature and continue adding the required vertices.

As you add vertices to your new line or polygon, a red line at the offset distance will be displayed. This is where your new feature will be created.</td></tr>
<tr><td>9</td><td>Tap Proceed when you are finished capturing your new feature.

The Feature Properties dialog box is displayed.


</td></tr>
<tr><td>10</td><td>Enter the information for the new feature.</td></tr>
<tr><td>11</td><td>Tap OK.</td></tr>
<tr><td>12</td><td>Your new feature is drawn at the specified distance of 20m from the existing polygon</td></tr>
</table>

	feature. 

☞ **Using the snapping environment with offsets:** You can set the snapping options so that your reference line, or capture line, snaps to an existing feature.

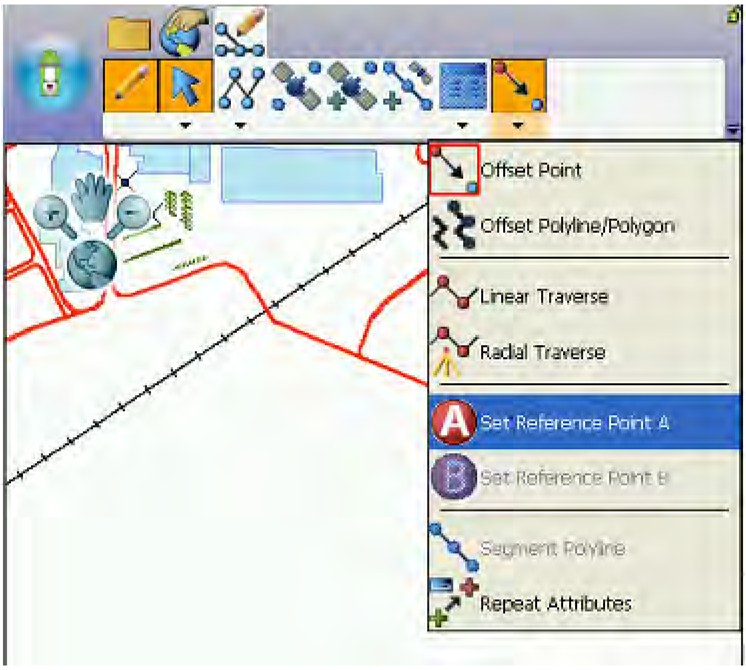
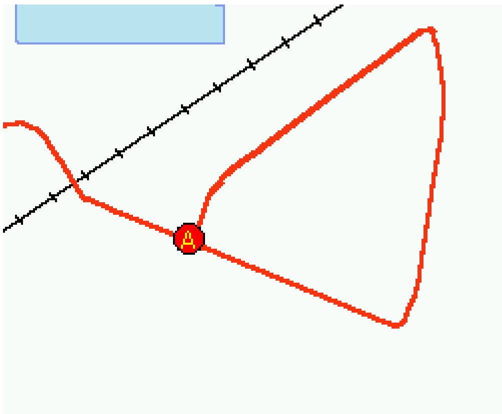
Using a 1 point offset

Overview of 1 point offset

A 1 point offset enables you to create a point or vertex offset from a single reference point. The reference point can be set using a pen, GPS, or manually entered coordinates. A 1 point offset uses bearing and two other parameters such as slope distance, horizontal distance, vertical distance, or inclination to calculate the offset.

Using the snapping environment with reference points: Use snapping to create your reference point at the location of an existing point feature or vertex of a line or polygon feature.

Creating a new point feature using a 1 point offset

Step	Action
1	Make the point layer editable using the Start/Stop Editing tool.
2	Tap the drop-down arrow next to the Offset Point button to display the drop-down list. By default, the Offset Point button is displayed on the Edit toolbar.
3	Tap the Offset Point button. 
4	Tap Set Reference Point A. A red box around the Offset Point and Set Reference Point A buttons indicates that they are active.
5	Tap the screen to set reference point A. 

	Using a GPS to set the reference points: Zeno Field will automatically use the current GPS position for the reference point if data is received from a rangefinder and there is no current reference point defined, and either Offset Point, Linear Traverse, or Radial Traverse are enabled.
6	Tap the Point feature button.
7	If you have a rangefinder activated, shoot your target or simply tap the screen at the location of your feature. The Point/Vertex dialog box opens on the Offset page.
8	Verify that the information in the fields is accurate.
9	Tap OK The Feature Properties dialog box is displayed with an edit form, if it exists. Enter the information for the new feature.
10	Tap OK. Your new feature is created.

Using a 2 point offset

Overview of using a 2 point offset

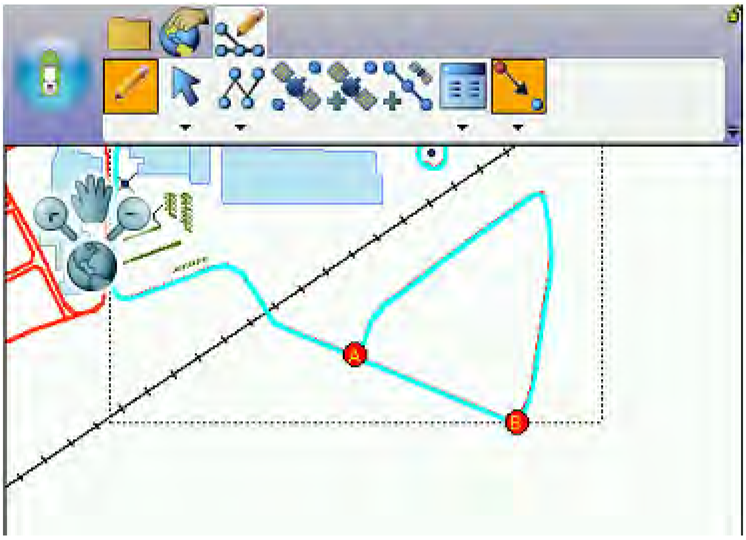
A 2 point offset enables you to create a point based on two reference points (A & B). The reference points can be set using a pen, GPS, or manually entered coordinates. There are two variations available in Zeno Field for the 2 point offset: distance– distance and bearing–bearing.

A distance–distance offset is used when the bearings are not known from the reference points but the distances are. For example, when you are using a rangefinder without a compass.

A bearing–bearing offset is used when two bearings are known for the reference points but the distances are not. For example, when you are using a compass without a rangefinder.

Creating a new point feature using a 2 point offset

A 2 point offset enables you to create a point based on two reference points (A & B). The reference points can be set using a pen, GPS, or manually entered coordinates. There are two variations available in Zeno Field for the 2 point offset: distance– distance and bearing–bearing.

Step	Action
1	Make the point layer editable using the Start/Stop Editing tool.
2	Tap the Offset Point button. The Offset Point button is depressed on the Edit toolbar and a red box is placed around the Offset Point button in the drop-down list to indicate that it is active.
3	Tap the drop-down arrow next to the Offset Point button and tap Set Reference Point A.
4	Tap the screen to set reference point A.
5	Tap the drop-down arrow next to the Offset Point button and tap Set Reference Point B.
6	Tap the screen to set reference point B. 
	Using a GPS to set the reference points: Zeno Field will automatically use the current GPS position for the reference point if data is received from a rangefinder and there is no current reference point defined, and either Offset Point, Linear Traverse, or Radial Traverse are enabled.
7	If you have a rangefinder activated, shoot your target from each reference point or simply tap the screen at the location of your feature. The Point/Vertex dialog box opens on the 2 Point Offset page.

8	Refer to section, Using your rangefinder for information on how to use your rangefinder with Zeno Field. Make any necessary changes to the information that is displayed. If you are using a rangefinder without a compass, you will need to specify whether the point you are capturing is to the left or to the right of an imaginary line between reference points A and B. You will also need to shoot a measurement twice, once for each distance from each reference point. If you are only using a compass, you will be using two bearing measurements to calculate the offset.
9	Tap OK. The Feature Properties dialog box is displayed with an edit form, if it exists. Enter the information for the new feature.
10	Tap OK.
11	Your new feature is created.

Overview of linear traverse

A linear traverse enables you to capture the vertex of a polyline or polygon from a known point as you walk along a line. In other words, you begin at point A, capture point B, move to point B, capture point C, move to point C, and so on.

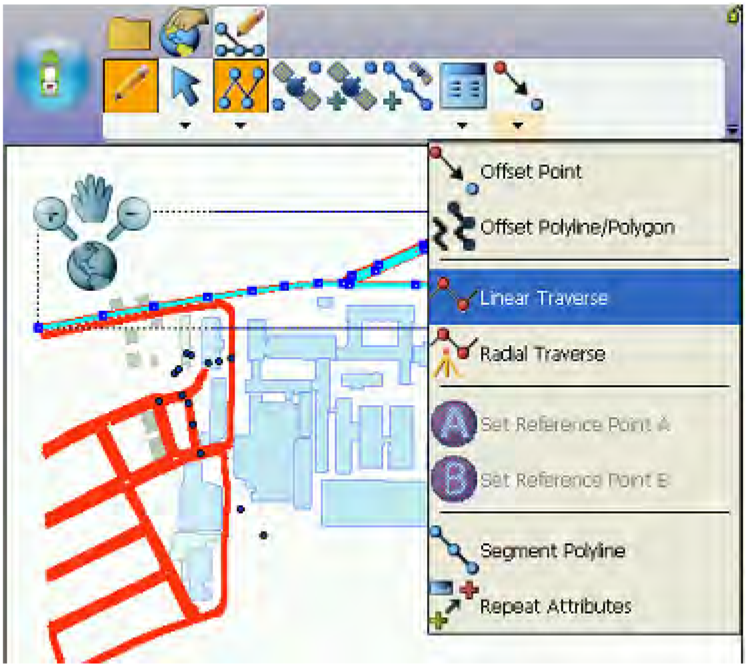
You can capture points in a linear traverse using foresight or backsight:

- Foresight: Looking forward to and shooting at your target from a known reference point.
- Backsight: Looking back at and shooting from your target to a known reference point.

Enabling the traverse tools: The Linear and Radial Traverse tools will only be enabled if a polyline or polygon layer is set as editable.

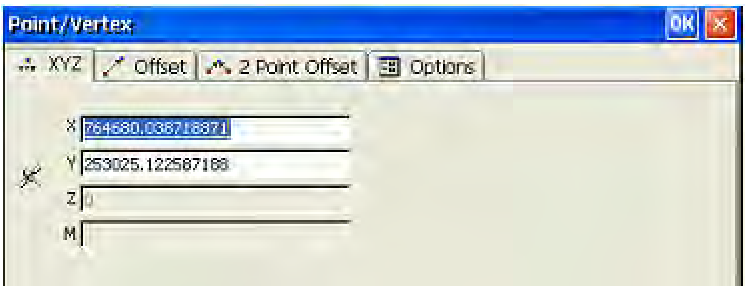
Steps to create a linear traverse

<table>
<tr><th>Step</th><th>Action</th></tr>
<tr><td>1</td><td>Make the polyline or polygon layer editable using the Start/ Stop Editing tool.</td></tr>
<tr><td>2</td><td>Tap the drop-down arrow next to the Offset Point button.</td></tr>
<tr><td>3</td><td>Tap Linear Traverse.



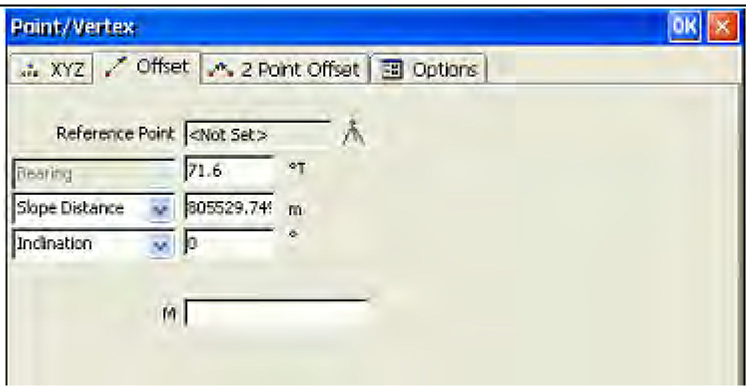
</td></tr>
<tr><td>4</td><td>Tap the drop-down arrow next to the Point button.</td></tr>
<tr><td>5</td><td>Tap the Polyline—or polygon—feature type.</td></tr>
<tr><td>6</td><td>Tap the screen to capture the first vertex of the line—or polygon.</td></tr>
<tr><td>7</td><td>The XYZ page of the Point/ Vertex dialog box is displayed.

If you have a GPS activated, tap the GPS button to capture the incoming coordinates.



</td></tr>
<tr><td>8</td><td>Tap OK.</td></tr>
<tr><td></td><td>Undoing or cancelling your edits: Use the Undo tool to go back a step to the</td></tr>
</table>

<table>
<tr><td></td><td>previously captured vertex or use the Cancel Edits tool to erase all edits. These tools are only enabled prior to tapping the Proceed button. Once you tap the Proceed button and tap ok on the Feature Properties dialog box, your edits cannot be undone.</td></tr>
<tr><td>9</td><td>With a rangefinder, shoot the next feature from the location of the first feature (foresight). Alternatively, shoot back to the first vertex (target) from the location of the second vertex (backsight). Simply tap the screen if you do not have a rangefinder connected.

The Point/Vertex dialog box is displayed on the Offset page.</td></tr>
<tr><td></td><td>Foresight versus backsight: You can use foresight or backsight to capture vertices in your traverse. Set foresight or backsight on the Options page of the Point/ Vertex dialog box.</td></tr>
<tr><td>10</td><td>

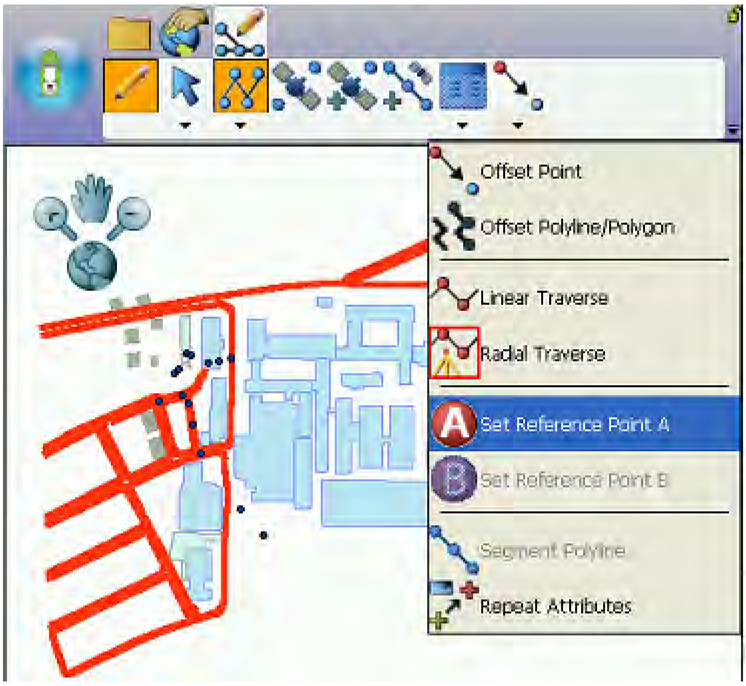
Tap OK.</td></tr>
<tr><td>11</td><td>Continue adding vertices until your line or polygon is finished.</td></tr>
<tr><td></td><td>Using the measure tool with offsets: You can use the measure tool in ‘traverse’ mode to perform an accurate measure in the field without capturing a feature. To do so, simply activate the Linear Traverse tool before enabling the Measure tool.</td></tr>
<tr><td></td><td>Refer to section, Using your rangefinder for information on how to use your rangefinder with Zeno Field.</td></tr>
<tr><td>12</td><td>Tap Proceed when you are finished creating your line or polygon.

The Feature Properties dialog box is displayed with an edit form, if it exists. Enter</td></tr>
</table>

	the information for the new feature.
13	Tap OK.
14	Your new feature is created.
☞	Undoing or canceling your edits: Use the Undo tool to go back a step to the previously captured vertex or use the Cancel Edits tool to erase all edits. These tools are only enabled prior to tapping the Proceed button. Once you tap the Proceed button and tap ok on the Feature Properties dialog box, your edits cannot be undone.

Creating a radial traverse

A radial traverse uses 1 fixed reference point to create a traverse relative to that fixed point. In other words, you begin at point A and capture the points around the perimeter of A. You are always standing at the same fixed point but you are capturing multiple vertices.

Step	Action
1	Make the polyline or polygon layer editable using the Start/ Stop Editing tool.
2	Tap the drop-down arrow next to the Offset Point button.
3	Tap Radial Traverse.
4	Tap the drop-down arrow next to the Offset Point button.
5	Tap Set Reference Point A. 
6	Tap the screen to set the reference point.
	Enabling the traverse tools: The Linear and Radial Traverse tools will only be enabled if a polyline or polygon layer is set as editable.
	Using a GPS to set the reference points: Zeno Field will automatically use the current GPS position for the reference point if data is received from a rangefinder and there is no current reference point defined, and either Offset Point, Linear Traverse, or Radial Traverse are enabled.
7	Tap the drop-down arrow next to the Point button and select the Polygon -or Polyline -feature type.

8	With a rangefinder, shoot the target (first vertex) from Reference Point A. The Point/Vertex dialog box is displayed on the Offset page.
9	Continue shooting your vertices from Reference A.
10	Tap Proceed when you are finished creating your line or polygon. The Feature Properties dialog box is displayed with an edit form, if it exists. Enter the information for the new feature.
11	Tap OK.
12	Your new feature is created. 
☞	**Undoing or cancelling your edits:** Use the Undo tool to go back a step to the previously captured vertex or use the Cancel Edits tool to erase all edits. These tools are only enabled prior to tapping the Proceed button. Once you tap the Proceed button and tap ok on the Feature Properties dialog box, your edits cannot be undone.

Creating new features with a GPS and rangefinder

Creating new features with a GPS and rangefinder

It's easy to create new features using the editing tools in Zeno Field. First, select the layers for which you want to create the new features. Then select the appropriate tool and use the mouse pointer, pen, or incoming GPS coordinates to digitize the feature.

You can use the editing tools to create new point, line, or polygon features. To create point features, tap once on the map or tap the GPS Point button. To create line or polygon features, use the mouse pointer, pen, or incoming GPS coordinates to digitize the vertices that make up that feature. The new feature is saved in the selected layer of the same feature type.

You can specify various quality and capture options when using the incoming GPS coordinates. You can also set alert messages and sounds to be activated when a specific GPS quality setting is not met. In addition, you can use offsets and a rangefinder to determine the location of your point feature.

GPS Quality, Capture and Alerts options

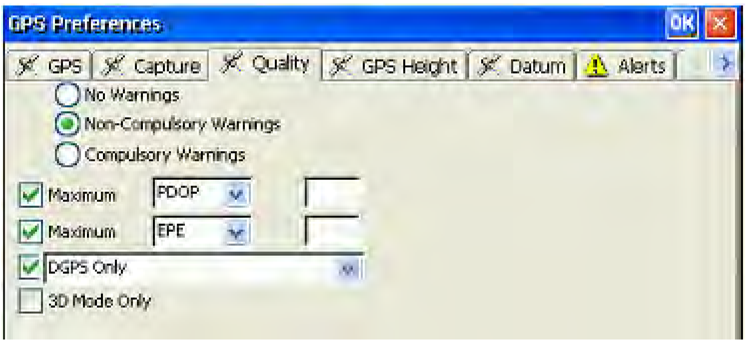
Zeno Field includes a number of user-specified options that can be used to control which of the incoming GPS coordinates are used for creating and editing features. You can use these options to ensure that Zeno Field only uses those GPS coordinates that meet your accuracy requirements for data capture. Zeno Field uses the specified options to filter the incoming GPS coordinates and ignores those coordinates that do not meet the requirements. The specified options have no influence on how the GPS receiver actually computes the position coordinates, nor do they affect the way Zeno Field displays the GPS position or coordinates, in the GPS Position Window, for example.

The GPS Quality, Capture, and Alerts options can be specified in the respective pages in the GPS Preferences dialog box.

Quality options

The Quality options allow you to specify the following parameters:

- Maximum Position Dilution of Precision (PDOP) and Estimated Position Error (EPE) values for the GPS position coordinates.
- Suitable maximum values will depend on the environment in which you are using the GPS receiver. For example, a PDOP of 5 could be appropriate when working in an open field but may be too low when working in an urban environment. It is best to refer to your GPS receiver's manual for an appropriate maximum PDOP or EPE value. In general, a maximum PDOP value of 6 is acceptable.
- DGPS Mode Only: only uses incoming GPS coordinates that have been real-time differentially corrected.
- 3D Mode Only: at least four satellites are available and are used by the GPS receiver to calculate the x,y, and z position coordinates.



More than one quality parameter can be active at any time. A quality parameter is active when the parameter's check box is checked and either Non-Compulsory or Compulsory Warnings have been selected.

The GPS Quality options are enabled, or disabled, by selecting one of three different warning levels:

- No Warnings (default) disables any selected Quality parameters. Zeno Field ignores the Quality parameters and uses any incoming GPS coordinate for creating and editing features.
- Non-Compulsory Warnings display a message box when an active Quality parameter has not been met and give you the option of whether or not to use the substandard GPS coordinate.
- Compulsory Warnings display a message box when an active Quality parameter has not been met. No option is provided to use the substandard GPS coordinate, thereby enforcing the specified GPS Quality setting.

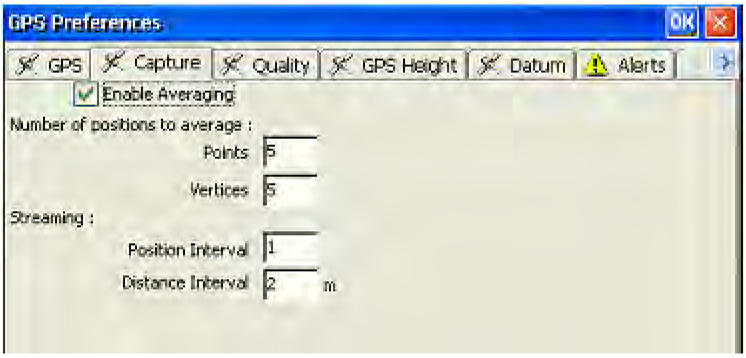
The Non-Compulsory and Compulsory Warnings message boxes are only displayed when Zeno Field is in the process of using the incoming GPS coordinates for creating or editing a point or vertex. However, the corresponding alerts for each of the four Quality parameters can be activated at any time if the Non-Compulsory or Compulsory Warnings have been selected.

Capture options

The Capture options allow you to specify position averaging and streaming interval parameters.

The averaging parameters specify the number of incoming GPS position coordinates that Zeno Field should use for calculating an average coordinate. The resultant average coordinate is then used by Zeno Field for creating the point or vertex. The number of positions to average can be specified for points and vertices. Averaging is enabled when the Enable Averaging check box is checked.

It is best that you refer to your GPS receiver's manual for an appropriate number of GPS positions to average; however, it is recommended that you average at least 20 GPS positions and preferably up to 180 positions.

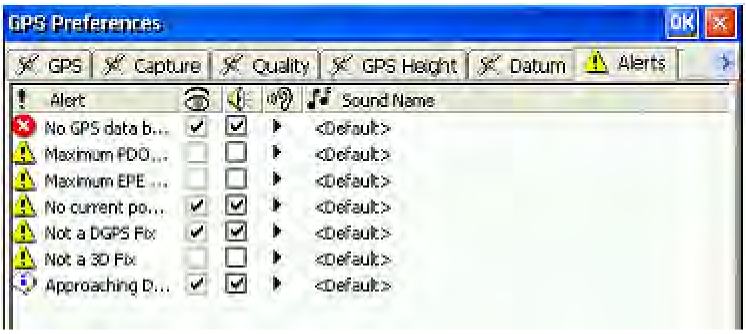


The Streaming Vertices Interval parameters allow you to specify how frequently Zeno Field should use the incoming GPS coordinates when creating vertices with the Add GPS Vertices Continuously tool. For example, a Position Interval of 2 means that Zeno Field will use every second-incoming GPS coordinate when creating vertices. The default Position Interval is 1. A Distance Interval of 2 means that Zeno Field will only use the incoming GPS coordinate when the distance from the last coordinate is 2 meters or more.

A dialog box is automatically displayed each time Zeno Field averages GPS coordinates. The dialog box shows a progress bar, which counts down from the specified number of GPS positions to average to zero. For example, the following dialog box is displayed while averaging to create a vertex:

Alerts options

The Alerts options allow you to specify which message boxes are displayed and which sounds are played when an alert condition is encountered by Zeno Field.



You can enable the following alerts:

- No GPS data being received: This alert is activated when the GPS has been activated but Zeno Field is not receiving any messages from the GPS receiver.
- Maximum PDOP exceeded: This alert is activated when the specified maximum PDOP has been exceeded and the Non-Compulsory or Compulsory Warnings have

been selected. The maximum PDOP and warnings are specified in the Quality options.

- Maximum EPE exceeded: This alert is activated when the specified maximum EPE has been exceeded and the Non-Compulsory or Compulsory Warnings have been selected. The maximum EPE and warnings are specified in the Quality options.
- No current position fix: This alert is activated when the GPS is not able to calculate a position fix, and therefore Zeno Field is not currently receiving position coordinates from the GPS. The GPS may not be able to calculate a position fix if, for example, the number of visible satellites is less than 3.
- No DGPS fix: This alert is activated when the incoming GPS position coordinates are not differentially corrected and the DGPS Mode Only and the Non-Compulsory or Compulsory Warnings have been selected. These warnings are specified in the Quality options.
- Not a 3D fix: This alert is activated when the incoming GPS position coordinates are x,y coordinates—with no z coordinate—and the 3D Mode Only and the Non-Compulsory or Compulsory Warnings have been selected. These warnings are specified in the Quality options.
- Approaching Destination: This alert is activated when the distance from the current GPS position to the selected navigation destination is less than the specified DST Distance Alert. The DST Distance Alert is specified in the Location options.

The alert message boxes are enabled by checking the alert's visible check box. The sounds are enabled by checking the alert's sound check box. You can enable the message box or sound or both for any number of alerts. The Play button plays the sound for the associated alert. You can change the sound for any alert by tapping on the alert's Sound Name column and selecting a Wave Sound (*.wav) file located on your computer.

Creating point features with a GPS

Overview of creating point features

Creating a point feature using the incoming GPS coordinates involves the following steps:

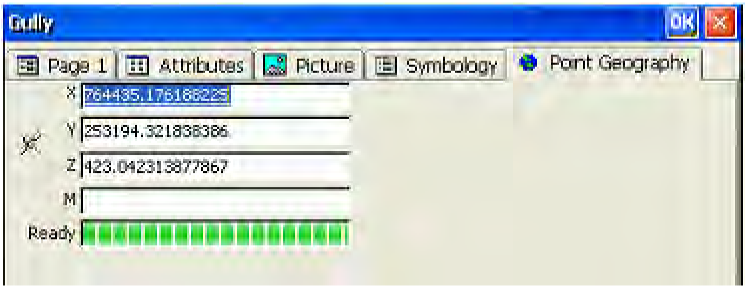
- Select a point layer for editing via the Start/Stop Editing tool or the Table of Contents.
- Activate the GPS.
- Tap the GPS Point button on the Edit toolbar to create a point feature.
- Type in attributes for the new point feature.

Enabling GPS position averaging for points: GPS position averaging for points is enabled in the Capture page of the GPS Preferences dialog box. You can also specify the number of GPS positions for Zeno Field to average.

Typing in attributes during position averaging: You can type in attributes (in the Attributes page or a custom edit form) without waiting for the position averaging to be completed. This is particularly useful if you have specified a large number of GPS positions to average. Zeno Field will stop averaging after the required number of GPS positions has been received and averaged. Averaging will stop once you have tapped the ok button.

Note: Refer to section, Connecting your GPS receiver, for help on activating the GPS.

Steps to create point features with a GPS

Step	Action
1	Tap the GPS Point button to capture a new point feature at the current GPS position.  The Feature Properties dialog box or custom edit form is automatically displayed after the new point feature has been created.
2	The Geography page shows a progress bar, which counts down from the specified number of GPS positions to average to zero.
3	Scroll and tap Attributes to display the Attributes page. Type the attributes for the new point feature. 
4	Tap OK to save the attributes, close the edit form—or the Feature Properties dialog box—and complete the new point feature. If you tap OK before the averaging is complete, a dialog box will display asking whether you want to terminate the GPS position averaging. You can also tap the X button if you want to cancel the capture of the new point feature. The point feature and any attributes that have been typed in will be deleted.

Creating line features with a GPS

Overview of creating line features with a GPS

Creating a line feature using the incoming GPS coordinates involves the following steps:

Step	Action
1	Select a line layer for editing via the Start/Stop Editing tool or the Table of Contents.
2	Activate the GPS.
3	Tap the Polyline button to start capturing a line feature.
4	Tap the Add GPS Vertex button to capture a single vertex, or tap the Add GPS Vertices Continuously button to capture streaming vertices.
5	Tap the Proceed button on the Command bar to complete the capture of the line feature.
6	Type in attributes for the new line feature.

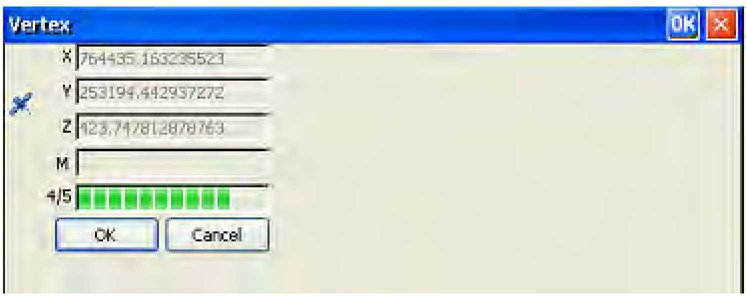
Enabling GPS position averaging for vertices: GPS position averaging for vertices is enabled in the Capture page of the GPS Preferences dialog box. You can also specify the number of GPS positions for Zeno Field to average.

Changing the streaming vertices position and distance intervals: By default, the Add GPS Vertices Continuously mode captures a vertex each time Zeno Field receives a coordinate from the GPS. This may be too frequent and result in the capture of unnecessary vertices. You can increase the streaming vertices position and distance intervals in the Capture page of the GPS Preferences dialog box.

Creating GPS point features while capturing a polyline feature: The GPS Point button will be enabled—if a point layer is active for editing—even while the Polyline button is active and a line feature is in the process of being captured. While capturing a polyline, you can tap the GPS Point button to capture a point feature without having to first end the capture of the line feature. You will need to pause streaming GPS data capture if it is active.

☞ **Pausing streaming GPS data capture:** Zeno Field continuously captures vertices in a streaming mode when the Add GPS Vertices Continuously tool is active. Tap the Add GPS Vertices Continuously button to pause or stop capturing vertices. Tap the button again to resume capturing vertices.

Steps to create line features with a GPS

Step	Action
1	Tap the arrow below the Feature tool to display the drop-down list. Tap the Polyline feature tool. The Add GPS Vertex and Add GPS Vertices Continuously buttons are enabled if the GPS is activated. 
2	Tap the Add GPS Vertex button each time you want to use the current GPS position coordinates to capture a vertex. The vertices are drawn with a blue box and joined with a line using the current selection color. At any time, tap and hold anywhere on the map to display the Capture menu. Refer to the Creating line features task for more information on the Capture menu. Use the Capture menu to create vertices at specified x,y coordinates or relative to the last vertex or the current GPS position. You can also delete the last vertex.
3	The Point/Vertex dialog box is automatically displayed if GPS position averaging is enabled for vertices.  The Point/Vertex dialog box shows a progress bar, which counts down from the specified number of GPS positions to average until it reaches zero. If you tap OK before the averaging is complete, a dialog box will display asking whether you want to terminate the GPS position averaging. Tap the X button to cancel the capture of the vertex.

4	Tap the Add GPS Vertices Continuously button to use the incoming GPS coordinates for capturing vertices in a streaming mode. A vertex will be captured each time Zeno Field receives a coordinate from the GPS. Vertices are captured according to the specified streaming vertices position and distance intervals. 
5	Tap the Proceed button  to complete the new line feature. The Feature Properties dialog box, or custom edit form, is automatically displayed after the new line feature has been created.
6	On the Attributes tab, tap the Value field to open the associated Value text box for typing in attribute data. For example, tap on the Value field for STREET_NAM to open the associated Value text box and type the street name value of "New".
7	Tap OK.

Creating polygon features with a GPS

Overview of creating polygon features with a GPS

Creating a polygon feature using the incoming GPS coordinates involves the following steps:

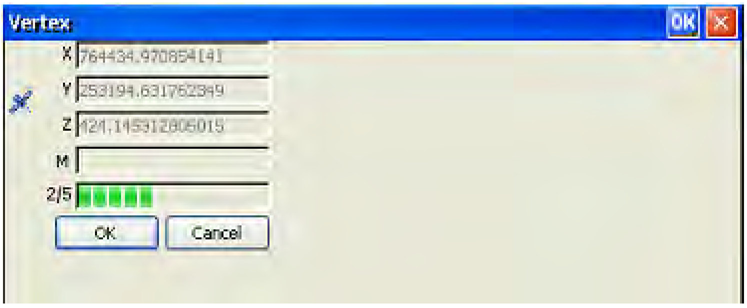
Step	Action
1	Select a polygon layer for editing via the Start/Stop Editing tool or the Table of Contents.
2	Activate the GPS.
3	Tap the Polygon button to start capturing a polygon feature.
4	Tap the Add GPS Vertex button to capture a single vertex or tap the Add GPS Vertices Continuously button to capture streaming vertices.
5	Tap the Proceed button to complete the capture of the polygon feature.
6	Type in attributes for the new polygon feature.

Enabling GPS position averaging for vertices: GPS position averaging for vertices is enabled in the Capture page of the GPS Preferences dialog box. You can also specify the number of GPS positions for Zeno Field to average.

Undoing or canceling your edits: Use the Undo tool to go back a step to the previously captured vertex or use the Cancel Edits tool to erase all edits. These tools are only enabled prior to tapping the Proceed button. Once you tap the Proceed button and tap ok on the Feature Properties dialog box, your edits cannot be undone.

Steps to create polygon features with a GPS

Step	Action
1	Tap the arrow below the feature tool to display the drop-down list. Tap the Polygon feature tool. The Add GPS Vertex and Add GPS Vertices Continuously buttons are enabled if the GPS is activated. 
2	Tap the Add GPS Vertex button each time you want to use the current GPS position coordinates to capture a vertex. The vertices are drawn with a blue box and joined with a line. At any time, you can tap and hold anywhere on the map to display the Capture menu. Refer to the Creating line features task for more information on the Capture menu. Use the Capture menu to create vertices at specified x,y coordinates or relative to the last vertex or the current GPS position. You can also delete the last vertex.

3	The Vertex dialog box is automatically displayed if GPS position averaging is enabled for vertices.  The Vertex dialog box shows a progress bar, which counts down from the specified number of GPS positions to average until it reaches zero. Tapping OK before the averaging is complete will display a dialog box asking whether you want to terminate the GPS position averaging. Tap the X button to cancel the capture of the vertex.
4	Tap the Add GPS Vertices Continuously button to use the incoming GPS coordinates for capturing vertices in a streaming mode. A vertex will be captured each time Zeno Field receives a coordinate from the GPS, based on the specified streaming vertices position and streaming intervals. 
5	Tap the Proceed button to complete the capture of the new polygon feature. Zeno Field will automatically close the polygon by adding a final vertex with the same coordinates as the first vertex. The Feature Properties dialog box, or custom edit form, is automatically displayed after the new polygon feature has been created.
6	On the Attributes tab, tap the Value field to open the associated Value text box for typing in attribute data.
7	Tap OK.

Creating a point feature using a 1 point offsett and a rangefinder

Overview of 1 point offset and a rangefinder

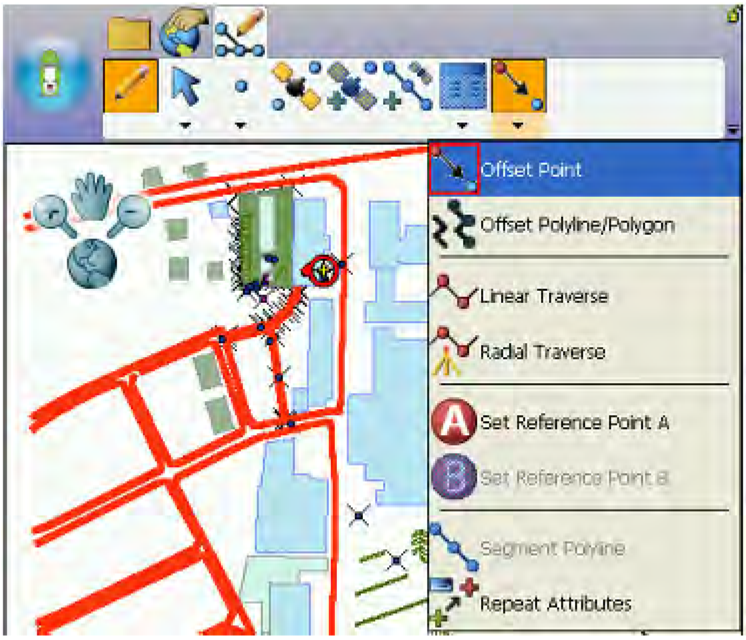
Creating a point feature using offsets and a rangefinder involves the following steps:

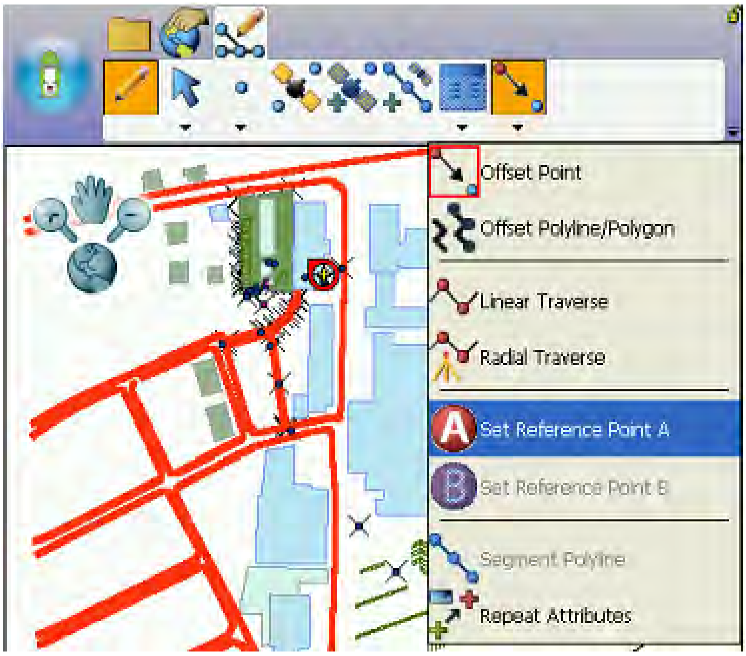
Step	Action
1	Select a point layer for editing via the Start/Stop Editing tool or the Table of Contents.
2	Activate the rangefinder.
3	Tap the Offset Point button.
4	Set Reference Point A.
5	Tap the Point feature button.
6	Shoot the target from Reference Point A using a rangefinder.
7	Type in attributes for the new point feature.

Refer to the topic Activating your rangefinder for help on activating the rangefinder.

Refer to the topic Working with Offsets for help using offsets.

Steps to create point feature using a 1 point offset and a rangefinder

Step	Action
1	Make the point layer editable using the Start/Stop Editing tool.
2	Tap the drop-down arrow below the Offset Point button to display the drop-down list. By default, the Offset Point button is displayed on the Edit toolbar. 
3	Tap the Offset Point button.
4	Tap Set Reference Point A. A red box around the Offset Point and Set Reference Point A buttons indicates that they are active.

	
5	Tap the screen to set reference point A. To use a GPS to set the reference point, refer to the following Tip.
☞	Using a GPS to set the reference points: If you have a GPS activated, you can set the reference point using the incoming GPS coordinates. Tap the Survey button to display the Vertex dialog box. Tap the GPS button on the Vertex dialog box to capture the incoming GPS coordinates as your reference point.
6	With your rangefinder activated, shoot your target The Point/Vertex dialog box opens on the Offset page with the bearing and slope distance information displayed from the rangefinder.
7	Tap OK. The Feature Properties dialog box is displayed with an edit form, if it exists. Enter the information for the new feature.
8	Tap OK. Your new feature is created.
☞	Using the snapping options to set the reference point at an existing feature: You can set the reference point to be at the location of an existing point or vertex by selecting snap to vertex or point for that layer on the Snapping page in the Table of Contents.

Editing existing features

Editing existing features: Overview

This section shows you how to modify features that already exist in your vector data—shapefiles, Zeno Field AXF files, or graphics layers. The editing tools, commands, and tasks provide a variety of ways to make changes to the geometry and attributes of existing features. For example, you can extend a line by adding vertices to the start or end of the line. You can also reshape line and polygon features by adding, moving, or deleting vertices. Editing of existing features is done using the mouse pointer, pen, incoming GPS coordinates, or offsets. Attributes of existing or new features can be edited via the

Attributes page of the Feature Properties dialog box, or via custom forms. Attributes in related tables can also be edited for Zeno Field AXF files which have relationships defined.

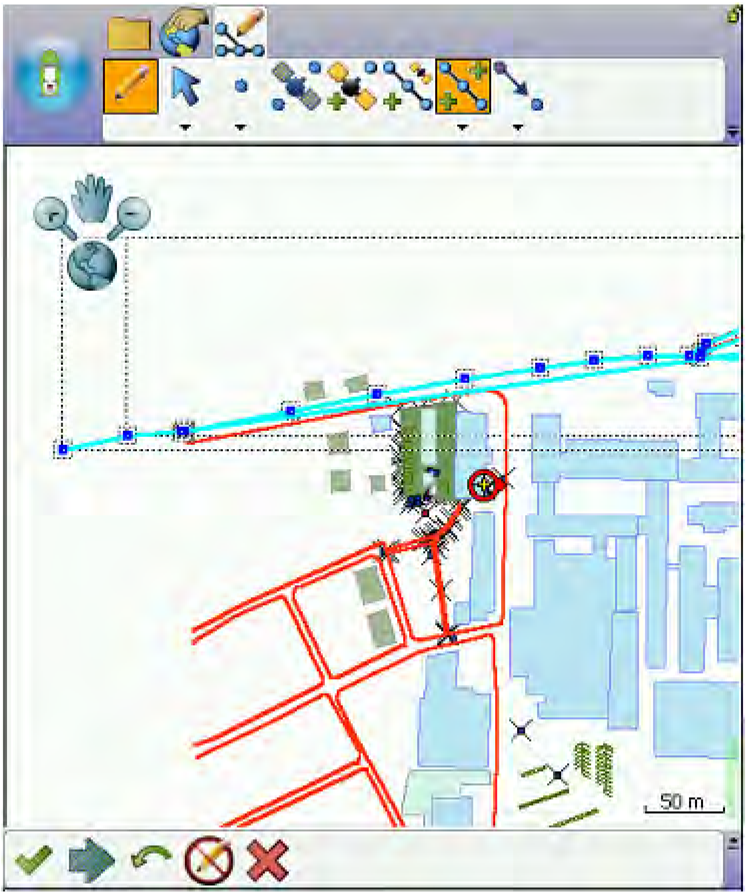
Extending a line

You can extend a line feature by adding, or appending, vertices to the tail (end) of the line. The Append Vertices tool is selected via the Feature Properties drop-down list.

In order to extend a line feature at the head (start) of a line, you can use the Insert Vertices tool. Refer to the next exercise to learn how to use the Insert Vertices tool.

Vertices can be added by using the pen, incoming GPS coordinates, offsets, or by typing in coordinates.

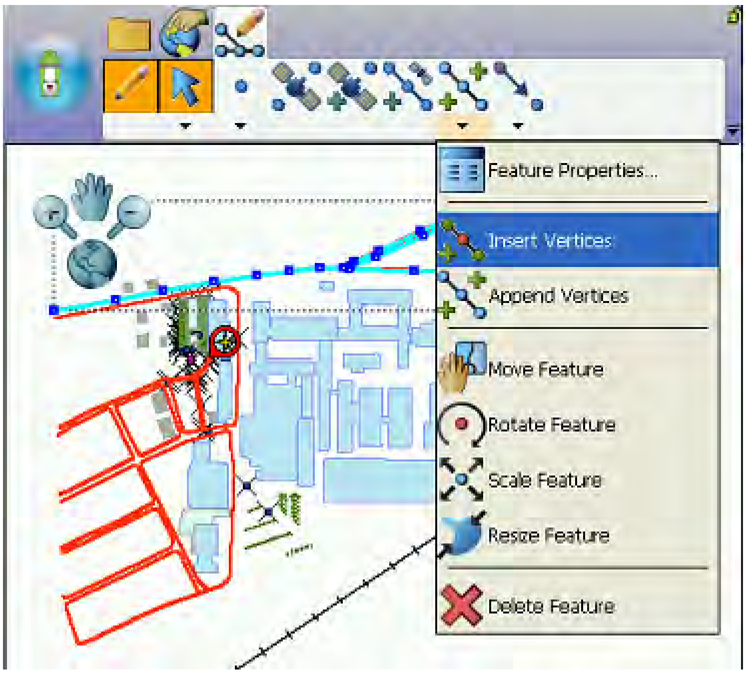
Step	Action
1	Select a line layer for editing using the Start/Stop Editing drop-down list or via the Table of Contents.
2	Tap the Select tool.
3	Select the the line feature you wish to extend.
4	Tap the drop-down arrow next to the Feature Properties button to display the dropdown list.
5	Tap Append Vertices.  The vertices will be displayed using a gray square. The head, or start, vertex is displayed with a bold square. All other vertices are displayed with normal squares.
	Changing the size of the vertex symbols: Vertices are displayed using a square symbol. You can change the size of the square by changing the Pen Tolerance in the Display page of the Options dialog box.

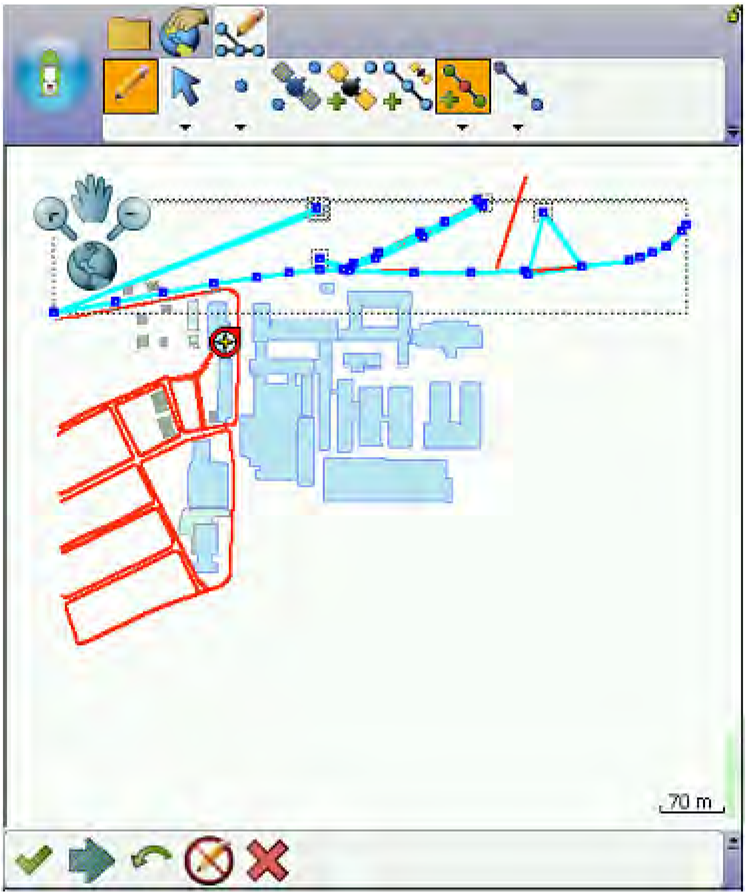
☞	**Note: Selecting features for editing is discussed in section, Editing basics**
6	Tap the map to add vertices and extend the line.  You can only append vertices to the end or tail of the line.
☞	**Adding vertices with a GPS:** You can also use the Add GPS Vertex and Add GPS Vertices Continuously buttons to add vertices. These buttons are only enabled if you have a GPS receiver connected and activated.
7	Tap the Commit Geometry Changes button on the Command bar when you are finished extending the line. The new vertices are added to your line feature.
8	To exit the append vertices mode, tap any other tool to activate it and deactivate the Append Vertices tool.

Inserting and deleting vertices

Inserting a vertex

You can easily add (insert) vertices to or delete vertices from a selected line or polygon feature using the Insert Vertex and Delete Vertex commands. By adding or deleting vertices, you can reshape a feature when changes in your geographic data are necessary.

Step	Action
1	Select a line or polygon layer for editing using the Start/ Stop Editing drop-down list or via the Table of Contents.
2	Tap the Select tool.
3	Select the line—or polygon— feature.
4	Tap the drop-down arrow next to the Feature Properties button to display the dropdown list.
5	Tap Insert Vertices.  The vertices will be displayed using a gray square.
6	Tap on the map at the exact location where you want the vertex, or vertices, inserted.

	 Vertices are added to the line—or polygon—and the feature is reshaped.
☞	**Adding vertices with a GPS:** You can also use the Add GPS Vertex and Add GPS Vertices Continuously buttons to add vertices. These buttons are only enabled if you have a GPS receiver connected and activated.
7	Tap the Commit Geometry Changes button on the Command bar when you are finished adding vertices. The new vertices are added to your line—or polygon— feature.
8	To exit the insert vertices mode, tap any other tool to activate it and deactivate the Insert Vertices tool.
☞	**Inserting vertices using the snapping environment:** You can turn snapping on in the Table of Contents so that new vertices are inserted at the edge, end, or vertex of an existing feature.
☞	**Undoing or canceling your edits:** Use the Undo tool to go back a step to the previously captured vertex or use the Cancel Edits tool to erase all edits. These tools are only enabled prior to tapping the Proceed button. Once you tap the Proceed button and tap ok on the Feature Properties dialog box, your edits cannot be undone.

Deleting a vertex

Step	Action
1	Tap the Select & Vertex Editing button.
2	Select the line—or polygon— feature.
3	Tap and hold within the blue vertex square that you want to delete to display the Move To menu.
4	Tap Delete Vertex. Repeat Steps 3 and 4 for each vertex you would like to delete.
5	Tap the Commit Geometry Changes button on the Command bar when you are finished. The vertices are deleted from the line—or polygon—and the feature is reshaped.

☞ **Undoing or canceling your edits:** Use the Undo tool to go back a step to the previously captured vertex or use the Cancel Edits tool to erase all edits. These tools are only enabled prior to tapping the Proceed button. Once you tap the Proceed button and tap ok on the Feature Properties dialog box, your edits cannot be undone.

Moving a Vertex

Overview of moving a vertex

Moving a vertex in a line or polygon offers another way to modify or reshape a feature.

Zeno Field lets you move a vertex in several ways: by dragging it, by specifying new x,y coordinates, by moving it to the current GPS position, or by using offsets.

Snapping vertices to existing features: You can turn snapping on in the Table of Contents so that when your vertex is dragged it snaps to the edge, end, or vertex of an existing feature. Note: Moving points is discussed in the section, Moving features.

Dragging a vertex

Step	Action
1	Tap the Select & Vertex Editing button.
2	Select the line—or polygon— feature.
3	Tap and drag the vertex to the desired location.
4	Tap the Commit Geometry Changes button on the Command bar when you are finished. The vertices are moved and the feature is reshaped.

Using the Move To command to move a vertex to a specific x, y coordinate or GPS position

Step	Action
1	Tap the Select & Vertex Editing button.
2	Select the line—or polygon— feature.
3	Tap and hold within the blue vertex square to display the Move To menu.
4	Tap Move To.
5	Type the desired coordinates in the XYZ page of the Point/ Vertex dialog box.
6	Tap OK. Alternatively, tap Move To GPS in step 4 and the vertex will be moved to the current GPS position.
	Moving a vertex to the current GPS position: You can also tap the GPS button, on either the Move To dialog box or the Vertex dialog box, to move the vertex to the current GPS position. (You can open the Vertex dialog box by tapping a coordinate in the Geography page of the Feature Properties dialog box.) These GPS buttons are only enabled if a GPS receiver is connected and activated.
7	Tap the Commit Geometry Changes button on the Command bar. The vertex is moved to the specified coordinates, and the feature is reshaped.

Refer to the topic Connecting your GPS receiver for more information on connecting your GPS receiver.

Moving a vertex using offsets

Overview of moving vertex using offsets

If you are unable to reach the vertex, cannot receive a strong GPS signal, or are using a rangefinder, you can use offsets to move the vertex of a line or polygon.

In order to move a vertex of an existing line or polygon, you must use the Move To menu to open the Point/Vertex dialog box. In the Point/Vertex dialog box, select the Offset page to capture your offset.

Alternatively, you can use the Radial Traverse tool. The Radial Traverse tool requires that you set a reference point, either by tapping the screen or by using a GPS receiver.

Note: For more information about using offsets, refer to the topic, Working with offsets

Using Offsets to move a vertex

Step	Action
1	Tap the Select & Vertex Editing button.
2	Select the polygon—or line— feature.
3	Tap and hold within the blue vertex square to display the Move To menu.
4	Tap Move To. The point/vertex dialog box is displayed.
5	Tap the Offset page.
6	Tap the Tripod button to set the reference point from the incoming GPS coordinates.
7	Capture the bearing, distance, and, optionally, inclination values using your rangefinder.
8	Tap OK on the Point/Vertex dialog box. Your vertex is moved to the new position.

Using Radial Traverse to move a vertex: You can move the selected vertex using Radial Traverse and the 1 or 2 Point Offset capabiltity in the Point/Vertex dialog box. Set one reference point or two reference points before selecting your vertex. Setting two reference points is only required for 2 point offsets such as Distance–Distance or Bearing– Bearing.

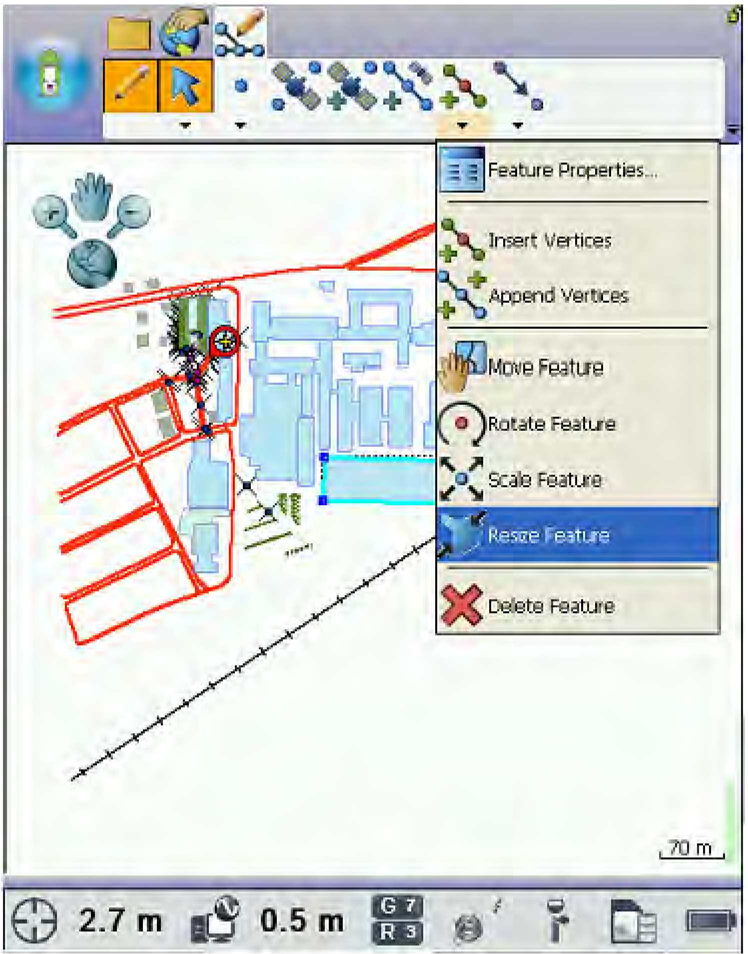
Using the Geography page to move a vertex to a specific x,y coordinate

Step	Action
1	Select the line—or polygon— feature. The Feature Properties button is enabled once a feature is selected.
2	Tap the Feature Properties button—or double-tap the feature—to open the Feature Properties dialog box.
3	Tap the Geography tab to display the Geography page. The Geography page includes a table that lists each vertex and its x, y, and z coordinates. Vertex number 0 is the head. The last vertex in the table is the tail.
	Displaying the Geography page: The Geography page can be used to move a vertex to a specific x,y,z coordinate. The layer that you are editing may have an associated custom edit form. If it does, the Feature Properties dialog box will have additional tabs displayed to the left of the Attributes tab and left and right arrow buttons for navigating between the tabs. Tap the right arrow button until the Geography tab is displayed. The Geography tab is always the last tab displayed. The custom edit form may hide the Attributes or Geography pages of the Feature Properties dialog box. If this is the case, then you will need to use the Move To tool to move the vertex.
	Resizing the columns in the Geography page: You can resize the columns in the Geography page by tapping and dragging the vertical column separator.
4	Double-tap the vertex coordinate that you want to change. The Vertex dialog box is displayed.
	Moving a vertex to the current GPS position: You can tap the GPS button on the Vertex dialog box to move the selected vertex to the current GPS position.
5	Tap the GPS button to use the incoming GPS coordinates
6	Tap OK.
7	Tap OK. The vertex is moved to the specified coordinates, and the feature is reshaped.

Changing the size of a feature

Dragging the sizing handles

Zeno Field lets you change the size of a line or polygon feature in several ways: by dragging the sizing handles (resizing); by scaling the feature; by adding, moving, or deleting a vertex; or by appending vertices to the head or tail of a line.

<table>
<tr><th>Step</th><th>Action</th></tr>
<tr><td>1</td><td>Select the line—or polygon— feature.</td></tr>
<tr><td>2</td><td>Tap the drop-down arrow next to the Feature Properties button to display the dropdown list.
</td></tr>
<tr><td>3</td><td>Tap the Resize Feature button.

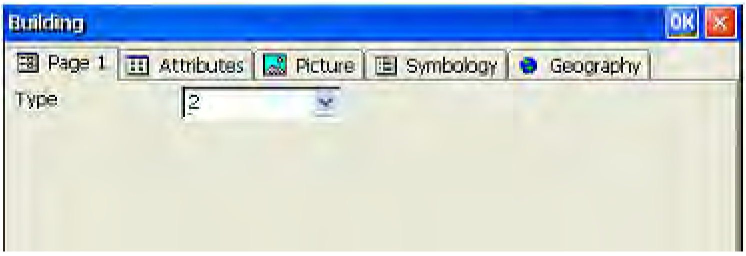
The bounding box for the selected feature is displayed using a dashed line and sizing handles.</td></tr>
</table>

	Scaling your feature: Use the Scale Feature tool on the Feature Properties drop-down list to scale your feature. Scale maintains the proportion of the feature; the size of the feature changes but the shape of the feature does not. Select a feature, activate the Scale Feature button, and tap the screen or tap and slide with the pen to see the size of the feature change. Lift the pen when the desired size is achieved. Tap the Commit Geometry Changes button to accept the change.
	Note: Adding, moving, and deleting vertices, as well as extending a line, are discussed earlier in this section.
4	Tap and drag a sizing handle.  The size of the bounding box is changed, and the feature is reshaped. Dragging a corner sizing handle will stretch, or shrink, a feature's geometry proportionately, thereby maintaining the general shape of the feature.
	Dragging a corner vertex versus dragging a corner sizing handle: Dragging a corner vertex will only move the selected vertex and will change the general shape of the feature. In contrast, dragging a corner sizing handle will stretch or shrink a feature's geometry proportionately, similar to scaling the feature, thereby

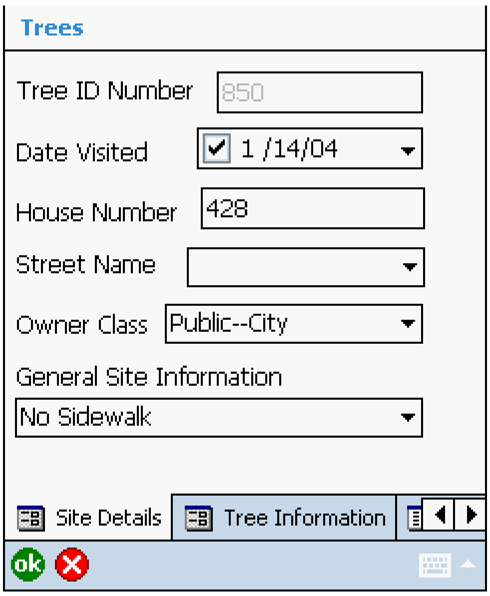
	maintaining the general shape of the feature.
5	Tap the Commit Geometry Changes button to complete the change. You cannot undo the feature changes once you have commited the changes.
☞	Changing the size of the sizing handles: Sizing handles are displayed using a solid black square symbol. You can change the size of the square by changing the Pen Tolerance on the Display page of the Options dialog box.
☞	Moving and rotating features: The Move and Rotate Feature tools are also available in the Feature Properties drop-down list. With your feature selected, use these tools to drag a feature to a new location or to rotate a feature around a point.

Working with attributes

Attributes for features in shapefiles and Zeno Field AXF files are displayed in the Feature Properties dialog box. For new features, the Feature Properties dialog box is automatically displayed once the geometry of the new feature has been captured. For existing features, the Feature Properties dialog box can be displayed by selecting the feature and then either tapping the Feature Properties button on the Edit toolbar, or double-tapping the selected feature.



The Feature Properties dialog box will, by default, contain the Attributes, Picture, Symbology, and Geography pages. However, if a custom edit form exists for the particular layer then this form will be displayed as the first page, or pages, of the Feature Properties dialog box. The custom form designer may choose to hide any of the default pages. The example below shows a custom edit form with two custom pages: Site Details, and Tree Information. The name of the Feature Properties dialog box has also been renamed, to ‘Trees’, by the form designer.



The Attributes page is used to display and edit the attributes and associated values of the selected feature. When accessed via the Identify tool, all values are read only. When accessed via the Feature Properties tool—or by double-tapping a feature with the Select tool—all values are read/write. An attribute that is used to define the symbology of the layer is displayed in red.

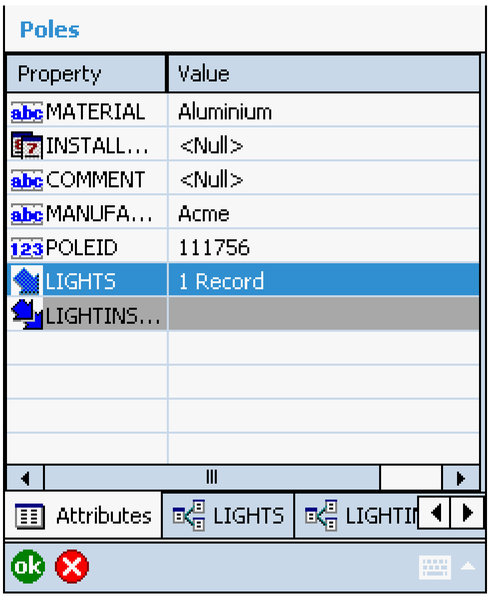
Attributes page for shapefile features

The Attributes page for shapefile features has two columns: Property and Value. The Property column corresponds to the field, or column, in the dBase table associated with the shapefile. The value column contains the value of the associated field or column. Tapping the value opens an edit box for editing the value entry.

With shapefiles, validation of the data entered is limited to adherence to the definition of the field or property. For example, Zeno Field will not allow text characters to be entered into a field which has been defined as numeric. Additional validation can also be performed via custom forms and, in some cases, scripts.

Attributes page for Zeno Field AXF features

The Attributes page for Zeno Field AXF features has two columns: Property and Value. Zeno Field AXF files support viewing and editing of related tables. The Attributes page for AXF features will also include a row for each relationship (or related table) that has been defined for the AXF feature layer.



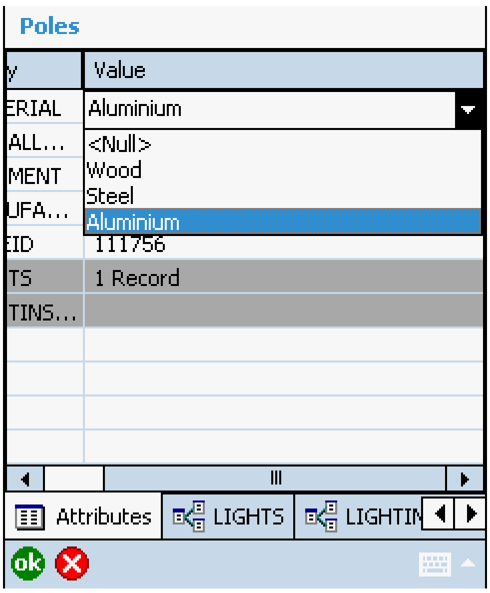
Primary related tables, i.e tables that have a direct relationship with the attribute table, are indicated by a single Down  button.

Secondary related tables, i.e. tables that have a relationship with a primary related table, are indicated by a double Down button. The double Down button arrows indicate that the relationship is two-levels down, for example LightInspections are related to Lights, which are related to Poles.

The related table row lists the name of the relationship, the number of records (or entries) in the primary related table, and a down button or double Down button to easily navigate to the Attributes page for the corresponding related table.

Tapping the value opens an edit box for editing the value entry, or activates a drop-down list to select from pre-defined valid values.

The value field for AXF layers and related tables may include built-in form controls—such as combo boxes (or pick lists)—if subtypes or coded value domains have been defined for the source geodatabase which the AXF layer was extracted from.



Validation of the data in AXF feature tables and related tables takes place at two levels:

1. Data is validated according to the definition of the field or property. For example, Zeno Field will not allow text characters to be entered into a field which has been defined as numeric.
2. Data is validated according to the database schema that has been defined for the AXF file. For example, a property may be associated with a subtype or coded value domain that limits the valid values to a pre-defined list of valid values—which is presented as a drop-down list of values to select from. Or, a property may be

associated with a range domain which, for example, limits the valid values from 1 to 100.

Domains are defined as part of the AXF database schema. The schema can be defined for the geodatabase in ArcCatalog (Zeno Office). The Zeno Field Data Manager for Zeno Office reads the geodatabase schema and then creates the corresponding schema for the output AXF file.

Attributes page for related tables

The attributes page for related tables is similar to the Attributes page, with the following differences:

- The related tables page title consists of the icon and the name of the related table.
- The related tables page can be displayed with two different views: a list view and a single row view.
- Both views have an Up  button, at the bottom of the page, which jumps to the parent page. If the relationship is with the feature attribute table then the parent page is the Attributes page or the first page of a custom form. If the relationship is with another related table, then the parent page is this related table.
- The related tables page has a number of additional buttons at the bottom of the page. These buttons behave slighlty differently for each type of view.

List view

The related table list view consists of a list of records and columns in the table, with one row per record. Rows or records can be added or deleted in the list view, but the record contents cannot be edited.

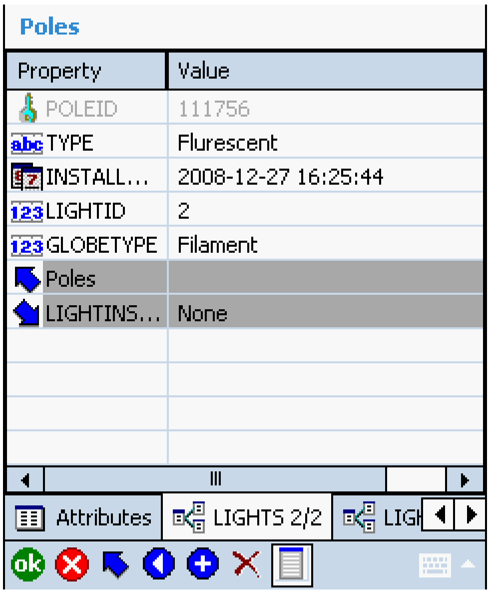
The list view has the following buttons at the bottom of the page (in addition to the previously described ok, Cancel, and Up buttons):

Icon	Description
	Moves the selection up one row
	Moves the selection down one row
	Adds a new row and then automatically switches to the single entry view.
	Deletes the selected row

	Switches to the single row view.

Single row view

The single row view has two columns: Property and Value. The data can be edited in the single row view. This view also includes rows for the parent table and any secondary related tables. The Up button can be used to easily navigate to the parent table, while the Down button can be used to easily nagivate to any secondary related tables.



Tapping the value opens an edit box for editing the value entry, or activates a drop-down list to select from pre-defined valid values.

The single row view has the following buttons at the bottom of the page:

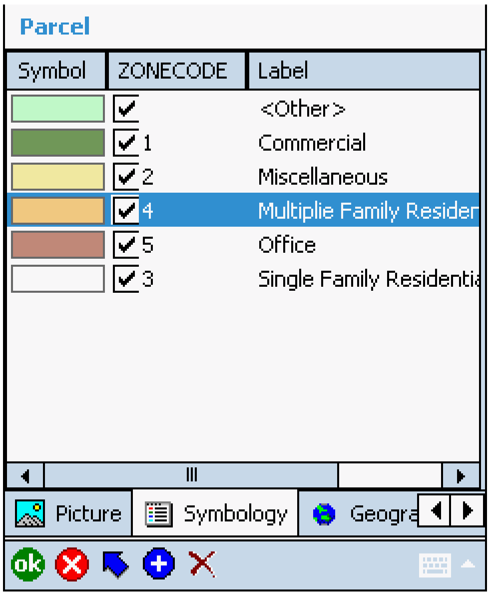
Icon	Description
	Moves the selection up one row
	Moves the selection down one row
	Adds a new row and then automatically switches to the single entry view.
	Deletes the selected row

	Switches to the single row view.

Selecting attribute values via the Symbology page

The Symbology page is used to view the symbols and labels defined in the Zeno Field layer definition. The Zeno Field layer file is created in ArcGIS Desktop using the Zeno Field Data Manager. Zeno Field assigns a random symbol for the layer if there is no symbology defined in the layer file. The symbol used by the currently selected feature is highlighted.

The Symbology page provides a visual method for selecting an attribute value. When a symbol, or category, is selected the associated property value is also selected for the current feature's attributes. The example below shows the selection of the ZoneCode property equal to a value of 5. The Label text is for display purposes only, and is not saved in the feature's attributes.

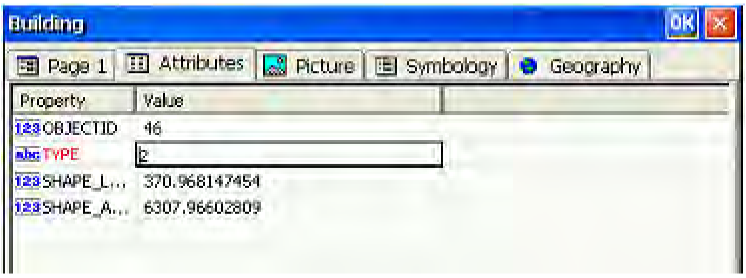


You can add a new category by tapping the button at the bottom of the legend. Each new category consists of a symbol, value, and label. You can also delete a category by selecting the category and tapping the button. Adding or deleting categories changes the symbology, or legend, used to display the features in the associated feature layer—adding or deleting categories has no impact on the attributes saved with features.

Editing attributes

The Feature Properties dialog box lets you view and edit the attributes of the feature you have selected. The Feature Properties dialog box is automatically displayed once any new feature is created.

By default, the Feature Properties dialog box includes pages for Attributes, Picture, Symbology, and Geography; a custom edit form will also be displayed if it exists. The custom edit form may change the title of the Feature Properties dialog box— for example, “Trees”.

Step	Action
1	Select the point, line, or polygon feature. The Feature Properties button on the Edit toolbar is enabled once a feature is selected.
2	Tap the Feature Properties button—or double-tap the feature—to open the Feature Properties dialog box.
3	On the Attributes page, tap the Value field to open the associated Value text box for typing in attribute data.  For example, tapping the Value field associated with the TYPE Property will open the associated Value text box for typing in the house number value of “2”. The Soft Input Panel is displayed when a Value text box is opened. If it does not, tap the SIP icon on the title bar.
	Typing data on devices without keyboards: Devices without keyboards—for example, Zeno 10 devices—use a Virtual Keyboard for typing in data. You open the keyboard by tapping the keyboard icon on the lower right side of the taskbar and press Large KB. To close it again, press Hide Input Panel. On devices with a leyboard, like Zeno 15, you can simply use the keyboard to enter values.

4	The Feature Properties dialog box displays the custom edit form if it exists.
5	Tap OK to save the attributes and close the edit form. You can also tap the X button if you want to cancel any changes made to the attributes.
☞	**Creating custom edit forms:** Custom edit forms can be created using Zeno Field. In Zeno Field, custom edit forms can be created with either the QuickForm or QuickProject tools. Custom forms are saved in an Zeno Field Layer file, which is associated with a shapefile (*.apl) or stored in the Zeno Field AXF file. Custom edit forms can have multiple tabs, or pages, each with multiple controls. These controls can include text boxes, date controls, and list boxes. Scripts associated with the form perform initialization and validation, enforcing correct data entry before continuing to another page or closing the form. Scripts cannot be added to forms from within Zeno Field.

Datum Configuration Tool

Datum Configuration Tool: Overview

Zeno Field includes two datum configuration files, Transforms.dbf and DefaultTransforms.dbf, which are located in the Zeno Field “System” folder. These files can be modified to add datum transformations as well as to override the default datum transformations within Zeno Field.

The Transforms.dbf file allows the user to add datum transformation parameters that are searched before Zeno Field's internal datum transformations. This means that the data in this configuration file will override the datum transformation information embedded in Zeno Field. The DefaultTransforms.dbf file forces Zeno Field to use a specific datum transformation if there is more than one available for a given pair of datum names.

The Datum Configuration Tool is a desktop tool to

- Define new transformation sets between two datums
- Select default transformations
- Transformation files can be copied to the Zeno
- Geoid and CSCS model are defined in the Survey Dataset properties
    - During new project wizard or
    - Manually
    - LGO file formats supported!
    - Applied during EasyIn, not supported in Zeno Field

The Datum Configuration Tool provides an easy to use tool for editing the Transforms.dbf and DefaultTransforms.dbf files. This tool is run on a desktop PC, and requires that Zeno Field be installed on the desktop PC. Once the .dbf files have been edited they can be copied to the Zeno Field “System” folder on your mobile device.

The Datum Configuration Tool has two tabs:

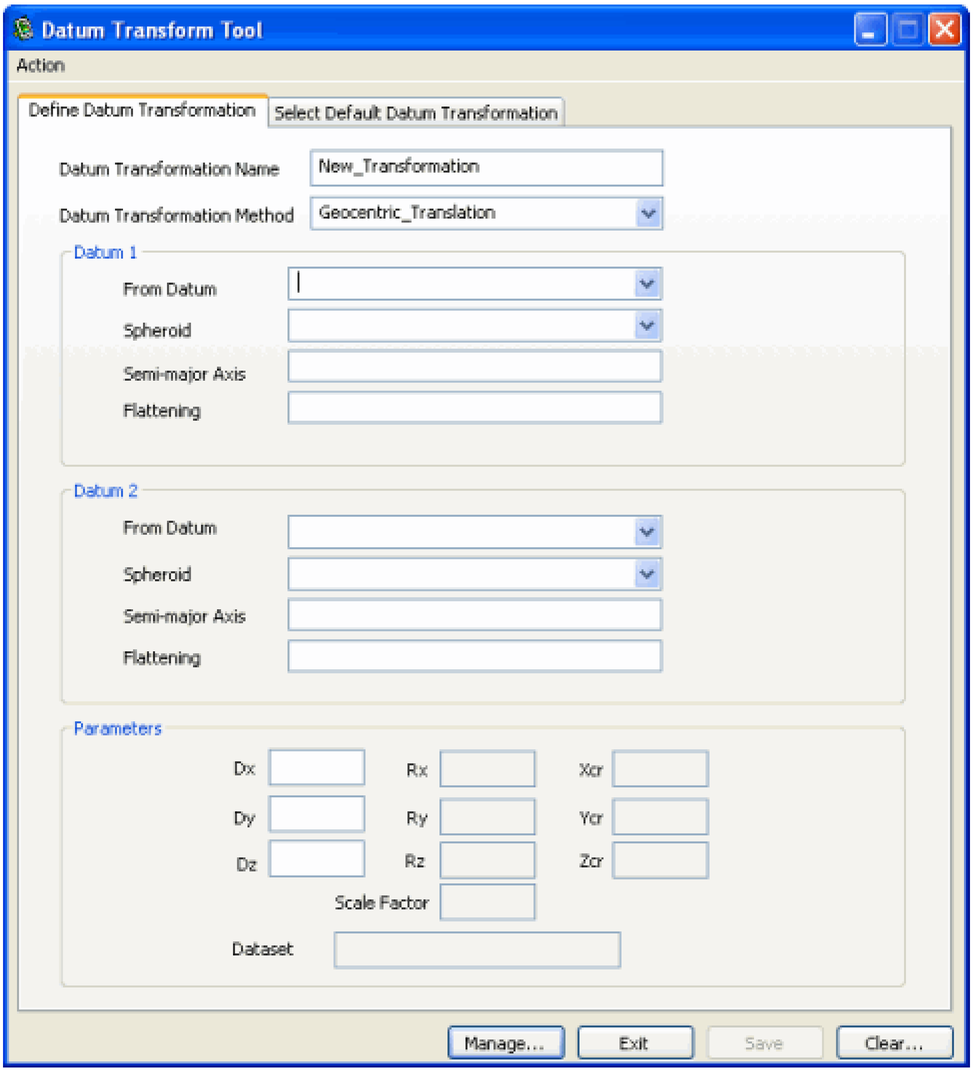
- The Define Datum Transformation tab is used for editing the Transforms.dbf file.
- The Select Default Datum Transformation tab is used for editing the DefaultTransforms.dbf file.

How to use transformation in Zeno Field

Step	Action
1	Open the Datum Configuration Tool in Start > All Programs > ArcGIS > ArcPad8.0 > Datum Configuration Tool.
2	Define new transformation in Datum Configuration Tool.
3	Define new datum transformation as default in Datum Configuration Tool.
4	Copy the defaulttransforms.dbf and transforms.dbf files from the c:\Program Files\ArcPad 8.0\ System\ folder into the Program Files\ArcPad\System folder of the mobile device.
☞	• The correct transformation will be used automatically for every map which uses the associated datum! • This process needs to be done only once.

Define datum transformation

<table>
<tr><th>Step</th><th>Action</th></tr>
<tr><td>1</td><td>Start the Datum Configuration Tool.

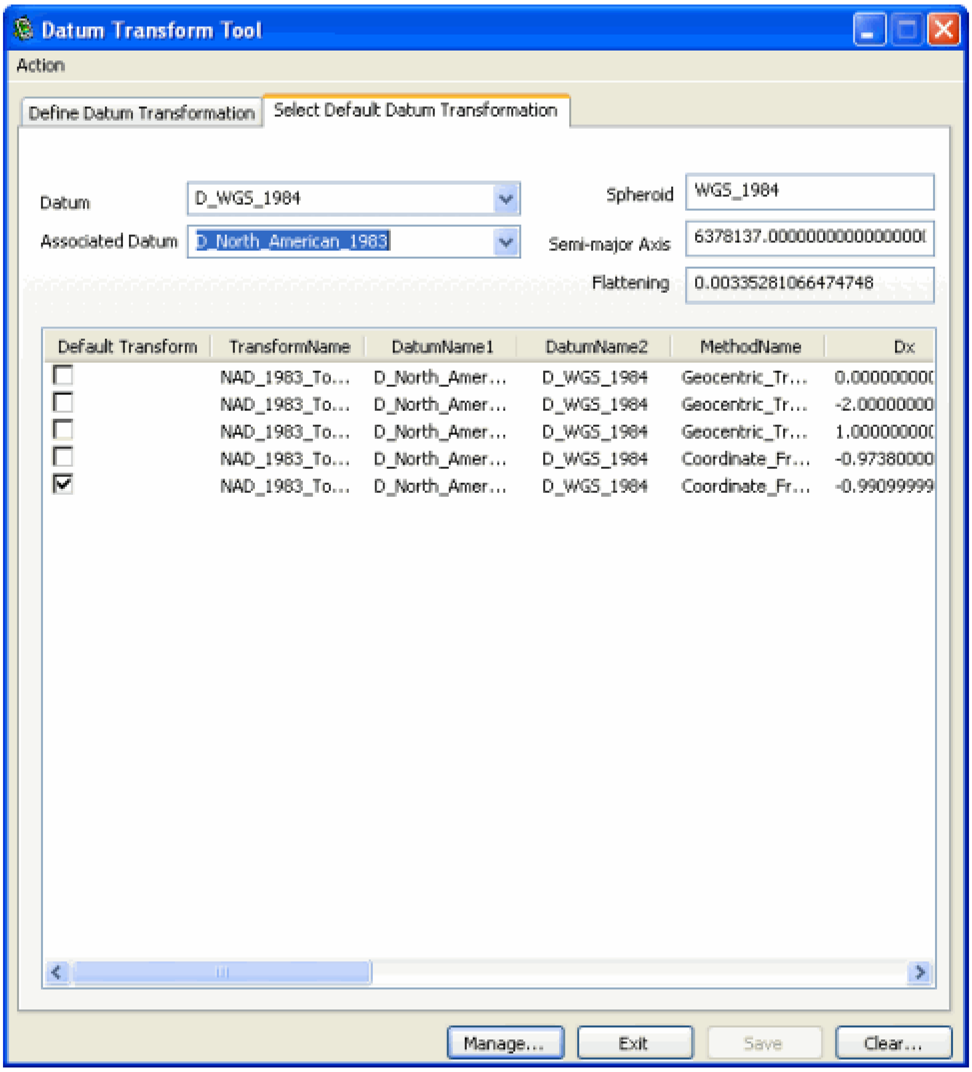


</td></tr>
<tr><td>2</td><td>Complete the required fields to define a new custom datum transformation.

- Datum Transformation Name: Enter a unique name for the new custom datum transformation.
- Transformation Method: Select method to be used for the datum transformation.
- Datum 1: Select the datum to be used for the From Datum. The Spheroid, Semi-major Axis, and 1/Flattening will be automatically completed using Zeno Field's projection information.
- Datum 2: Select the datum to be used for the To Datum. The Spheroid, Semi-major Axis, and 1/Flattening will be automatically completed using
</td></tr>
</table>

	Zeno Field's projection information. • Parameters: Enter in the required parameters for the selected transformation method. Only the parameters required by the selected transformation method are editable. The Dataset parameter is required by the HARN and NADCON transformation methods, and refers to the name of the .las and .los files.
3	Click Save to write the new custom datum transformation to the Transforms.dbf file.
4	Click Clear to clear the selections already made.
5	Click Manage to edit the parameters of previously saved custom datum transformations. You can also delete datum transformations from the Transforms.dbf file.
6	**Download files to your Zeno 10/15 device** Click Download to copy the Transforms.dbf and DefaultTransforms.dbf files from your PC to the Zeno Field “System” folder on your connected Zeno device. The Download button is only enabled when a Zeno 10 or Zeno 15 is connected to your PC via Microsoft ActiveSync (Windows XP) or Windows Mobile Device Center (Windows Vista).

Select default datum transformation



Select the Datum and Associated Datums to display a list of all the possible transformations between these two datums. This information is extracted from Zeno Field's projection engine. If no transformation has been selected as the default, then the first transformation displayed is used by Zeno Field. The default transformation has a check in the Default Transformation column's checkboxes.

Leica Zeno Device Manager

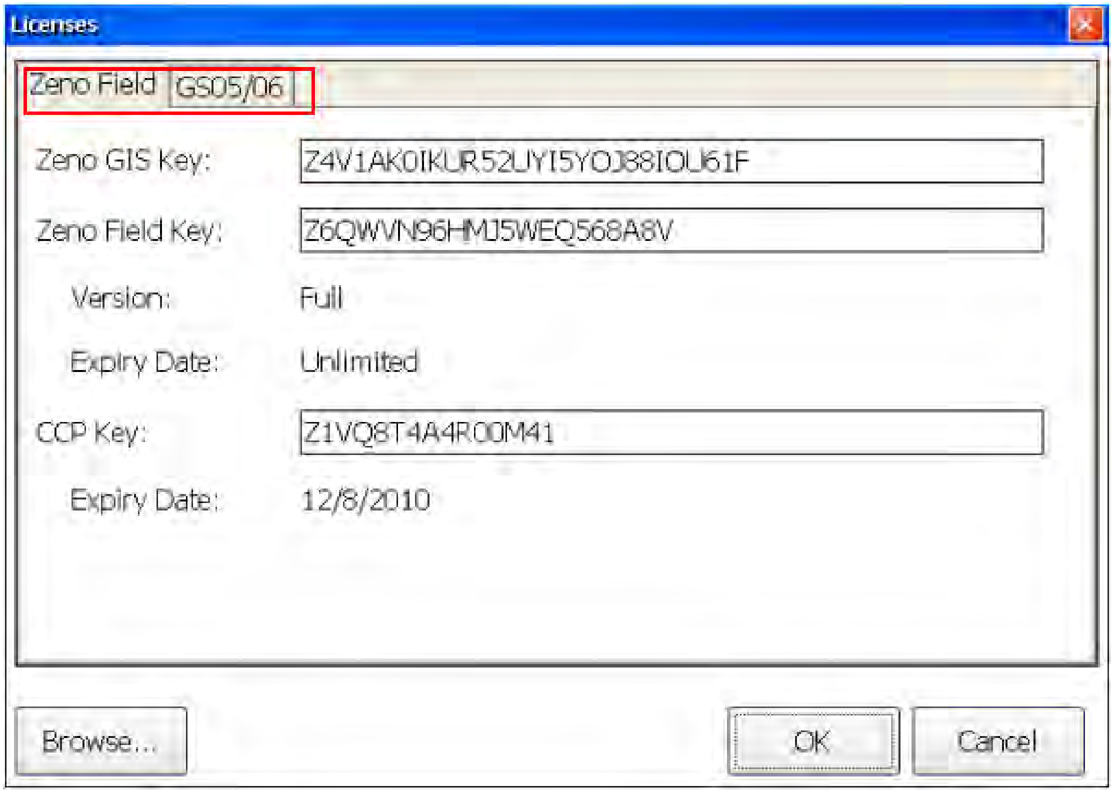
Leica Zeno Device Manager: Overview

The Zeno Device Manager gets installed with the Zeno Field installation package. This tool controls the functionality of the Zeno device and includes the following functions:

- License upload
- System Settings
- GS 05/06 Firmware upload

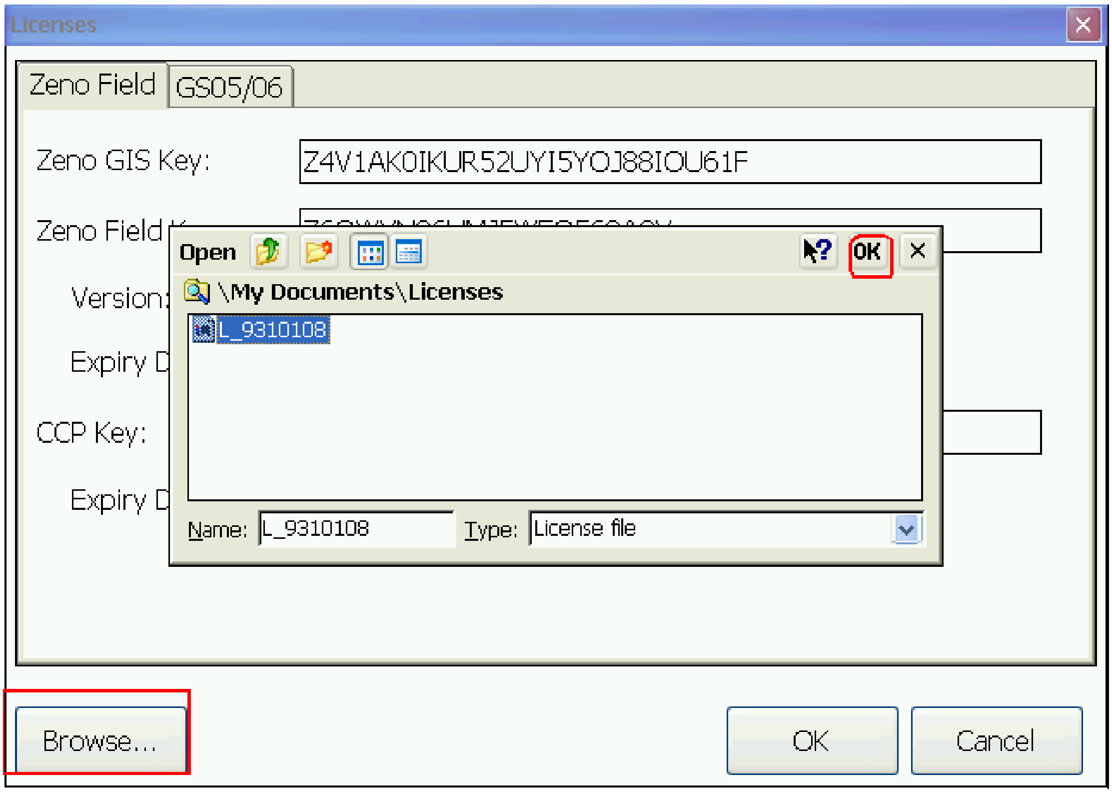
Licenses

All Zeno device gets shipped with pre-installed licenses keys. Additionally you receive the keys in printed form. In some cases it can be necessary to register new license keys e.g. if the key for CCP has expired.



How to register a license for a Zeno device

Step	Action
1	Start Zeno Device Manager on your Zeno 10/15 by taping Start > All Programs > Zeno Device Manager > Licenses. 
2	Enter you license keys in the according fields in the Zeno Field tab. Alternatively tap Browse

	and browse for you license file. This will fill in all included keys automatically. These are: a. Zeno GIS Key: Enables the CS 10/15 controller for Zeno Field b. Zeno Field Key: License for Zeno Field c. CCP Key: Maintenance key for Zeno Field 

Licenses for the Zeno Field GNSS Cap GS 05/06

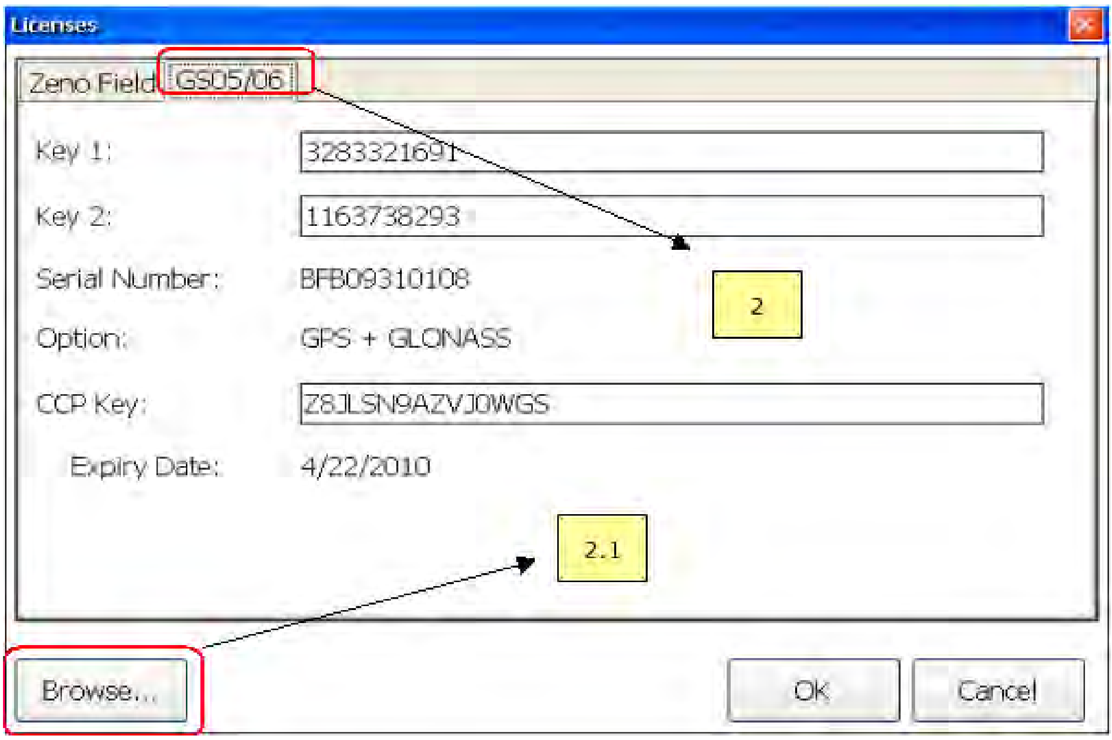
There are two types of licenses for the GNSS cap which the user can request when purchasing the product:

a. GPS only

b. GPS and GLONASS

Step	Action
1	Start the Zeno Device Manager on your Zeno 10/15 by taping Start > All Programs > Zeno Device Manager > Licenses.
2	Change to the GS 05/06 tab and enter you license keys in the according fields. Alternatively

tap Browse and browse for you license file. This will fill in all included keys automatically.



System Settings

This tool is used to set the system font size for the Zeno handheld device. The available font sizes are small, medium, large, and Zeno optimized fonts.

Please note, that using larger font sizes will also resize dialog boxes. Some of them will not be fully visible anymore.

Step	Action
1	Start Zeno Device Manager on your Zeno 10/15 by taping Start > All Programs > Zeno Device Manager > System Settings.
2	Select preferred text size.
3	Tap OK. A dialog box will ask you to restart the system. Tap yes and the system will restart with the new text size settings.

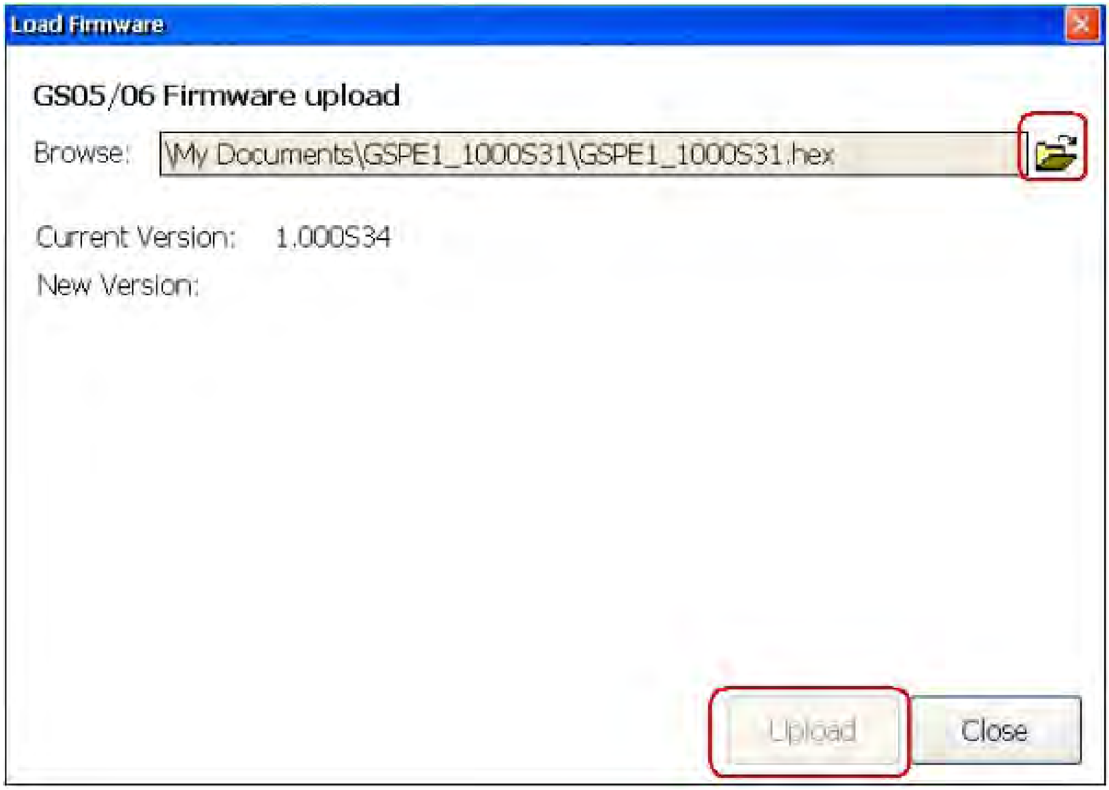
Reset GS05/06 GNSS Cap

The reset function for the GS 05/06 resets it to factory default. This means, e.g. the almanac gets deleted. This can be helpful for faster position acquisition after the Zeno device was moved a long distance.

Step	Action
1	Start Zeno Device Manager on your Zeno 10/15 by taping Start > All Programs > Zeno Device Manager > System Settings.
2	Change to the Reset tab.
3	Tap the Reset button.
4	Tap OK to close the System Settings dialog.

GS05/06 Firmware

GS05/06 Firmware upload

Step	Action
1	Download the most recent GS 05/06 firmware file from https://myworld.leica-geosystems.com.
2	Connect your Zeno field controller to your PC through synchronization software
3	Copy the GS 05/06 firmware file onto a folder on the Zeno handheld device, SD card, Leica CompactFlash card or USB stick.
4	Start the Zeno Device Manager on your Zeno 10/15 by taping Start > All Programs > Zeno Device Manager > GS 05/06 Firmware
5	Tap the folder icon on the load firmware dialog box, browse to the directory into which you've copied the GS firmware file, select it and start the upload. 

CS10/05 Firmware upload

Step	Action
1	Download the most recent CS firmware file from https://myworld.leica-geosystems.com. Refer to **Introduction**.
2	Connect the CS field controller to your PC through synchronization software.
3	Copy CS firmware file onto a folder on the Leica handheld device, SD card, Leica CompactFlash card or USB stick.
4	Tap the Loader icon on the desktop, to run the Loader application.
5	Browse to the directory into which you copied CS firmware file, select it and start the upload.
6	A message will appear when the upload is complete.