Quick Start...

If you read nothing else,
please check out pages 5, 7 and **8**!

Coordinate Style,
Datum Questions?

Read Appendix A

All Topo Maps V7 Pro User's Guide

Igage Mapping Corporation
Salt Lake City Utah
Printed in the United States of America. Revision 1 2003

5vpa0644

Very Important Words about Staying Out of Trouble: All Topo Maps Will Not Replace a Licensed Surveyor

> Please carefully read all the disclaimers that come with the PLS Tool, and the viewer (see 'All Topo Maps License and Warranty' on page 6.) In particular the Elevation Data and Tools, the 'PLS Tool', the coordinate geometry math and the 'Property Description Writer' are useless and can't be trusted for any purpose! You alone are responsible for checking results and determining if the products and its results are suitable for a particular purpose.

All Topo Maps makes some of the things that surveyors do look pretty darn easy:

- The PLS Tool shows footage offsets and ¼ ¼ sections as fast as you move the mouse cursor.
- You can compute areas by tracing sections and property boundaries.
- From a list of coordinates, you can generate a property description that looks good and closes to one part in a trillion.
- You can quickly take a property description and impose it on a topographic map.
- Shape files that indicate property ownership can be displayed.

But All Topo Maps is not a surveyor or a survey tool, the displayed accuracy is an illusion and **you will** get into serious trouble if **you** impersonate a surveyor. (All Topo Maps is a 'mapping' tool, not a 'surveying' tool.)

Most of the functions performed by a licensed surveyor are strictly regulated by State law. If you perform these regulated functions, then you will be liable for the damage that you cause!

> **If you are buying, selling or exchanging property; building or removing improvements or doing anything that involves money, water or the just the possibility of lawsuit, you need to consult with a Professional Licensed Surveyor in the state where the property is located.**

If you don't understand this, consider returning All Topo Maps to the place of purchase within 60 days and requesting a refund.

19tbu8594

Very Important Words about All Topo Maps, Safety and Common Sense

'All Topo Maps' is a great resource for professionals and consumers alike. We know that our customers are doing incredible things with All Topo Maps and we are proud to be a small part their success.

There are a few folks out there who are pushing the envelope a little too far (you know who you are) and we want you to stop and think about your safety and the safety of the folks around you for just a moment.

Please don't use All Topo Maps for real-time navigation!

What is wrong with this picture?

> You are driving down a dirt road at 60 mph on your way to someplace new. All Topo Maps is loaded on your laptop, connected to your GPS (there are cables everywhere), guiding you to your destination. The windows are rolled down all the way, the stereo is blasting, you are drinking a cup of coffee, eating a bagel, smoking a cigar and then your cell phone rings!

"Hey! Hang up and drive!" And don't use All Topo Maps for real time navigation because there is always a map or two that is messed up. We don't want you to drive off the road; we want to sell you more maps...

Don't 'Fly by All Topo!'

Just because there is an airstrip marked on the map, does not mean there is really an airstrip on the ground. This goes for almost everything on the map and everything that isn't. All Topo Maps are NOT suitable for use when flying an airplane or helicopter. Important things like runway locations, elevations, towers, cables and the like have not been field checked.

Please don't use All Topo as a navigational aid while flying!

Some of these maps are 50 years old

Yes, it is true; one was last updated in 1907. Some of these maps are really old, and some of the new ones are really out in left field.

What ever you are planning, please take a moment to consider what might happen if the map is just plain wrong. Develop a plan that keeps everyone safe.

What happens if your GPS does not work, or the GPS satellites are turned off (fail) while you are on your trip?

Gee, it is going to happen sooner or later for sure; with your luck it will probably happen to you.

Don't rely on computers. GPS receivers are computers. All Topo Maps run on computers. Computers hate us and are part of a large conspiracy, don't trust them. ***Take a paper map and a magnetic compass (the kind without batteries) for backup.***

Be prepared, take printed maps, have a plan in case something goes wrong, let someone know where you are going and be safe!

Thanks again for purchasing and using All Topo Maps!

All Topo Map V7 Pro Quick Start Guide

Everything you wanted to know about All Topo Maps, in two pages!

Installation

Read the first couple of pages of Chapter 5. Register at:

www.igage.com/regweb

Looking for (Place, Map and Location):

Place:	press the button or press Alt+P
Map:	press the button or press Alt+M
Location:	press the button or press Alt+L

Printing a Map

Press the button on the toolbar and choose the scale you want to print at.

Press Ctrl-P (or use the main menu selection 'File: Print') then:

1. Select the proper printer and page size.
2. Choose Portrait (Tall) or Landscape (Wide) orientation.
3. Choose to print the entire map, or just the viewed selection.
4. Select an option under '4. Printed Map Scale'
5. Choose the top 'Image Processing Method': Use Windows Print Driver.
6. Select options as appropriate.
7. Press the Preview button , if needed use the Drag-Hand cursor to compose the printed image in the map viewer.
8. Press the 'Print' button .

Place a Waypoint/Annotation on the Map

Put the cursor at the spot on the map and press F2 or right-mouse click, select 'Add New Annotation'.

Move an Existing Waypoint/Annotation

Move the mouse cursor near the annotation to move, right-click, select 'Move Annotation', move the cursor to the new location and left-click.

Delete an Existing Waypoint/Annotation

Move the mouse cursor near the annotation to delete, right-click, select 'Delete Annotation'.

Shortcut Keys

Arrow keys	move around the map image quickly, shift-arrow keys move slowly.
PageUp	keys moves the helicopter up 10% (zooms out). PageDown key moves the helicopter down 10%(zooms in), hold the shift-key down to move in 1% increments.
F1	Context sensitive help.
F2	Add a new waypoint/annotation at the current cursor position.
Shift-F2	Edit the waypoint/annotation nearest the cursor.
F3	Configure the format of the primary cursor coordinate display.
Shift-F3	Configure the format of the secondary cursor coordinate.
F4	Change the Measurement Spike units:

	Feet, Yards, Meters, Miles, Survey Feet, Rods (Perch, Poles), Chains, Links, Varas, Nautical Miles
F5	Zero the bombsight cursor traced distance and area.
F6	Set the Measurement Spike at the current cursor location.
Ctrl-F6	Remove the Measurement Spike.
F7	Add another waypoint/annotation at the cursor location, just like the last one.
F8	Show the Annotation Source Editor.
F9	Change map scales, centered at cursor location.
Alt-G	Control Annotation, Grid and Layers.
N	Toggle annotation Names ON/OFF.
D	Toggle annotation Descriptions ON/OFF.
T	Toggle annotation Notes ON/OFF.
Ctrl-N	New annotation file.
Ctrl-O	Open an annotation file.
Ctrl-A	Save annotations to a new file.
Ctrl-S	Save annotations to the current file.
Ctrl-Shift-S	Backup annotations.
F11	Add a waypoint/annotation at the current GPS position.
Ctrl-G	Open the GPS Tool.
Ctrl-Shift-B	Open BigTopo, make a custom map.
Ctrl-B	Open a previously built BigTopo Map.
Ctrl-P	Print the map.
Ctrl-C	Export the map to the clipboard or a file.
Ctrl-X	Copy the primary coordinate to the Windows clipboard.
Ctrl-Z	Copy the secondary coordinate to the Windows clipboard.
Ctrl-M	Toggle the PLS Magnet (PLS Option Required).
Ctrl-K	Jump to a bookmark, the clipboard or the Measurement Spike.
1,2,3,4...9,0	Set a bookmark at the current cursor location.
Alt-Y	System options and configurations.
Ctrl-Q	Quick Shape Controller.
Alt-Q	Toggle High Quality Display ON/OFF.
Alt-R	Refresh and redraw the map screen.
Alt+0	Zoom to map extents.
Alt+1 and Home	Zoom to 100%.
Alt+2	Zoom to 200%.
Alt+4	Zoom to 400%.
Alt+5	Zoom to 50%.

Keypad Arrow Keys

Set the **text position** of the nearest waypoint/annotation to the direction pointed to by the arrow:

7 - North West	8 - North	9 - North East
4 - West	5 - Center	6 - East
1 - South West	2 - South	3 - South East

Transfer Coordinates to/from a GPS

Checkout Chapter 10.

Get Program Updates from the Web

Select the main menu option ‘Updates: Web Update, Viewer and Tools...’

Acknowledgements

This product contains portions of imaging code owned by Pegasus Software LLC, Inc., and Pegasus Imaging Corporation, Tampa FL, (www.pegasusimaging.com).

If this product is distributed with the library file
'.\AllTopo\Bin7\ATMDeCmp.DLL'
203,776 bytes in length, then the product contains code "Licensed under U.S.A. Patent No. 4,558,302 and foreign counterparts" by Unisys Corporation, Blue Bell Pennsylvania. If the file ATMDeCmp.DLL is 59,392 bytes in length, then this product is free of Unisys claims as licensed under said patents.

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(the fine print...)

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Contents

Chapter 1: About All Topo Maps Pro

This chapter includes the following topics:

Welcome to All Topo Maps!

Welcome to the 'User's Manual' for Version 7 of the All Topo Map Professional toolset.

Like All Topo's predecessors, Version 7 Pro provides reasonable cost, high quality topographic maps with simple to use tools to enhance your geographic projects.

Years of intense customer contributions have resulted in a unique tool that builds, interprets, annotates, prints and exports beautiful maps for personal or business use.

All Topo Maps Optional Components

This manual describes features that are not available in all installations. Light text indicates that an optional feature is being described. Specifically:

A state specific 'PLS Tool' is required to access the Township, Range, Section capabilities of All Topo Maps.

The 'Deed Plotter+ Interchange Option' is required to exchange files with 'Deed Plotter+'.

A 'V7 Professional Extensions' license is required to access some professional extensions.

A 'BigTopo Pro' license is required to access some features of the professional map seaming tool.

Map updates are available by paid subscription.

Contact your All Topo Map dealer or Igage Mapping Corporation for assistance in purchasing these extensions.

What is 'All Topo Maps'?

Topographic maps are graphical representations of the earth. In the United States the 'United States Geographical Survey' traditionally has produced topographic maps covering the entire country. Originally produced to assist in the division of federal lands and for national defense, the 7 ½ minute maps and their predecessors, the 15 minute maps, are the basis for most modern maps produced in this country. A series of approximately 60,000 quadrangles cover the entire country.

Recently the United States Forest Service has assumed responsibility for producing 1:24,000 scale maps for lands that are administered by the Forest Service. These maps are called 'Forest Service Single Edition' (FSSE) maps. FSSE maps are available as Forest Service released maps without a vegetation layer and as USGS released FSSE maps with a vegetation layer.

All Topo Maps are a collection of 7½ minute (1:24,000), 1:63.360 (Alaska), 1:50:000 (Canada), 1:100,000 scale and 1:250,000 topographical maps, with easy to use viewing software (AllTopo) for your Win95/98/Me/NT/Win2000/XP based computer.

Collections include every map for a state, or are arraigned by geographical area. The viewing software allows quick access to every map by location or place/feature name.

Maps can be viewed individually or new maps can be built to provide large or small custom coverage with BigTopo. Extensive annotations may be attached to maps. Annotation and map image export to files, clipboard and printing are supported. Straight line, traced distances and areas may be measured.

What's New in All Topo Maps Version 7?

Better printing and plotting support. All Topo will automatically tile a large map image into multiple pages for output to smaller printers. Map and annotation scaling is intuitive and previews properly under all conditions. Color reduction and RIP options are exposed to assist printing huge map images on memory limited computers.

Enhanced elevation profiling. All Topo can build intelligent elevation profiles along traced paths, routes or between two points. Profiles can be adjusted for earth curvature or presented flat-world for hiking visualization.

Map Color Changer: All Topo can selectively lighten colors to increase annotation visibility and enhance other colors to embolden features. A common use is to remove the vegetation layer and darken water features.

All Topo's hill shader and false elevation coloring engine enhances topographic maps with 3-D perspective and novel coloring schemes that highlight elevation based map interpretation.

Web based automatic map update subscription allows you to update maps as new revisions become available.

The Annotation Source Editor accepts source files of any size, honors user coordinate styles and the 'Convert' coordinate style button is back!

New, highly indexed Quick Shapes allow instantaneous access to industry standard shape files.

The Auto-GeoLink tool automatically associates digital images with trackpoints; quickly building spatially associated image databases.

New Point-to-Point Pencil tool quickly generates automatically numbered routes with spurs and closed shapes.

Annotations can be assigned to layers which can be enabled individually.

State Overview maps show where you are in a state set and allow quick selection of new maps.

BigTopo maps now are contained in single files. It is no longer necessary to move both the .it? and .mi files when exchanging and moving BigTopo maps.

BigTopo maps now include declination, the AllTopo viewer can show true north to magnetic and grid declination dip at the cursor location.

Map Export now allows annotation and feature scaling to the intended scale of use. Both TIF images with TFW world files and GeoTIF coded images can be exported in selectable datum.

Up to 10 coordinate Bookmarks can be placed to speed up BigTopo generation and moving among multiple maps and projects.

More coordinate annotation styles; more line drawing styles; GPS Icon and date/time stamp control; additional symbols and tick-marks; closed shapes and named annotation styles allow quick style assignment. Multiple annotation editing makes style assignments easy.

Compressed annotation file Backup/Restore makes saving your work to alternate storage locations quick and easy. Project packaging speeds up

project exchange and remote printing.

All Topo fully supports all reasonable datum, both Molodensky approximations and NADCON interpolations; State Plane and the Military Grid Reference System. PLS coordinates are accepted as fully qualified coordinates, Sections, halfs, ¼ Sections and ¼ ¼ sections can be broken into aliquot parts and automatically drawn. The 'PLS Magnet' tool allows quick boundary drawing without entering metes and bounds descriptions. (The PLS Option is required for PLS coordinates.)

All Topo will write a property description from a series of GPS locations.

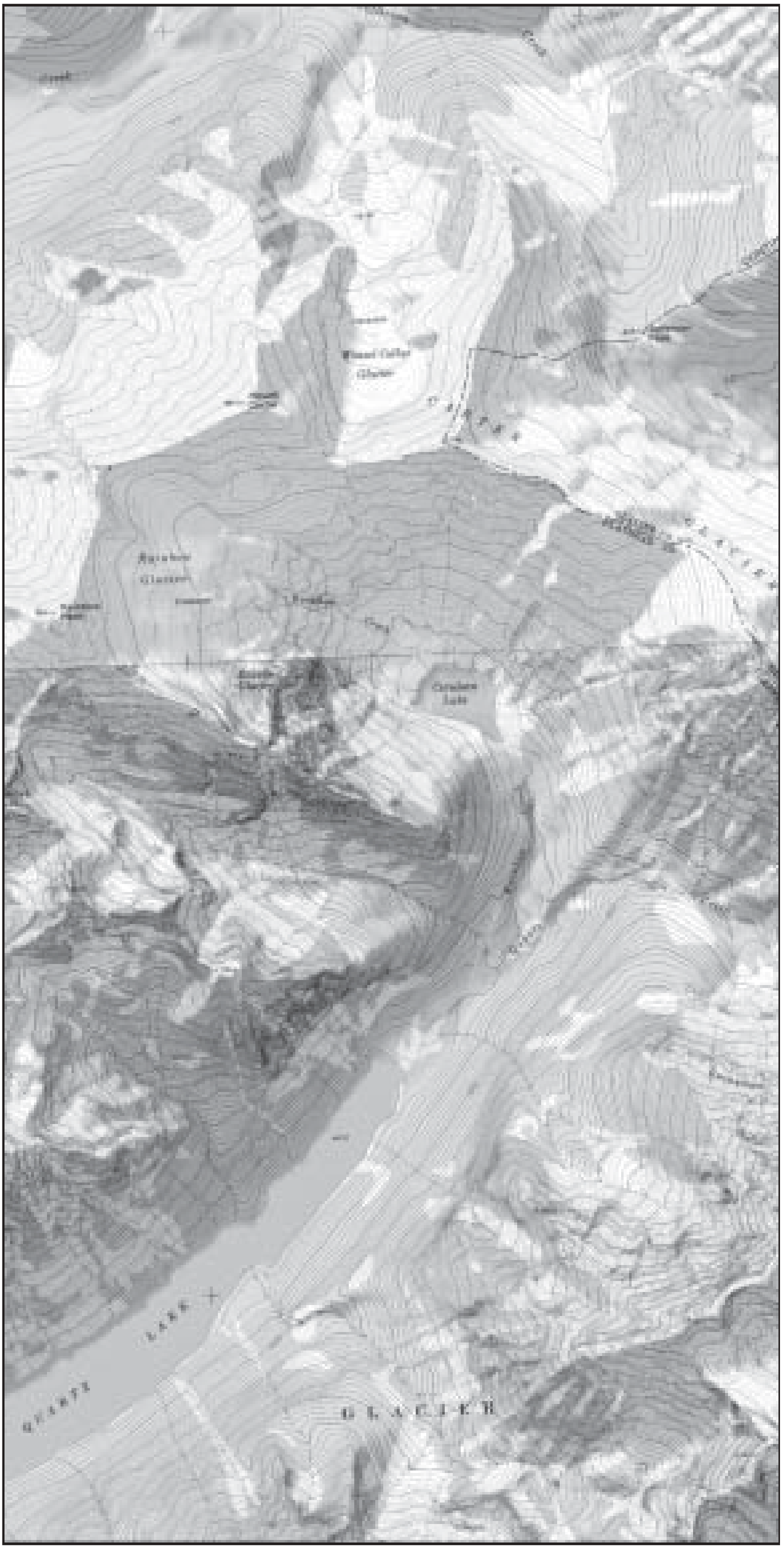
The 'Triangulation Tool' allows coordinate derivation from two known offset locations and bearings.

The 'Projection Tool' allows coordinate derivation from a known location using Great Circle, UTM Grid or State Plane Grid projection.

All Topo now displays and interprets compass bearings in azimuth (273º) and surveyor angles (N87.0000W).

All Topo directly accepts bearings using UTM Grid North, State Plane Grid North, True North and Magnetic North using the 'World Magnetic Model' to compute magnetic declination.

All Topo allows simultaneous display of cursor location using two styles. Elevation, declination and dip can be continuously displayed. The 'Giant Coordinate Fonts' option makes All Topo's use in vehicles and planes easier.



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Chapter 2: All Topo Components and Dialogs

This chapter includes images and brief descriptions of all of the components, screens, dialogs, utilities, tools and wizards you might encounter while using your All Topo Map set.

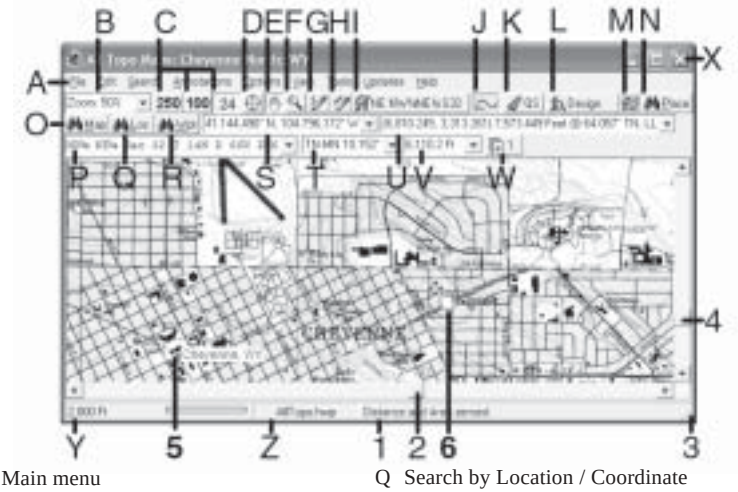
Select a State Set to Open

Shown when All Topo Maps is started and when you change map sets using the menu option 'File: Open Map Set…' Available map sets are listed, select the set you want to use, then press 'OK' or double-click on the state to open.

When starting All Topo checking the 'Open Last Project' box opens the map set at the last viewed map and annotation file. When changing map sets, checking the 'Open Last Project' box only retrieves the last viewed map.

The All Topo Viewer

The viewer is the main interface, it allows quick access to and display of base maps, annotations and all the All Topo wizards and tools.



A Main menu
B Zoom display and control
C Map Scale selection
D Bombsight cursor
E Draghand cursor
F Zoom cursor
G Freehand Pencil
H Point-to-Point (Route) Pencil
I PLS Magnet toggle
J Annotations enable
K Quick Shape toggle
L Scale / Design toggle
M Printed Scale Controller
N Search by Place name
O Search by Map name
P Secondary Coordinate display
Q Search by Location / Coordinate
R Search by Waypoint
S Primary Coordinate display
T Magnetic, Grid Declination; Dip
U Measurement Spike distance
V Elevation at Cursor
W Map Revision selection
X Minimize, maximize, close
Y Map Scale bar
Z Current annotation file (* modified)
1 Status line
2 Horizontal scroll bar
3 Window size handle
4 Vertical scroll bar
5 Map annotation
6 Mouse cursor (drag hand shown)

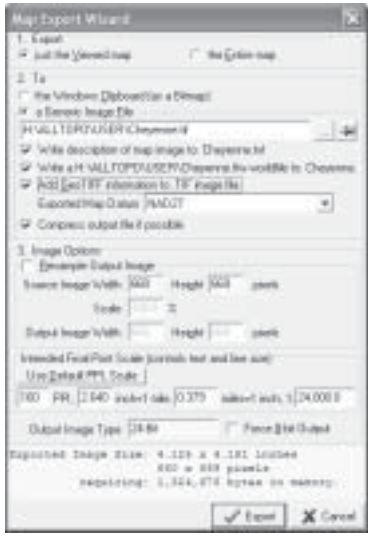
Map Printing Wizard

The 'Print Map' wizard selects and configures output printers.

Choose the map view to print, select a printed map scale, customize annotations, and tile large maps onto several printed sheets.

Print jobs can be optimized for speed, quality and available memory.

Export Map to File or Clipboard



Export the entire map or the viewed map to the Window's Clipboard or a generic graphics file (including GeoTIF images.) Images can be resampled and color reduced.

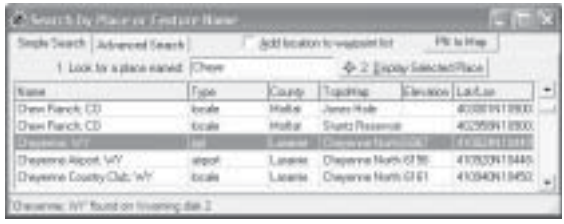
Annotation Editor

The annotation editor allows access to annotation properties and styles: Name, Description, Notes, symbols, connecting lines, GeoLinks, Deed Plotter imports.

State Overview Map

State overview map shows current map extent, quickly jumps to new locations.

Search by Place Name

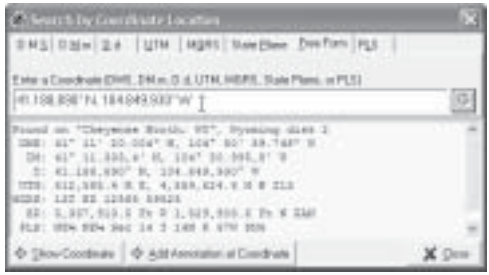


Use the 'Search by Place or Feature Name' tool to quickly find a map location if you know the name of a map feature.

Search by Map Name

Use the ‘Search by Map Name’ tool to find a map if you know the map name, or to move to a map adjacent to the currently displayed map.

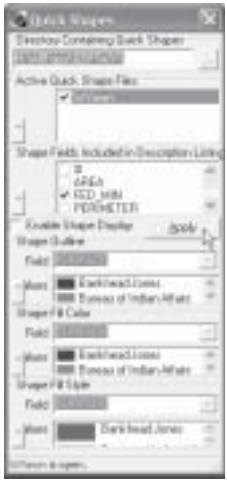
Search by Coordinate Location

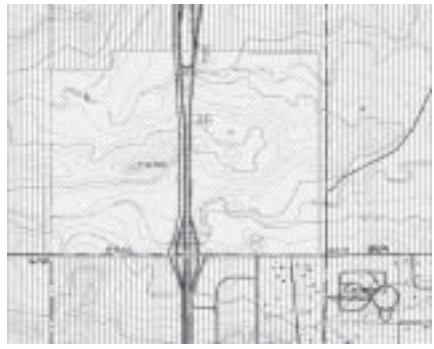


Use the 'Search by Coordinate Location' tool if you know the Lat/Lon, UTM, MGRS, State Plane or PLS coordinate of the point you want to view.

Also used to quickly enter a location, show the location and set an annotation at a known location.

Quick Shape Controller

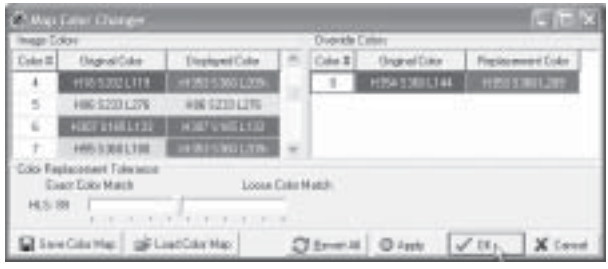




Quick Shape overlay example using BLM land ownership shape file.

The 'Quick Shape Controller' chooses the displayed fields, colors, and fill styles for 'Quick Shape' annotation overlays. Overlays might include hunting units, land ownership or vegetation types.

Map Color Changer



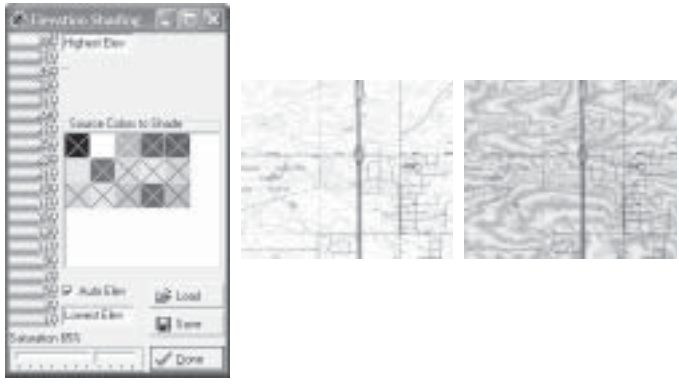
Quickly change the colors used on maps, or entirely eliminate a color from maps.

Hill Shader

Hill Shader, plain map and elevation highlighted map.

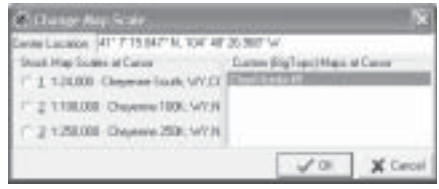
Converts flat maps to beautiful 3-D shaded, elevation highlighted, relief maps.

False Elevation Color Tool



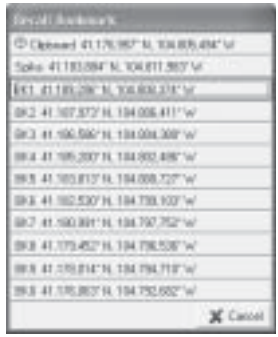
Elevation coloring is useful for highlighting elevation strata, giving maps elevation color hinting and visualizing flooding scenarios.

Change Map Scale



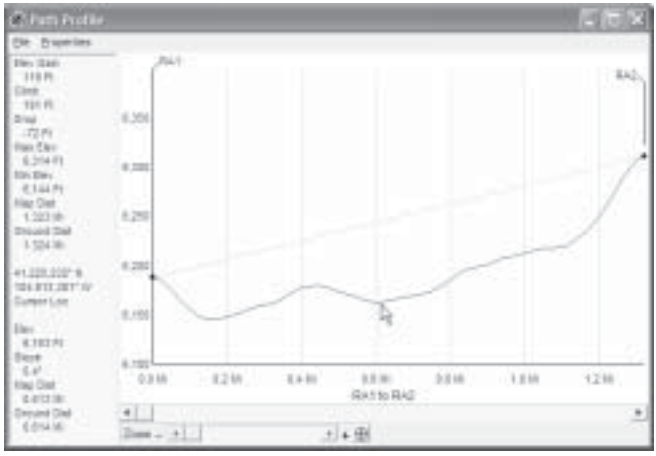
When an action requires the display of an alternate map, this dialog allows you to choose the map scale or a BigTopo map with coverage for the location.

Recall Bookmark



You can ‘drop’ one of ten bookmarks by positioning the cursor over the map and pressing the keyboard keys ‘1’ through ‘9’ and ‘0’. Later you can recall these locations as coordinate’s location by pressing the button and choosing the location from the Clipboard, the Measurement Spike or a bookmark.

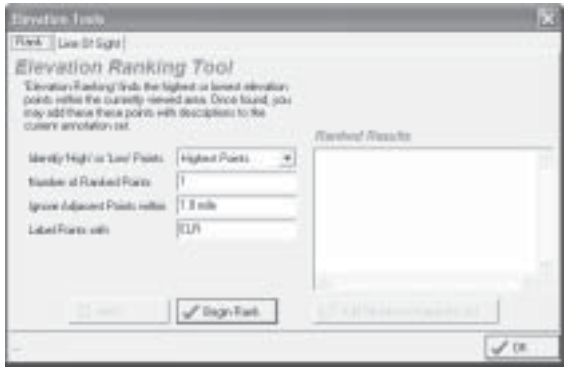
Profile Tool



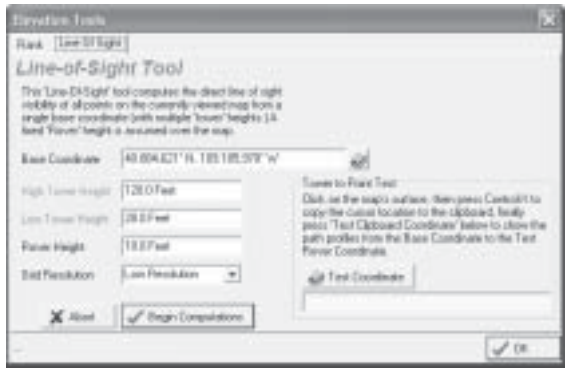
Show elevation profiles between two points, along a route or a hand-drawn path. Computes and displays elevation gain/loss, climb/drop and slope along path. Profiles can be optimized for scale and size for inclusion in publications.

Elevation Tools

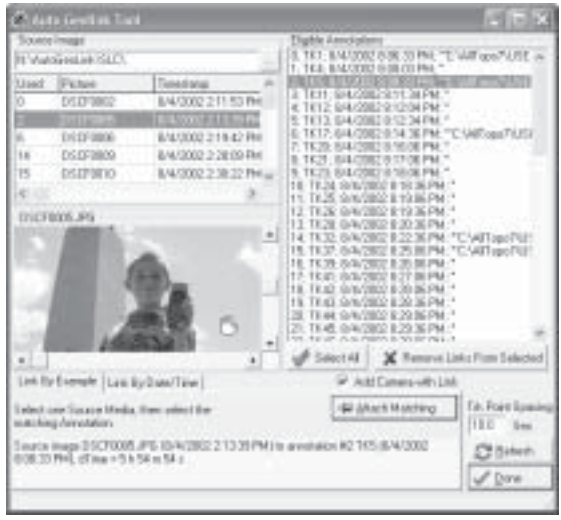
The Elevation Tools automate the interpretation of elevation data. The Rank Tool searches and ranks high and low elevations:



The Line of Sight Tool computes and shows where you can see a building or radio tower from.



Auto GeoLink Tool



Automatically associate digital camera images with GPS track, route and waypoints. Quickly builds geographic based media databases.

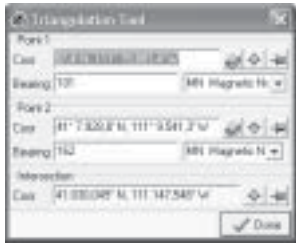
JPG Date Utility

This utility builds a small helper file containing the date time stamp of JPEG encoded image files. It is useful if you intend to use a picture editor that removes the timestamp from images and you will be Auto GeoLinking in the future.

GeoLink Media Viewer

Automatically displays GeoLinked image media, Annotation Name, Description, Notes and Quick Shape Identity results associated with the annotation nearest the mouse cursor.

Triangulation Tool



Knowing the bearing to a target location from two other positions, compute the target location.

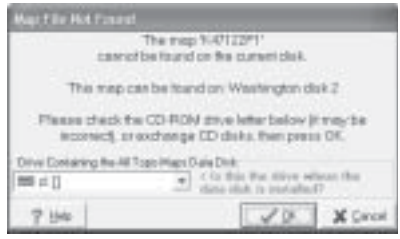
Point-to-Point Distance & Bearing Tool

Display the point-to-point distance and bearing in Lat/Lon (Great Circle), UTM Grid and State Plane Grid projections. Simultaneously shows bearing in True North, Magnetic North, UTM Grid North and State Plane Grid North.

Annotation Projection Tool

From a base location, project a new annotation at a fixed distance and bearing.

Map File Not Found

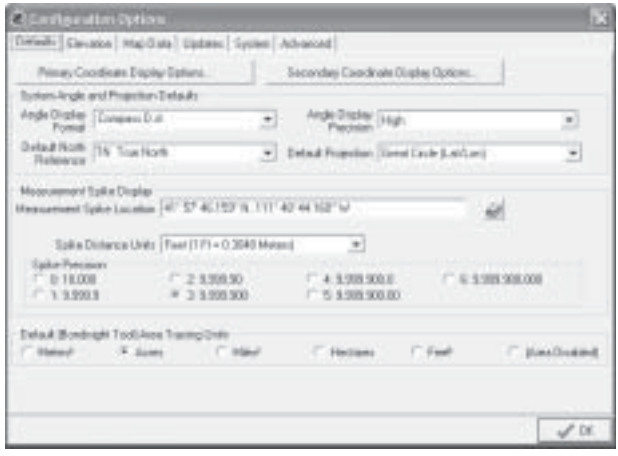


When you request a map that the viewer can not find, it will request the correct All Topo Maps data disk that holds the needed map file.

Set Map Scale

All Topo can print maps at scales other than their nominal scale. This dialog allows you to set the scale you intend to use the current map at which you intend to use and print the maps.

System Configuration Options



Customize All Topo Map's coordinate display styles, map source locations, web update and default annotation styles.

Coordinate Style Picker

Choose styles for coordinates that All Topo displays and writes. Pick the coordinate type: Lat/Lon, UTM, MGRS, State Plane and PLS. Configure the style, precision, datum and East-West/North-South order.

Layer, Grid Controller

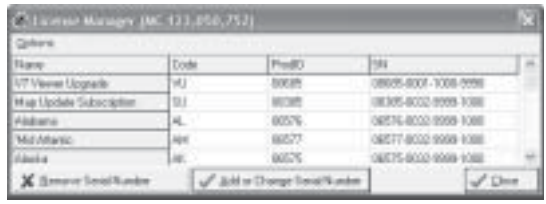
Enable/Disable Annotation Names, Descriptions, Notes; drawing layers; UTM, Lat/Lon and State Plane Grids.

Map Revision Selection

Some map sets include multiple revisions of maps. The button shows the number of maps that are available for the currently viewed map. Pressing the button shows the Map Revision Tool and allows selection of the available maps.

If you have installed the optional ‘Map Update Subscription’ and have an active internet connection, you can automatically download updated maps from the Igage map server.

License Manager

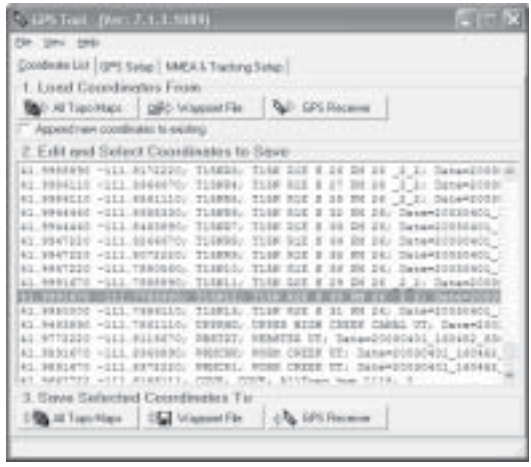


Adds and removes All Topo serial numbers for map sets and optional tools and subscriptions.

SHP2QSF Utility

This utility converts industry standard shape-files to the All Topo Quick Shape indexed file.

GPS Tool



Import and export annotations from the All Topo Maps viewer to most consumer GPS receivers using a cable connected to your serial port.

BigTopo7 Map Seaming Tool

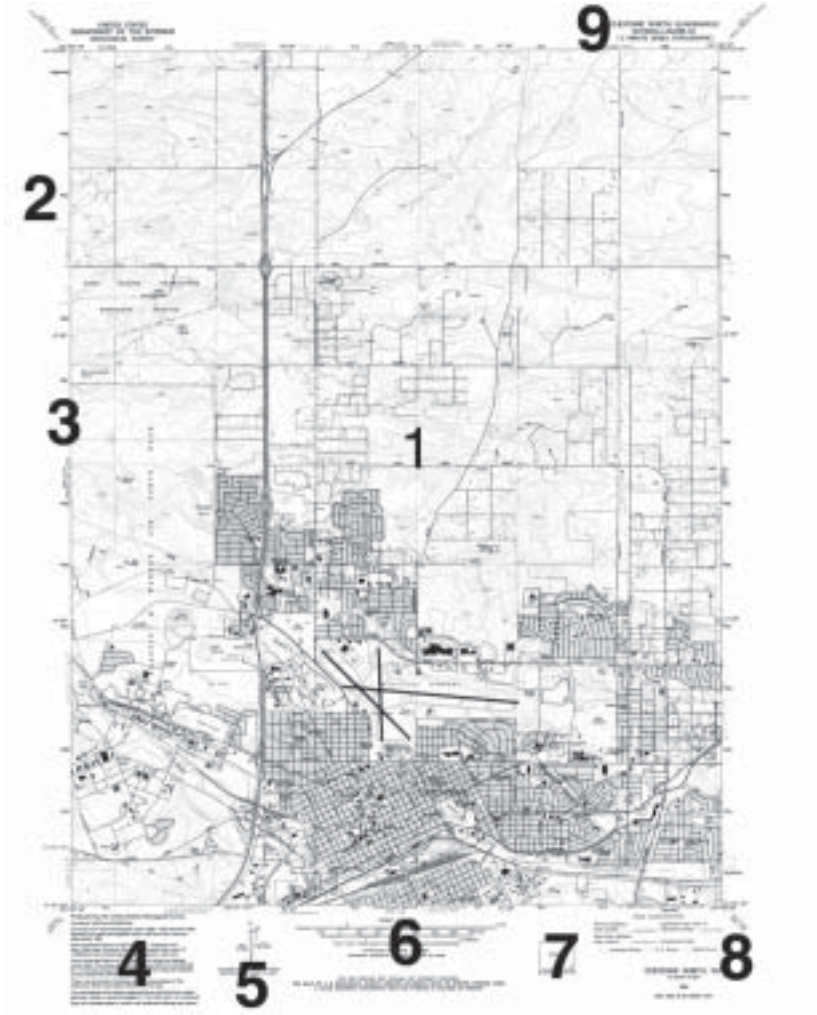
Build new, custom coverage maps for use in All Topo Maps or other programs.

Chapter 3: Map Basics

This chapter discusses basic map terms, use and some computer basics. It includes these topics:

- The Parts of a Topographic Map
- Map Scale
- Topographic Map Symbols

The Parts of a Topographic Map



Cheyenne North, Wyoming ; 7½ Minute Quadrangle

1. Map image.
2. Map collar or whitespace.
3. Neatline: separates the map from collar.
4. Map notes.
5. Declination vector.
6. Scalebar, contour interval, elevation datum.
7. Overview map.
8. Mapname (Title), freshness date.
9. Mapname (Title), County.

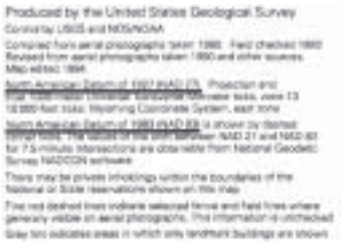
All Topo Maps are scanned, digital copies of the U.S.G.S. and Forest Service Single Edition quadrangles. Igage does not add or remove features from the maps while preparing sets. The All Topo Map program attempts to preserve the look and feel of paper maps and the map should appear in the program just as they do on the printed page.

In order to use the All Topo viewer, it is important to understand the parts of a topographic map.

Typical 7½ minute quadrangles cover 7½ minutes of latitude and 7½ minutes of longitude. Each printed quadrangle includes a map **(1)**, surrounded by a white map-collar **(2)**.

The black neat-line (**3**) separates the map-collar from the map. Typically the neat line is drawn orthogonal to latitude and longitude projection. That means the longitude along the right and left neat lines is constant and the latitude along the top and bottom neat lines is constant.

Corner coordinates describe the Lat/Lon coordinates of the spot where two neat-line intersections meet. Many maps include supplementary corner ticks indicating the corner location in an alternate datum. The coordinates are expressed in the datum listed in the map-collar.

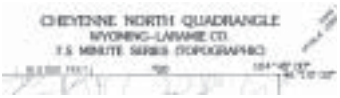


In the example above, the primary neat line intersections are NAD27 datum, the secondary ticks (right and just above the primary corner) are NAD83 datum.

Map Names

Map names are printed on the top right and bottom right corners of most maps.

North East Corner



South East Corner

The top right corner includes the map name, the state and county covered by the map. The bottom right corner includes the full map name and state list, a USGS reference number of some sort and a freshness date indicating the timeliness of the map.

The names of 7½ minute quadrangle names are not unique across the United States or even within a single state. For example, there are two 'Clarkston' maps in Idaho. One is on the boarder of Utah ‘Clarkston ID, UT’, the other on the boarder of Washington ‘Clarkston ID, WA’. It is very important to specify

the full name including the state list when referencing quadrangles.

Many map names are overused: there are 'Clarksville' maps in Missouri, Arkansas, Texas, Florida, Iowa, Tennessee, Maryland, Ohio, and two in Illinois.

Don't assume that you can circumvent the duplicate map name problem by referring to a map using the number printed under the map name or the bar code number included on some of the new maps. The USGS stock numbering system has changed numerous times and the printed stock numbers rarely can be cross referenced to a valid map.

All Topo Maps always fully qualifies map names with state lists to help reduce the chance of map name mix-ups.

Overview Map

Most quadrangles have an overview map, showing the relative position of the map within the outline of the state. The Cheyenne North map is shown by a black rectangle in the southeast corner of Wyoming:

Adjacent Maps

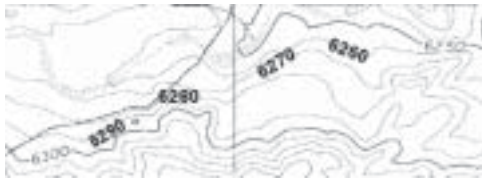
Most quadrangles list the names of the eight adjacent maps in the map collars at each corner and in the center of each edge:

Some newer maps may show a grid of adjacent quadrangles instead of listing maps around the collar:

Contour Interval and Vertical Datum

The Vertical Datum is shown under the map scale bar. The 'National Geodetic Vertical Datum of 1929' (based upon mean sea level) is almost universally used. If you are using a GPS, you should remember that your GPS reads elevation above the geode*, not NGVD29. *The geode is an imaginary ellipsoid that approximates the shape of the earth.

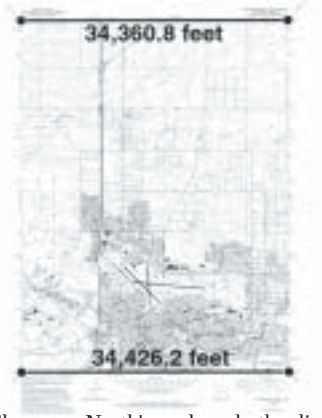
‘Contour Interval’ is the elevation distance between each contour line shown on the map. Typically index contours are shown every five intervals. In this example from the ‘Cheyenne North’ map, the intermediate contour interval is 10 feet, index contour lines are drawn every 50 feet:



The Scale Bar and Projection

The scale bar shows the horizontal scale at the center of the map, the vertical contour interval and the vertical datum.

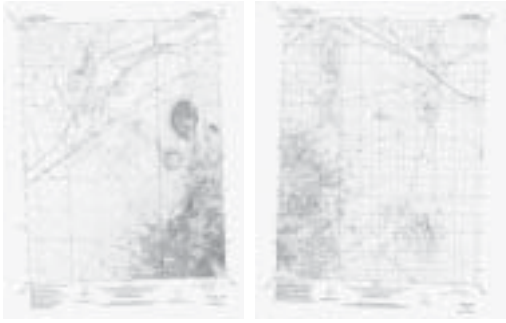
Since the paper map is projected with equal area of latitude and longitude, the actual map scale is slightly larger at the top of a map and slightly smaller at the bottom of a map:



For example, on the 'Cheyenne North' quadrangle the distance from the northwest neat line intersection (41 15 0 N 104 52 30 W) to the northeast neat line intersection (41 15 0 N 104 45 0 W) is 34,360.8 Feet; while the distance from the Southwest corner (41 7 30 N 104 52 30 W) to the Southeast neat line intersection (41 7 30 N 104 45 0 W) is 34,426.2 Feet, a difference of 65.4 feet.

While All Topo Maps are digital images of the paper maps, they have been carefully reprojected to flat space (the Universal Transverse Mercator projection). The UTM projected All Topo Maps, can be successfully seamed over very large areas and exactly match as the scale factor is held constant over the map and the map set.

The UTM reprojection has a side effect of 'tilting' the maps that lie at the edges of the UTM zone. Good examples of tilt are the adjacent maps 'Tecoma NV' and 'Lucin, UT'. Tecoma, the west map, lies at the easternmost edge of Zone 12; Lucin, the east map, lies at the westernmost edge of Zone 13:



Since these maps are projected to different UTM Zones, they will not align, even though they fall exactly next to each other. When BigTopo seams these maps, it reprojects both maps to the same UTM zone.

Magnetic Declination

Declination vectors show the relationship between True North, Magnetic North (the direction a compass needle points) and UTM Grid North.

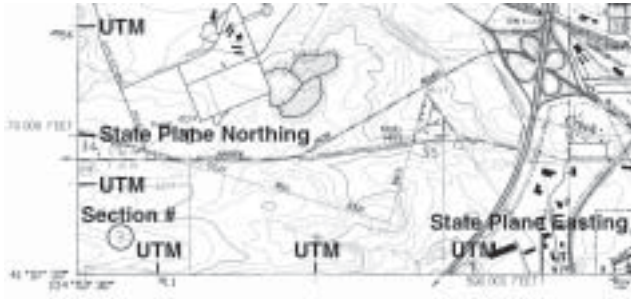
Magnetic North changes substantially over time and with position. On the 'Cheyenne North' quadrangle, magnetic declination has changed almost 1 full degree in nine years, from 11.0º in 1994 to 10.1º in 2003. In addition, there is a 0.1º change from the southeast to northwest corner of the quadrangle.

Declination is shown in both degrees and mills; there are 6,400 mills in 360º.

Don't scale angles from the printed declination vectors, they are rarely drawn to scale (the 11º degree declination in the diagram above is drawn as 14º.)

Grids and Ticks

Around the immediate edge of the map, just outside the neat-line, you will find several cryptic coordinates:



Most recent maps have blue UTM ticks or black UTM grid overlays. The UTM grid values are shown just outside the neat-line.

UTM grid labels are abbreviated showing only 1,000 meter values. UTM Grid labels are often omitted if another coordinate or margin annotation falls at the same location.

Collar notes indicate NAD27 or NAD83 datum (Old Hawaiian datum on some Hawaii maps and International Ellipsoid 1929 on some US protectorate maps.)

State Plane reference ticks are typically shown in both the southwest and northeast map corners. In the figure above, the State Plane northing is 170,000 feet, the easting is 590,000 feet. The State Plane Zone (Wyoming East NAD27) is shown in the collar notes.

Most of the United States is covered by Public Land Survey Grids. These grids are shown by 1 mile square red grids. These grids are grouped into 6 mile by 6 mile townships, comprised of 36 sections labeled 1 through 36. Section 3 is circled in the figure above.

While the section numbers are enumerated in red within the map collar close to the center of each section, Township and Range are shown in red, just outside the neat line. On provisional edition maps, township and range are handwritten, just inside the neat lines.

Collar Notes

The collar notes in the bottom left corner contain some of the most important information on a map. The dates of compilation and field checks are indicated. The horizontal datum (typically NAD27 or NAD83) is listed as is the State Plane Zone indexed at the edge of the map. Notes about tints and boundaries are crucial for deciphering tinted parcels and additions.

Map Scale

Topographic maps can be produced at any scale. In the United States topographic maps are commonly produced at:

1:250,000, 1:100,000, 1:63,360, 1:25,000 and 1:24,000 scale

A map's scale refers to the ratio of distance on the map to distance on the ground. A 1:250,000 scale map represents 250,000 inches (3.945 miles) on the ground as one inch on the map.

SCALE	1 Inch=? Feet	1 Inch=? Miles	1 Mile=? Inches
1:250,000	1" on map = 20,833 feet	1" on map = 3.945 miles	1 mile = 0.2534 inches
1:100,000	1" on map = 8,333 feet	1" on map = 1.578 miles	1 mile = 0.6336 inches
1:63,360	1" on map = 5,280 feet	1" on map = 1.000 miles	1 mile = 1.000 inches
1:50,000	1" on map = 4,167 feet	1" on map = 0.789 miles	1 mile = 1.267 inches
1:25,000	1" on map = 2,083 feet	1" on map = 0.395 miles	1 mile = 2.534 inches
1:24,000	1" on map = 2,000 feet	1" on map = 0.378 miles	1 mile = 2.64 inches

Smaller map scales show a smaller area with great detail, large map scales show a large area with less detail:

1:24,000

1:100,000

1:250,000

1:25,000 scale maps were briefly produced during the late 1970's when the United States was planning on converting to the metric system. When the national conversion was abandoned by President Reagan in 1977, the USGS reverted to producing 1:24,000 scale topographic maps. Most 1:25,000 scale topographic maps and 1:100,000 scale maps produced during the 1970's have elevations noted in meters instead of feet. 1:25,000 scale maps in All Topo map sets are rescaled to 1:24,000 scale maps to help reduce map scale complexity.

Topographic Map Symbols

The following symbols are commonly used on USGS topographic maps.

Control Data and Monuments

Control points are maintained by the National Geodetic Survey for survey, geode and elevation control purposes. A very detailed database of these points is routinely published, and the latest data is available on the web at www.ngs.noaa.gov. Many of these control sites have been maintained since the founding of the United States and the coordinate database makes interesting reading.

NGS defines and manages the National Spatial Reference System (NSRS). NSRS is a consistent coordinate system that defines latitude, longitude, height, scale, gravity, orientation throughout the United States, and how these values change with time.

Horizontal Control

Third order or better, permanent mark

With Third order or better elevation

Checked spot elevation

Triangulated from orthophotos

Arial triangulation

Coincident with section corner

Unmonumented

Vertical Control

Third Order or Better, with tablet

Third Order or better, recoverable mark

Benchmark found at section corner

Spot Elevation

Boundary Monument

With tablet

Without tablet

With number and elevation

U.S. Mineral or location monument

Contours

Topographic

The interval of contour lines varies from map to map. The contour interval is almost always listed below the horizontal scale bar at the bottom center of each map. Some maps have two contour intervals. One portion of the map, typically beginning at the foot of a steep mountain range has greater interval spacing reflecting steeper terrain.

Intermediate

Index

Supplementary

Depression

Cut, Fill

Bathymetric (Water Depth)

Bathymetric depths are based on a variety of measurements and reference elevations. Check the collar of the map for detailed information on the reference elevation (mean, high or low tide) and accuracy of bathymetric contours and depth values.

Intermediate

Index

Primary

Index Primary

Index Supplementary

Boundaries

Boundaries between tracts of property are never enumerated on topographic maps unless one (or both sides) of the boundary is administered by the Federal government.

National

State or Territorial

County or equivalent

Civil Township or equivalent

Incorporated City or equivalent

Park, Reservation or Monument

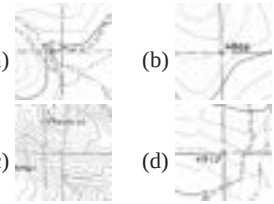
Small Park

U.S. Public Land Survey System

While the township/range/section line style is indicative of the accuracy of the drawn line, the corner tick style is a much better indicator of plotted corner and line accuracy.

(a) (b)

(c) (d)



If dashed lines merely cross (a), then the location and existence of a survey monument is doubtful and the dashed lines are most certainly plotted in the wrong place.

A solid corner tick (b) indicates that the survey monument was recoverable (when the map was researched) and is believed to be plotted in the correct location. The dashed section lines in example (b) above indicate unreliable section lines.

Solid lines, with no separated tick (c), indicate that there is some certainty that the lines are plotted correctly, however the section marker was not recoverable, or a marker was never set.

Solid lines, with a solid separated corner tick (d), indicate the best line and corner accuracy.

With respect to the accuracy of section lines, in all cases you should assume the sections shown on topographic maps may have substantial errors. They typically are NOT representative of any survey, nor do they have any legal basis in the survey record.

Since township/range/section lines are rarely projected to adjacent quadrangles when plotted, they often do not align when quadrangles are seemed.

Section numbers are indicated by red integers within the section. Section or parcel numbers denoted with 'PB' indeicate 'Protracted Blocks' and are not surveyed.

Township or range line

Township location doubtful

Section line

Section location doubtful

Found Section/Closing corner

Witness corner; meander corner

Other Land Surveys

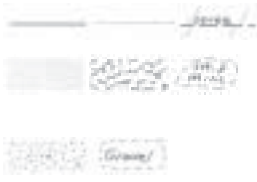
Township or range lines

Section Line

Land Grant, mining claim; monument

Fence line

Surface Features



Levee

Sand, mud area, dunes or shifting sand,

Intricate surface area

Gravel beach or glacial moraine

Tailings pond

Mines and Caves

Quarry or open pit mine

Gravel, sand, clay or borrow pit

Mine tunnel or cave entrance

Prospect, mine shaft

Mine dump

Tailings

Vegetation

Woods

Scrub

Orchard

Vineyard

Mangrove

Glaciers and Permanent Snowfields

Contours and limits

Form lines

Coastal Features

Foreshore flat

Rock or coral reef

Rock bare or awash

Group of rocks bare or wash

Exposed Wreck

Depth curve; sounding

Breakwater, pier, jetty or wharf

Seawall

Bathymetric Features

Area Exposed at Mean Low Tide

Sounding datum

Channel

Offshore Oil or Gas: Well; Platform

Sunken Rock

Rivers, Lakes and Canals

Intermittent Stream

Intermittent River

Disappearing Stream

Perennial Stream

Perennial River

Small falls; Small rapids

Large falls; Large rapids

Masonry Dam

Dam with Lock

Dam carrying Road

Perennial, Intermittent Lake or Pond

Dry Lake

Narrow Wash

Wide Wash

Elevated Aqueduct, Flume or Conduit

Aqueduct Tunnel

Well or Spring; Spring or Seep

Submerged Areas and Bogs

Marsh or Swamp

Submerged Marsh or Swamp

Wooded Marsh or Swamp

Submerged Wooded Marsh or Swamp

Rice Field

Land subject to inundation

Buildings and Related Features


Building


School, Church

Built-up Area


Racetrack


Airport

Landing Strip


Well (other than water)

Windmill


Tanks


Covered Reservoir

Gauging Station

Landmark object (feature as labeled)


Campground; Picnic Area

Cemetery: small; large

Roads and Related Features

Road widths are not plotted to scale, but are symbolically represented at the correct location. A true-scale trail may be so narrow on the map that it would be difficult to see.

Primary Highway

Secondary Highway

Light Duty Road

Unimproved Road

Trail

Dual Highway

Dual Highway with median strip


Road Under Construction


Underpass; Overpass


Bridge


Drawbridge


Tunnel

Railroad and Related Features

Standard Gauge Track w/ Station

Standard Gauge Multiple Track

Abandoned

Under Construction

Narrow Gauge Single Track

Narrow Gauge Multiple Track

Railroad in Street

Juxtaposition

Roundhouse and Turntable

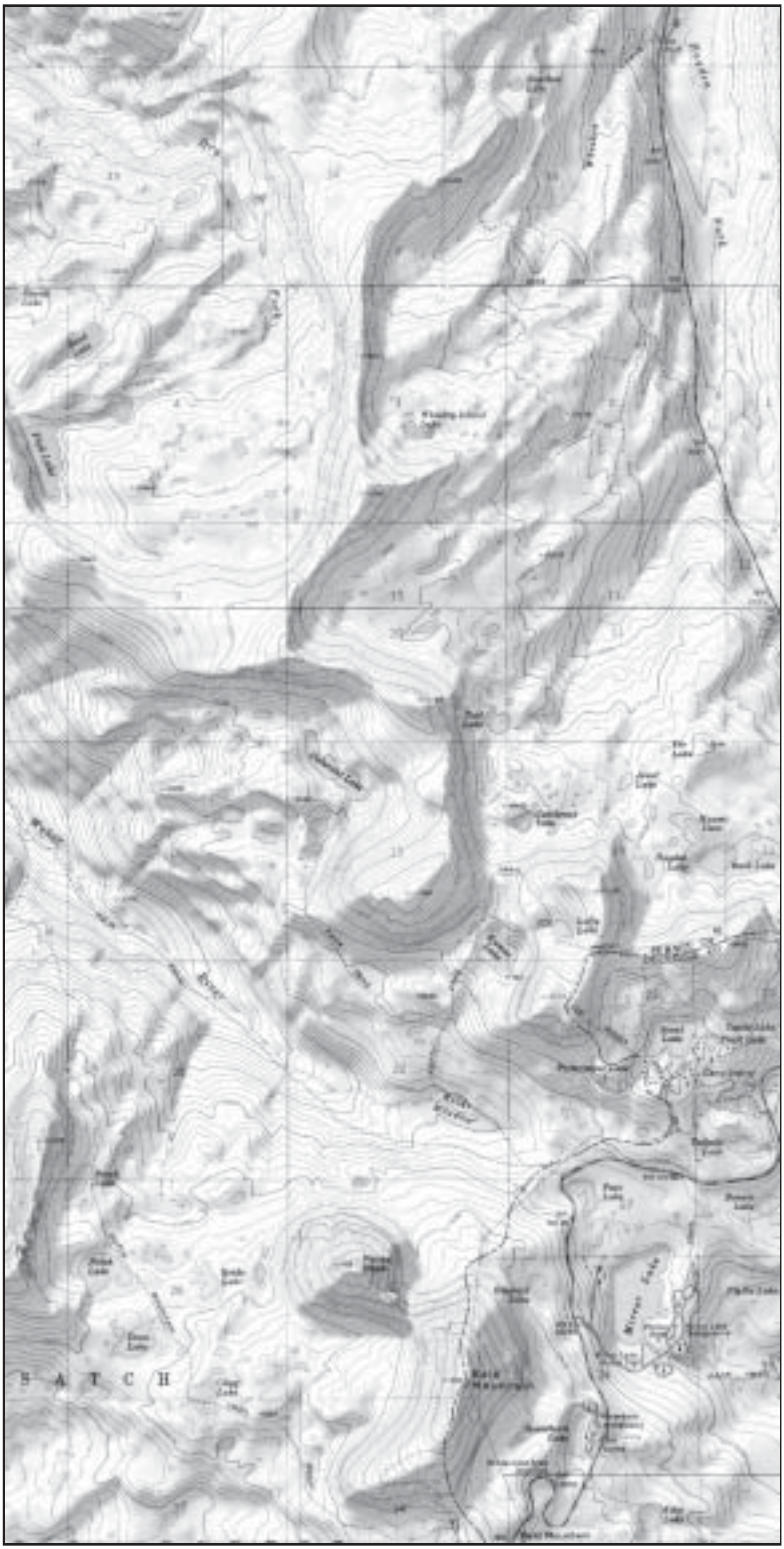
Transmission Lines and Pipelines

Power Transmission Lines:

Pole Tower, Telephone Line

Aboveground Oil or Gas Pipeline

Underground Oil or Gas Pipeline



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Chapter 4: Computer Conventions and Basic Terms

This chapter discusses general mapping and Windows terms and tricks. It includes the following topics:

- All Topo Prerequisites
- Map Terms Glossary
- General Windows Tricks

All Topo Prerequisites

You will need a basic understanding of 'Windows' operation to use 'All Topo Maps'. If you have never used a computer don't despair, consider taking a short class on computers through a local educational resource. Look for a basic Windows class at your local high school, community college or continuing education center.

Map Terms Glossary

This short list of terms and tricks may help you figure out concepts presented in this manual. This is not a dictionary, some of these words have very different meanings in real life and many of these definitions are All Topo Maps specific!

Browse for file or file path. This button is often found to the right of filenames and file paths. Press the button for dialog assistance finding a file or setting a file path.


Recall a position from the geographic Coordinate Bookmarks.


Recall the geographic position from the Windows clipboard. If the clipboard does not contain a recognizable coordinate nothing happens.

%Token% - A word or group of words, surrounded by percent signs, that All Topo evaluates and replaces tokens with another value when placed in an annotation Name, Description or Note. For example %TIME% is replaced with the current time-of-day.

'The drive letter that represents your CD ROM'
Your computer should have a CD Rom device, if you have a CDROM writer and a DVD reader/writer, then you have two devices that can read a CD. Each CD ROM drive has a letter associated with it, just as your floppy disk is the 'A:' drive and your fixed disk is the 'C:' drive.

Most CDRom devices are drive 'D:', however your CDRom drive letter could be any letter between D and Z. To figure out which letter to use: find the 'My Computer' icon on your desktop; double click on it to open the 'My Computer Browser'. Look through the icons for one that looks like a CDROM, the letter next to the CD icon is the drive letter.

109.117,913,2 (commas after a decimal point)
Commas after a decimal point. You are probably used to seeing numbers like $10,000,000.00 instead of $10000000.0. The comma separators help you immediately recognize the first number as 10 million bucks. All Topo and this manual offer the same courtesy to your eye: 109.117,913,2 is a lot easier to read than 109.1179132.

All Topo Maps, '**All Topo**', '**GPS Tool**' and '**BigTopo**'
In this manual, 'All Topo Maps' refers to the All Topo Map system, a software collection that includes: the maps, the viewer 'All Topo', the GPS Tool (ATMGPS) and the seaming tool BigTopo.

Annotation - Text symbol or line added to a geographic location on a map. Also called a Waypoint.

BigTopo is a seaming tool that extracts portions of maps or combines adjacent maps to form new maps with custom (typically large) geographic coverage. BigTopo is included with every 'All Topo Map' system. BigTopoPro is a professional version of the seaming tool that has even more features.

CAD - Computer Aided Drafting: A software program that is used to draft engineering document.

Control Key - The key labeled 'Ctrl' on the bottom left and right of your keyboard. Pressing the control key changes the operation of most every other key. Often you will see descriptions like 'Ctrl-S'. This means: press and hold the Ctrl key, then tap the 'S' key, then release the control key.

Cursor - the icon that moves around on the computer screen when you push your mouse around on the table. Cursors are selected in All Topo Maps with these toolbar buttons: 

Datum - Plural of 'data'. Geographic datum describes two numbers: the diameter of earth at the equator and the flattening at the North and South poles. Consider an inflatable ball pushed in at the top and bottom. 'Datums' is not a word as 'datum' is already plural!

Geo - A great prefix that turns any boring thing into a hot new trend. For example: - 'Link' (way boring) vs. 'GeoLink' (totally cool!)

Geographic Coordinate - A geographic coordinate uniquely describes a place on the Earth's surface. Hopefully a coordinate specifies only a single location. A single location may be described by many coordinates. Often abbreviated as 'coordinate'.

Geographic - Pertaining to the earth.

GeoLink A hyperlink that is associated with a geographic coordinate.

GIS - Geographic Information Systems. These complex products contain extensive tools for classifying and reporting data which is associated with geographic locations. They typically cost a lot of money and are fairly difficult to use.

All Topo Maps is not a GIS system; it is an inexpensive and easy to use map and geographic toolbox. Of course: 'Easy to use is easy to say!'

GPS Icon - a small image associated with a coordinate in a GPS receiver. Tent, anchor and buoy icons are common.

Hyperlink A reference to more information or another (hopefully related) subject.

Icon - a picture that floats over a background image. Icons may have transparent areas.

Media - Picture, sound file or movie file.

Mouse - the thing that pushes the Cursor around on your computer screen. May also be a trackball or digitizing tablet.

Plotter - An output device that prints on large-format paper (larger than 13"x19".)

Printer - An output device that prints on paper 13"x19" and smaller.

Projection - Printed maps are flat, the earth is a sphere. When we make a flat map, we 'project' the curved surface of the earth to a flat space. All Topo Maps use equal area projections (Universal Transverse Mercator), every pixel on a UTM projected map covers the same area on the surface of the earth. Other common projections are Lat/Lon (pixels cover equal latitude and longitudes of coverage), and State Plane Projections.

General Windows Tricks

These commands and tricks are available at all times when using All Topo Maps. They are features of Windows (not the All Topo viewer); since no one ever reads the manual that comes with Windows, the list bears repeating:

'**Home**' Key - In All Topo the Home key sets the map zoom to 100%. If you are using a desktop computer with a standard keyboard, you will find the Home key in the group of six keys to the right of the 'Enter' key. If you are using a laptop, the home key is probably at the top of rightmost row of keys, just under the 'Del' key.

A window's **Tabs** - Some windows have tabbed forms. The tabs are like the label tabs on a file folder. Here is an example:

Alt+F4 - Closes the current window, if the current window is the main form of the program then the program will exit.

Alt+Tab - Switches focus between the running applications. If you are both editing a document and running All Topo, you can quickly switch between the two applications by pressing Alt+Tab. Since the GPS Tool and BigTopo are separate applications, Alt-Tab is especially useful for switching between windows.

ALT+underlined letter - Press the Alt key to see menu options with underlined shortcut letters. Pressing and holding the Alt key, then tapping the underlined letter, then releasing the Alt key will select the option just as if you had clicked on the option with your mouse.

Click - Press the primary mouse button once. If you are right-handed, the primary mouse button is the left button; if your computer is configured for left-handed operation, the primary mouse button is the right button.

Ctrl+F4 - Close the current window (CTRL is the Control Key, which is labeled 'Ctrl' on your keyboard).

Ctrl+Shift+Tab - Moves backwards through a window's Tabs.

Ctrl+Tab - Moves forward through a window's Tabs (not all windows have tabs).

Ctrl-C - Copy whatever is selected to the Windows clipboard.

Ctrl-V - Paste whatever is in the Windows clipboard at the current cursor location.

Ctrl-X - Cut whatever is selected to the Windows clipboard.

Current Application - It is possible and desirable to have more than one application running on your computer at once. Only one application is selected at a time (computer nerds say the currently selected application has 'focus'.). The Menu Bar of the Current Application is highlighted to let you know it is selected. When you use shortcut keys, the application that you want to receive the keystrokes must be selected.

Desktop - the entire area shown on your computer screen, or screens if you have more than one display device.

Dialog - A dialog is a window form that you interact with. Typically you will enter data and check boxes, then after you get everything to your liking press 'OK', 'Done', 'Yes', 'No' or 'Cancel' to close the Dialog. Dialogs can be either 'modal' or 'non-modal'. Modal dialogs stay on top preventing you from accessing anything behind them until they are closed. Non-modal dialogs coexist with other windows in the

application.

Double-Click - quickly click the primary mouse button twice (see click).

Esc - Pressing the Escape key (upper left corner of your keyboard) typically is the same as pressing a form's 'Cancel'.

F1 - Press the F1 key to display help (hopefully the help will be directed at what you are currently doing).

F10 - Activate the menu bar of the current application.

Form - A form is a window dialog that you interact with. See Dialog!

Menu Bar - Many windows have a menu bar under the title bar. You can click on the menu options to see pull-down menus with additional selections.

Menu Selections - Throughout this manual you will find instructions that read like: select the menu option 'Annotations: Backup, Restore, Package…: Unpackage…'

This is interpreted as click on the 'Annotations' selection from the Main menu, then click on the 'Backup, Restore, Package…' option on that menu, then click on the 'Unpackage' menu.

The three dots '…' at the end of menu choices indicate another menu or dialog box will be displayed when you click on the selection.

Moving Windows - if you don't like the place where a window is shown on your desktop, you can grab it with the mouse and move it where you want it. To move a window, position the mouse cursor above the Title Bar, push and hold the left-mouse-button down and then drag the window to where you want it.

Resizing Windows - You can resize most (but not all) windows: - position the mouse cursor at the edge of the window, press and hold the left-mouse-button and drag the window to a new size.

Some windows have limits on how small they may be resized.

Many windows have three buttons in the upper right window corner:

These buttons can be used to force Windows to hide the dialog, fill the screen with the window and close the window. Alternatively you can double click on the Title Bar to toggle between partial and full screen window coverage.

Right-click - click the secondary mouse button once (the right button if you are right-handed).

Shift-Tab - Moves backwards through a window's options.

Shortcut Keys - A shortcut key replaces a series of mouse movements and clicks. Shortcut keys sometimes require pressing more than one key. For example the shortcut key to display the 'Placename Search' tool is 'Alt+P'. To activate the shortcut key: press and hold the 'Alt' key, then while holding the Alt key down tap the 'P' key, finally release the Alt key.

In addition to the Alt key there is a Ctrl key and a Shift key. Some shortcuts use three key combinations; Ctrl-Alt-Del is the most famous three key combination (if you are lucky it will show the Windows Task

manager.)

There should be two Shift keys, two Control keys and two Alt keys on your keyboard, either the left or right key will work. There may also be a 'fn' key that shifts the status of many of the keys on the keyboard.

Status Line - Many windows (but not all) have an area at the bottom of the window where messages are displayed. This area is called the 'Status Line'.

Tab - Moves forward through a window's options.

The Windows Clipboard - The Windows Clipboard is a place where you can put objects. When you are editing text, if you highlight the text and press Ctrl-C the selected text is copied into the clipboard. If you instead press Ctrl-X, the selected text will be cut from the source and placed in the clipboard. Later you can paste the clipboard text into another location by pressing Ctrl-V.

The clipboard will hold pictures and other objects and is a convenient way to transfer objects between applications.

Title Bar - The solid bar at the top of most windows. You can grab a window by its title bar and move it around your desktop. Here is the title bar from BigTopo7:

Tool Bar - The collection of tools located under the Menu Bar.

Window - A dialog box or form that is shown on the computer desktop.

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Chapter 5: Support, Installation, Serial Numbers

This chapter includes the following topics:

- Suggestions and Complaints
- Support
- Minimum and Recommended System Requirements
- Registering Your Product
- Installing All Topo Maps
- Updating your All Topo Version 7 Product
- Advanced Installation Settings
- General Serial Number Information

Suggestions and Complaints

Thanks again for purchasing and using All Topo Maps!

Our goal is to make a great, easy to use mapping product that solves the needs of professional users, sell it a reasonable price and provide the best service we can.

Most of the nifty features of All Topo Maps are a direct result of past customer input. If you have a great idea to make All Topo a better solution for your application, be sure to call us.

Igage Mapping Corporation is not a big outfit. Your suggestions and complaints **will** make a difference!

Support

Support for the All Topo maps viewer can be obtained by email, phone or fax. General questions may be answered in the FAQ (Frequently Asked Questions) section of the Igage website.

www.igage.com

Phone numbers and email address are available on the 'Certificate of Serial Number' and on the web site.

You will find instructions for joining the All Topo mailing list on the web. Joining the list will insure that you receive timely notices of updates and new products.

Email and Phone Support

If you call or write, please have the following information readily available so we can assist you:

- If you send us email, please include the words 'All Topo' in the message subject so we can find your email in the sea of spam.
- All Topo product state set, revision and program version (see Help: About All Topo Maps.)
- Your full 16 or 20-character serial number.
- Your machine code (see Help: About All Topo Maps.)
- This manual so we can refer you to figures and examples.
- A telephone number where we can call you back.
- If your product has not been previously registered, we will register your product before we assist you.

Please respect our desire to provide excellent customer support for a reasonably priced product. We can't:

- Support operating system (Windows) questions, debug your hardware

problems.

- Teach you basic computer techniques over the phone.
- Support our competitor's products.
- Teach you how to use your GPS.
- Support your CAD (Computer Aided Design) or GIS programs.

Minimum and Recommended System Requirements

To install and run All Topo Maps, the minimum requirements are:

- IBM compatible computer.
- 90 MHz - 486 processor (PII - 400 MHz or faster highly recommended).
- 32 MB RAM (256 Megabytes RAM recommended.)
- VGA Monitor (Super VGA 1024 x 768 or better recommended), High Color or True Color. All Topo will not run under 16-color and some 256-color modes.
- Mouse or other pointing device.
- Microsoft Windows 98, Windows 98 SE, Windows Me, Windows NT, Windows 2000, Windows XP (Windows 2000 or Windows XP recommended.)
- CD-R drive.
- At least 120 Megabytes **free** disk space (1 Gigabytes recommended.)

Registering Your Product

Please take a moment to fill in the registration card and return it, or use the web based registration form at

http://www.igage.com/regweb/

We want our upgrade information to be welcomed at your address and promise to keep our customer lists (your name and address) private.

One of the most common All Topo service calls is a request for a Serial Number when a user changes or reloads a computer. We can't look up your serial number if you don't register. Replacement serial numbers can not be issued for Version 7 products!

Store your Certificate of Serial Number in a safe place; you will need it if you upgrade your system's All Topo Map components. Your certificate lists telephone numbers for All Topo Map support.

Don't divulge your serial number to others. Program updates, special promotions and support are offered only once per customer as metered by your serial number. Other individuals using your serial number will prevent you from obtaining the updated tools and support that you deserve.

Installing All Topo Maps

A variety of installation scenarios are supported to provide compatibility with previous map sets:

- New Installation
- Upgrade Previous Versions (V6 to V7 upgrade)
- Adding Additional V7 State Sets
- Adding Additional V6 State Sets

Installation is the same for all scenarios: run the installation disk from each product once, allowing the installer to install each product into the same base location (typically “C:\AllTopo\”.)

The installation tool for each AllTopo product automatically keeps the latest program and data revisions for your installation. You can install products in any order.

Installation

All Topo Map products are installed from dedicated installation disks or the first data disk in each set. (It is never necessary to install data disks numbered 2 or higher.)

To run the installation program:

1. Start (turn on) your computer.

2. After your computer has started, place the installation disk into the CD-ROM drive.

3. Wait for the installation program to automatically start. If the installation program does not start:

   Click **Start** (on the Start menu bar), and then click Run.

   Type *d:*\Setup, where *d* is the letter representing your CD-ROM drive, and then click OK.

   If you don't know the drive letter of your CD Rom, press the 'Browse…' button; choose 'Look In' 'My Computer' and finally look for the CD icon. Double-click on the 'Setup' icon found on the CDRom disk.

Pre V7 Installations

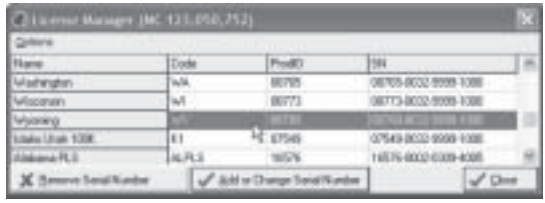
When installing pre-V7 installations, follow the on-screen instructions. Allow the installer to use the same base installation folder for each product.

Version 7 Installations

When the setup program is launched, a splash screen will be displayed while the installation tool prepares to run. After a moment, the installation program will begin, follow the onscreen instructions.

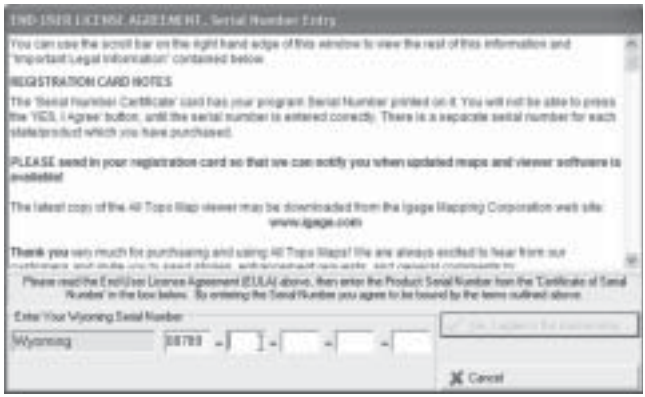
When the 'Serial Number Manager' is displayed, insure that all the serial numbers for the All Topo products you have purchased are listed. Missing serial numbers will prevent products from being installed and they will not be available for use.

To enter new or missing serial numbers press the 'Add/Change' button, the License Manager will be shown:



Browse for missing products. To add a Version 7 serial number (V7), highlight the product description, then press the 'Add or Change Serial Number' button,

and enter the full 20 or 21 character serial number.

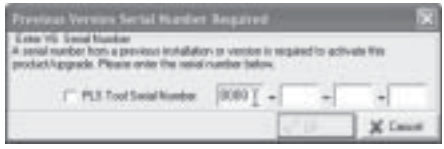


Some products require factory authorization. If a 'FCode' is requested, you will need to call the factory and provide the Product Serial Number and MCode to receive the FCode for your specific system.

Installing Pre Version 7 Map Sets

Version 6 All Topo Map sets can be used as data sources for the V7 viewer if you have purchased and entered a ‘V7 Viewer Update’ serial number.

First insure your 'V7 Viewer Update' serial number has been entered, then choose the menu selection 'Options Add Pre-V7 Serial Number'.



Check the ‘PLS’ box if your ‘V6 Certificate of Serial Number’ indicates the serial number you are entering is a PLS tool. The ‘OK’ button will light when the full 16-character V6 serial number is entered correctly; press the ‘OK’ button.

When all serial numbers have been correctly entered, press the License Manager’s ‘Close’ button, then press the Serial Number Manager’s ‘OK’ button and complete the installation.

Updating your All Topo Version 7 Product

If you have an internet connection you can update your All Topo product (the viewer, GPS Tool and BigTopo) using the automatic web update tool. To use the tool, exit the GPS Tool, BigTopo and any other All Topo tools. Start the All Topo viewer, from the Start Menu, choose: 'Tools: Web Update: Viewer and Tools…' then follow the onscreen instructions.

Advanced Installation Settings

Large Format Printer/Plotters

If you will be printing maps to large format printers, read the section 'Printing Huge Maps on Plotters' in the Printing section of this manual for additional

configuration instructions.

Optimizing Disk Usage

The All Topo Maps viewer and BigTopo tool utilize a number of folders to hold map images and temporary files. By default most of the folders for these temporary files are located under the main All Topo folder, typically “C:\All Topo\”

Several of the folders can be configured to hold huge amounts of data. If you plan on copying the map data source files to your fixed drive you may want to first choose alternate folder locations to optimize the placement of All Topo’s temporary and data files on alternate disk volumes.

'Base Location of Auxiliary Elevation Data Files'

If you store map images on your fixed drive, this folder location holds all of the .idz elevation data. By default the elevation data stays on the distribution CD, if you choose to copy the maps from the distribution CD to your fixed drive, the elevation files will be arraigned in this folder.

See 'Options: System Options…: Elevation (tab)' to modify the location.

L1 and L2 Map Cache

L1 and L2 Caches are used to hold decompressed and raw map images copied from the CDRom. The L1 and L2 caches hold 20 megabytes each by default.

If you use the distribution CD's for map sources, setting the L1 cache to a much larger size will significantly reduce source CD swapping.

Setting the L2 cache to a large value will allow the viewer to keep additional decompressed maps available for viewing.

See the main menu option 'Options: System Options…: Map Data: Map Cache Size' to modify these locations.

Map Updates Folder

MapUpdates, used to hold copies of new maps downloaded from the web. Each updated map, downloaded from the AllTopo map server will require 0.5 to 5 Megabytes of disk space.

See the main menu option 'Options: System Options…: Updates: Base Location of Updated Map Components'

GeoLink Cache

The GeoLink Picture Cache holds decoded thumbnails for GeoLinks. The Picture Cache is set to 2 megabytes by default. If your project contains hundreds of GeoLinks you will achieve significant performance benefits by setting this cache to a much larger size.

See the main menu option 'Options: System Options…: System: GeoLink Picture Cache'

General Serial Number Information

All Topo Maps sets are licensed for installation on a single computer. Every computer that has All Topo Maps installed and 'ready-to-run' must have a **unique** serial number.

When you use our web based update services (updating the software or maps), our server records the serial number and machine identification of your system. When you call us requesting assistance we also record your serial number and machine identification. Both web based updates and phone support register your unique serial number to your physical computer.

We know that you will purchase new computers, or need to reload our software after a crash, so we automatically allow you to install our software on new or rebuilt machines. However, each new installation will invalidate all previous installations; only the latest installation is eligible for updates and support.

While invalidated installations will continue to run, they are not eligible for additional web based updates or support. Attempts to update invalidated installations will disable the invalid installation.

Extra Serial Numbers: Multiple Machines, Site Licensing, Network Licensing, Subscription Services

Single User with Multiple Machines

Additional licenses (serial number sets) can be purchased to allow a single user to install and utilize web based updates on multiple machines. These 'Serial Number Only' licenses do not include disk or manual sets, must be registered to a single user and are available at a greatly reduced price.

Site Licensing

Discounts on multiple full copies of All Topo Map Sets (with media, manuals and serial numbers) are available. Site licensing pricing is based upon these criteria:

- Number of client seats: you must purchase at least 5 licenses to qualify.
- Number of Serial Numbers per user (desktop and laptop); purchasing multiple serial numbers per user will accrue the same discount as the 'Single User with Multiple Machines'.
- Site licensing requires a signed agreement and individual approval by Igage Mapping Corporation.

Network Licensing

Network enabled copies of All Topo Maps are available. These copies share map data sources on the network, install client copies from the network and are centrally administrable.

There is a fixed, per server, V7 Network License fee; server connected client serial numbers are discounted.

Subscription Services

Web based 'Map Updates' are provided via subscription. Complementary subscriptions are provided with some products.

When a subscription expires, it may be renewed for a nominal charge.

Internet Based Updates and Subscriptions

All Topo Map web based program and map updates require subscription verification. The subscription process requires that a small amount of data be transferred from your computer to the subscription server. When you use the subscription service, the following information is exchanged:

User Name	‘Mark’ The user logged into windows
Computer Name	‘PLUTO’ The user assigned computer name
Computer IP Address	169.123.132.12 The IP address used for registration
Product Serial Number	3584-0001-0320-1004-XXXX Unique number from certificate
Computer ID	54,123,456

Unique identifier for physical CPU

When registration (or re-registration) is necessary, the All Topo Maps viewer will warn you that a data transfer is going to occur and show the data that will be transferred. You can cancel the operation if you don't want to share this data with our server; however it is not possible to utilize Web Based Updates and subscriptions without agreeing to transfer registration information.

If you are transferring a serial number to a new machine, the web based update tool will ask for confirmation/permission before it invalidates the previous installation.

If you are unable to use the Web Based Update, update CD's are available from Igage Mapping Corporation to update your mapping set. Contact Igage for a list of available update CD's and pricing.

Serial Number Use Scenarios

1 User Mark purchases a state set, installs it on his personal computer and obtains web based updates. Later Mark purchases a new computer (faster, bigger, better) and installs ATM on the new computer, and obtains web based updates.

   The new computer will automatically have full access to web based updates and technical support. The old computer will not have access to updated maps; however the old installation will continue to run unless a web-based product update is attempted.

   Telephone/email support will be provided for Mark when he is using the new machine.

2 User John purchases a state set, installs it on his personal computer and obtains web based updates. Later John loans his set to a friend Cindy, who installs it on her machine and obtains web based updates.

   John's machine is no longer eligible for web based updates. Cindy is not eligible for support as she is not the registered user. John is eligible for support if he calls while using Cindy's computer.

3 User Mary purchases a state set, installs it on her personal computer and obtains web based updates. Later Mary also installs it on her office computer and obtains web updates. Upon returning home, Mary can't obtain additional web based updates or support.

   Mary may purchase a reduced price 'Additional Serial Number' set for use with her home computer.

4 User Terry purchases and installs an All Topo Map set on an office computer. Someone gains access to his CD disk set and full serial number and installs All Topo Maps on their computer, and gets the latest viewing software and maps via the web.

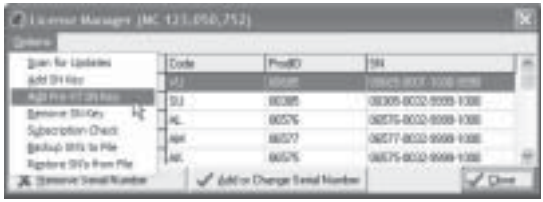
   Terry attempts to update his program and finds that his serial number has been hijacked. Terry calls Igage Mapping Corporation, reports the theft, and fills out a short incident form. A new, clean serial number is issued to Terry.

   Later, when the thief attempts to upgrade the product (with the first serial number) Igage Mapping Corporation electronically voids the original serial number and map set. Since the user name, computer name, and IP address are logged and traceable to the thief's computer, it is a simple matter for Igage Mapping Corporation to identify the thief and report the incident.

License Manager

You can check the status of all your All Topo Products using the 'License Manager'. From the License Manager you can enter new serial numbers, remove serial numbers, and enter serial number from old All Topo map sets.

To view the License Manager, select the main menu option "Help: License Manager":

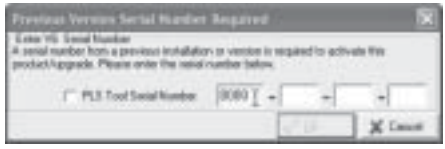


Besides adding and removing serial numbers, the following functions are available from the Options menu.

Scan for Updates

Checks for new pre-version 7 products and serial numbers that may have been installed since All Topo began running. (A scan is performed automatically when All Topo starts.)

Add Pre-V7 SN Key



Allows pre-V7 (16-character) serial numbers to be entered.

Subscription Check

Checks the status of the currently selected product serial number. A valid internet connection is required.

Backup / Restore Serial Numbers to File

You can backup all of your V7 All Topo Map product serial numbers to a file which can be used to restore the serial numbers as a group to the same machine or a new machine. A valid internet connection is required.

This option is very useful if you intend to reload the operating system on your computer, or you plan to move your All Topo installation to a new computer.

To backup all your All Topo serial numbers, insure you have an internet connection, then select the menu option ‘Options: Backup SN’s to File’.

The License Manager will request a filename and path to store the license file to. Placing the file on a floppy disk will allow easy transfer to a new machine and protection against fixed disk failure and formatting.

To restore the serial numbers, select the ‘Options: Restore SN’s from File’ menu option and follow the on-screen instructions.

Chapter 6: Using the All Topo Maps Viewer

This chapter describes the operation of the All Topo Map Viewer.

Starting All Topo Maps

When you install 'All Topo Maps' a shortcut icon is placed on your desktop:

Double-click on the 'All Topo7' icon to start All Topo Maps. If the desktop icon is obscured or lost, you can start the viewer from the Windows Taskbar.

> Click the 'Start' button on the Windows Taskbar, then click on '(All) Programs', then 'All Topo Maps V7', then 'All Topo Maps V7'.

If more than one state set is installed, choose the state you want to work with:

Un-check the 'Open Last Project' option to start without loading the previously displayed map and annotation file.

Main All Topo Viewer Menu

Mouse Cursor Styles

The All Topo Viewer has five cursor styles that are useful for different map viewing and annotating tasks:

- Bombsight Cursor: useful for accurately positioning the cursor. When moved with the left-mouse button depressed, the bombsight cursor accumulates traced distance and area.
- Drag-hand Cursor: useful for dragging the map around the screen.
- Zoom-tool Cursor: Click-drag-release to zoom into an area on the map. The right-click shortcut menu is not available when using the Zoom cursor.
- Pencil-tool Cursor: Draws freehand lines on the map.

Point-To-Point Cursor: Snaps line connected coordinates on the map. The Point-to-Point tool is useful for building routes and drawing property lines and trails on the map.

Each cursor can be selected by pressing the appropriate cursor button on the toolbar, or by pressing a shortcut key:

CURSOR	Shortcut Key
Bombsight	B
Drag-**H**and	H
Zoom tool	Z
Pencil tool	P
P**o**int-To-Point	O

Roller Mice

If your mouse has a 'wheel' configured for default operation, rolling the wheel away from you will zoom into the map (make the map larger). Rolling the wheel towards you will zoom away from the map (show more map area.)

Bombsight Cursor

The bombsight cursor is useful for snapping locations, dropping accurate annotation points and tracing distances and areas.

Accurately Snapping a Location

To very accurately snap a coordinate or place an annotation:

1. Press the 'B' shortcut key to select the bombsight cursor.
2. Double-click at the spot you are interested in; this will center the point on the screen.
3. Press Alt-4 to zoom to 400%.
4. Carefully place the cursor over the spot, press F2 to drop an annotation, then configure the new annotation with the ‘Annotation Editor’.
5. Press the 'Home' key to return to 100% zoom.

Trace an Irregular Path or Area

When the left-mouse-button is pressed and held, the bombsight cursor will accumulate traced distance and area in the main window’s status area:

The bombsight tracing tool uses the same distance measurement units as the Measurement Spike. You can select the distance units and the 'Default Area Tracing Units' on the 'Defaults' option page, select the main menu option: 'Options: System Options…: Default tab'.

To use the bombsight tracer:

Make sure you can see the bottom status line on the screen. Often the All Topo viewer window will be occluded behind the Taskbar, adjust the All Topo window position if needed.

Press the F5 key to clear any accumulated distance.

Move the bombsight cursor to the starting location, then press and hold the left-mouse-button while dragging the cursor along the trail or feature to measure. As the cursor moves, the status window will display the accumulated traced distance and area.

Measurements and traces made with the Bombsight tool are temporary and will be lost when the map is redrawn.

Drag Hand Cursor

The drag-hand tool is the most useful cursor for viewing maps. To select the Drag Hand cursor, press the hand cursor button on the toolbar or press the shortcut key 'H'.

The cursor point is the intersection of the two crosshairs on the Drag Hand:

To use the Drag Hand cursor, press and hold the left-mouse-button, then move the map to a new location.

Double-clicking the drag-hand cursor will center the location under the insertion point, on the viewing screen.

Press the Control key to change the Drag Hand to a Bombsight cursor. Press the Shift key to change the Drag Hand to the Zoom cursor.

Zoom Tool Cursor

The zoom-tool cursor allows you to drag over an area on the map and blow that area up to fill your screen.

When used with the Alt-0 shortcut key (view entire map), the zoom-tool will allow you to quickly view any area on a map.

Press the Control key to change the Zoom cursor to the Drag Hand cursor. Press the Shift key to change the Zoom cursor to the Bombsight cursor.

The right-click menu is not available from the Zoom cursor.

Pencil Tool

The pencil-tool draws freehand lines on the map, use the Point-to-Point Pencil tool to draw accurate boundaries and routes.

To use the pencil tool, first select the Pencil cursor by pressing its icon on the toolbar, or by pressing the shortcut key 'P'. Choose the pencil's color and width attributes from the main menu option: "Annotations: Pencil Attributes…"

Move the pencil to the spot where you want to begin drawing, press and hold the left-mouse button and move the pencil over the map.

You can reposition the map while you are drawing:

1 Press the Shift key (with the mouse still down).

2 Pull the map to a new location.

3 Release the Shift key and continue drawing.

When you release the left mouse button, the viewer will ask if you want to annotate the trace with the total traced distance. If the trace describes a closed area, you will also have the option of including the enclosed area in the annotation.

To delete a trace and remove it from the screen, find its insertion point (where

you started drawing). Place the cursor next to the insertion point, right-click and select 'Delete Annotation'. When the insertion point is deleted, the attached trace will be removed.

Point-to-Point Cursor

The Point-to-Point Pencil (P2P) cursor is a powerful route building and area delineating tool. With the P2P tool you can quickly define a multi-segment route or draw a line around an area.

If you have the optional 'PLS Tool' then the P2P cursor combined with the PLS Magnet will make quick work of delineating property boundaries.

Press the 'O' shortcut key to select the P2P tool. The P2P cursor has a special right-click pop-up menu:

Edit … edits the coordinate annotation nearest the cursor

Begin New Line starts a new line, route or shape.

Close Current Line draws a line from the last point on the current line, back to the first point on the line, fills the resulting shape and displays the enclosed area near the last point.

Insert After … adds an intermediate point after the nearest annotation and the next annotation on the line. This is useful for 'filling in' a sparsely defined route.

New Spur From … starts a new line from the nearest annotation. Automatically numbers the new route using a hierarchical naming convention.

Renumber Route fixes the annotation names of non-sequential points on a line.

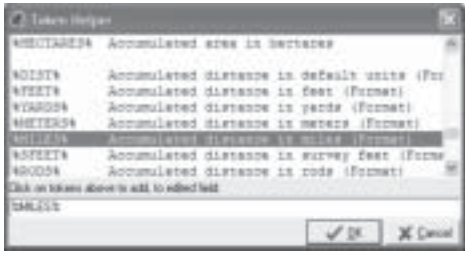
Erase Last deletes the last-added route point.

Delete … deletes the annotation nearest the cursor.

When the P2P cursor is selected, you can reach the normal pop-up menu and the drag-hand cursor by pressing and holding either the shift or control key, then pressing the right-mouse button.

Display Mileage Along a Route

You can add %Tokens% along the route to display accumulated mileage from the route's beginning: place the cursor near the point, right-click and select 'Edit Annotation', press the '%...%' button under the 'Desc' entry on the 'Edit Annotation' dialog to display the 'Token Helper':



Click on %Miles% to display miles, then press OK to close the token helper, and OK to close the 'Edit Annotation' dialog.

Tokens are available for many measurements; see Appendix D for Token details.

Add Spurs to Routes

You can insert a spur route anywhere along the route, move the point-to-point cursor next to the existing annotation to spur from, right-click and select 'New Spur from …', move the cursor to the next point of the spur and left-click, continue dropping spur points until the spur is complete.

You can add spurs to spurs, All Topo will automatically number and name each new route and spur with unique waypoint names.

Adding More Points in a Route

Additional points can be added within an existing route by right-clicking near the point you want to add a route point after, right-mouse clicking and selecting 'Insert After XX…', subsequent left-clicks will add route points after the inserted point.

Drawing a Route with the P2P Cursor

Move the point-to-point cursor over the first point in the route:

right-click and select 'Begin New Line':

A new annotation will be added with a unique name and number:

Move the P2P cursor to the next point and left click. A second point will be added with a line back to the first point:

Continue adding points until the route is defined. After adding the last point, right-click and select 'End Current Line' to complete the route:

When you 'End Current Line' All Topo will add a distance tag to the last route point's description. If descriptions are enabled (see the Layer Grid Controller - Alt-G), the route's distance will be displayed on the map.

Erasing a Route Point

If you add a point in the wrong place, just right click and select 'Erase Last' to remove the last drawn point.

Moving a Route Point

To move a point to a new location: press-hold the shift key while right-clicking the mouse near the errant point, release the shift key. Select 'Move Annotation', then move the cursor to the new location and left-click once.

Adding a Spurs to a Route

To add a spur from an existing route point, right-click near the route point and select 'New Spur from …' then click on the next point from the spur. All Topo will automatically name spurs and manage the spurs intersection with the primary route.

Drawing a Property Boundary

All Topo calculates acreage just like a mechanical planimeter. Clockwise descriptions result in positive area, while counterclockwise descriptions result in negative area. Choose a starting point that will conveniently allow clock-wise description.

Right-click at the starting point and select 'Begin New Line'. Move to the second point and left-click. Repeat at each corner.

After clicking on the last corner, right-click and select 'Close Current Line'. All Topo will add a '%area% tag to the last point's description which will display the enclosed area if annotation descriptions are enabled.

The fill color and style are controlled by the last point in the area description. To change the area fill style and color, right-click near the last point, select 'Edit …', then select the 'Line' tab.

The 'PLS Magnet'

The PLS Magnet is only available if the optional PLS Tool is installed for the open state set.

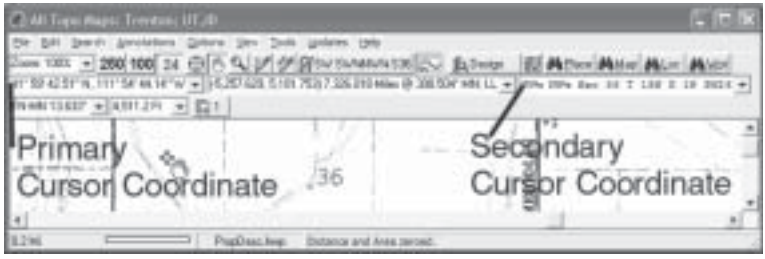
The 'PLS Magnet' combined with the Point-to-Point Pencil makes quick work of property boundary delineation when property boundaries are coincidence with quarter-quarter section lines.

When the 'PLS Magnet' tool is depressed, all new annotations added with the Point-to-Point Pencil cursor are automatically snapped to the nearest ¼ ¼ section corner that contains the cursor.

Since the ¼ ¼ sections are rarely coincident along township boundaries, it is important to place the cursor within the section that contains the described property.

Primary and Secondary Coordinate Display

As any of the cursors move over the map, the location of the cursor is displayed in the 'Primary Coordinate Display' box:



You can copy the coordinate from the Primary Coordinate Display box to the windows clipboard by pressing Ctrl-X.

If the Secondary Cursor Coordinate is not shown on the toolbar, you can enable it by checking the main menu option "View: Display Secondary Coordinate" checkbox:

You can copy the coordinate from the Secondary Coordinate Display box to the windows clipboard by pressing Ctrl-Z.

The coordinate style and format of the coordinates can be modified by double-clicking on top of the coordinate box or from the main menu option "Options: System Options…".

The 'Primary Coordinate Display' settings are very important for many other All Topo functions. Many displayed, exported and printed coordinate styles are based upon the primary style.

Lat/Lon, UTM, Military Grid, State Plane coordinates are always available for display, Public Land Survey (PLS) coordinates are available if the appropriate state PLS Tool has been installed.

Detailed descriptions of each coordinate style can be found in Appendix A.

Elevation

Many All Topo map sets include elevation data. (If your set does not have elevation data, an inexpensive elevation dataset can be purchased from Igage).

You can display the elevation at the cursor by checking the main menu option "View: Display Elevation" checkbox.

Once elevation is visible, you can select the elevation units using the drop arrow to the right of the elevation. Available units are Feet, Meters or Survey Feet.

The elevation data represents elevation at evenly spaced grid points. By default All Topo interpolates an elevation surface between grid points, you can turn off this interpolative smoothing by un-checking the 'Smooth Grid' checkbox on the 'Elevation' tab of the 'System Options' page.

Declination and Dip

The All Topo viewer includes the 'World Magnetic Data' and can approximate magnetic declination and dip for any location. Computations are made using the year of the computer's real-time clock.

To display the Declination/Dip values, check the main menu option 'View: Display Declination'.

Once displayed, use the drop arrow to select declination or dip from one of several formats:

Tag	Description
TN-MN	True North to Magnetic North Declination in Degrees
TN-MN	True North to Magnetic North Declination in Mills
TN-GN	True North to UTM Grid North Declination in Degrees

TN-GN	True North to UTM Grid North Declination in Mills
TN-SP	True North to State Plane North Declination in Degrees
TN-SP	True North to State Plane North Declination in Mills
DIP	Compass Dip in Degrees

UTM grid declination is computed using the zone selected for the Primary Coordinate Display. State Plane declination is computed using the State Plane Zone and Datum selected for the Primary Coordinate Display.

Map Revision Selection

The All Topo viewer tracks multiple revisions of each quadrangle. The 'Map Revision' button displays the number of maps that are available for the currently viewed quadrangle.

Press the 'Map Revision Selection' button to display a list of available maps:

Choose the map you want to view, then double-click on it to load and display the map.

Updated maps are available on regional update disks and by web subscription.

If you have a valid subscription and an internet connection, you can get the latest list of updated maps from the web by selecting the menu option: "Updates: Check Web for New Maps".'

If you purchase a Map Update disk from the Igage factory, you must register the update disk with the All Topo program to use the updated maps: press the 'Map Revision' button, the select the "Updates: Register 'Map Update CD'…" menu option and follow the instructions to register the update maps.

Finding a Place, Map or Location

You can search for the correct map using several methods:

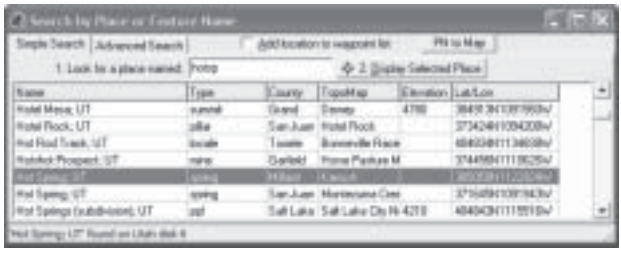
- Search by Placename
- Search by Map Name
- Search by Location (geographic coordinate)
- Search by Overview Map
- Bookmarks, Clipboard and Spike
- Search by Annotation

Each search method is described below.

Search by Placename

The All Topo placename database includes almost every annotated location on all of the maps, NGS control sites, postal ZIP codes and telephone area codes.

Press the 'binocular Place' button (shortcut key Alt+P) to find a place using the Placename database. The Find Placename tool has a 'Simple Search' tab that looks for matching place names that begin with the search value and an 'Advanced Search' tab that looks for place names containing the search value.



The 'Search by Place or Feature Name' dialog is shown, select the 'Simple Search' tab and enter the first few letters from the place you are looking for. The list of places will automatically update as you type, displaying (alphabetically) nearby placenames. When you see the place you are looking for, double-click on the line containing the place and All Topo will center the location on the viewing screen.

To find an NGS control point, prepend the point's name with 'NGS' or use the 'Advanced Search' function.

To search for a Public Land Survey Township and Range use the search format: 'T12N R55W'.

Place name searches are done without spaces and punctuation. Searching for 'mccal' will match 'Mc Callister', 'McCallister' and 'Mc-Callister'.

Advanced Placename Search

If you can not find the location using the 'Simple Search' tab, you can use the 'Advanced Search' tab to look for locations containing any sequence of characters.

To build a list of every hot spring in a state, select the 'Advanced Search' tab, type 'hots' in the '1. Look for places that contain this pattern:' box, then press '2. Submit Search'.

All Topo will take a moment to search for all the matching placenames. Double-click on the correct location to center the location on the map viewing screen.

Finding a Map by its Map Name

If you know the name of the map you are looking for, or you know the map is adjacent to the currently viewed map, you can use 'Find Map' tool.

Show the 'Find Map' dialog by clicking the Map button or pressing the shortcut key 'Alt+M'.

The 'Find Map' dialog is shown; you can enter the first few characters of the map in the search box, then double-click on the correct map name to display the entire map.

You can single-click on the eight adjacent maps shown in the grid to center them in the grid. Once the correct map is shown as the center map, press the 'Show Center Map' button to display the map.

Finding a Map by a Geographic Coordinate

If you have the coordinate (GPS reading) for a coordinate, All Topo will find the appropriate map and center the location on the screen.

Show the 'Find Location' dialog by clicking the button or by pressing the shortcut key 'Alt+L'.

You can find a location by

- **DMS** Degrees Minutes decimal Seconds
- **DM** Degrees decimal Minutes
- **D** Decimal Degrees
- **UTM** Universal Transverse Mercator
- **SPC** State Plane Coordinates
- **Free Form** All Topo will figures out the format
- **Public Land Survey**
  coordinates, optional 'PLS Tool' required

Select the appropriate style tab for your coordinate. If you can't figure out which style to use, choose the 'Free Form' tab.

After entering a location, the status box will show you which map and disk the selected location is on:

You can preview the location by pressing the 'Show Coordinate' button  . This will center location on the screen over the correct map; and place a **temporary** (not permanent) system annotation at the location. The annotation deposited by the 'Show Coordinate' button is not permanent, nor is it included in the current annotation set. You can clear temporary System annotation marks using the menu selection 'Annotations: Clear System Annotations' or by pressing the shortcut key Alt-C.

Press the ‘Add Annotation at Coordinate’ button  to add a new User annotation at the entered coordinate.

Finding a Location Using the State Overview Map

You can choose a location to display using the State Overview map. Select the menu option 'View: State Overview' or press the shortcut key 'Alt+J' to show the overview map:

As the cursor is moved over the map, the name of the map under the cursor is displayed as the window's caption and the disk containing the map is displayed at the bottom of the window on the status line.

Position the mouse cursor over the location you are interested in and then double-click to load and center the appropriate map. Alternatively you can right-click at the location and choose the map scale you want to view.

If the current map set has more than one available overview map, you can use the buttons at the bottom of the overview map window to choose alternate maps.

Bookmarks Set/Jump

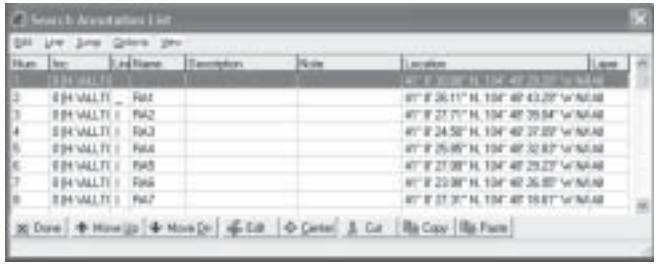
Press the number keys '1' through '9' and '0' to set a bookmark at the current cursor position. A system annotation will be set at the cursor with the current system style and the description 'BKn'.

Once Coordinate Bookmarks are set, you can recall them anywhere you see the button. To jump and center a bookmark press 'Ctrl-K’ to show the ‘Recall Bookmark’ tool:

If the clipboard and Measurement Spike contain valid coordinates then they too can be a jump destination.

Search By Annotation (Find Wpt)

The ‘Search Annotation List’ tool lists all the user annotations in a grid. To show the 'Search Annotation List' tool, click the button or press the shortcut key 'Alt+W'.



A list of every user defined annotation will be displayed. You can highlight one annotation or a group of annotations and perform these tasks:

- Edit one annotation or a group of annotations
- Change the order of annotations using the ‘Move Up’ and ‘Move Dn’ buttons
- Use the ‘Cut’, ‘Paste’ and ‘Copy’ buttons to change annotation order
- Change the layer of selected annotations
- Collect multiple points into a route or a closed shape
- Reduce ‘Points on a Line’
- Export selected annotations to a text deed description

Editing a Group of Annotations

Highlight one or more annotations, then press the button to edit the annotation or group of annotations.

Changing the Order of Annotations

Highlight one or a group of annotations, then

- select ‘Cut’ to copy them to the Windows clipboard. Highlight a destination and press ‘Paste’ to insert the annotations.
- use the ‘Move Up’ and ‘Move Dn’ buttons to change the annotation order.

Setting Annotation Layers

Use the 'Edit: Set Layer…' option to change the drawing layer for the selected

annotations. If you move an annotation that is part of a route (connected to other annotations by a line) then the entire route is moved to the selected layer.

Collect multiple points into a route or a closed shape

Highlight a sequential group of annotations and convert them to a closed or open shape using the menu option 'Line: Set Line …' option.

Select an annotation and build a profile using the 'Options: Build Profile' selection.

Reduce 'Points on a Line'

Highlight an annotation that is part of a line connected route. Select the menu option 'Options: Reduce Points' to delete points that fall in a straight line. Enter the maximum allowable position error for points falling near a straight line:

Points that fall within this distance of a line connecting subsequent points are automatically removed from the annotation list. Annotations that have GeoLinked media will not be removed.

This options is useful for reducing the number of track points recorded by a GPS to the minimum number of points required to accurately define the track.

Write a Deed Description

Select a group of annotations, then choose the menu option 'Options: Export Selected to Deed Description' to generate a metes and bounds survey description.

> *Carefully read the disclaimer presented when writing a survey description. The use of this feature is regulated by state survey law.*

Measuring Distance along a Straight-Line

All Topo can measure the straight-line distance between two points using two methods:

- Distance from the Measurement Spike to the cursor
- Projected distance and bearing between two points

Distance can be expressed in any of the distance units understood by All Topo7, including:

> Feet, Yards, Meters, Miles, Survey Feet, Rods, Chains, Links, Varas and Nautical Miles

Bearings can be expressed as a azimuth 'Compass Angle' (clockwise rotation from North; 0°-North, 90°-East, 180°-South, 270°-West) :

- Degrees: 45.3376 degrees
- Degrees Minutes: 45 degrees 20.26 minutes
- Degree Minute Seconds: 45 degrees 20 minutes 15.6 seconds
- Mills: 806.0 mills (6,400 mills =360 degrees)

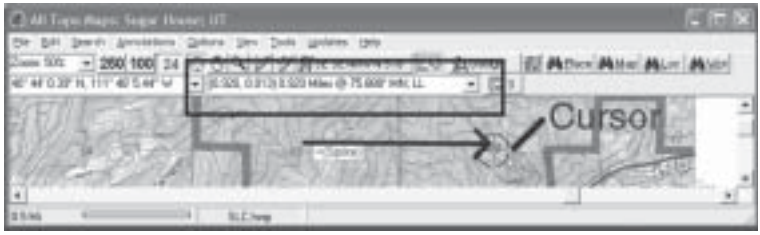
or as a Survey Bearing:

- Survey Bearing – Indicating an angle and bearing from North or South towards the East or West Ex: North 45 degrees 20 minutes 15.6 seconds East

All Topo supports three 'Map Projections' for distance measurements:

- Great Circle
- UTM (Universal Transverse Mercator)
- State Plane (all standard NADCON supported NAD27 and NAD83 projections)

Using the Measurement Spike



The Measurement Spike is a virtual stake that you pound in the ground. Once the Spike is set, the 'Measurement Spike Display Box' will show the distance and bearing from the Spike to the Cursor.

Before making a measurement with the Spike, choose the Measurement Spike map projection, north reference and distance units:

> Select the menu option 'Options: Coordinate, System Options…', then choose the 'Defaults' tab. Choose appropriate 'Angle Display Format', 'Default North Reference', distance units, and the projection for distance calculations.

You can double-click within the Measurement Spike Display Box to quickly reach the configuration screen.

To use the Measurement Spike, select the Bombsight cursor and move the cursor to the base point to measure from. To pound the stake right-mouse-click and select 'Set Measurement Spike' or pressing the shortcut key 'F6'.

A dot and '<{Spike}' will appear at the Spike location.

Now move the cursor away from the spike, the Measurement Spike Distance/ Bearing display will continuously show the both the Cartesian offset and vector distance and bearing from the Measurement Spike to the Cursor.

> Press Ctrl-K to jump to the Measurement Spike or Bookmarks.
>
> Press Ctrl-F6 to remove the Measurement Spike from the map.

Using the Point-to-Point Distance Tool

The 'Point-to-Point Distance Tool' will show a line between the two points, while displaying the Great Circle Distance, True Azimuth, Magnetic Azimuth, UTM Grid Distance and Bearing, and the State Plane Grid Distance and Bearing between the points:

- Before using the Point-to-Point Distance tool, set the Measurement Spike distance units, as they are honored by the Point-to-Point-Distance tool.
- The Point-To-Point Distance Tool uses the UTM and State Plane Zone Code from the 'Primary Coordinate Display'. You can double click on the Primary Coordinate Display to reach the configuration screen.

To display the distance between two points, select the Bombsight or Drag Hand cursor then right-click at the first point. Choose 'Point to Point Distance: From Cursor' then move the cursor to the second point, right-click and choose 'Point to Point Distance: To Cursor'.

You can use the Point-to-Point Distance tool to measure the distance and bearing between two annotations by selecting 'Point to Point Distance: From/ To Annotation'.

If the ‘Show’ checkbox is checked, All Topo will show the projection line with green and red annotations at the line’s endpoints.

Annotating Maps

All Topo has a rich selection of annotations that can be placed at georeferenced locations. There are four primary annotation types:

- **Point Annotation:** A single point waypoint at a geographic coordinate.
- **Line Connected Annotations:** Ordered set of point annotations, sometimes called a route or track.
- **Closed Line Connected Areas:** A closed ordered set of point annotations that describe an area.
- **Point Annotations with Trace**: Useful for describing an arbitrary path from a point.

Annotations are applied on top of base maps and are contained in annotation text files. Annotations are never permanently added to the base maps, they always are drawn on top of the base maps on a separate layer.

User, Auto and System Annotations

There are three classes of annotations in All Topo Maps:

- **User Annotations** entered and maintained by the user. These annotations are stored in annotation files (with '.hwp' extensions by default.) The All Topo version 7 viewer supports an unlimited number of user annotations.

  You can change the default User annotation style with the menu selection 'Options: System Options…: System Tab'.

- **System Annotations** are added as temporary place markers. They include the Measurement Spike, Coordinate Bookmarks, Click-ticks (tick marks at double click locations when changing maps), construction ticks for projections and triangulation. System annotations are not stored in annotations files, however some system annotations like the Measurement Spike are restored when All Topo starts or a map is reloaded.

  The System annotation style can be set on the 'Options: System Options…: System Tab'.

  You can delete all system annotations from the screen using the 'Annotations: Clear System Annotations' selection or by pressing the short cut key 'Alt-C'.

- **Auto Annotations** are collections of annotations that fall onto a common map. Auto annotation files are typically built by the 'Auto HWP Splitter' program and automate the process of quickly displaying millions of annotations. Auto annotations are enabled on the 'Annotations' main menu. When enabled they are drawn over the map surface, under any user and system annotations. Auto annotations are write protected and can not be modified.

Annotation Editor

Annotations can be added to the map using the ‘Search by Location’ tool, the ‘Search by Placename’ tool, the ‘Project New Annotation’ tool and by simply placing the cursor at a map location and pressing the ‘F2’ key (or right-mouse-clicking and selecting ‘Add New Annotation’.)

You can edit the properties of a new annotation when it is added. You can edit an existing annotation’s properties by right-clicking near the point and selecting ‘Edit Annotation’. You can edit a group of annotations using the ‘Find Wpt’ tool.

Properties are set using the ‘Annotation Editor’:

The editor has several tabs, each tab controls a group of annotation properties:

Tab	Function
Simple	Description and line ON/OFF enable
Details	Name, Desc, Notes, Font, Text Styles, Colors, GPS tags, Location
Symbol	Symbol Type, colors, marker dots
Line/Fill	Line styles, colors, widths, shape fills
GeoLinks	Hyperlinks attached to annotation location
DeedPlotter+	Optional DeedPlotter description plots
Styles	Save and recall named annotation styles

After modifying annotation properties, press the ‘Apply’ button to save the results, press the ‘OK’ button to apply and exit the annotation editor.

Check the ‘Automatically Apply Changes’ box to apply changes as they are made.

The Details Tab

Each annotation has three associated text data fields: Name, Description and Notes. These fields can be separately enabled and disabled from the ‘Layer and Grid Control’ menu (shortcut Alt+G):

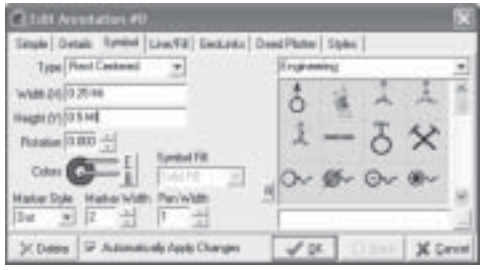
or with the shortcut keys ‘N’ (Name), ‘D’ (Description) and ‘T’ (Notes).

The ‘Details’ tab includes property editors for annotation location; text color, size, style, font, rotation, and position; and GPS Icon, date, elevation.

Checking the ‘Auto Name’ box automatically generates annotation names from the annotation description. Checking the ‘Auto Inc’ or ‘Auto Dec’ box will automatically number subsequent annotations.

Descriptions and Notes both can contain %Tokens% which abstract properties of the annotation. For example, the %DMS% token is replaced with the coordinate location in degree minute decimal seconds format. A complete list of tokens and information on the Token Helper can be found in Appendix D.

The Symbol Tab



The ‘Symbol’ tab controls the properties of the marker dot, and any iconic images that are overlaid at the annotation’s base location.

By default a small marker dot is display at every annotation location. The marker size can be set with ‘Marker Width’ and ‘Pen Width’. Marker colors can be set with the ‘Colors’ tools. Five Marker Dot styles are available:

 No Dot

 Dot (Marker Width = 5; Pen Width = 1)

 Small Cross (Marker Width = 5; Pen Width = 1)

 Medium Cross (Marker Width = 5; Pen Width = 1)

 Large Cross (Marker Width = 5; Pen Width = 1)

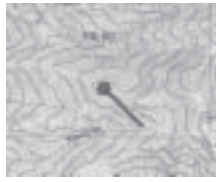
In addition you can display sizeable Lines, Triangles, Circles, Rings, Eclipses, Squares, Rectangles, Wind barbs, Pictures and Icons at any point. Over 700 stock icons are included with All Topo.

Symbol Type: Plain Marker

Setting a symbol to 'Plan Marker' draws only the Marker Dot at the coordinate location.

Symbol Type: Line, Arrow

A line is drawn from the annotation location. The rectangle described by Width and Height defines the line length; Rotation is applied to the resulting vector.



Type=Line; Width = 0.25 Mi; Height = 0.0 Mil; Rot=45.0

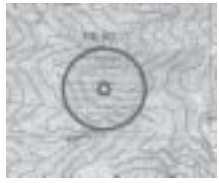
Symbol Type: Triangle

A triangle is drawn, centered at the annotation location. The major height of the triangle is defined by the Width. Rotation is applied to the resulting triangle.

Type=Triangle; Width=0.25 Mi; Rot = 45.0

Symbol Type: Circle

A circle is drawn, centered at the annotation location, filled with the background color and fill style. The circle diameter is set by the Width.

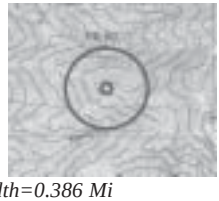


Type=Circle; Width=0.386 Mi; Fill=Horz Hatch

When the symbol type is set to 'Circle' the 'Set Area' button is shown to the right of the symbol width. This area tool can be used to set the circle to cover an exact area.

Symbol Type: Ring

A ring is drawn, centered at the annotation location, the ring is not filled. The ring diameter is set by the symbol Width.



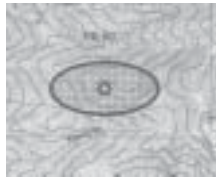
Type=Ring; Width=0.386 Mi

When the symbol type is set to 'Ring' the 'Set Area' button is shown to

the right of the symbol width. This area tool can be used to set the circle to cover an exact area.

Symbol Type: Ellipse

An ellipse is drawn, centered at the annotation location, filled with the background color and fill style. The ellipse height and width are set by the symbol Height and Width.



Type=Ellipse; Width=0.5 Mi; Height=0.25 Mi; Fill=CrossHatch

Symbol Type: Square

A square is drawn, centered at the annotation location. The square is not filled; its side length is set by the symbol Width.

Type=Square; Width=0.5 Mi; Rotation=25.0 degrees

Symbol Type: Rect Centered, Rect SW, Rect S, Rect SE

A rectangle is drawn with dimensions Width and Height, rotated about the base point by the symbol Rotation.

Rect Centered is centered about the annotation location:

Type=Rect Centered; Width=0.5 Mi; Height=0.25 Mi; Rot=25 degrees

Rect SW is anchored at the bottom left (South West) corner:

Type=Rect SW; Width=0.5 Mi; Height=0.25 Mi; Rot=25 degrees

Rect S is anchored at the bottom center (South) corner:

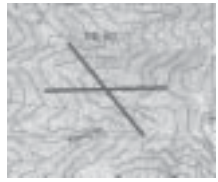
Type=Rect S; Width=0.5 Mi; Height=0.25 Mi; Rot=25 degrees

Rect SE is anchored at the bottom right (South East) corner:

Type=Rect SW; Width=0.5 Mi; Height=0.25 Mi; Rot=25 degrees

Symbol Type: Cross

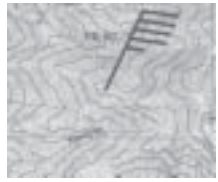
A cross is drawn, centered at the annotation location, the height and width are set by the symbol Height and Width, rotation is honored.



Type=Cross; Width=0.5 Mi; Height=0.25 Mi; Rot=25 degrees

Symbol Type: Wind Barb

A Wind Barb is drawn, based at the annotation location, wind speed set by the symbol width (use Knots for units), rotation honored. To set a wind speed of 45 knots, enter “45 Knots” in the symbol Width setting.



Type=WindBarb; Width=45 Knots; Rot=25 degrees

Symbol Type: Icon and Bitmap

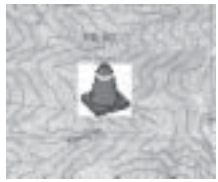
The specified icon is drawn at the annotation location. The symbol width controls the size of the icon. If the symbol width is 0.0, then the icon is drawn at its nominal size in pixels. Typically this looks great on a screen, but generates a very small symbol on a printer.

Icons are drawn with transparent backgrounds; the transparent color is set by the bottom left image pixel.

Icons have transparent background:

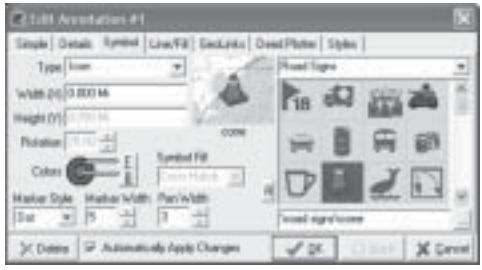
Type=Icon “Cone”; Width=0.25 Mi

Pictures are drawn without transparency:

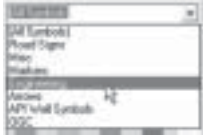
Pictures overlay map image: 

Type=Picture "Cone"; Width=0.25 Mi

To add a standard icon, just find it on the right-hand icon grid and double-click it to add it at the symbol location:



Icons are organized by type:



You can add additional icons by placing 8-bit, 256 color palette bitmap images in the folders under '.\AllTopo\V7Symb'.

Any 256-color, 8-bit palette bitmap can be used as an icon. Press the '...' button to browse for a custom icons and pictures.

The Line Tab

The 'Line' tab controls the line and shape fill patterns.

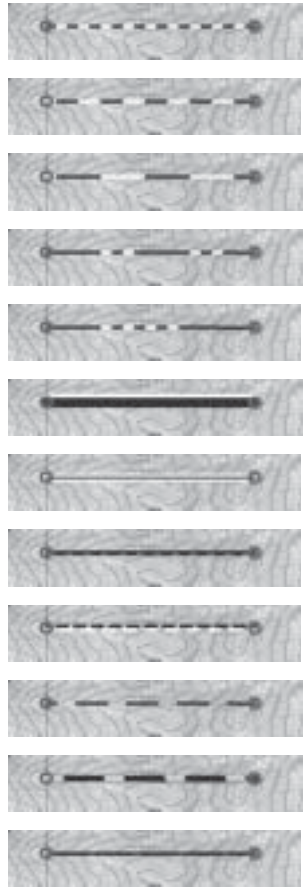
You can connect coordinates with 16 lines styles; each line style features programmable colors and widths.

When annotations are line connected, the first annotation's line attribute is set to 'Line Begin' subsequent annotations are set to 'Line On'. To draw a closed shape with hatched fill, set the final point to 'Line Close' and a line will be added back to the beginning of the line:

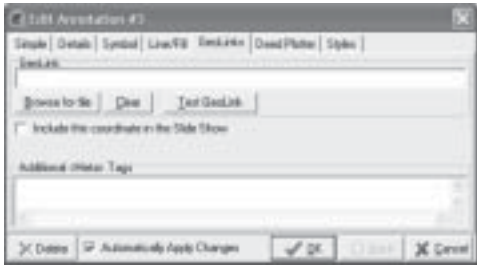
Annotations connected by unclosed lines are also called ‘Routes’. When building a route, lines are drawn from annotation to annotation in order. You can change the point ordering using the ‘Move Up’ and ‘Move Down’ buttons in the ‘Search by Wpt’ tool.

Custom Line Styles

All Topo’s line styles can be customized by changing color, width and style. These are some of the standard line styles:



The GeoLinks Tab



Every coordinate can have one or more associated hyperlinks. If the hyperlink is an image, All Topo will automatically display the image in the 'GeoLink / Attribute Viewer' window when the mouse cursor hovers near the annotation.

The ‘GeoLinks’ tab includes buttons to search for file based links, and buttons to test links.

Once a hyperlink is associated with an annotation, righ-mouse-clicking near the annotation will display a popup menu with an option to ‘Open’ the link. If more than one link exists, then a selection menu is presented for the user to choose a link.

The ‘Auto GeoLink’ tool can automate the association of digital pictures with a GPS track log. See the section ‘Attaching GeoLinks to Annotations’ at the end of this chapter.

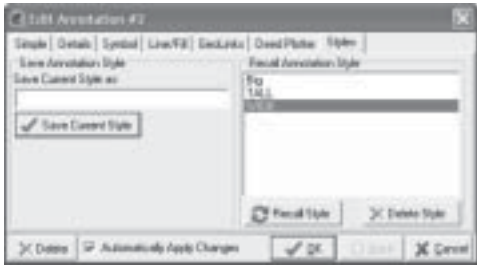
Additional <Meta> Tags

Annotation properties that do not have dedicated editing controls may be listed in the ‘Additional <Meta> Tags’ editor.

The DeedPlotter Tab

The ‘DeedPlotter’ tab is described in chapter 8 of this manual.

The Styles Tab



Annotation styles define all of the properties of an annotation except for the Name, Description, Note, elevation and timestamp. Once you configure an annotation, you can save its style to recall and apply to another annotation.

The left side of the Style tab allows you to save the current annotation style to a named style. The right side of the tab lists the named styles; double-click on a named style to apply the style to the current annotation.

Annotation Files

Annotation files are used to store your map annotations. You can have an unlimited number of annotation files on your computer. Because only your annotations are stored in the file, annotation files are very small.

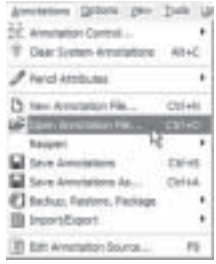
This section discusses saving, opening, backing up, restoring and packaging annotation files.

Choosing an Annotation File Name

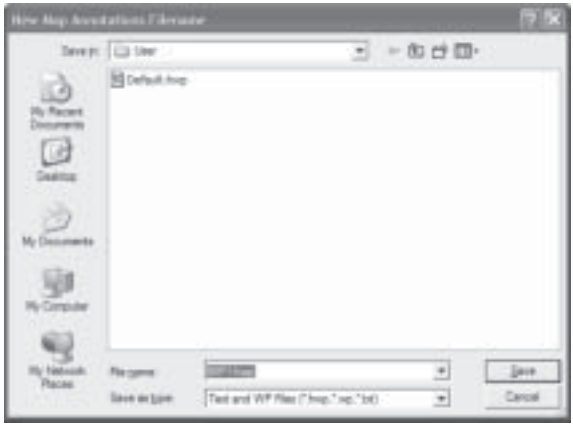
By default, annotations files are stored in the 'C:\All Topo\User\' folder and have a '.hwp' file extension. (For advanced users: detailed information about the format of annotation files can be found in Appendix E of this manual.)

When you start All Topo for the first time, any annotations that you add are stored in a file named 'Default.hwp' in the 'C:\All Topo\User\' folder. While a single annotation file can hold an unlimited number of annotations, it is best to organize annotations by project, job, trip or application.

All Topo makes managing annotation files easy using the main menu option 'Annotations':



To start a new, blank annotation file, select 'Annotations: New' or use the shortcut key Ctrl-N. All Topo will prompt you if you need to save changes made to the current annotation file and request a file name and location for the new annotation file:



By default, All Topo will suggest a unique file name beginning with 'WP...', you should override the default path and file name and choose a file name that is meaningful for the project you are working on.

Opening Previously Used Annotation Files

Use the menu option 'Annotation: Open Annotation File…' to open existing annotation file.

All Topo keeps a list of the 10 most recently used annotation files for you to choose from using the menu option 'Annotation: Reopen…' option.

Save Annotations

While working with annotation files, you should save the current annotation file often. You can use the menu option 'Annotations: Save Annotations' or the shortcut key Ctrl-S to save your annotations to the disk file currently in use.

Save Annotations As...

You can rename the current annotation file and save your work using the ‘Annotations: Save Annotations As...’ option.

Backup and Restore

Your annotation files represent a great deal of effort getting everything 'just right'. You can save your work often (every five minutes is reasonable) to a unique, compressed backup file using the 'Annotation: Backup, Restore, Package…: Backup' option (shortcut key Shift+Ctrl+S).

The backup option automatically generates a unique, incrementing file name (based upon the file name of the annotation file) for the backup file in a special folder (C:\All Topo\Backups\ by default.) Your annotation file is saved in a compressed format to the backup folder with a '.hwpZ' extension.

If you have multiple fixed disk drives on your computer, or have a network connection to a server, you can choose to save backup files in an alternate folder location. If your machine crashes, then your work will be saved on an alternate physical drive which may greatly improve your chances of recovery.

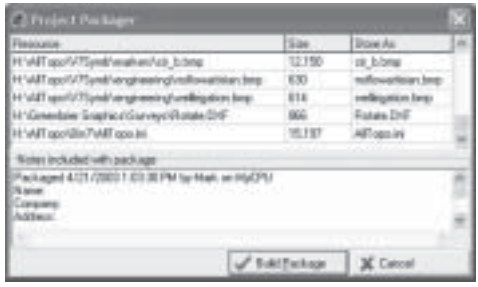
If you need to restore a backup, choose the menu option 'Annotations: Backup, Restore, Package…: Restore' menu option. Select the correct saved '.hwpZ' file, press 'Open'; choose a new name for the restored file and finally press 'Save'. All Topo will decompress and display the backup annotations.

Package and Unpackage

It is possible to generate All Topo Map projects that reference multiple annotation files, contain links to hundreds of images, apply multiple 'Deed Plotter+' property descriptions and utilize thousands of custom symbols spread over hundreds of directories.

The 'Project Packager' will combine every element of a project (except for the base map image) into a single compressed file. This single file can be transferred to another All Topo user who can then un-package the project on their machine for use with their All Topo Map set.

To package the current project, select the menu item 'Annotations: Backup, Restore, Package…: Package', All Topo will display a list of all of the current project's elements. You can optionally include project notes in the 'Notes / Instructions' field:



Press the 'Build Package' button, All Topo will prompt for a package name and

folder, enter a file name then press 'Save' to write the package file.

To use an existing package, select the menu item 'Annotation: Backup, Restore, Package: Unpackage…', browse for the correct 'Package File to Unpackage', enter a 'Path to Restore to' and click 'OK' to unpackage.

Unpackaged projects are flattened into a single folder. If two like-named files exist in the original project they are automatically renamed with unique names in the flattened project folder.

Exchanging Annotation Files with Pre V7 All Topo Versions

All Topo Version 7 stores information in annotation files that may not be fully compatible with previous All Topo versions.

If you need to exchange a data file with someone who is using an older copy of All Topo Maps, select the menu item 'Annotations: Save As…' (shortcut key Ctrl-A) and change the 'Save As Type' to 'V6 Waypoint Files (*.hwp, *.wp)'.

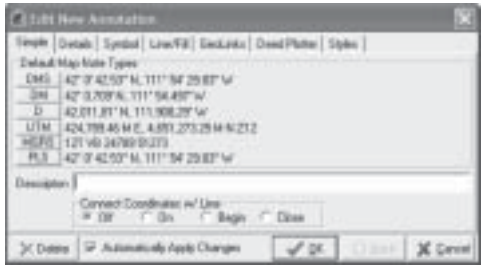
All coordinates will be reduced to NAD27, Lat/Lon coordinates and some metatags will be stripped.

Placing a Single Coordinate Annotation on the Map

If you know the coordinate of the desired annotation, use the 'Find Location' tool, click the button or press the shortcut key 'Alt-L'.

If you don't know a coordinate, find the location on the map, then move any of the cursors over the location and press F2. You may alternatively right-click, then select 'Add New Annotation…' or use the menu option 'Edit: Add Current Location to Annotation List…':

The 'Edit New Annotation' dialog box will be shown.



You can enter a description for the waypoint, or use one of the 'Default Map Note Types' to set the annotation's description to its coordinate location. Since you are adding a single coordinate or a waypoint, make sure that 'Connect Coordinates w/ Line' is set to 'Off'.

For a simple project, the 'Simple' tab will be the only annotation attributes you will need to change.

Defining a Closed Shape

To define a closed shape around a property boundary, select the Point-to-Point Route tool then right-click at the starting point for the closed shape and choose 'Begin New Line'. Left-click around the shape's border until only one segment is left to close out the shape, right-click and select 'Close Current

Line'. All Topo will close the shape, fill the shape and add the enclosed area at the last coordinate.

To change the fill pattern, right click near the next to last point and select 'Edit WP#', select the 'Line' tab and choose a new fill pattern and fill color. Press OK and All Topo will redraw the image with your new fill selection.

Moving Annotations

You can move an annotation using the mouse to point at the new location, or by entering the exact new coordinate.

Moving Annotations with the Mouse

Select the Bombsight or Hand cursor. Right-click near the annotation you want to move and select the pop-up menu option 'Move Annotation'. Finally move the cursor to the new spot and left-click once.

All Topo will confirm the move, and then move the coordinate and any associated symbols, lines and text.

If you have the optional 'PLS Tool' you can turn on the 'PLS Magnet' and each point will snap to the nearest section ¼ ¼ corner.

Moving Annotations to an Exact Coordinate

Right-click near the annotation you want to move and select the pop-up menu option 'Edit Annotation' or press the shortcut key 'Shift-F2'.

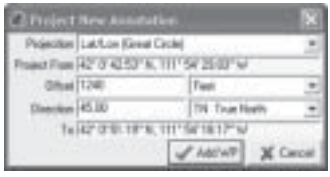
Enter the new coordinate in the 'Location' field of the 'Details' tab:

Projecting New Annotations

You can easily enter a new annotation at an offset from any place or an existing annotation using the 'Project New Annotation' tool.

To use the tool place the Bombsight or Drag Hand cursor near an existing annotation or at the point you want to project from, then right-mouse-click and choose 'Project New Annotation…' then 'From Annotation' or 'From Cursor'.

The 'Project New Annotation' tool will be shown:



The base location (click-point or base annotation) will be shown in the 'Project From' field. Choose the projection (Great Circle, UTM or State Plane) you want the offset computed in.

Enter the distance, distance units, bearing and North reference (True North, Magnetic North, UTM Grid North or State Plane North). As each value is entered the 'To' field will reflect the new annotation location.

When all the input fields are correct, press the 'Add WP' button to add a new annotation at the projected location, then edit the new annotation's properties.

All Topo will automatically add the base point, offset, and bearing information to the Notes field of the new annotation. (You can delete the information if you don't need it.)

Entering Metes and Bounds Survey Descriptions

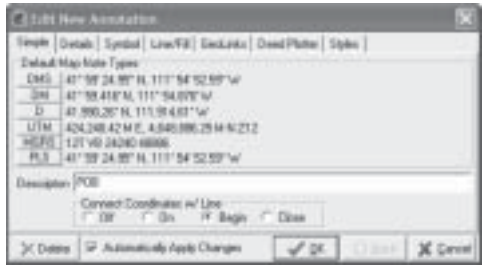
All Topo Maps is not a substitute for a professional certified licensed surveyor. It is a violation of state law to survey property, for any purpose, without a valid state surveyor's license! You should always consult a licensed surveyor when interpreting or generating deed descriptions.

Often, parcels of land are described with 'metes and bounds' survey descriptions. These descriptions typically include a starting point (like the corner of a section or quarter section) and a series of bearings and distances:

> From a true point of beginning, at the North East Corner of Section 2 Township 14 North Range 1 West Salt Lake Base Meridian; thence South 1 degrees 2 minutes 42.24 seconds East, a distance of 1,374.5 Feet to the South East property corner; thence North 89 degrees 33 minutes 21.47 seconds West, a distance of 2,609.5 Feet to the South West property corner; thence North 0 degrees 11 minutes 25.82 seconds West, a distance of 1,337.7 Feet to the North West property corner; thence to the true point of beginning. Containing 81.1 Acres, more or less.

First find the 'Point of Beginning' on the map. Since we know the true point of beginning as a township/range coordinate, it is easiest to use the PLS tab of the 'Search by Location' tool. Press the  then select the PLS tab and enter the base coordinate's location:

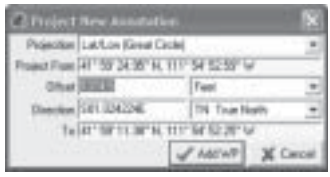
Press the  button to set a base coordinate at the true point of beginning:



Change the Description to 'POB', set the line style to 'Connect Coordinates w/ Line Begin' and press OK to save the base coordinate.

Right-click near the base annotation and select 'Project New Annotation: From Annotation':

The ‘Project New Annotation’ menu is shown:



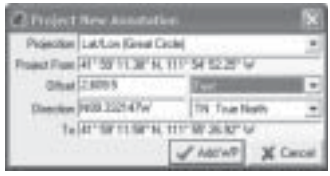
Call #1: S1.024222E 1374.5 Feet Desc ‘NE’ corner:

“thence South 1 degrees 2 minutes 42.24 seconds East, a distance of 1,374.5 Feet to the South East property corner”

Enter Call #1, then press the ‘Add WP’ button to add the second point:

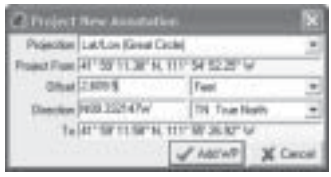
Set the 2nd point’s annotation description to ‘SE’ and press OK.

Repeat this process for the remaining two deed description calls:



Call #2: N89.332147W 2,609.5 Feet Desc ‘SW’ corner

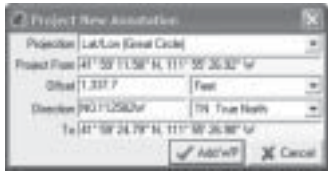
“thence North 89 degrees 33 minutes 21.47 seconds West, a distance of 2,609.5 Feet to the South West property corner”



Finally enter the third and final call:

Call #3: N0.112582W 1,337.7 Feet Desc ‘NW’ corner

“thence North 0 degrees 11 minutes 25.82 seconds West, a distance of 1,337.7 Feet to the North West property corner”



Set the line style to “Close” and the description to ‘NW’:

Finally press ‘OK’ to display the completed property boundary:

It is worth noting that you can directly enter this survey in the the ‘Annotation Source Editor’ (shortcut key F8):

Syntax descriptions for .HWP files are described in Appendix E of this manual.

If you work with metes and bounds survey descriptions often, we highly recommend purchasing and learning to use 'Deed Plotter+' from Greenbrier Graphics. 'Deed Plotter+' automates the conversion of a text description to a series of vectors and writes an exchange file that All Topo uses to plot on the associated topo map. Deed Plotter+ makes short work of curves and descriptions with errors.

A more complete description of Deed Plotter's use with All Topo and the optional ‘Interchange Option’ can be found in Chapter 8, Using 'Deed Plotter+' Deed Descriptions.

Triangulating New Annotations

The All Topo viewer can help you triangulate a feature’s location if you know the bearing to the location from two separate known locations.

Consider a forest fire burning some distance away. You can see the smoke, but you have no idea how far away the fire might be. If you have a GPS and a compass you can quickly determine the fire's location:

From the first place you can see the fire, take a GPS reading and a compass bearing. Make a note of the bearing and your GPS location:

40° 51' 13.81" N, 109° 5' 3.90" W 97.5° magnetic north

Drive to a second location, far enough away that the compass bearing changes appreciably, again note the bearing, and GPS location.

40° 51' 13.81" N, 109° 2' 36.65" W 223.5° magnetic north

Finally, display the 'Triangulation Tool' by selecting 'Tools: Triangulation…' from the main menu:

Enter the two base coordinates and angles, selecting the correct North Reference (Magnetic North). All Topo will compute the fire location and place a temporary marker at the intersection. Press the thumbtack next to the triangulation point to add a user annotation at the intersection.

It is important to choose observation points that have a large difference in bearing to the target, and to use a quality compass in a non-magnetic environment. In the example above, a 2 degree error in the bearing results in a ¼ mile error in the projected fire location.

For this reason, the use of a quality sighting compass like the Brunton Sightmaster is highly recommended. With some practice, you can quickly take ½ degree repeatable bearings with this compass. Since All Topo automatically adjusts for declination, you won't need to worry about computing declination (or in the worst case setting the declination backwards!)

The Brunton Sightmaster (SM360LA)

Annotation Display: Descriptions, Layers and Grids

The All Topo viewer can overlay UTM grids, Lat/Lon grids and State Plane grids over displayed maps. Each annotation can have three associated text fields (Name, Description, Notes) and be assigned to one of ten layers. These annotation features can be controlled with the 'Layer and Grid Controller', which you can display by selecting 'Annotations: Annotation Control…: Layer, Grid…', or by pressing the shortcut key Alt-G.

Displaying Name, Descriptions and Notes

Annotation Name, Description and Notes can be enabled by checking the appropriate checkbox on the controller, or by pressing the shortcut keys 'N', 'D' and 'T' which toggle the text descriptions on and off.

The 'Hide All Annotations' checkbox is connected to the toolbar button 'Display/Hide All Annotations'. Unchecking the checkbox or un-depressing the button will hide all User, System and Auto annotations; grids, and quick shape

overlays.

When annotations are hidden the button looks like this:  , when annotations are shown the button looks like this:  .

If no annotations are shown on the map, verify that this button is depressed.

Annotation Layers

By default, all annotations are on all layers. You can move an annotation to an alternate layer by right-clicking near the annotation and selecting 'Set Layer' then choosing another layer. You can also move a group of annotations by selecting them in the 'Search Annotation List' tool  , then selecting the menu option 'Edit: Set Layer…' and choosing another layer.

UTM, Lat/Lon and State Plane Grids

All Topo will display UTM, Lat/Lon and State Plane grids in the same style as the Primary Coordinate Display settings. The 'Layer and Grid Controller' allows the color of each grid and the underlying coordinate to be configured.

To change the color of a grid, press the 'color tool' button  to the right of the grid enable checkbox. Press the 'Tool' button  to change the coordinate style. It is very important that the UTM Zone and Units, and the State Plane Zone and Units be configured properly to match any grid printed on the base maps.

Checking the 'Fine Grids' checkbox, doubles the displayed grid frequency.

Exchanging Annotations: Annotation Import and Export

The All Topo viewer includes powerful coordinate exchange wizards to automate the process of importing and exporting annotations from external, delimited-text files.

Importing Annotations from Delimited Text Files

The All Topo Import Agent helps automate the process of reading a delimited text file into the current annotation set.

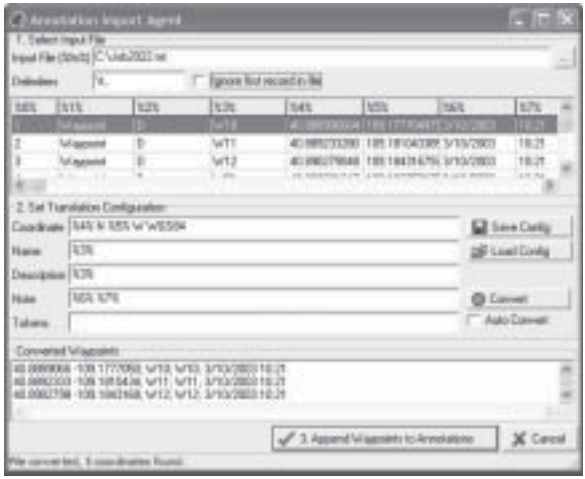
Delimited-text files might have almost any format, but they always contain one record per line, with fields separated by a unique delimiters like a comma or tab character.

The 'Import Agent' can build a recipe pattern that instructs All Topo how to interpret each input line or record. For example, we might want to import this text file:

```
Waypoint,D,W10,40.888906604,109.177704979,3/10/2003,10:21
Waypoint,D,W11,40.889233280,109.181043385,3/10/2003,10:21
Waypoint,D,W12,40.890279848,109.184316797,3/10/2003,10:21
Waypoint,D,W21,40.893001647,109.163256178,3/10/2003,10:21
Waypoint,D,W22,40.890121678,109.163517855,3/10/2003,10:21
```

This file is comma delimited, and contains 7 fields per record. We are interested in the third field (name/description), the fourth field (latitude) and the fifth field (longitude). The file is known to be WGS84 datum.

To import this file, start the import wizard by selecting the main menu option "Annotations: Import/Export: Import Annotations…" The 'Annotation Import Wizard' will be displayed. Browse for the text file to import by pressing the '…' button to the right of the file name.



Configure the ‘Delimiters’ box with the character that separates columns in the input data. It is possible to define multiple delimiters for a single file. The tab character is not easily entered, so the '\I' token can be used to represent the tab character. Other available tokens are:

\i	tab (control I)
\t	tab (control I)
\n	new line (^M^J)
\r	return carriage (^M)
\h1h2	any hex encoded character: '\ff 'represents ASCII(255)
,	a comma, used for comma delimited files

If the first line (record) of the file is a header line, check the 'Ignore first record' box to instruct All Topo to toss the first line of the file.

Once the file name and delimiters are specified, All Topo will show the contents of the selected file in the Input Grid at the top of the wizard.

Each annotations location is defined by the latitude in field 4 and the longitude in field 5. The coordinate datum is not included in the file, but we know the points were recorded by a GPS and are WGS84 Molodensky encoded. We can form a fully qualified coordinate by referring to the column names and adding the WGS84 datum code:

Coordinate:	%4% N %5% W WGS84

It is important to include the N and W to indicate that the longitude is West, or to include a '-' in front of the longitude:

Coordinate:	%4% -%5% WGS84

All Topo will process each line of the input file, substituting the value in the 4th field for %4%, the value in the 5th field for %5% and finally adding the WPS84 datum code to the coordinate. The token %0% is converted to the line number within the input file, the token %FN% is converted to the input file name.

To use the 3rd field value for both the Name and Description, set both values to the third column tag:

Name	%3%
Description	%3%
Note	From %FN%, line %0%

Press the 'Convert' button to test the decoder configuration and show the conversion in the 'Converted Waypoints' window at the bottom.

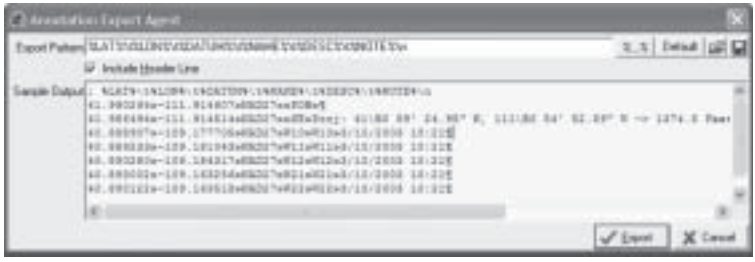
When the conversion is configured correctly, press the '3. Append Waypoints to Annotations' button to add the converted waypoints to the currently open annotation file in All Topo Maps.

Once the conversion is correct, you can save the configuration by pressing the 'Save Config' button and choosing a descriptive file name. Later if you input a similar file, you will be able to recall the saved configuration by pressing the 'Load Config' button.

Sometimes you may have a field in the input file that can be treated as a symbol name. To attach a symbol to each waypoint that has the same name as a field, you can include a token like '<S "%1%.bmp">' which would add a symbol defined by the file 'waypoint.bmp' to every annotation.

Exporting Annotations to Delimited Text Files

To export all of the annotations currently defined in the All Topo viewer to a delimited text file, start the 'Annotation Export Agent' by selecting the main menu option 'Annotations: Import/Export: Export Annotations…'. The Export Agent will be shown:



The Export Wizard converts a series of tokens to output records for each of the current annotations using the 'Export Pattern'.

The default export pattern:

%LAT%\t%LON%\t%DATUM%;\t%NAME%;\t%DESC%;\t%NOTE%\n

exports the latitude, longitude, datum, annotation name, description and note; each field separated by a tab token.

Use the token helper to edit the token list by pressing the '%...%' button, or enter tokens manually. A full list of available tokens is described in Appendix D.

Check the 'Include Header Line' box to include a descriptive line showing the field tokens in the output file.

The ‘Sample Output’ shows tab characters as a right pointing double angle bracket‘»’ symbol and new-line characters as pilcrow signs ‘¶’.

Once you define a useful export pattern, you can save the export pattern by pressing the button. Previously saved patterns can be recalled using the button.

Press the 'Export' button to choose an export file name and location, then write the export file name to disk

Map Export Wizard

The Map Export Wizard automates the process of exporting the entire map or the viewed map to the Windows Clipboard or a graphics file.

To export a map, launch the Map Export Wizard using the main menu selection 'Edit: Export Map to Clipboard, File or GIS…' or use the shortcut key 'Ctrl-C'.

To export a map, set the options in each of the three numbered sections:

1. Choose to export either 'just the viewed map' or 'the Entire map'.
2. Choose the destination for the exported map: 'the Windows Clipboard (as a Bitmap)' or 'a Generic Graphics File'. If you choose to export to a graphics file, you can also:

   Enter the file name and path for the output file. Press the button to set the output file name to match the current map name.

   Enable the generation of an extra file that describes the exported maps by checking **'Write description of map image to: (file name).txt'**. This file will contain the corner coordinates, scale factors and insertion points for use with CAD programs.

   Check the '**Write a … Worldfile**' box to write a world file that contains the geographic coordinate of the North West corner of the exported image and the image scale factor. The extension of the world file is derived from the first letter of the image file extension, the third letter of the image file extension followed by 'W'. Many GIS and CAD programs will automatically use the world file to georeference the exported map image into world space.

   If the output file type is .TIF, then checking the **'Add GeoTIF information…'** box will add extended geographic and scale factor information to the exported map. Some GIS and CAD programs will use these GeoTIF extension to georeference the exported map into world space.

   The **'Exported Map Datum'** is used to control the datum of the coordinates exposed by the world file and GeoTIF extensions. You should choose the datum that matches the datum of your project. Maps exported from AllTopo are always UTM projections (NAD27 or NAD83), choosing alternate coordinate styles only changes the coordinate style/datum of the corner coordinate NOT the underlying map projection.

   Checking **'Compress output file if possible'** will enable file compression for these file types:

   .BMP Bitmap RLE compression if checked

.PNG	Portable Network Graphic	Maximum compression if checked
.JPG	JPEG	Quality = 75 if checked, 100 if unchecked
.TIF	TIFF	BitPack compression if checked (NOT RECOMMENDED!)

3. Set image re-sampling and choose the print scale for intended final use.

   AllTopo normally exports map images at the full resolution of the image database. Check the 'Resample Output Image' box and choose the output scale, or output image height or width to change the output resolution.

   So text and annotations can be appropriately scaled, it is necessary for AllTopo to know the intended scale at which you intend to use the exported map image. If you intend to print a 1:24,000 scale map at 1:48,000 (half normal size) then AllTopo will double the size of all annotations so they are the intended size.

If annotations or grids are enabled, AllTopo will export the map as a 24-bit raster image so every annotation color may be accurately represented. Check the **'Force 8-bit Output'** to force an 8-bit palette file to be written. Since 24-bit files are three times larger than 8-bit images, 8-bit images will require less disk space for storage and load more quickly.

When the exported map image is formatted correctly, press the 'Export' button to build the output image file.

Printed Map Scale / Print Preview

The size of map annotations (text and lines) can be configured to provide desirable results on printed and exported map images. When the 'Print Preview' button is depressed  , the viewer scales annotations so they are drawn on the screen at the same size they will print at. This is useful for setting the position and size of text so adjacent annotations do not obscure each other.

At some zoom settings, annotations will be scaled and drawn so small or large that it is impossible to read them. For these conditions it is desirable to render annotations on the viewing screen at the size they were designed. To disable final print size scaling, un-depress the toolbar print preview button  or use the main menu option 'View: Print Preview: Design or Scaled' to toggle the setting.

To set the intended print scale, select the main menu option 'File: Set Printed Map Scale…' or press the toolbar button  :

The 'Set Printed Map Scale' tool allows the map scale to be set to common values with the 'Force Common Map Scale' buttons; or exact scales can be set using one of these scale settings:

- **Map Scale**: directly set the map scale ratio.
- **Percent of Nominal Scale**: zoom the map as a percentage of nominal

map scale. If the scale is set less than 55% or greater than 200%, it will be highlighted with red text to indicate the scale may not be appropriate for printing.

- **Inches per Mile**: number of inches that 1 mile of map coverage will cover on the printed map.
- **Miles per Inch**: number of miles of map coverage shown in 1 inch of printed map.
- **Feet per Inch**: number of feet of map coverage shown in 1 inch of printed map.
- **Centimeters per Kilometer**: number of centimeters on printed map that 1 kilometer of map coverage will require.
- **Meters per Centimeter**: number of meters of map coverage shown in 1 centimeter of printed map.

After setting any of the scale settings, press the tab key to exit the setting and all of the other scale settings will change to reflect the new setting.

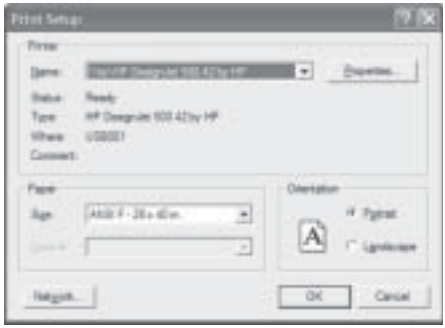
The 'Set Printed Map Scale' menu is also available directly from the Print map menu.

Printing Maps

To print a portion of, or the entire current map, select the main menu option "File: Print…'. The 'Print Map' tool will be displayed:

The 'Printer Information' button displays page size, resolution and low level driver features for the currently selected printer.

Press the 'Printer Setup' button to reach the 'Print Setup' menu where you can choose a printer:



Press the ‘Properties’ button to access the print driver configuration specific to your printer. Within the Windows print driver, you may be able to configure these additional print driver items:

- If possible select a 300 Pixel Per Inch (PPI or DPI) print resolution; avoid 600 PPI or higher resolutions as excessive system memory may be required to rasterize the map image.
- Choose the smallest possible paper size that the print job will fit on.
- Choose 'Optimize for Graphics' in the print driver if possible.
- Choose 'Process In Computer' NOT 'Process In Printer' if possible.
- Choose the 'Printed Page Orientation'. Portrait is taller than wide. Landscape is wider than tall.

After closing the Windows print driver configuration, and the Print Setup dialog, check each of the numbered items in the Print Map dialog:

1. Select and Configure Printer. Choose from installed Windows printers.
2. Printed Page Orientation. Select tall or wide orientation.
3. Print Selection. You can select the currently viewed map, or the entire map.
4. Choose the 'Printed Map Scale'. If you have not set the nominal print scale, press the 'Set Print Scale' button  and choose the nominal print scale for the map. All Topo uses the print scale to both size the image and scale line and vector features to the correct size.

   Depending upon the size of the printer, the desired nominal print scale and the size of the current map, you will be able to select from up to three printing options:

   • Typically the first item will scale the image selection (entire or viewed) to just fit on the printed page. The resulting print scale will be shown.

   • The center option will print the image selection (entire or viewed) at the desired print scale, beginning at the North West corner and filling the available printed page.

   • The last option will tile the image selection (entire or viewed) to multiple pages at the desired print scale. Press the 'Tile Margin' button to set the top and left overlap between printed pages.
5. Choose the image processing method:

   • The 'Windows Print Driver' uses the print driver to rasterize the map image to the final printer resolution.

   • The 'All Topo RIP' uses the All Topo graphics engine to resample the map image to the final printer resolution.

   • The 'Color Reduce' option, re-colors the image to an 8-bit, 256 color palette image, then uses the 'Window Print Driver' to print the image.

   The approximate print job size is displayed for each selection. When printing huge maps, you may need to choose the image processing method that reduces memory usage.

   Typically the first option will produce good results, using the smallest amount of memory in the shortest time.

Several additional options control printing:

Check '**Only print annotation overlay**' to print only the annotations. The base map is not output. This option is useful for making transparent overlays.

Check **'Add alignment ticks to corners'** to print small tick marks in the corners of the map. If tiled images are aligned at these tick marks, the map images will be aligned correctly.

Check **'Print System annotations'** to print the System annotations on the map. System annotations include: Click-Ticks, the Measurement Spike, temporary Find Placename/Location markers and Elevation Line of Sight results.

Check **'Break multiple pages into separate jobs'** ends print jobs after each individual page is printed. This setting may result in print jobs starting to print sooner and may result in smaller, more stable print jobs.

The **'Print Preview'** button adjusts the aspect ratio of the map viewing screen to match the aspect ratio of the printed page. The zoom level is set to display the same map extents that will print with the current settings. If you change any of the print setup values, press the preview button to resize the image.

Printing Huge Maps on Plotters

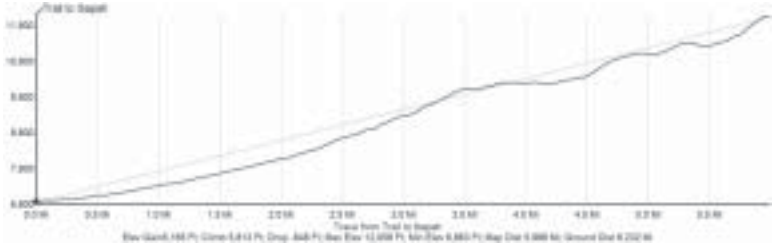
If you are plotting map images (especially large BigTopos) to full sized plotters, and you encounter 'out of memory' errors, or blank or all black images then follow these instructions to optimize your printer driver and computer for printing huge images:

- Make sure you have the latest print drivers for your plotter. (Go to the plotter manufacturer's web site to download the latest drivers.) Even if you just purchased and installed your printer, there are most likely updated drivers available on the web.
- Set your windows print driver to 300 DPI (not 600 or 1,200 DPI.) A 42 x 60 inch map requires 680 megabytes of disk space to virtualize the image for printing at 300 DPI. The same image requires 3,628 megabytes at 600 DPI. It is doubtful that a 3½ Gigabyte image will successfully rasterize or print on any machine!
- Make sure you have plenty of free disk space on your system drive. Once the print image is rasterized, it is stored in the Windows system folder.
- Set your Virtual Memory setting to at least 1,200 megabytes (Control Panel: System: Advanced: Performance: Advanced: Virtual Memory: Change). We prefer to allocate 3,000 megabytes and set both the 'Initial' and 'Maximum' size to the same value.
- Choose 'Process in Computer' and 'Optimize for Graphics' in the windows print driver configuration for your plotter if the options are available. Do not check the 'Maximum Detail' checkbox.
- If you have the option of using an HP-GL/2 or RTL print drivers, use the RTL driver for printing raster images.
- Do not attempt to print raster image maps on plotters connected by RS232 serial cable to your computer, a USB or network cable is preferred over a parallel cable. RS232 (serial) connected plotters will work, however it will take over 8 days to transfer a 42 x 60 inch map at 9,600 baud.
- When printing large maps, watch the plotter as it begins to print. When huge print jobs fail, often the printer will print a solid black image. It is best to manually cancel these failures.
- Once a print job fails, you most likely will need to reboot the computer that sent the print job in before another job may be successfully sent.
- Huge images may not be printable without the addition of a hardware

raster image processor (RIP) to your plotter.

Elevation Profiles

If your All Topo map set includes elevation data, then you can build elevation profiles between two annotations, along a route, or along a freehand traced path.

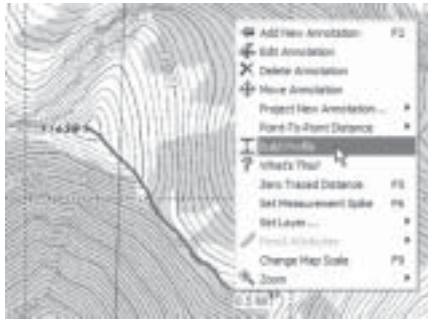


Profiles along a Drawn Path

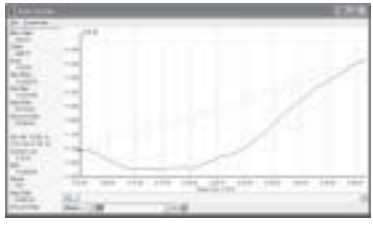
To draw a free hand path and build an elevation profile, select the Pencil Tool by clicking the button on the toolbar.

Move the mouse to the starting point of the path, press and hold the left-mouse button down and trace the path you would like to profile. When the trace is complete, release the left mouse button.

To generate a profile, right-mouse-click near the marker at the start of the trace, then select the popup menu option 'Build Profile'.:

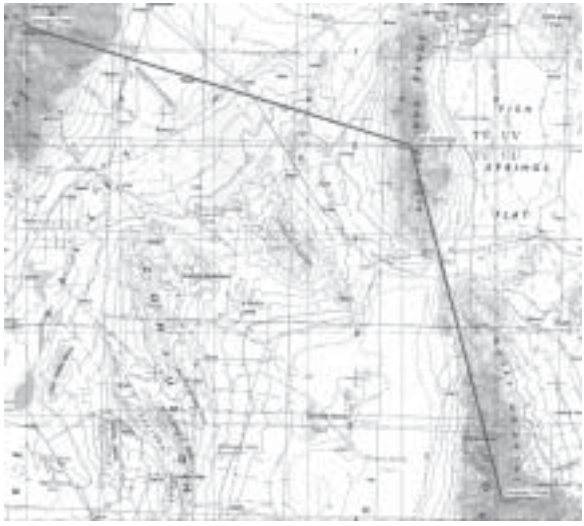


All Topo will generate an elevation profile of the traced path.

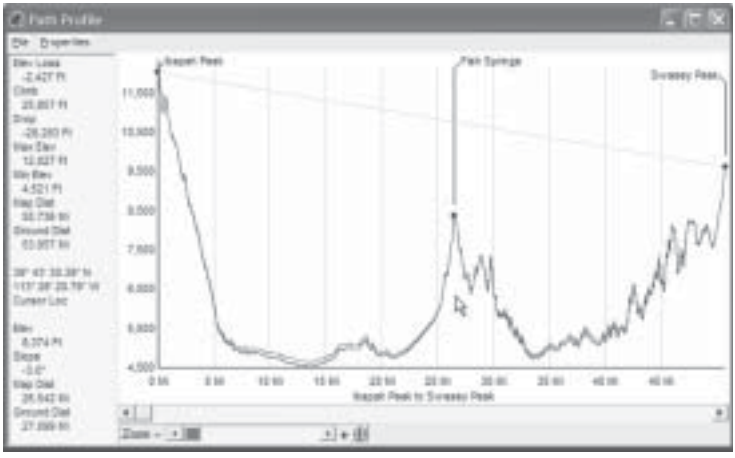


Route Profiles

To draw a route and build an elevation profile; click to select the Point-to-Point Pencil Tool. Move the cursor to the start of the route, right-mouse-click and select 'Begin New Line'. Left-mouse click at each subsequent route point.



When the route is complete, click to select the drag-hand cursor and right-mouse-click near any of the points on the route, then select ‘Build Profile’. All Topo will generate an elevation profile along the traced path:



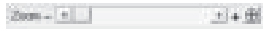
Using Profiles

Each displayed profile includes profile statistics. These statistics can also be included on exported maps by checking the ‘Include Elevation Statistics’ box under “Properties: Axis/Title Options”:

- **Elev Gain/Loss:** The change in elevation from the beginning to end of the profile.
- **Climb**: The total elevation gained in the profile.
- **Drop:** The total elevation lost in the profile.
- **Max Elev:** The highest elevation found in the profile.
- **Min Elev:** The minimum elevation found in the profile.
- **Map Dist:** The distance traveled if computed without elevation gain and loss compensation.
- **Ground Dist:** The distance traveled, adjusted for elevation gain and loss.

As the mouse cursor moves over the profile, the elevation of the path at the cursor location is shown with the slope at the cursor. Right-mouse-click on the elevation profile to jump to a location along the profile:

You can zoom into the profile, by dragging the Zoom slider to the right:



Press the button to return the profile to the full view mode.

The path profile 'Properties' menu item:

will access these configuration settings:

- **Smooth Profile**: Check to enable elevation smoothing, uncheck to use raw elevation data.
- **Show Earth Curvature**: Check to display two profile curves. The lower trace shows the flat-earth profile that represents the effective elevation. The upper trace shows a profile adjusted for earth curvature which is useful for approximating line of sight and radio propagation.
- **Line Color**: Click to set the main profile trace color.
- **Curvature Line Color**: Click to set the upper Earth curvature trace color.
- **Title Font**: Click to set the font style for the graph Title.
- **Grid Font**: Click to set the Grid and Axis label font.
- **WPFont:** Click to set the font style for the waypoint names listed at the top of the graph.
- **Axis, Title Options**: Click to change the way Minimum and Maximum elevation are determined for the profile, and to enable a summary of the elevation statistics on exported and printed profiles. If you plan to print a series of elevation profiles, it is best to manually fix the minimum and maximum elevations for the series so the elevations axis for each profile in the series will be comparable.

The 'File: Export to Clipboard, Printer or File' menu option allows printing/exporting the elevation profiles. When exporting to the printer, the elevation profile will fill the printer's page. If exporting to the Windows Clipboard or a file, it is possible to set the exported image size.

Elevation Tools

All Topo includes a set of basic elevation tools:

- **Elevation Rank:** Finds the highest or lowest points in the currently viewed map area.
- **Line Of Sight:** Identifies and displays locations that can and can not see a base location.

To reach the Elevation Tools, select the main menu option 'Tools: Elev Tools…':

Elevation Database Accuracy Note

WARNING! The All Topo Elevation Tools exploit the elevation grid defined National Elevation Database (NED) digital elevation model. The model includes 0.1 meter resolution elevation grid points at 1 arc-second spacing (continental US) or ½ arc-second spacing (Alaska). While the NED model is the best elevation model available with full coverage for the United States, it does contain errors and may not reflect actual field conditions. Specifically the grid point spacing may not be small enough to satisfy some requirements.

The user is responsible for determining the suitability of these tools for a specific purpose.

Elevation Rank Tool

The elevation rank tool searches for the highest or lowest points in the currently viewed map area. The following rank configuration settings should be configured before pressing the 'Begin Rank' button:

- **Viewed area:** Adjust your map view so you can see the area you want All Topo to rank. If you want to search an area larger than a quadrangle, switch to a larger scale (1:100,000 or 1:250,000 scale), for areas that span more than a single 1:250,000 scale map, build a BigTopo that has the exact coverage you want to search. Large areas take a long time to search.
- **High or Low Points:** All Topo will search for the highest or lowest points, choose the points you want to identify.
- **Number of Ranked Points:** Choose the number of high/low points you want to find. If you are searching a large area, choose a small number of points.
- **Ignore Adjacent Points:** After the first point is found, All Topo will ignore adjacent high/low points within this distance from all previously found points.
- **Label Points With:** Once the high/low points are found, you can add them as numbered annotations in the User Annotation space, annotation names will be generated using this prefix.

Press the **'Begin Rank'** button to start searching. You can abort the search by pressing the 'Abort' button. Once points have been found you can add them and show them as User Annotations by pressing the 'Add results to waypoint list' button. Each point will be added with the exclusion ring shown.

Line of Sight Tool

The line of sight tool evaluates the viewed map for line of sight coverage from two heights above a base location. The Line of Sight tool has numerous applications including visibility impact studies and radio propagation coverage. Paths are evaluated along Great Circle paths and include earth curvature.

Before running a line of sight analysis, first configure each of the Line-of-Sight tab settings:

- **Base Coordinate:** Set the base coordinate to the location you want to compute coverage to. The base coordinate might be the location of a cell tower. To enter the coordinate, set a bookmark or use Ctrl-X to mark a spot on the map, then click the button to load a coordinate.
- **High and Low Tower Height:** Coverage will be computed for two elevations above ground level. Elevations are assumed to be expressed in meters unless units are also included in the height ("120 feet"). These heights might be low and high antenna heights.
- **Rover Height:** At each grid location, All Topo evaluates line of sight between the two tower heights and the rover height above ground level. The height is assumed to be expressed in meters unless units are also included in the height ("6 feet"). The rover height might be an assumed antenna height.
- **Grid Resolution:** All Topo computes line of sight between the base and grid points spread over the viewed map. Run a 'Low Resolution' study first to fine tune settings. Studies for huge areas at 'High Resolution' can take a very long time to complete.

Press the **'Begin Computations'** button to begin the analysis. As output points are evaluated, red, purple and green dots are applied at each output grid location.

Red dots indicate no line of sight to either the low or high tower height from the rover height. Purple dots indicate line of sight to the high tower height only. Green dots indicate line of sight to both the high and low tower height.

You can test the line of sight from the base location viability to any arbitrary location by pressing the 'Test Coordinate' button with the test coordinate loaded in the Clipboard or a bookmark.

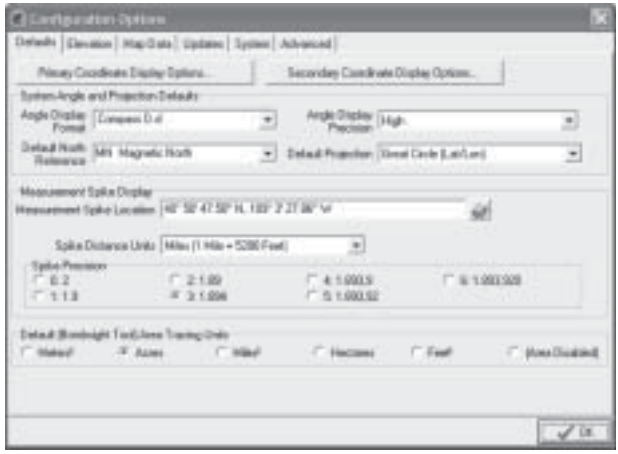
System Configuration Options

The 'Configuration Options' dialog control All Topo:

- Program, coordinate, units defaults.
- Elevation model details and use.
- Map data sources.
- Web based map and program updates,
- System options.
- Deed description export options.

These options control the default behavior of many aspects of All Topo Maps.

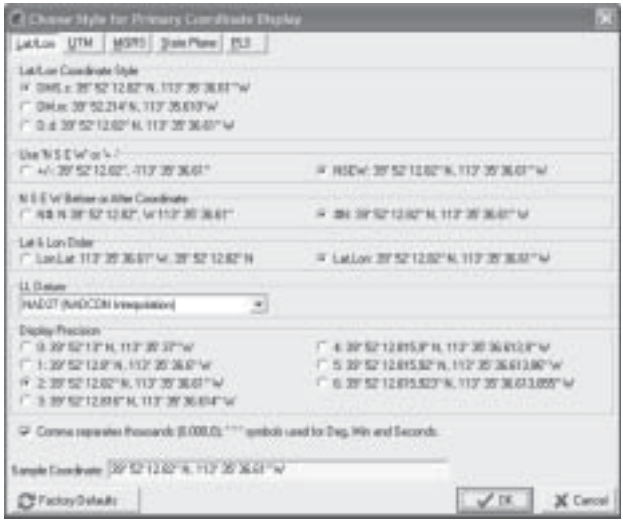
To view and change the options, select the main menu choice "Options: System Options…" or use the shortcut key Alt-Y.



The '**Defaults**' tab controls the coordinate styles; precision, distance and area units, and north reference defaults.

Primary Coordinate Display Options

The 'Primary Coordinate Display Options…' button sets the coordinate style for the first coordinate display.



You can quickly change the primary coordinate style by double-clicking within the primary coordinate display box or pressing the shortcut key F3.

Each of the coordinate styles (Lat/Lon, UTM, MGRS, SPC and PLS) are discussed in Appendix A of this manual.

Secondary Coordinate Display Options

The 'Secondary Coordinate Display Options…' sets the coordinate style for the second coordinate display. You can quickly change the secondary coordinate style by double-clicking within the secondary coordinate display box or by pressing the shortcut key Shift-F3. Editing the 'Secondary Coordinate Display Options' will automatically enable the secondary coordinate display.

System Angle and Projection Defaults

'System Angle and Projection Defaults' are used by the Measurement Spike, and Point-to-Point Distance tools.

Angle Display Format

The 'Angle Display Format' selects the compass bearing format used for the Measurement Spike, Point-to-Point distance tool and other bearing displays. The D.d format is appropriate for most uses.

‘Quadrant’ angles may be suitable for survey work.

Default North Reference

The 'Default North Reference' can be set to:

- **True North:** Handy for surveys or some navigation.
- **Magnetic North:** Great for working with compass readings; no need to manually compensate for declination.
- **UTM Grid North:** Best if navigating with UTM coordinates
- **State Plane Grid North:** May be appropriate if navigating with State Plane coordinates.

Default Projection

The 'Default Projection' can be set to

- **Great Circle (Lat/Lon)**
- **UTM Grid**
- **State Plane Grid**

Measurement Spike Location

You can manually position the Measurement Spike by entering an exact coordinate, or recalling a coordinate from the windows clipboard or an All Topo bookmark.

Spike Distance Units

The 'Spike Distance Units' selects the distance units used to display the distance from the Measurement Spike to the mouse cursor. The 'Spike Distance Units' are also used as the default units for most wizards and helpers.

Default (Bombsight) Area Tracing Units

The 'Default Area Tracing Units' are used by the bomb-sight tool area tracing function, automatically closed lines and some metatags. Available area units are: Square Meters, Acres, Square Miles, Hectares, Square Feet. You can also disable area calculations.

Elevation Tab

All Topo uses a set of compressed files (.idz extension) to estimate the elevation at a location. By default the .idz elevation files are kept on the

distribution CDROM disks with the map files that they cover.

If you copy the map data files from the distribution CD's, the elevation files are automatically organized under the folder specified by the 'Base Location of Auxiliary Elevation Data Files'.

Base Location of Auxiliary Elevation Data Files

If you choose to copy map files from the distribution CDs to your fixed drive, elevation data files are copied to this folder. Elevation data for the entire US requires about 9 gigabytes of disk space.

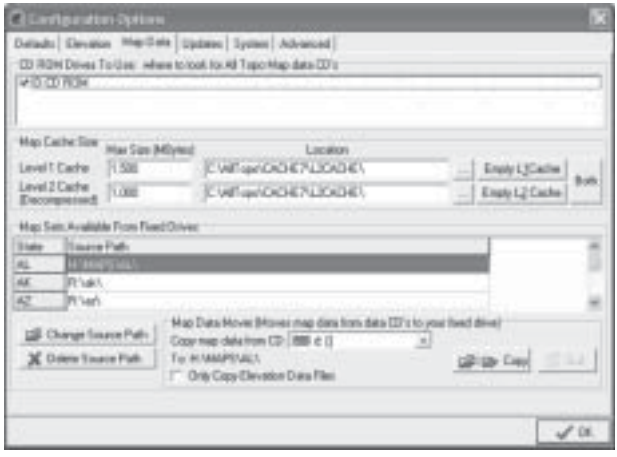
Smooth Grid

Checking the 'Smooth Grid' box directs All Topo to interpolate intermediate elevations, between the grid points. Un-checking the 'Smooth Grid' box results in the elevation grid point, nearest the location of interest to be used.

Elevation Cache Size

All Topo caches decompressed copies of the most recently used elevation files in memory to speed up elevation display. The decompressed elevation grids are quite large, however there is a significant performance boost to having multiple files cached. The default setting of 7 files should be adequate for most projects.

Map Data Tab



The configuration options on the 'Map Data' tab control where and how the All Topo viewer and BigTopo look for source maps.

CD ROM Drives to Use

All Topo will look for map data files on each CD ROM drive checked in the 'CD ROM Drives To Use' box. If you have multiple CD ROM drives, you can use multiple All Topo data disks at the same time by checking the appropriate drive boxes in the list.

Map Cache Size, Empty

All Topo V7 keeps copies of the last maps that you have viewed in local drive caches. The L1 Cache holds compressed maps, copied from CD ROM drives. A larger cache will greatly reduce the time required to display new maps that have been recently viewed. The default L1 cache size is 20 megabytes, if you have sufficient disk space a value of 500 megabytes or more will speed up map access. If you copy the map data from your distribution CD's to a fixed

drive, this cache is not used.

The L2 Cache holds decompressed maps. If you have sufficient fixed disk drive space, a setting of 200 megabytes or higher is recommended.

Press the 'Empty L1 Cache', or 'Empty L2 Cache' buttons to clear the contents from the cache folders. The 'Both' button clears both cache folders.

Installing Maps on Fixed Drives

The viewer and BigTopo expect to find map data on the distribution CDs which you put in your CDROM drive. You can also copy the source maps from the CDs to a fixed disk location.

Press the 'Change Source Path' button, then browse for the location where you want to install maps. Typically maps are stored in folders named with the state set name abbreviation.

If the destination folder does not already exist, you can browse for the root location, then press OK and manually append the desired path.

All Topo V7 can assist in the installation of map data sources to fixed drive locations.

To copy maps from the distribution disks, first click on the grid to the right of the map set you want to copy from and enter or browse for the correct map data path.

Once a path is entered, and selected, insert the first CD ROM from the corresponding state set in a CD ROM drive, select the appropriate drive in the 'Copy map data from CD:' and press the 'Copy' button. The maps will be copied to the selected disk path, elevation files (if present) will be copied to the correct NED folder location (configured on the 'Elevation' tab).

Repeat the copy process for each of the map set's data disks.

Updates Tab

If you have installed a valid 'Map Update Subscription' then it is possible to acquire updated topographic maps directly from the All Topo internet server.

Base Location for Updated Maps

As updated maps are downloaded from the internet, they are stored under this base folder. You can modify the 'Base Location for Updated Map Components' if you need to optimize disk usage.

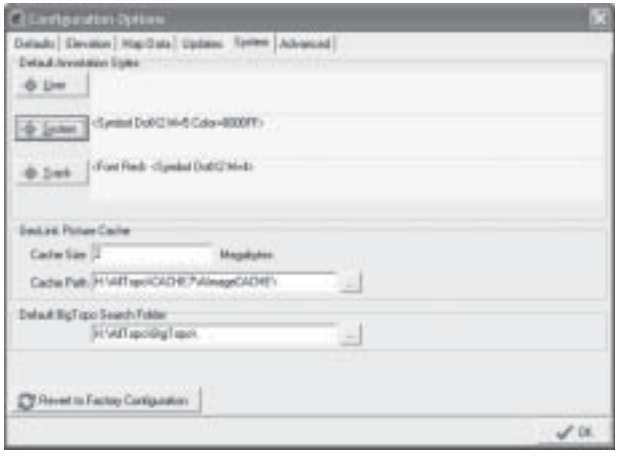
Internet Options for Reaching the Update Server

Your computer needs to be able to communicate with the All Topo server. The default web address of the map update server is '**maps.alltopo.com**'. If you are unable to reach this server, the All Topo factory may be able to provide either a fixed IP address or an alternate server address for the 'Host' entry.

If your network configuration requires the use of a proxy, you will have to enter the proxy address in the 'Proxy' entry and the Proxy Port in the 'Proxy Port' entry. Your network administrator will provide the address and port.

If you don't have a proxy server, then leave the proxy entry blank and set the proxy port to the number 0.

System Tab



The system tab contains configuration options for the default User, System and Track annotations; the size and location of the GeoLink picture cache; and default location where you want BigTopo maps to be built and stored.

Default Styles

The default User style is used for new user annotations.

The default System style is used for the Measurement Spike, double-click-ticks, found locations and bookmarks.

The default Track style is used to display the real-time-tracking location when enabled by the GPS Tool.

The waypoint name, description and note for the User and Track styles will be used for annotations based upon them. Adding tokens like %DMS% to the Track style will result in the track position being displayed at the current location. Annotations based upon the System style ignore any configured name, description and notes.

Auto GeoLink Viewer Cache Path and Size

When the auto GeoLink viewer is shown, linked images are sub-sampled down to the resolution needed for display on the tool. These sub-sampled thumbnails are stored in the 'GeoLink Cache Path' and managed so the cache size remains less than the GeoLink Cache Size. The Cache Size is set in megabytes. A

value of 2 or greater is suggested.

BigTopo Search Path

By default BigTopo maps are built in the 'C:\AllTopo\BigTopo\' folder. The viewer expects to find BigTopo maps in this location and the BigTopo seaming tool defaults to building maps in this path. You can change the default path to any valid folder location to optimize data locations or disk space.

The viewer's 'Change Map Scale' function (shortcut key F9, and some search tools) presents a list of maps (all scales and BigTopos) at the cursor location:

The 'Change Map Scale' function searches all of the BigTopo maps in the BigTopo Search Path and any subfolders of the default BigTopo path for map content at the requested location. If you organize your BigTopo maps in the default folder and its subfolders, the Change Map Scale tool will automatically list available BigTopo maps.

Advanced Options tab

The Advanced Options tab contains settings for the Deed Description wizard and the initial annotation allocation.

Deed Export Settings

The deed export engine will reduce multiple waypoints if they fall within the 'Points-On-A-Line Precision' of a single line.

If you have multiple points, that you know fall on a single line, but want to force the inclusion of, then set the first characters of the waypoint name to the **'Force Use of Waypoints Beginning With'** value. This is handy if you want to include gate posts or road intersections in an exported deed description. Waypoints with names beginning with TPOB are always included and are assumed to be a True Point of Beginning.

'Write Description Using' chooses the distance units the deed description is written with. Typically you would always choose 'Feet'.

'Bearing Distance Projection' sets the projection used to compute offsets. Typically Lat/Lon projection is appropriate, however 'State Plane' may be required for some surveys. If you choose UTM or State Plane, then the settings for the Primary Coordinate Display are used for Zone Code and Datum.

Advanced Annotation Options

By default All Topo will draw lines and text annotations that fall outside the neat lines of a map. You may alternatively uncheck **'Annotate Map Collars'** to stop annotations just outside the neat lines.

The All Topo annotation engine will support an unlimited number of annotations. (Your computer might grind to a stop, but All Topo will be just fine. We often work with 200,000 annotations in a single file.)

All Topo allocates memory for annotations as it needs it, however there is typically a operating system penalty if a lot of memory is allocated piecemeal. If you know you will be working with 60,000 annotations, you can set the 'Preallocated User Annotation Space' to 65,000 annotations to speed things up.

By the same token, if you know you will only be using a couple of hundred annotations, and your machine is memory limited, then setting the preallocated user space to 500 will greatly reduce the program's memory requirements.

The default value of 5,000 annotations is adequate for most modern computers, running typical All Topo projects.

Controlling UTM, State Plane and Lat/Lon Grids

The annotation engine supports three grid types:

- Universal Transverse Mercator (UTM)
- State Plane Coordinate Systems (SPC NAD27 and NAD83)
- Geographic Lat/Lon

You can control the grids using the 'Layer Grid Control' tool. To view the tool select the menu option 'Annotations: Annotation Control…: Layer, Grid Controller…' or use the shortcut key Alt-G:

Each grid is controlled by the Primary Coordinate Display's current setting.

Check the 'Fine Grids' box to double the grid spacing interval.

Click the ‘Color’ button to set the grid color.

Click the 'Tool' buttons to change the grid configuration. Important auxiliary settings include:

UTM Grid: Datum, Zone, Units

Lat/Lon Grid: Datum

State Plane Grid: Datum, State Plane Zone Code, Units

The base maps typically are NAD27 projected, however some maps are NAD83 projected and include black NAD83 grids over the base map image. Remember that NAD27 grids will not align with NAD83 grids. All Topo presents a uniform grid, controlled by the Primary Coordinate display, it does not automatically switch to alternate datum to match base maps.

Viewing 'Quick Shape' Files

Quick-Shape files are a collection of polygons with attribute data. Quick shapes may define areas of land ownership with size and ownership attributes or the shapes might be a hunting unit.

The All Topo viewer will display Quick Shapes over the maps, and show the identity and attributes of the shape(s) under the cursor in the "View GeoLink, Attributes".

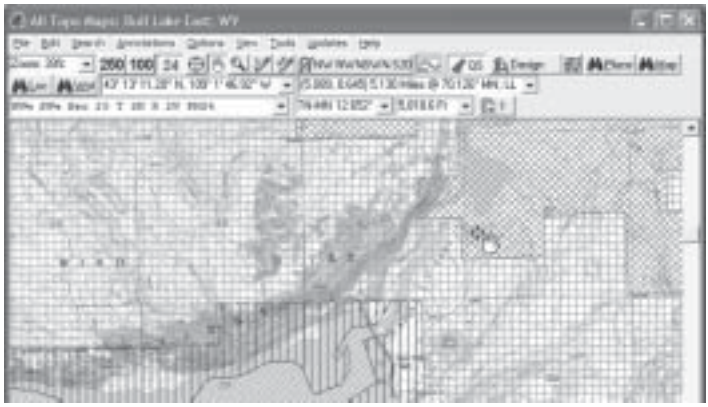
The Quick Shapes controller allows you to choose the shape fields that are included in attribute lists, and choose the colors and patterns that are used to display shapes over the maps.

View the Quick Shape controller by selecting the main menu selection ‘Options: Quick Shape Controller...’:

the Quick Shapes controller will be shown:

To show quick shapes over the maps, first choose the quick shape files to display, adjust the color and fill attributes; then enable shape displays by checking the 'Enable Shape Display' box on the Quick Shapes controller, or press the 'QS' button on the main toolbar to the 'in' position.

Once enabled, the All Topo viewer will overlay the shapes included in the QSF file with the properties selected by the Quick Shapes controller:



and the 'Auto GeoLink' viewer will display the quick shape file attributes of the location under the cursor:

Building Quick Shape Files

The converter required to convert Shape Files is only available in the Professional Edition of All Topo Maps.

Quick Shape files are built by converting industry standard 'Shape Files' (.SHP) to the Quick Shape format. The Quick Shape format arranges the shapes into groups of nearby shapes, with high performance indexing so that the shape list can be searched and displayed very quickly.

To convert a standard shape file to a quick shape file, you need to first install the QSFConverter. This All Topo utility is distributed in a separate installation file 'SetupQSC.exe' on the installation disk. Once installed, the converter can be run from the Windows start menu 'start: (All) Programs: All Topo Maps V7: Tools: SHP2QSC'.

It is best to gather all the shape files you want to convert into a single folder. The converter can combine multiple shape files into a single quick-shape file. To start a conversion select 'File: Convert SHP File':

select one or more input files; then choose an appropriate output file and path.

By default, QSF files are kept in a folder with the same name as the state set they pertain to under the 'QSF' folder in the All Topo directory. For example,

all Wyoming set quick shape files are kept in the C:\All Topo\QSF\WY\ folder.

The converter will request the input coordinate style, Zone and Datum for each input file, once the 'Coordinate Style' is selected, press 'OK' to begin the conversion.

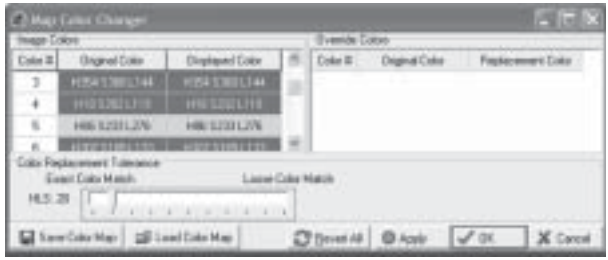
Modifying Map Colors

The All Topo viewer can selectively change each color in a map. If your map set has elevation data included or you have installed optional elevation data products, the viewer can perform beautiful 24-bit hill shading and false elevation coloring.

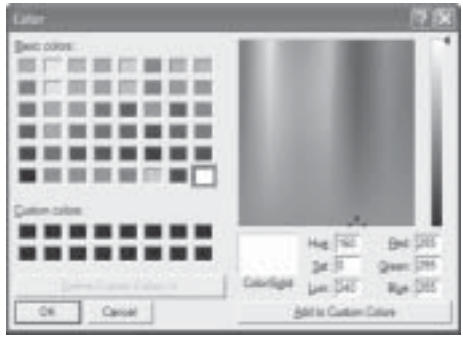
Changing Map Colors

It is useful to change map colors when they obscure your annotations, or to highlight water features. All Topo can globally change all the dark greens to light greens or white.

To modify map colors, start the 'Map Color Change' tool by selecting the menu option 'Options: Modify Map Colors…' or by pressing the shortcut key Alt-Shift-C.



The 'Map Color Changer' has two color grids, the 'Image Colors' and the 'Override Colors'. To change an original color, double-click on the 'Displayed Color' in the 'Image Color' grid that you would like to change. A color picking dialog will be displayed:



If you just want to lighten the displayed color, use the intensity slider to the right of the Custom Color picker. When the correct replacement color has been selected, press the OK button.

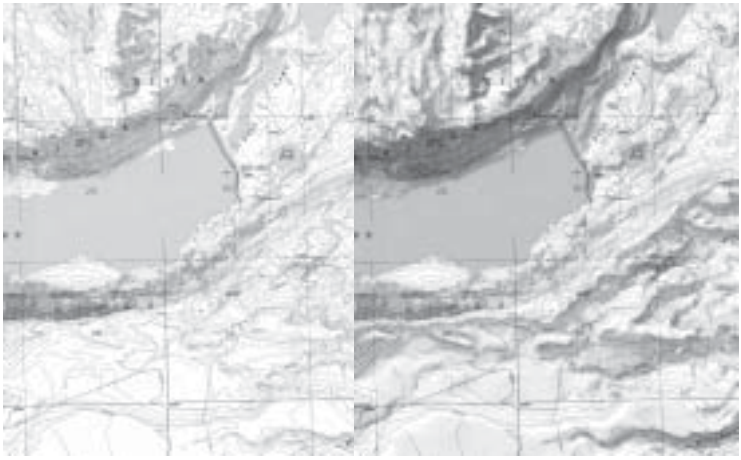
The '**Color Replacement Tolerance**' allows a single color replacement to automatically be applied to nearby colors.

To revert a single color to its original color, double-click the 'Original Color' item in the 'Image Colors' grid. To change a replacement color, double-click the replacement color in the 'Override Color' grid. To revert all colors to the original selections press the 'Revert All' button.

If you configure a color replacement palette that you would like to keep for future use, press the 'Save Color Map' button and choose a meaningful file name. To recall a previously saved color maps, press the 'Load Color Map' button and pick the appropriate color map.

Hill Shading and False Elevation Coloring

The All Topo hill shading engine will quickly generate hill shaded maps based upon the original map colors and elevation data. (If your All Topo map set does not include elevation data, contact the factory to get an elevation data update disk.)



Unshaded - Hillshaded

To start the hill shade tool, select the main menu option 'Tools: Hill Shader…' or press the shortcut key Alt-I:

The hill shader allows you to place the '**Sun Location**' and the '**Sun Elevation**'. Setting the 'Sun Elevation' to Low will generate longer shadows.

In the United States it is customary to shade maps with the sun in the North West. It is doubtful that the sun ever illuminates Alaskan mountains from the North West, so a South West or South East sun position may be more appropriate for northern locals.

The '**Intensity**' slider controls the total amount of lighting and darkening allowed for the resulting image. Typically a setting of 15% to 30% provides good results.

The '**Gain**' setting compensates for flat maps. Maps that have little elevation relief benefit from higher gain. Gain settings of 5 to 20 usually provide good results.

If you are unsure of reasonable settings, press the '**Defaults**' button to set the hill shade engine to the default values.

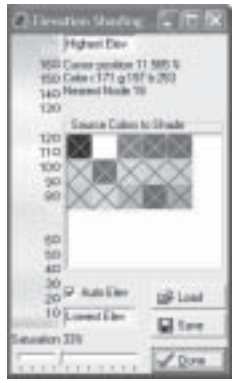
Check the 'High Resolution Output (24-bit)' box for the best shading results. 24-bit shaded maps will take slightly longer to shade, however the resulting file size will be three times larger than the unshaded map. If you are shading a huge BigTopo map, 24-bit shading may generate an image too large to print or view; 8-bit shading is appropriate for these large images.

If you are viewing a BigTopo map, you can make the hill shade and false elevation coloring permanent by checking the 'make changes permanent' box. Once permanent changes are made it is not possible to retrieve the original BigTopo map colors, the BigTopo must be rebuilt from scratch.

Configuring the False Elevation Colors

If 'High Resolution Output' is enabled, then you can choose to add false elevation coloring by checking the 'Add Elevation Color' box. False Elevation coloring is applied concurrently with hillshading.

Press the colored 'Set Elev Color' button  to configure the false elevation coloring setup:



Elevation shading is controlled by color nodes applied to specific elevations or percentages of the actual elevation range of the current map.

If the 'Auto Elev' box is checked then the colors nodes are applied over the actual high and low elevation range of the current map. If you plan to color more than one map, and want the elevation coloring to match from map to map, it is important to uncheck the 'Auto Elev' box, manually set a gain and choose appropriate high and low elevations that cover all of the maps.

Color nodes are indicated by numbered circles in the left-most color display box. At each node you can set the color that will be used at the node's elevation. All Topo blends colors between the notes. You can edit, move, add and delete color nodes by right-clicking within the color display box near the node point you want to change.

The 'Saturation' slider changes the color transparency. Low saturations will only slightly tint the base map, while high saturations will completely replace the base map image.

The 'Source Colors to Shade' box shows the colors in the currently displayed map. Colors without 'X' marks will be recolored, while colors with 'X' will be left as is. Typically you will want to recolor at least the white and green colors.

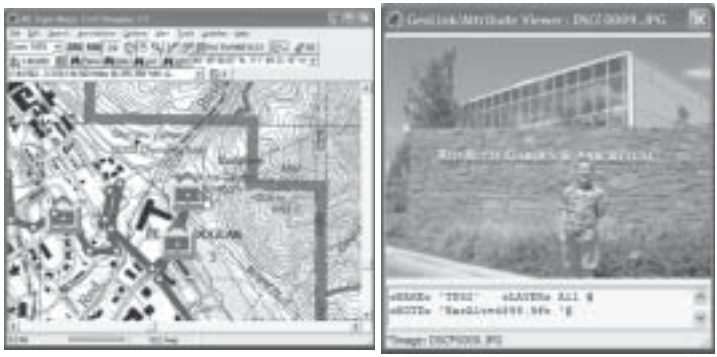
The predefined 'Elevation Shading Files' can be loaded by pressing the 'Load' button. If you define a custom color configuration, you can save it by pressing the 'Save' button.

Attaching GeoLinks to Annotations

You can attach (GeoLink) any media or link your computer can evaluate to an annotation. Common uses include opening a web page when the user right-clicks on an annotation, automatically generating email, or displaying a picture or movie.

All Topo will automatically display pictures and annotation information for the annotation that is nearest the mouse cursor in the Auto GeoLink viewer. To enable the GeoLink/Attribute viewer, click on the menu option 'View: GeoLinks, Attributes' or press the shortcut key Shift-Ctrl-G:

The GeoLink/Attribute Viewer can display pictures with the file types: .JPG .JPEG .PNG .TIF .TIFF .GIF and .BMP:



Holding the cursor near a track point, automatically shows the picture defined by the GeoLink

To manually connect media and links to an existing annotation, right-click near the annotation and select 'Edit Annotation'; the 'Edit Coordinate' dialog will be shown. Select the 'GeoLinks' tab:

Enter the address of the target in the 'GeoLink' box. To display a picture, include the full address to the picture. If the media is stored on an accessible

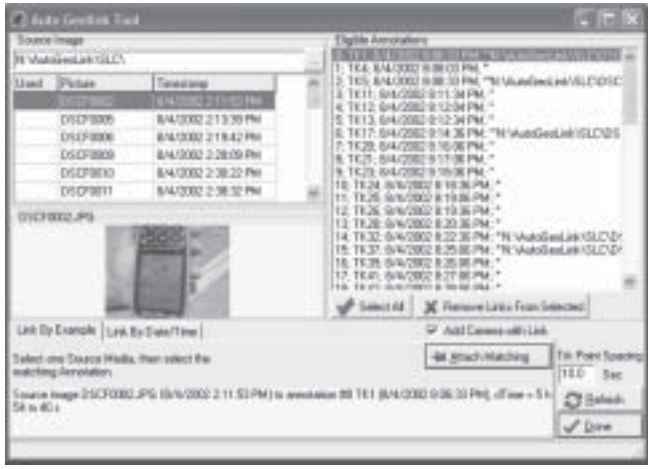
drive, you can use the 'Browse for file' button to find the picture:

To enter a web address, use the form 'http:\\www.igage.com\index.html' To send email to an address when the link is evaluated use the form 'mailto:\\gripes@igage.com'.

If an annotation has media attached, it is customary to include a symbol (like a camera) or an underlined link reference to indicate there is a GeoLink.

Automatically Attaching GeoLinks

The All Topo Auto GeoLink tool automatically attaches JPEG images taken with digital cameras to GPS track points or waypoints. The Auto GeoLink wizard can be started from the 'Tools: Auto GeoLink…' menu selection:



The Auto GeoLink wizard tool requires that:

- your GPS record a time/date stamp with track points or waypoints
- your .JPG images contain a recognizable time/date stamp

Recording a GPS Track While Taking Pictures

To take pictures for use with the Auto GeoLink wizard:

1 Turn your GPS on and allow it to acquire satellites, wait for the Estimated Position Error (EPE) to drop below 20 - 30 feet.

2 Estimate the time you will spend taking pictures and choose a track point spacing that will not overflow the track buffer on your GPS. Clear any track points from your GPS and enable track recording.

3 Select the display page on your GPS that shows date and time. (You don’t need to set the clock on your camera.) Take a picture of the GPS that shows the GPS date and time. This picture will be used to correlate the GPS time with your camera's time. Don't change the camera's clock after you take the picture of the GPS's time screen.

4 Now travel with your GPS turned on, recording track points. Take pictures at your leisure. It is not necessary to connect your GPS to your camera or computer. Make sure the GPS is carried nearby the camera and that the GPS has a clear view of the sky.

5 When you are done taking pictures, turn off the GPS or disable track

point logging to insure that the GPS buffer does not wrap.

Automatically Attaching Pictures to the Track

Download all of the pictures from your camera to a new folder on your computer (see the instructions for your digital camera), then use the All Topo GPS Tool to download the GPS track to the same folder:

Get Trackpoints from GPS

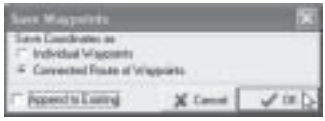
1. Start the GPS Tool (configure GPS on 'Settings' tab if needed):

2. Load Coordinates from GPS Receiver:

3. Load Coordinates from GPS Track Log:

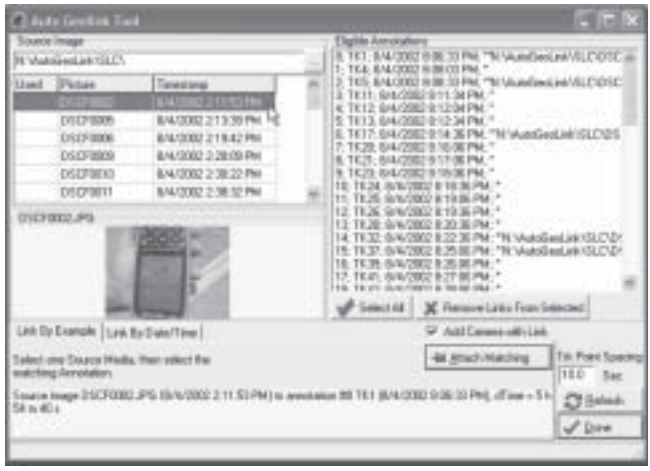
4. Save Coordinates to a Waypoint File in the same folder as the images:

5. Save Waypoints as a 'Connected Route of Waypoints':



6. Open the saved track log from your GPS in All Topo Maps using the 'Annotations: Open Annotation File…' menu option:

7. Start the Auto GeoLink wizard from the main menu option "Tools: Auto GeoLink…".



Use the '…' button to the right of the 'Source Image' entry to browse for the folder containing the pictures and track log file. Every picture will be listed by the date/time order extracted from the picture. Click on the picture that you took of the GPS date/time screen.

Read the date/time from the GPS display in the picture, you can zoom into the picture by pressing and holding the Shift key, then drag the mouse over the image to zoom in. Click on the image's file name to fit the entire image on the display again.

Select the nearest matching track point in the 'Eligible Annotations' grid (the GPS track point that was recorded at nearly the same time that you took the picture of the GPS.) If you cleared the track points from your GPS when you started, the correct track point will be near the top of the list and the minutes and seconds will very nearly match the time shown on the picture of the GPS:

Next enter the track point spacing you programmed the GPS for (typically 10 seconds.) Check the 'Add Camera with Link' box to add a camera icon to each annotation point that is linked.

Finally press the 'Attach Matching' button. All Topo will correlate the images and track points. If you took pictures more often than the track point spacing, All Topo will attach multiple pictures to a single track point.

When All Topo finishes attaching images, close the Auto GeoLink tool to return to the All Topo viewer. Click the main menu option 'View: View GeoLink, Attributes…' option to display the Auto GeoLink viewer. You may need to adjust the windows on your screen so you can see both the map and the GeoLink viewer.

As the cursor hovers near a GeoLinked point the linked image will be displayed.

Auto GeoLink Tool Issues:

If your GPS does not allow a time based track point spacing, set the 'Track Point Spacing' value on the 'Auto GeoLink Tool' to 60 seconds.

If your GPS does not provide a date time stamp for track log points, but it does timestamp waypoints, you can manually record waypoints as you take each picture.

If you have traveled slowly between track points, and there are many track points clustered around the linked points, use the point reducer to delete unneeded track points from the annotation file after attaching the pictures to the track log. To use the point reducer, press the button, then highlight one of the annotations in the attached track log, then choose the 'Search Annotation List' menu option "Options: Reduce Points…".

Don't rotate pictures until after they have been GeoLinked to annotations. Image processing tools typically will destroy the date/timestamp included within the picture file.

If you want to edit, or rotate images before attaching them make sure you first run the JPGDate utility which will build an associated date/time stamp file (.date extension.) If your image editing tool destroys the image's date/time stamp, All Topo will use the external file to correlate the image.

If All Topo and JPDDate can't find a date/time stamp in your .JPG image file and you are sure there is one, email two images with the exact date/time stamps reported by your camera to iGage for evaluation. (Our email address is listed on the 'Certificate of Serial Number' that came with your map set.)

Chapter 7: Sourcing Basemaps with All Topo

All Topo is an excellent source of basemaps for use with other programs like CAD, GIS, other mapping and image tools.

All Topo can export entire maps, pieces of maps and arbitrary coverages comprised of seamed sets of maps using BigTopo.

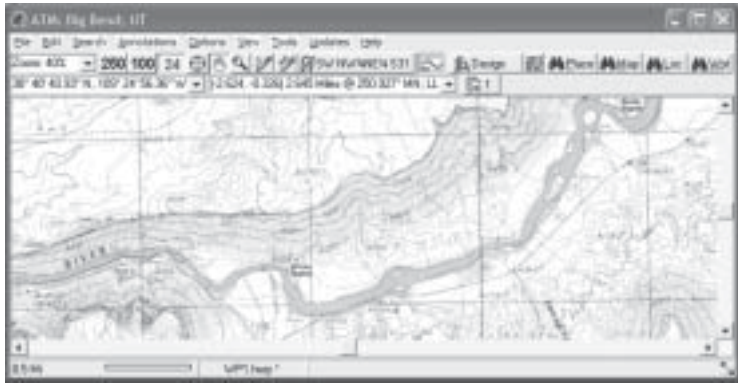
This chapter discusses exporting maps to a variety of other applications. In every case you first must export a map image from either the viewer or BigTopo to a TIF image file:

- **Map Viewer:** Exporting a piece of an existing map or an entire map.
- **BigTopo:** Exporting coverage that extends over two or more maps.
- Importing asemaps into Trimble **Pathfinder Office**
- Importing basemaps into ESRI **ArcGIS Products**
- Importing baseemaps into **OziExplorer**
- Importing basemaps into **AutoCAD LT** and **AutoCAD Map**
- Importing basemaps into **Mapinfo**

Exporting a piece of an existing map or an entire map

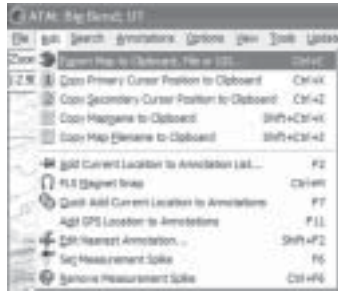
1 Open the topographic map (any scale) from which you want to export.

2 Adjust the aspect of the map viewing Window to match the coverage you want to export. Zoom in or out until what you see on the viewer is the map you want to export:

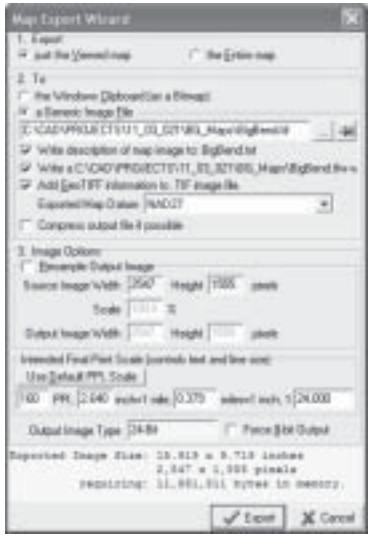


If the All Topo map viewer covers your entire screen, press the restore button in the window corner to return to partial screen mode so you can resize the window.

3 Select the main menu option 'Edit: Export Map to Clipboard, File or GIS...':



4 The ‘Export Wizard’ will be displayed:



Choose

- ‘1. Export just the Viewed map’.
- ‘2. To a Generic Image File’.
- Press the ‘...’ button to the right of the filename and choose an appropriate path and filename. Insure that the filename extension is .TIF.
- Check the ‘Write a description of map image to ...’ checkbox.
- Check the ‘Write a Worldfile’ checkbox.
- Check the ‘Add GeoTIF information to .TIF image file’.
- Choose an appropriate export datum, typically NAD27 or NAD83.
- Uncheck the ‘Compress output file if possible’ checkbox
- Uncheck the ‘3. Resample Output Image’ checkbox.
- Click the ‘Use Default PPI, Scale’.
- Click the ‘Force 8-bit Output’ checkbox to minimize the output filesize.

Finally, press the ‘Export’ button to write the output file.

BigTopo exporting coverage over two or more maps

Use BigTopo to export a map that extends beyond the collars of a single map image.

Follow the BigTopo instructions found in Chapter 11’BigTopo7’, except in section 3 ‘Choosing Output Files and Paths’:

- On the ‘Output File’ tab, choose to ‘Export the BigTopo as a generic graphic picture.

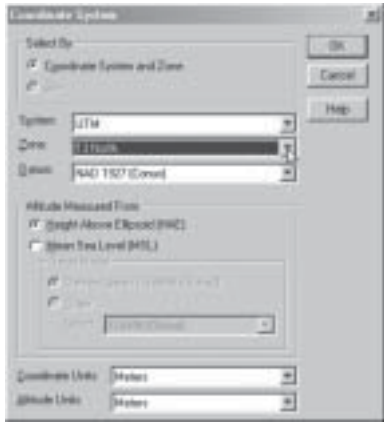
- Press the ‘Browse...’ button to the right of the filename to choose an appropriate path and filename. Insure that the filename extension is .TIF.
- Check the ‘Add GeoTif Information’ checkbox

When the BigTopo is built, it will be built as a GeoTIF image, with a .TFW worldfile.

Importing basemaps into Pathfinder Office

From the Pathfinder menu, select “Options: Coordinate System”.

The ‘Coordinate System’ dialog is shown:



Choose:

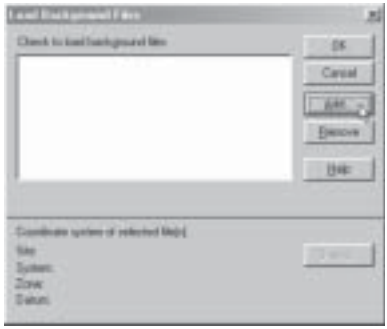
- System to ‘Universal Transverse Mercator’
- Zone ‘(the proper UTM Zone)’
- Datum to ‘NAD 1927 (CONUS)’
- Coordinate Units to ‘Meters’

If you don’t know the correct UTM Zone, inspect the .TXT worldfile that was written with the exported map:

```
;***** CAD INSERTION POINT AND SCALE INFORMATION *****
CAD Insertion Point (SW Image Corner) = 623,581.3 M E, 4,276,517.6 M N
   Z12 (Meters UTM Projection)
CAD Horz Scale = 13,757.910,000 (Meters); 45,137.500,000 (Feet)
```

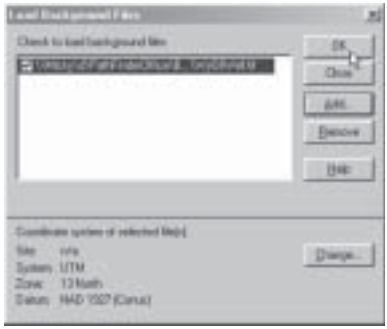
From the “File: Background” menu, load the new image:

The ‘Load Background Files’ dialog is shown:

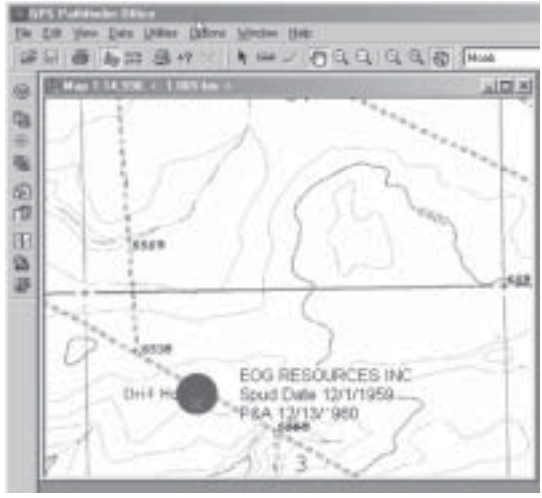


Press ‘Add...’, then browse for the image (you might need to change ‘Files of type:’ to ‘*.tif’):

When you find the correct file, press ‘Open’ to add it to the background file list:



Finally press OK and Pathfinder will load and display the selected background image:



To turn off background map display, simply go back to File, Background… and uncheck the check box next to the filename to turn it off. Press the Add… button to add other background maps.

Importing maps into ESRI Arc Products

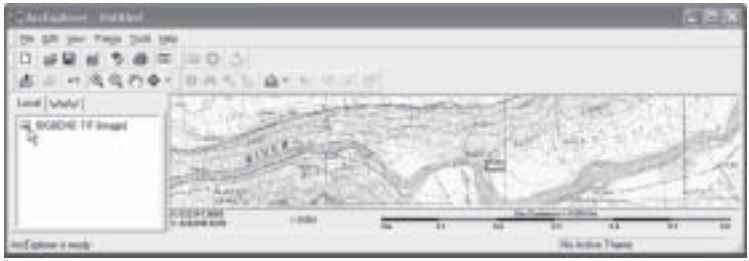
ArcExplorer

ArcExplorer is a free GIS viewer supplied by ESRI. Exported All Topo maps can be displayed by ArcExplorer with shapefiles and other GIS data layers.

From ArcExplorer's main menu, select the option 'Theme: Add Theme...':

the 'Add Theme' dialog is shown:

Browse and highlight the map exported from All Topo Map, then press ‘Add Theme’ on the toolbar to load the map. Finally check the box next to the newly added theme to display the map image:



ArcView

ArcView is a powerful GIS tool supplied by ESRI.

Before loading the map, make sure ‘Tiff Image Extensions’ are turned on.

From ArcView’s main menu select ‘File: Extensions...’, then check ‘Tiff 6.0 Image Support’; finally press OK to close the extension manager.

- Open an existing view or create a new one.
- Press the ‘Add Theme’ button:

- Browse for the All Topo basemap to import (you may need to set the ‘Data Source Type’ to ‘Image Data Source’,) then press OK. ArcView will add the image as a theme, check the table of contents box corresponding to the basemap to display the basemap.

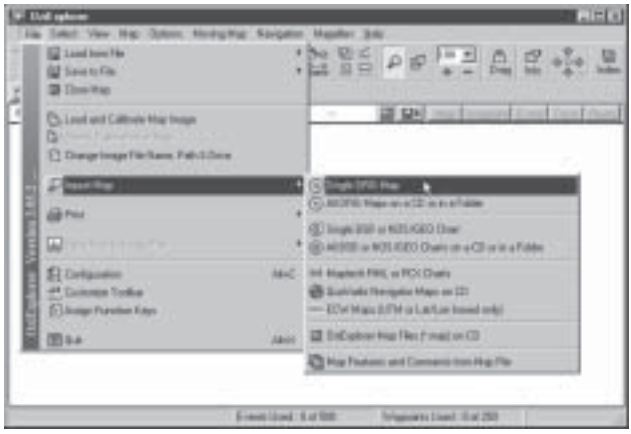
If other vector themes are added you may need to manually set the projection by selecting the main menu option: ‘View: Properties...’, then press the ‘Projection’ button, then set the ‘Projection Properties’ to

‘Standard’
‘Category’ = ‘UTM - 1927’
‘Type’ = ‘Zone XX’ (match Zone to the correct UTM Zone)

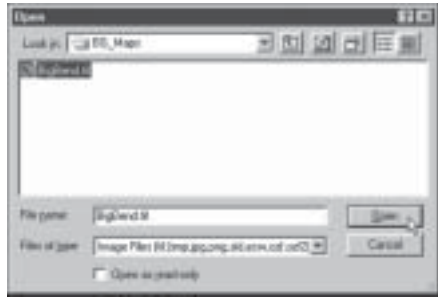
Importing basemaps into OziExplorer

OziExplorer is interactive, scanned map, trip planning software available from Des & Lorraine Newman (www.oziexplorer.com).

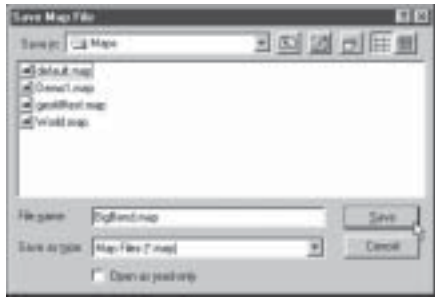
OziExplorer will directly import basemaps generated with the All Topo viewer or BigTopo. To import and register a map, select the OziExplorer main menu option ‘File: Import Map: Single DRG Map’:



Ozi will prompt to find the source image, browse for the .TIF file exported from All Topo:



Press 'Open' to import the file, Ozi will ask for a name and path for the Ozi map file that defines the imported image:



The default file and path is usually adequate. Press 'Save' to import and register the image from All Topo.

Importing basemaps into AutoCAD LT

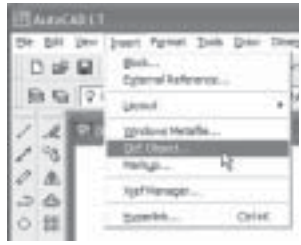
AutoCAD is a computer aided drafting program by AutoDesk. Raster images can be imported into AutoCAD (R14 and higher) as base layers and engineering documents can be overlaid on the base maps. A complementary product 'AutoCAD Map' can automatically georeference basemaps into world space.

To import an image into AutoCAD LT 2000, first open the accompanying .TXT file generated when All Topo or BigTopo exported with the Windows Notepad editor. Find the lines labeled:

```
; CAD base insertion and scale include map collars (entire image).
CAD Insertion Point (SW Corner) =
                632,113.03 M E, 4,281,285.14 M N Z12  (UTM Meters)
CAD Horz Scale = 6,469.380,0 (Meters); 21,225.000,0 (Feet)
```

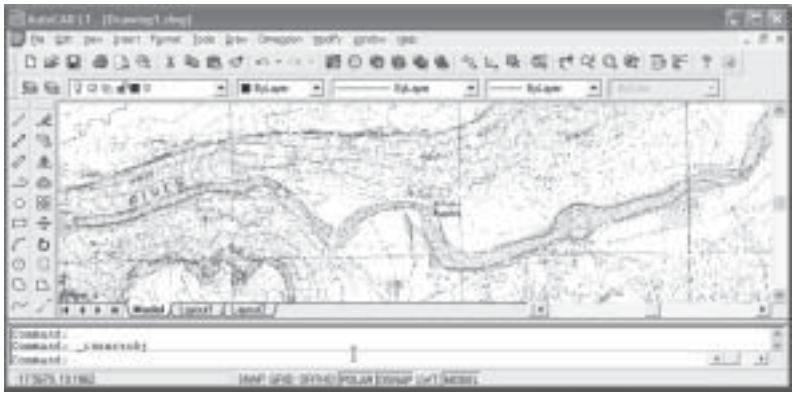
If you choose to insert the basemap at its UTM location, the listed insertion point can be used. The 'CAD Horz Scale' is required so that engineering units can be used on the imported map.

Open an existing drawing or create a new drawing. Select the main menu item 'Insert: OLE Object':



The ‘Insert Object’ dialog is shown:

Select the ‘Create From File’ option, check the ‘Link’ checkbox, browse for the basemap; then finally press the ‘OK’ button. The basemap will be shown:



Typically the basemap will look absolutely horrible when viewed in AutoCAD! AutoCAD uses a sub-sampling algorithm optimized for speed not quality. The full resolution image is registered by AutoCAD and will be used when the project is printed.

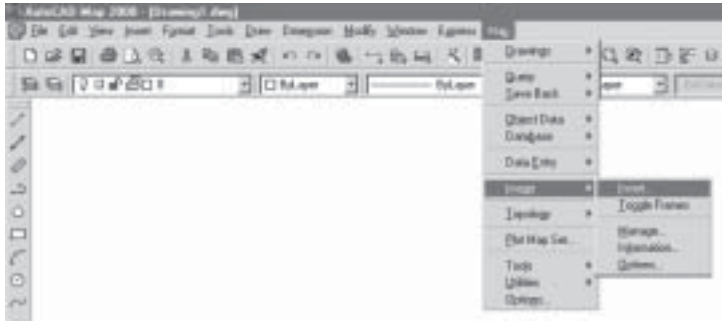
To scale the image to ‘real world coordinates’, right-click on the image and select ‘Properties’:

Check the ‘Lock Aspect Ratio’ box, then set the ‘Size: Width’ to the ‘CAD Horz Scale’ indicated in the .TXT file that is built with the basemap. Be sure to use the scale that matches your drawing units (feet or meters.) Press OK.

You will need to ‘Zoom, Extents’ to see the entire basemap.

Importing basemaps into AutoCAD Map

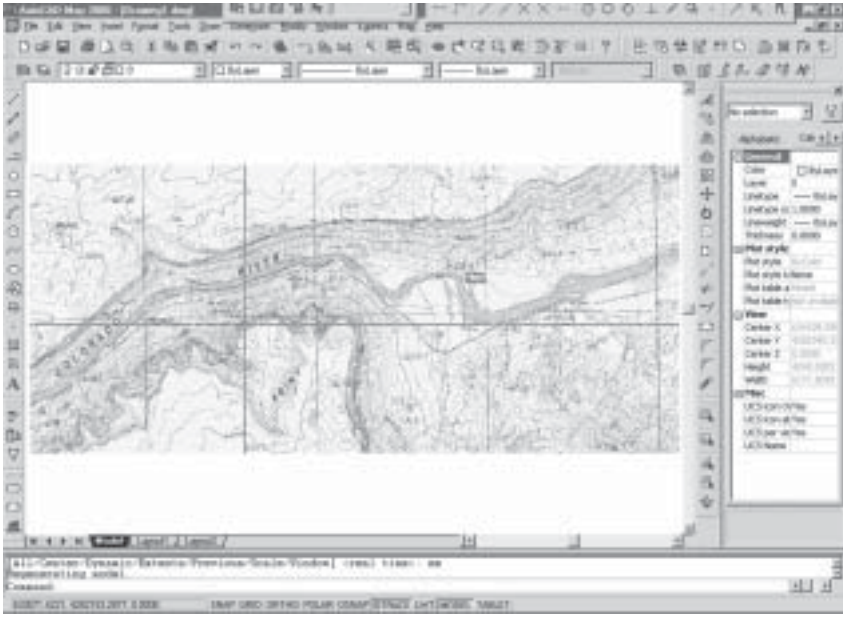
From the AutoCAD Map main menu, select ‘Map: Image: Insert...’



Browse for the .TIF image file saved from the viewer or BigTopo. Check ‘Modify Correlation’ to inspect the insertion point and scale, check ‘Show Preview’ to verify you have selected the correct image:

Check the ‘Image Correlation’, if you added ‘GeoTIF’ information to the image, then the ‘Correlation Source’ should be the ‘Image File’.

You will need to ‘Zoom Extents’ to view the inserted image:

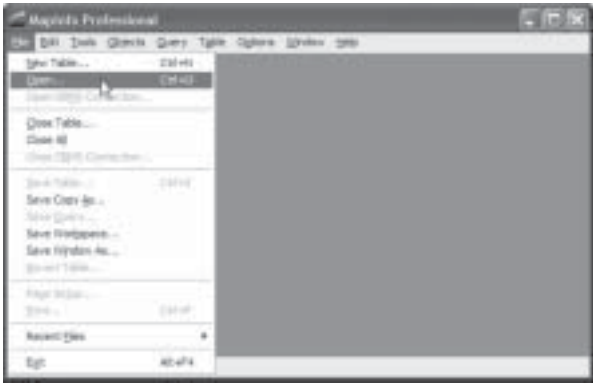


Importing basemaps into MapInfo

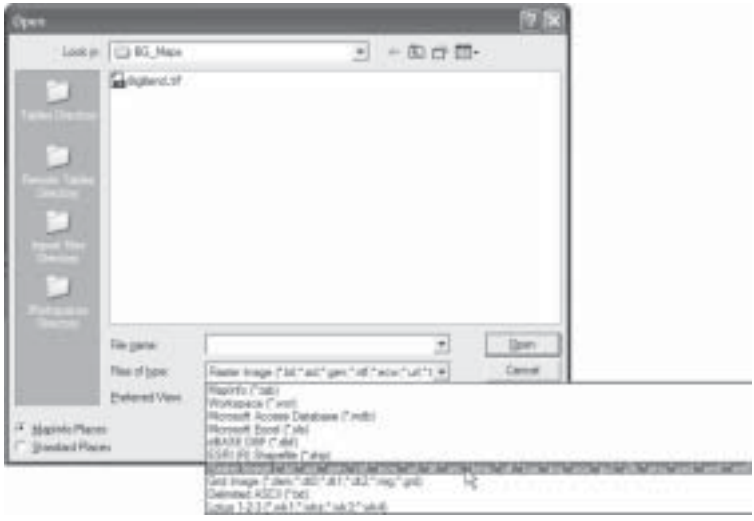
MapInfo is a leading business mapping solution, it performs sophisticated and detailed data analysis to drive insightful decisions.

Maps exported from the All Topo Map viewer or BigTopo can be easily imported into MapInfo.

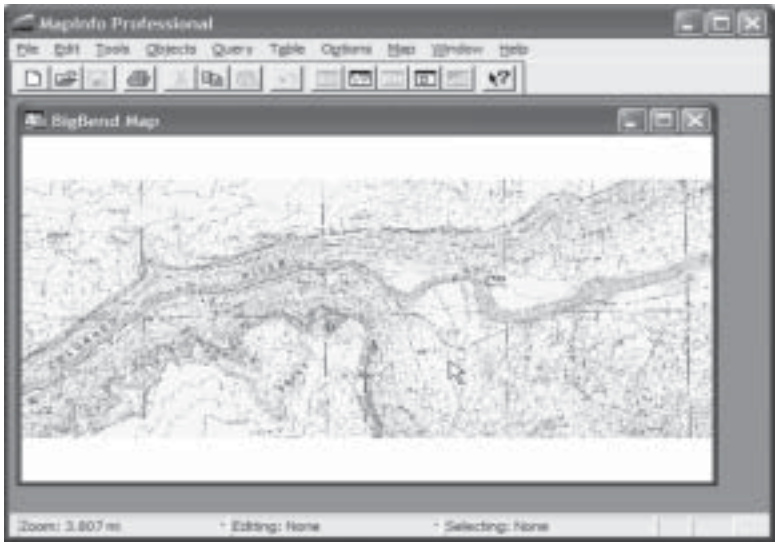
From the main MapInfo menu select “File: Open..”:



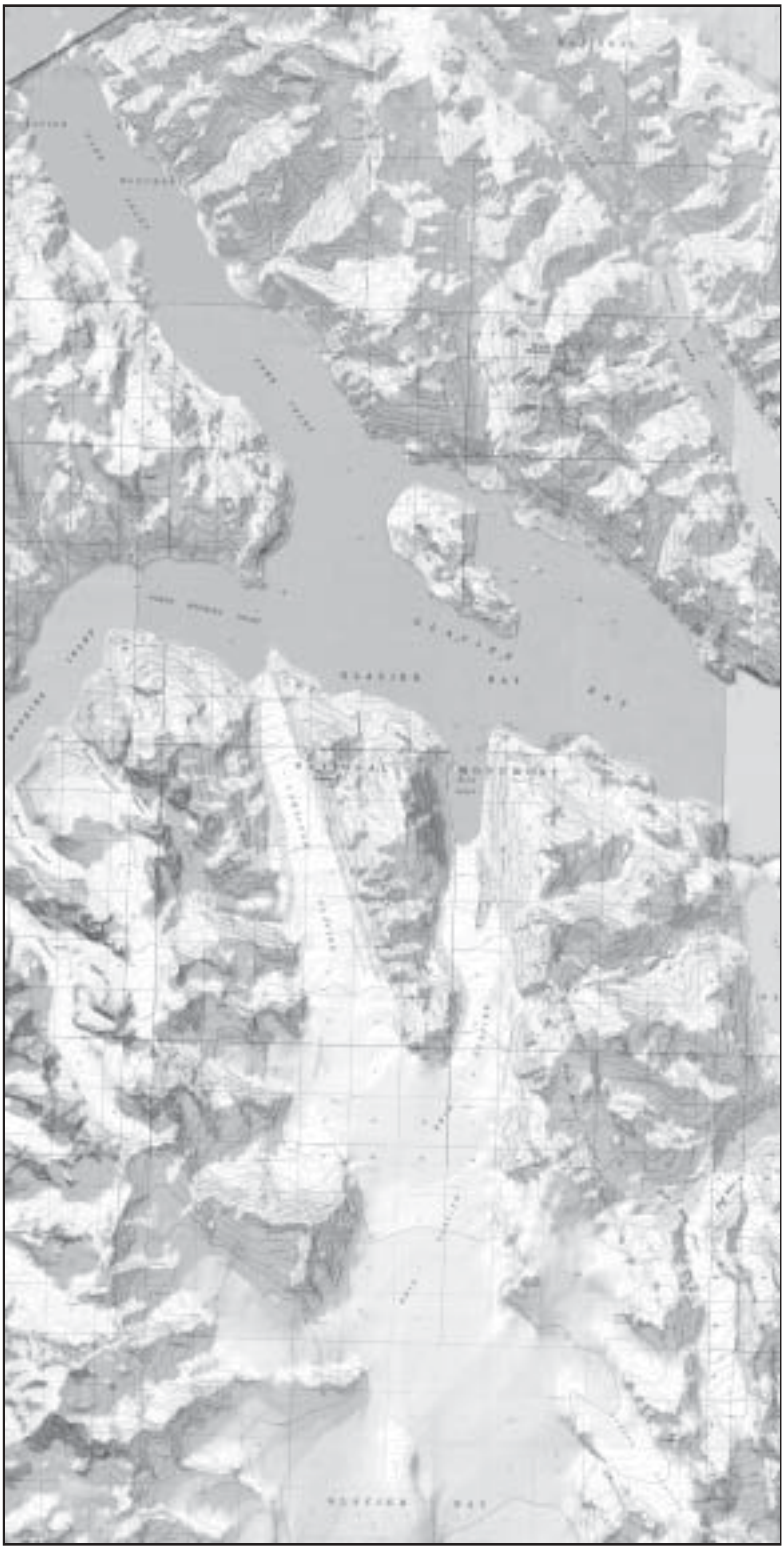
Change the “Files of Type:” to ‘Raster (*.bil...’:



Browse for the ‘.tif’ image, then press the ‘Open’ button to load the basemap:



MapInfo will load the raster image and generate a .TAB file in the same folder as the basemap for future use.



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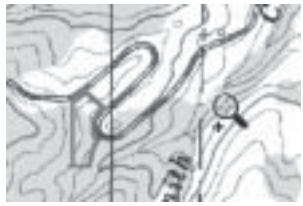
Chapter 8 Using 'Deed Plotter+' Deed Descriptions

All Topo Maps when combined with ‘Deed Plotter+’ (a trademark of Greenbrier Graphics, Inc.) takes text descriptions like:

> A part of the Southeast Quarter of Section 23, Township 6 North, Range 1 East, Salt Lake Base and Meridian, U.S. Survey: Beginning at the East quarter corner of this Section 23, thence South 89°36' 25" West 1446.81 feet along the quarter section line, thence South 6°59' 51" East 565.86 feet, thence South 4°54'27" West 66.0 feet; thence Easterly along a curve to the left with a radius of 206.57 ft., an arc distance of 110 feet, a chord bearing of N. 79° 39' 08" E and a chord length of 108.70 feet to the True point of Beginning.
>
> Thence Easterly along a curve to the left with a radius of 206.57 feet, an arc distance of 50.3 feet, a chord bearing of N. 57° 20' 25" E and a chord length of 50.13 feet; thence Northeasterly along a curve to the left with a radius of 2683.29 feet, an arc distance of 100 feet, a chord bearing of N. 49° 23' 04" E and a chord length of 99.99 feet; thence South 46°54' 35" East 225.64 feet to the Northerly line of Snow Basic Road; thence South 43° 05' 25" west 92.25 feet; thence Southerly along a curve to the left with a radius of 164.61 feet, an arc distance of 263.10 feet, a chord bearing of S. 02° 41' 56" E and a chord length of 235.98 feet, along said South line to the center of an existing road, thence two courses along the center of said road as follows: South 41° 30' 42" West 58.98 feet and South 11° 46' 15" West 211.33 feet; thence North 86° 17' 37" West 152.24 feet; thence North 0° 17' 53" East 606.33 feet to the place of beginning.

and automatically annotates a topographic map with the described property boundary:



Enabling the ‘Deed Plotter+’ Interface

'Deed Plotter+' exchange is an optional feature of All Topo Maps. A separate 'Deed Plotter+ DXF Interchange' serial number must be purchased and entered into the Serial Number Manager (Help: License Manager) to enable the options discussed in this section.

The All Topo Deed Plotter product requires the separate purchase of ‘Deed Plotter+’ Version 4.08 or higher from Greenbrier Graphics, Inc. or their vendors. Checkout www.deedplotter.com or www.johnsonmapping.com for purchase details.

Accuracy and Use Limitations

The boundaries plotted by All Topo Maps are approximate and subject to errors in placement and rotation. The U.S.G.S. base maps have a published accuracy of:

> not more than 10 percent of the points tested shall be in error by more than 1/30 inch, measured on the publication scale; for maps on publication scales of 1:20,000 or smaller, 1/50 inch.

This means that 90% of plotted points will enjoy accuracy of 66.6 feet on a 1:24,000 scale map. No claim is made for the remaining 10% of plotted points!

Always seek property descriptions provided by a competent surveyor. Represent site maps generated with All Topo Maps as approximate. Don't represent property for sale by acreage.

Paul McClung and Dr. Thomas E. Rider have addressed important consider-

ations in 'Appendix V: Fundamentals of Surveying Law' of the 'Deed-Plotter+ Users Manual'. Please take a few moments to read this excellent overview.

Igage Mapping Corporation provides the 'Deed-Plotter+ DXF Interchange' option without claims for it's fitness for purpose. You must check all generated maps as you alone are responsible for any errors. Always consult the advice of a Licensed Professional Surveyor for advice on the suitability of All Topo Maps and Deed Plotter+ for a particular purpose.

Obtaining Deed Plotter+ Support

Hopefully you will find the support associates at Igage Mapping Corporation knowledgeable about the All Topo Map's viewer and linking a Deed Plotter+ DXF interchange survey file to a coordinate as an annotation. If you have a survey question or a Deed-Plotter+ issue check the 'Johnson Mapping' web site. Johnson Mapping also provides excellent, hands on Deed Plotter+ seminars offering professional continuing education credits.

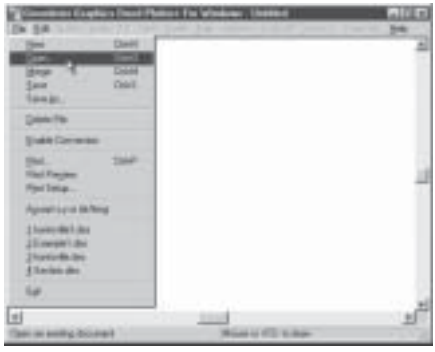
www.johnsonmapping.com

Johnson Mapping's 'Frequently Asked Questions' section is continuously updated and has great hints and examples on Deed Plotter's operation.

Placing a Deed Plotter Property Description in All Topo Maps

Start Deed-Plotter+ by double clicking on its desktop icon:

Deed-Plotter will start, select the 'File: Open...' option to specify the file that holds the description we want to evaluate:



Find the document containing the survey description, highlight the file and press 'Open':

Deed-Plotter will display the survey description; press the 'Test' button to highlight significant elements:

Press the 'Convert Calls' button, Deed-Plotter+ will convert the text description to a series of 'Calls':

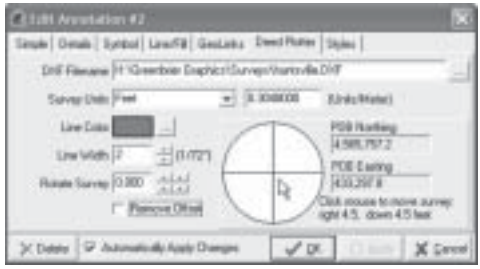
While directly reading description text files is useful for checking descriptions for errors, typically users would quickly enter a series of calls as shown above.

Finally press 'F2' to display an outline of the property:

To overlay this lot on a topographic map, first save the deed description file: press the esc (Escape) key twice, then use the main menu option “File: Save As...’ option to choose an appropriate filename for the description. Finally, press F2 to draw the map, then choose the “Map: Save as .dxf” option to save the property boundary as a drawing exchange file:

Start the All Topo Maps viewer and navigate to the map that contains the Point of Beginning (POB) for the description. Since we have a public land survey description: 'East quarter corner Section 23 Township 6 North, Range 1 East, Salt Lake PM' we can use the 'Search by Coordinate Location' tool to specify the exact location (we use the south east corner of the north half):

Press the 'Add Annotation at Coordinate' button, then select the 'Deed Plotter' tab and browse for the .dxf file we exported from Deed Plotter. Use the 'Survey Units' box to select 'Feet' units for the imported file:



If you would like All Topo Maps to remove an offset to the initial point of beginning, check the 'Remove Offset' checkbox. This is useful if you specify an initial point in 'Deed Plotter' using a State Plane or UTM base coordinate, and don't want to specify the deed insertion point as the grid's origin.

Choose a line color and width. Widths are entered in 1/72" (points).

Finally use the 'Rotate Survey' option and the 'Jog Circle' to move and rotate the survey onto the map. Rotation is compass based: Positive Rotation = Clockwise; Negative Rotation = Counter Clockwise. Surveys are placed with respect to True North and any rotation is applied with respect to a True North bearing.

The 'Jog Circle' moves the POB in the direction of the cursor when you click within the circle.

When the annotation is properly aligned, click OK to finish the deed description insertion.

To edit an existing Deed Plotter+ annotation, right-mouse-click near the deed's insertion point to re-display the 'Edit Waypoint' dialog.

Removing Surveys from the Map

To remove a Deed Plotter+ survey, right click near the POB marker point and

select 'Delete Waypoint'. You can also use the 'WP List' tool: highlight the annotation that contains the Deed Plotter+ link in the 'Search Annotation List' grid and press the delete key.

Interchange Hints

DXF Filename Link

The DXF Filename is a link to the file output from Deed Plotter+. The .DXF file must exist when the map is viewed.

If you place the .DXF file in the same directory as the .HWP annotation file you will not need to include a fully qualified pathname.

All Topo evaluates the .DXF file continuously, so if you make a change within 'Deed-Plotter+', just select 'Map: Save-As DXF' again to replace the original file. The changes will appear when the map screen is redrawn in the All Topo Maps viewer (Alt-R will force a screen refresh).

Hiding POB to TPOB Vector

Often a deed description will contain an initial call from the Point of Beginning (POB) to a True Point of Beginning (TPOB). It is usually desirable to hide the initial vector to the property's corner.

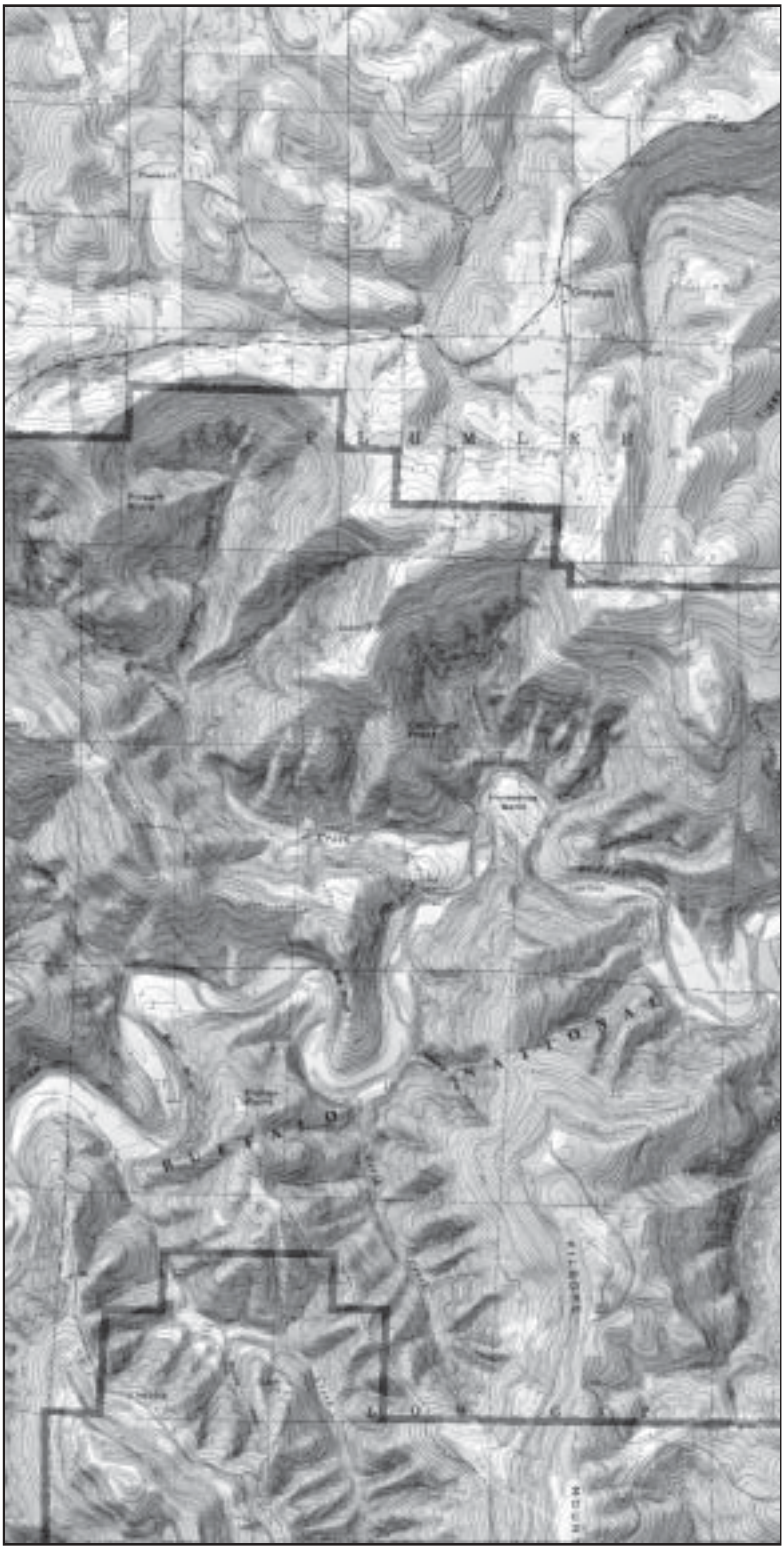
Place a forward-slash "/" as the first character of the line to hide in 'Deed Plotter+'s Deed Description Editor and the call will be ignored for plotting in 'Deed Plotter+'. The initial offset will be included in All Topo; however a line will not be drawn.

Surveys that Cross Maps

If a survey falls on two or more quadrangles, use BigTopo to make a new topographic map, centric to your survey. See the 'BigTopo' description found in this manual.

'Deed Plotter+' Program Version

The lowest 'Deed Plotter+' program version that will work with All Topo Maps is V 4.08.



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Chapter 9: Command Line Arguments & API

Normally you just click on the All Topo viewer's desktop or Start Menu icon and the All Topo viewer starts and loads the last viewed map and annotation set.

You can optionally start All Topo from the command line or a special icon that adds arguments to change the initial view point, map name, loaded state set and annotation file.

If the All Topo viewer is already running, the running copy will process any command line arguments. It is possible to remote control the All Topo viewer by passing arguments to a command line.

To pass command line arguments from the Windows Command Prompt, just add the arguments at the end of the program invocation:

To pass arguments via a Windows shortcut, add the arguments at the end of the target file specification:

Argument Descriptions

Load State Set

If you have purchased multiple All Topo state sets, you can specify the state set to load on the command line and bypass the state selection menu.

Add the two letter state set abbreviation on the command line:

```
C:\AllTopo\Bin7\All Topo UT
```

to load the Utah map set.

Initial View Location

Add a quote delimited coordinate to change the initial view location:

```
C:\AllTopo\Bin7\All Topo "N 45 12 32 W 107 23 41"
```

to display the specified location in the center of the screen. If you have more than one state set, it may be necessary to include the correct state code before the coordinate to force the viewer to load the state set that contains the

coordinate:

```
C:\AllTopo\Bin7\All Topo UT "N 45 12 32 W 107 23 41"
```

Annotation files can contain AutoJump location tags (<A "location">) which are evaluated after the annotation files are loaded. The AutoJump tags contained within HWP files will override any initial view/map selection that you make on the command line.

Specify Initial Map

Add a quote delimited map name to force the viewer to display a specific initial map. If you have more than one state set, it may be necessary to also specify the state set that contains the map:

```
C:\AllTopo\Bin7\All Topo UT "Clay Basin"
```

Specify Initial Annotation File

Add a quote delimited filename and path to force the viewer to load a specific initial annotation file:

```
C:\AllTopo\Bin7\All Topo "c:\All Topo\User\well24.hwp"
```

will load the 'well24.hwp' annotation file.

Programmer's API

The Programmer's API is a very advanced topic. Only experienced Windows programmers need this capability and will benefit by reading the following section.

Factory support for the Programmer's API is not included in the purchase price of All Topo Maps.

All Topo Maps has a powerful programmer's API (Application Program Interface). Any remote process can attach to a shared memory block and retrieve All Topo runtime information, or control the All Topo viewer.

Shared Memory Structures

All Topo's ATM_API_rec contains the geographic coordinates of the current All Topo map cursor position as both UTM and Lat/Lon coordinates. The name and path of the map file, annotation file are continuously updated as is the current map image scale, and a short list of the last (trapped) keypresses by the user. Currently only the A, and S keys are trapped.

The 11,176 byte, ATM_API_rec record is attached/created by the windows API:

```
CreateFileMapping( $FFFFFFFF,
                   nil,
                   PAGE_READWRITE,
                   0,
                   sizeof(ATM_API_rec),
                   'AllTopoMaps_API_IPC_Block' );
```

The ATM_API_rec uses these data types:

char	1-byte
double	64-bit floating-point number
integer	signed 32-bit integer

The ATM_API_rec is defined by the following structure.

```
type
  // Note DatumCodes
  //  0-NAD27, 1-NAD83, 2-WGS84, 3-WGS72, 4-NAD27CONUS,
  //  5-NAD27AK, 6-NAD27CANADA, 7-NAD83CANADA, 8-OLDHawaii,
  //  9-Intl1924
    ca16  = array[0..15]  of char;  // short string
    ca128 = array[0..127] of char;  // long string

    tKeyPress = packed record       // Single Key Description
      KeyCode: integer;             // windows keycode
      ShiftCode: integer;
          // 0x1-ssShift, 0x2-ssAlt, 0x4-ssCtrl,
          // 0x8-ssLeft, 0x10-ssRight, 0x20-ssMiddle,
          // 0x40-ssDouble
      // Cursor Geographic Position when key was pressed
      UTM_X:   double;              // cursor position
      UTM_Y:   double;
      UTM_Z:   integer;             // UTM Zone
      UTM_D:   integer;             // Datum Code

      LL_X:    double;              // cursor position
      LL_Y:    double;
      LL_D:    integer;             // Datum Code

      WPName:  ca16;                // nearest waypoint Name
      WPDesc:  ca128;               // " waypoint Description
      WPNote:  ca128;               // " waypoint Note
    end;

    ATM_API_rec = packed record     // Size = 11176 bytes
      API_Version: integer;         // Currently = 1
   // **** From All Topo Maps ****
      LockSync: integer;
    // This number is incremented after the following
    // values are updated by the viewer. It is sufficent
    // to read LockSync before reading any of the following
    // values, and after the read is complete. If LockSync
    // has not changed, then the value you read is complete.
        // Current Cursor Position
        UTM_X:             double;
        UTM_Y:             double;
        UTM_Z:             integer;
        UTM_D:             integer; // Datum Code
        LL_X:              double;  // Longitude, neg=West
        LL_Y:              double;  // Latitude
        LL_D:              integer; // Datum Code
        MapFilename:       ca128;
        WPFilename:        ca128;   // path and filename of
                                    // annotation (hwp) File
        CurrentScale:      integer;   // 100 = 100%

        // A & S keypresses are pumped through this buffer
        KeyPress:          packed array [0..31] of tKeyPress;
        KeyPressInPtr:     integer;
          // points to the place the next keypress
          // will be place in. So if KeyPressInPtr = 0
          // then the last keypress is in [31] or there
          // has not yet been a keypress.

      // **** From Remote Device ****
      RemoteID: ca128;              // description of who
          // we are listening too, passed to System Log
      DoCenterMapUTM:    integer;   // set non-zero
          // to center following UTM position on screen
        CenterUTM_X:     double;
        CenterUTM_Y:     double;
        CenterUTM_Z:     integer;
        CenterUTM_D:     integer;
```

```
  DoCenterMapLL:     integer;   // set non-zero
    // to center following LL position
    CenterLL_X:      double;
    CenterLL_Y:      double;
    CenterLL_D:      integer;
  DoImageScale:      integer;   // set non-zero
    ImageScale:      integer;   //  to force Zoom
  DoReadWPFilename:  integer;   // set non-zero
    // to force load following WP File
    ReadAsFilename:  ca128;     // if first character
     // is '@' then the rest of the line is treated
     // as a command line would be on invocation

  DoSaveCurrent:     integer;   // set non-zero
     // to save current waypoint file
  DoSaveAsFilename:  integer;   // set non-zero
     // to save waypoints to following file
    SaveAsFilename:  ca128;
  DoWindow:          integer;   // set non-zero
     // to move AllTopo main window to screen pos:
    WLeft:           integer;
    WWidth:          integer;
    WTop:            integer;
    WHeight:         integer;
  // Set Map Type/Scale
  MapType_24K:       integer;
      // set non-zero to 'push' the 24K button
  MapType_63K:       integer;
      // set non-zero to 'push' the 63K button
  MapType_100K:      integer;
      // set non-zero to 'push' the 100K button
  MapType_250K:      integer;
      // set non-zero to 'push' the 250K button
end;
```

Chapter 10: All Topo GPS Tool

All Topo Maps includes a powerful GPS interface tool that directly exchanges waypoints, route points and track points with most consumer GPS receivers.

The 'GPS Tool' links the All Topo Maps viewer and your GPS receiver. Waypoints and Route points and Track points may be moved from the All Topo Maps viewer to your GPS and from your GPS to All Topo Maps. Real time tracking also automatically plots and centers your current position on the map viewer's window.

This chapter describes the operation of the GPS Tool with your GPS receiver.

Starting the GPS Tool

You can start the GPS tool by selecting 'Tools: GPS Tool' from the All Topo Maps viewer window:

or by using the Windows Start Menu link 'Start: Program (Files) All Topo Maps V7: GPS Interface Tool.

Configuring the GPS Tool

Connect your GPS to the COM port on your computer with the GPS manufacturer's serial cable (available separately). Select the 'GPS Setup' tab to configure the correct GPS device brand and communications port settings.

Select the GPS Brand that matches your receiver. Detailed hints and suggestions for use with your GPS brand may be displayed. After reading the hints on your GPS Brand, press the 'OK' button.

Choosing the Correct COM Port

The 'COM Port' must be set to the COM port that is physically connected to your GPS. COM1, COM2 and COM5 are the most typical port selections.

Laptop computer COM port hints:

- If you have a laptop with a serial port, the port is most likely COM1, the internal modem is COM2 and the infrared port is COM3. **COM1 is most likely the correct setting**.
- If you have a laptop without a serial port you will need to purchase a USB to Serial Port adapter. The adapter will have a software driver that you will need to install. Check the web site of the serial port adapter manufacturer to make sure you have the LATEST software drivers for the USB to Serial port adapter. **Typically a USB to Serial port adapter will be COM5**, however any other COM port may be likely.

If you have a desktop computer:

- If you have a serial mouse, the mouse will most likely be connected to COM1. The remaining port is COM2. **COM2 will most likely be the correct setting.**
- If you don't have a serial mouse, the left-most COM port typically is COM1, while the right-most COM port typically is COM2. If you have an internal modem, the second COM port is typically disabled and the internal modem is COM2. Use the left port if possible, **COM1 is most likely the correct port setting.**

Setting Baud, Stop Bits, Parity

Pressing the 'Defaults' button will select the Baud, Data, and Parity which best match the selected GPS's typical factory defaults. The 'Baud Rate', 'Data Bits' and 'Parity' must match the settings in your GPS.

Garmin receivers MUST have the interface selection set to GARMIN, GARMIN/GARMIN or GARMIN/HOST. Check the GPS receiver's User Manual for help changing the interface mode. Garmin receivers always use baud = 9600.

Testing the GPS Connection

After successfully configuring the GPS hardware, press the 'Test GPS Link' button  to verify that your GPS can communicate with your computer. If the test fails, a list of possible causes will be presented:

- The GPS is not turned on.
- GPS Interface is not correctly configured. Wrong COM port number, baud rate, data bits. Make sure the GPS configuration matches the Default settings on the settings tab.
- The serial cable is not connected or is not making contact: remove the connector from your GPS, clean the contact and replace the connector.
- Garmin receivers should be set to 'GARMIN' mode, not NMEA.
- The GPS Batteries are weak. Some GPS receivers have problems communicating with low batteries.

If the test is successful, then the GPS make, model and firmware revision will be displayed to the right of the 'Test GPS' button:

After successfully verifying the serial connection, press 'Done' to return to the 'Coordinate List' tab.

Garmin ETrex Style GPS Receivers

If you have a Garmin ETrex style GPS with a flat, slide over contact connector:

make sure the gold contacts on the GPS and the spring loaded contacts on the cable are clean and oil free. Clean both the contacts and the connector pins with alcohol and a soft cloth.

Conflicts with Microsoft ‘ActiveSync’ and Palm ‘HotSync’

If you have a PDA (Personal Digital Assistant) and have installed the synchronizing software, the synchronizing tool may be enabled and have your serial port open even if you have disconnected the PDA and connected your GPS. The GPS tool will report an 'Error Opening Communication Port' and refuse to select the COM port until the PDA's tool closes the communication port. Check the documentation that came with your PDA for information on disabling the sync tool.

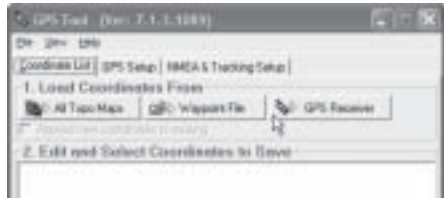
Disabling Microsoft PocketPC ‘ActiveSync’

If you have a 'Pocket PC', the synchronizing tool is called 'ActiveSync'. ActiveSync may have the COM port, which you have connected to your GPS, held open and prevents the GPS Tool from connecting to your receiver.

To disable ActiveSync and re-enable your communication port right-click on the ActiveSync icon in your Start Menu tray; select 'Open Microsoft Active Sync'; select 'File: Connection Settings'; finally uncheck the box 'Allow serial cable or infrared connection to this COM port.' After using the GPS Tool you will need to enable the communication port in ActiveSync if your PocketPC connects to the same port.

Moving Points from a GPS to the All Topo Viewer

Select the 'Coordinate List' tab of the GPS Tool:



Get coordinates from GPS: press the '1. Load Coordinates From GPS Receiver' button  :

Choose the correct source from: 'Waypoint List', 'Route List' or 'Track List'. Press 'OK', wait for the transfer to complete. In the coordinate list box, highlight coordinates to save to All Topo Maps:

Press the '3. Save Selected Coordinates in All Topo Maps' button. The 'Save Waypoints' dialog will be displayed.

Make sure the 'Append To Existing' checkbox is checked so the new coordinates do not overwrite any existing coordinates already in the All Topo viewer. Press 'OK'. Close the GPS Tool: select the menu option 'File: Exit'.

The new waypoints will be inserted into the current All Topo viewer's annotation list. You may need to manually center the map over the new coordinates to see the downloaded locations.

All Topo does not enforce unique annotation names or descriptions. It is possible to download two sets of identical waypoints from a GPS and save them twice to the All Topo viewer.

Moving Points from the All Topo Viewer to a GPS

You can transfer coordinates from All Topo Maps to your GPS receiver.

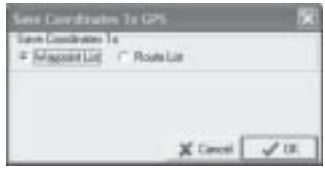
In the All Topo map viewer, open the annotation file that holds the annotations you want to transfer to your GPS. Start the GPS Tool by selecting the main menu selection 'Tools: GPS Tool':

The GPS Tool will be displayed:

Select '1. Load Coordinates From All Topo Maps' on the 'Coordinate List' tab of the GPS Tool. The GPS tool will retrieve all the current coordinates from All Topo Maps.

By default every coordinate will be selected. Highlight only the coordinates you want to transfer to your GPS, you can press and hold the Control key, and then click on individual coordinates to toggle their selection.

Press the '3. Save Selected Coordinates To GPS Receiver' button . The 'Save Coordinates To GPS' dialog will be displayed:



Choose the appropriate point style (Waypoint List or Route List) and then press the 'OK' button. Wait for the transfer to complete, then close the GPS Tool.

Real Time Position Tracking

You can use your GPS to continuously track your location in the All Topo Maps viewer. After starting the All Topo Maps viewer, start the GPS tool. Select the 'NMEA & Real Time Tracking' tab:

Check both the 'Display current position in All Topo Maps' and 'Automatically center map over GPS position' options.

When your GPS receiver has position lock, the viewer will automatically center the correct map on your screen and place the configurable 'Track' annotation at your current location on the map. Change the ‘Default Annotation Style’ configured for the Track on the All Topo viewer menu “Options: System Options...: System (tab): Default Annotation Styles: Track”.

Real Time Tracking Configuration

NMEA Sentence Selection for Real Time Tracking

Check at least one sentence type to use for real time tracking. Typically the GPGGA selection is sufficient, however if it does not work, try checking all the boxes.

Require Checksum on NMEA Sentences

Check this box to enable error detection on the serial link.

Position Update Interval

Choose an appropriate interval to update your position in All Topo Maps. Since the map and all annotations must be redrawn with each update, a longer interval may be appropriate for slower computers.

Chapter 11: BigTopo

BigTopo is a map seaming tool capable of accurately seaming 24K and 63K (Alaska) All Topo Map sourced quadrangles, BigTopo7 can quickly build custom map coverage (in .IT3, .IT5 formats) for use with the All Topo Map viewer, and generic graphic formats (including GeoTIF encoded TIF images with TFW worldfiles) for use with other GIS and CAD applications.

A professional version of BigTopo (BigTopo Pro) is available that seams 1:100,000 and 1:250,000; exports alternate map datum; has provisions for controlling collar annotations and scales.

This chapter includes a short BigTopo7 tour that highlights basic map building and detailed information about all of BigTopo7's configuration options.

Starting BigTopo from the All Topo Viewer

The BigTopo7 tool can be started from the All Topo viewer main menu "Tools: BigTopo7" or from the Windows Start Menu: "Start: Programs: All Topo Maps V7: BigTopo7:

As BigTopo starts it reads all of the map information for every installed All Topo map set. After initializing, the BigTopo7 main screen is shown:

Tour: Building A BigTopo Map

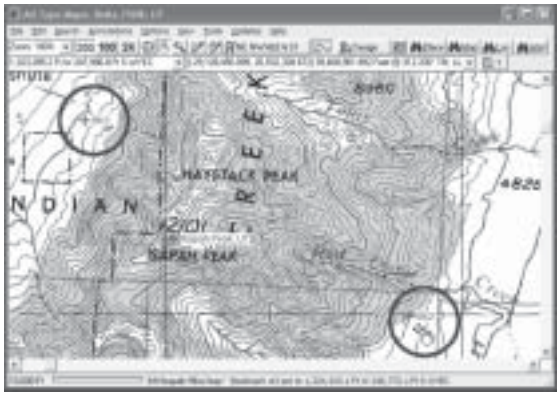
Building a BigTopo map is easy to do. This tour will take you through these easy steps:

1. Define the BigTopo coverage.
2. Controlling BigTopo annotation options.
3. Choose an output file name and path.
4. Make the BigTopo.

5. Preview the seamed map in BigTopo.
6. Opening the BigTopo from within All Topo Maps

Tour 1: Defining BigTopo Coverage

Start the All Topo Maps viewer and move the mouse cursor over the North West (top left) location of the desired BigTopo map, press the '1' key to drop a bookmark. Move the mouse cursor to the South East (lower right) corner, press the '2' key to drop a second bookmark:



The bookmarks don't need to be on the same map, nor do they need to be marked on the seamed map scale. Often it is most convenient to set the bookmarks on 1:250:000 scale maps.

Now start the BigTopo7 application. Select the main menu option 'Tools: BigTopo7':

The BigTopo program will start, automatically load all available map information files and return to the same settings as last used.

Check the 'North West Corner Coordinate' 'Lock' box so the North West coordinate will be the resulting map's anchor point:

Press the northwest bookmark button, the 'Recall Bookmark' dialog is shown:

Press the 'BK1' button to recall the North West corner location we marked in the viewer. Next press the 'South East Corner Coordinate' bookmark button,

then press the 'BK2' button to recall the south east corner location.

BigTopo7 will automatically compute the resulting map width and height to exactly fit the bookmarked locations.

Tour 2: Select Annotation Options

Select the 'Settings' tab. Choose the 'Source Map Scale' appropriate to the map you are building. (Typically '1:24,000' except in Alaska where '1:63,360' is more appropriate.) 1:100,000 and 1:250,000 scale seaming is available when the Pro option is installed.

Width and Height units choose the units for coverage display.

'Exported Datum', 'UTM Zone' and 'Color Match' are only available if

'BigTopo7 Pro' is installed.

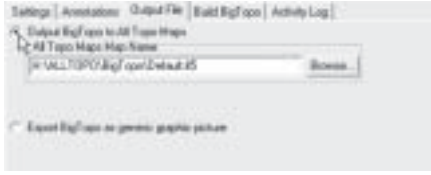
Select the 'Annotations' tab:

Check the 'Recollar (add borders to) BigTopo)', 'Overlay UTM Grid...' and 'Include a Map Scale' check boxes.

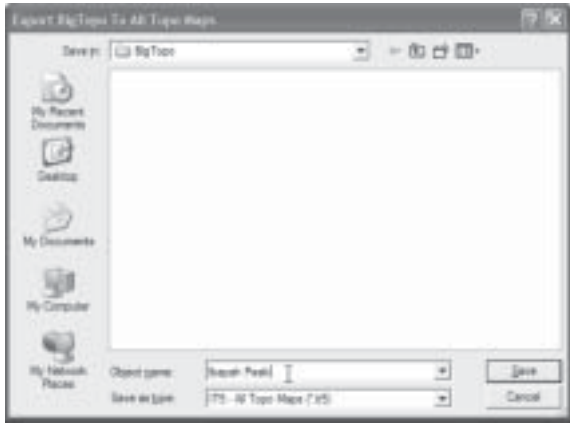
If you have purchased the optional BigTopo Pro tool, press the 'Use Default PPI, Scale' button and 'Use Default Fonts' button to use the factory defaults for the new map.

Tour 3: Choosing Output Files and Paths

Select the 'Output File' tab; push the top radio-button 'Output BigTopo to All Topo Maps'. Selecting



Press the 'Browse...' button to choose an output filename. Select 'Save as Type' = 'IT5 - All Topo Maps (*.it5)'.



finally press ‘Save’.

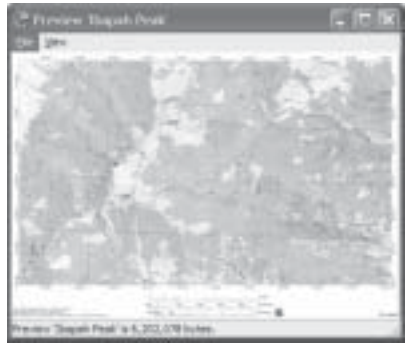
Tour 4: Making the BigTopo

Select the 'Build BigTopo' tab:

Information about the resulting BigTopo map is displayed; press the 'Make Big Topo' button to start building the requested BigTopo map.

Tour 5: Previewing a BigTopo

When BigTopo7 has finished building the map, press the 'Preview'  button on the 'Build BigTopo' tab to view the new map.



After previewing the BigTopo, use the menu option 'File: Close Preview' to return to the main BigTopo screen.

Finally, close BigTopo7 by selecting the ‘File: Exit’ menu option.

Tour 6: Opening a BigTopo in the All Topo Maps Viewer

After closing BigTopo7, select the viewer's main menu selection 'File: Open BigTopo':

The 'Open BigTopo Map' dialog will be shown, highlight the BigTopo map you just made, then press the ‘Open’ button. The new map will be loaded and displayed.

BigTopo7 Menu Details

The Main Menu

BigTopo Pro's Main Menu has:

- A thumbnail map showing the size ratio (in green) and the annotation collars (in white).
- A 'Define BigTopo Coverage' section for specifying the extents of the output map.
- Tab cards containing 'Settings', 'Annotations', 'Output File', 'Build BigTopo' and the 'Activity Log'.

BigTopo7 initializes with the same configuration you last used. You can recall and save the current configuration using the File Menu options 'Open Configuration' and 'Save Configuration':

The top section of the BigTopo application allows you to specify the output BigTopo's map coverage.

Defining BigTopo Map Coverage

To define the coverage extents for a BigTopo map, you can specify:

- The North West and South East corners.
- The Center coordinate and a height and width.
- The North West corner and a height and width.
- The South East corner and a height and width.
- Specify an .HWP file that contains a list of coordinates you want to encompass with a programmable margin.

BigTopo7 will automatically figure out which quadrangles are required to fill the area you specify.

Once you set the map Height and Width or choose a starting corner or center, you can 'Lock' the value by placing a check in the appropriate 'Lock' box. You can anchor a map corner by clicking on the anchor box, then change the Height and Width or specify another image corner. As you enter subsequent coordinates, the lock and anchor control BigTopo's actions.

The 'Fill Printer' button allows you to set the BigTopo's size to exactly fill an image size or printer's canvas. BigTopo Pro will figure the size of the annotation collars and set the Width and Height to exactly fill the page. Before pressing the ‘Printer Fill’ button, lock the corner or center coordinate you want to hold constant when the map coverage changes to fill the selected printer’s page.

If you have purchased and installed the Pro option, the ‘.hwp Fill’ button will be available. This tool will read a .hwp annotation file and set map

coverage to cover the extents defined by the file, plus a definable margin.

The main menu also has five tabs at the middle of the screen:

Each tab selects a page with additional configuration settings and information:

Settings: Selects base map scale, displayed units and coordinate style, exported map datum (for generic images), UTM Zone forcing and color matching.

Annotations: Enables a collar (border) around the generated map, configures collar annotations.

Output File: Selects the type, file and path for the generated map. Maps for use with the All Topo viewer, generic images and GeoTIF images can be directly built.

Build BigTopo: Displays the physical dimensions of the generated map, builds and previews the defined BigTopo map.

Activity Log: Shows system configuration settings and the current operation during the BigTopo build process.

The Settings Tab

Use the Settings tab to control:

- The map scale used for source maps
- Distance Units: map Height and Width units (Feet, Yards, Meters, Miles)
- Coordinate Style: used for corner and center location

Not all map sets have every available map scale. 1:63,360 scale maps are found only in Alaska. If you are using the standard edition of BigTopo7 then you can only seam 1:24,000 and 1:63,360 scale maps.

If you are using the professional version, BigTopo7 Pro, then choices for 1:100,000 and 1:250,000 scale maps are also available, as are selections for output datum, UTM Zone projection and the color match tolerance.

The default 'Exported Map Datum' is NAD27. Select NAD83 datum to display coverage information in NAD83, write a NAD83 Lat/Lon TFW world file and include NAD83 corner information in the .TXT file, GeoTIF headers and .TFW world file (if exporting a .TIF image).

The 'UTM Zone' setting allows you to override the default UTM Zone behavior and force a UTM Zone for the generated map. This is handy if you are working in a state like Wyoming or Colorado and want to treat the entire state as if it is a single UTM Zone.

'Color Match' sets the tolerance for matching colors between source maps. Setting the tolerance to 0 will result in every original map color being preserved in the output map; a setting of 4 is the default; settings above 32 may result in unexpected map colorings.

Recollar (add borders to)

Check the 'Recollar' box to generate a map with borders, titles, grids and map scales. When unchecked all other annotation settings are disabled.

South East Corner Title

The south east title is placed on the lower right corner of the generated map.

BigTopoPro: you can also choose the title font, style, size and color. Pressing the 'Use Default Fonts' button sets the corner title text to Arial 14pt, black text.

Include Filename as NE Title

The filename (without file extension or path) is placed at the top right corner if this box is checked.

Optional BigTopoPro: you can choose the title font and color with the 'Title Font' and color picker buttons. Pressing the 'Use Default Fonts' button sets the corner title text to Arial 14pt, black text.

Overlay UTM Grid on BigTopo

Check to include a UTM grid on the generated map. The UTM grid is drawn with a dashed line and the UTM grid values are placed on all four sides of the map.

BigTopo automatically adjusts the UTM grid spacing so that grid lines are spaced at least 1.5 inches apart. 1:100,000 and 1:250,000 scale maps nominally use a 10,000 meter grid, 1:24,000 and 1:63,360 (Alaska) maps use a 1,000 meter grid. Checking the 'Use Fine Grids' box will double the grid spacing.

Optional BigTopoPro: you can choose the grid font and color with the 'UTM Label Font' and color picker buttons. Pressing the 'Use Default Fonts' button sets the text to Arial 10pt, black text.

Overlay Lat/Lon Grid on BigTopo

Check to include Latitude / Longitude grid on the generated map. The Lat/Lon grid is drawn with a dashed blue/white line and the Lat/Lon grid values are placed around all four sides of the map.

BigTopo sets Lat/Lon grids to 1 minute spacing for 1:24,000 and 1:63,360 scale maps and 6 minute spacing for 1:100,000 and 1:250,000 scale maps. Note that the Lat/Lon grid will not be orthogonal with the map borders.

BigTopoPro: checking the 'Use Fine Grids' box will double the grid spacing. You can choose the grid font and color with the 'Lat/Lon Label Font' and color picker buttons. Pressing the 'Use Default Fonts' button sets the text to Arial 10pt, blue text.

Include a Map Scale

Check this box to include a map scale at the bottom of the image.

The image file '.\Bin7\BTLogo.BMP' is added to the right of the Map Scale; a default image file with the BigTopo logo provided. You can replace this image file with your company logo to customize your BigTopo maps.

BigTopoPro: choose the map scale font style and color with the 'Scale Font' and color picker buttons. Pressing the 'Use Default Fonts' button sets the text to Arial 10pt, black text.

The Scale Font is also used to annotate the lower left map corner with the map information text. This text block includes the map's annotation datum and a list of maps used to create the map.

Show Declination

Checking the 'Show Declination' box will add a declination graphic left of the map scale. Declination is computed using the 'World Magnetic Model' for the center of the map sheet, for January 1st, of the current year.

Lat/Lon in Corners

Check the 'LL in Corners' box to include the latitude and longitude outside the neat lines at the four corners of the map.

Rotate E/W Labels

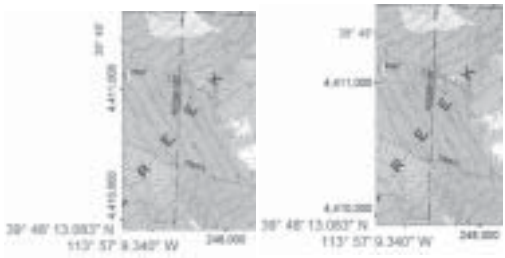


Figure 10-2: Rotated E/W Labels and Un-rotated E/W Labels.

BigTopoPro: the UTM, latitude and longitude labels along the left and right edges of the map take a great deal of space. Check the 'Rotate E/W Labels' box to rotate these text annotations 90 degrees so they require less margin space. This leaves more space inside the neat line for map coverage.

Nominal, Final Print Scale

BigTopo Maps are always generated with the full resolution available from the base maps. Each base map scale (1:24,000, 1:100,000, 1:250,000) has a scanned resolution. If you print a BigTopo at the scanned resolution, it will have the same map scale as the original printed map.

Often a map is printed and used at a scale other than its nominal magnification. All Topo Maps 1:24,000 scale maps are typically scanned at 160 PPI, if you print them at 200 PPI then the resulting printed map scale will be 1:30,000 scale or 2.112 inches = 1 mile.

BigTopo needs to know the scale that you intend to use the generated map at so that it can scale text annotations appropriately for your intended use.

If you're not sure what scale or PPI you intend to use, press the 'Use Default PPI, Scale' button and BigTopo will typically 'do the right thing.' When you change the PPI or other scale values, the other scale values will automatically change to reflect your new settings. Some scales will round slightly after you choose them as PPI is forced to an integer value.

The 'Output File' tab

The ‘Output File’ tab defines the type, location and name of the output file.

Two styles of BigTopos can be generated:

- **dot in top box**: the native All Topo Maps format (.it3 and .it5)
- **dot in bottom box**: generic graphic pictures (.bmp, .eps, .gif, .pcx, .png, .tga, .tif and .jpg).

BigTopo Metadata Files

Each time a BigTopo image is created, a plain text file (.txt) containing information about the resulting map is also created in the same output path.

The metadata file contains important information about how the BigTopo was created, the map image extents and scaling and insertion information for use with CAD programs.

BigTopo Pro metadata files also contain machine readable configuration information. You can use the main menu option 'File: Open Configuration File' to open a BigTopo generated '.TXT' file to recall the configuration of a previously generated BigTopo.

World files are also generated for exported BigTopo's. By convention the extension of a world file is built from the first character, the third character and a 'W':

TIF ->	TFW
BMP ->	BPW
JPG ->	JGW

World files contain the North West coordinate and scale factors for the generated image.

All Topo Map (.it?) Format

If you want to view the generated BigTopo using the All Topo Map viewer choose the top 'All Topo Maps' selection: "Output BigTopo to All Topo Maps"

By default All Topo Maps will look for BigTopos in the BigTopo directory of the AllTopo path (typically C:\AllTopo\BigTopo\), the file extension for version 7 products should be '.it5'.

If you are going to share the BigTopo map with a version 6 All Topo User, set the file type to '.it3'. These V6 compatible files also require a helper file with the '.mi' extension. If you move an '.it3' file to a new location, be sure to also move the '.mi' file.

Generic Graphics Formats

Choose the generic graphic picture format to generate BigTopo images for use with other programs.

One note of caution: BigTopos are built as Windows bitmaps. The BigTopo engine can build an image of unlimited size, subject to your computer's available virtual memory. Generic formats other than .BMP require an additional translation step. The image translator can not translate images greater than 32,300 pixels on a side. If you are using the Windows 95, Windows 98 or Windows Me operating system then there is an additional file size limit of 250,000,000 bytes.

Files can be stored as .BMP, .EPS, .GIF, .PCX, .PNG, .JPG, .PGA and .TIF files. The image resolution is exactly the same for all formats (except .JPG which has lossy compression.)

If the .TIF format is selected then a .TFW world file may also be generated for use with CAD programs and world information can also be embedded in the .TIF file using the GeoTIF standard.

Details on each of the graphics formats follow. If you don't know which format you want to export to consider:

.BMP	Generates big files that work with almost any application.
.PNG	The best choice for use on web pages and email exchange.
.TIF	Big files, but GIS application may be able to use the .TFW.

Windows Bitmap (.BMP) Format

The Windows bitmap .BMP format is the simplest and most widely supported output format. BMP files are stored uncompressed as 8-bit palette files.

Encapsulated Postscript (.EPS) Format

The image is saved as an 8-bit Version 3 palette color, Encapsulated Postscript file. This format is not widely supported and should be used with caution.

Graphics Interchange File (.GIF) Format

The image is saved as an 8-bit GIF file with palette information.

PCX (.PCX) Format

The image is saved as an 8-bit PCX.

Portable Network Graphics (.PNG) Format

The image is saved as an 8-bit PNG file. The PNG format, with compression is an excellent choice for storing generated maps.

The PNG compression 'maximum compression using the best filter for each row' is used.

TGA (.TGA) Format

The image is saved as an 8-bit TGA file.

TIF (.TIF) Format

The image is saved as an 8-bit, palette color TIFF file. LZW compression is not supported (try the PNG format as an alternative.) This is the best format for exporting BigTopo maps to CAD and GIS programs as georeferencing information is included with the image file.

When the TIF output file format is selected, an option to 'Add GeoTIF information' is shown. Checking the box will embed projection, zone, scale, corner location and map name information within the TIF file.

When you select a .TIF format file output, a companion world file (.TFW) is also generated. This .TFW file contains the UTM coordinates for the upper-left corner of the image, the image rotation and the image scale factors. The UTM zone is not enumerated in the world file. The .TFW when found in the same directory as the .TIF file, enables other GIS applications to automatically georeference the BigTopo image.

The name of the .TFW file (filename without an extension) will be the same as selected for the .tif file.

JPG (.JPG) Format

The JPG format is a common, compressed image format. If you select a .JPG output, you can also control the compression quality:

The JPEG format is "lossy" in that not all of the information contained in an image is saved in the file and the JPEG format is intended for use with photographs. Maps are not photographs and very undesirable compression artifacts are introduced by this format.

We recommend that maps NOT be stored in the "lossy" JPG format, typically the JPG file type is not suitable for compressing maps. The PNG format typically offers higher compression with no image quality loss and allows subsequent editing and manipulation.

Depending on the value of quality, more or less image information is retained. A quality factor of 100 retains the most image data (Best Quality). A quality factor of 75 will generally produce reasonable images. As a guideline, we recommend starting with quality factors between 75 and 100. Quality factors less than 25 are not recommended.

If quality is 25 or greater, the image is saved as a baseline DCT sequential Huffman encoded file (type SOF0). If quality is less than 25 the image is

saved as an extended DCT sequential file (type SOF1). All JPEG readers should be able to read baseline DCT files (quality >= 25), but many are not capable of loading extended DCT files. Therefore, for maximum compatibility quality factors of 25 or greater are strongly recommended.

Since some image information is lost each time an image is saved as a JPEG file, this is NOT the format to use if you plan on editing the image and re-saving it.

Using BigTopos in GIS and CAD Applications

Export Specifications

Maps built with BigTopo are:

UTM projected.

NAD27 or NAD83 datum (NAD27 without Pro Option).

TFW world files are always written with Meter units.

The UTM Zone is listed in the accompanying .TXT file.

CAD Metadata

You can easily georeference BigTopos into CAD programs:

If your CAD program is map aware, output the BigTopo as a Generic Graphic .TIF file with the 'Add GeoTIF Information' box checked. A .TFW metadata file will also be created. Your map aware CAD program will automatically use the information in the .TFW file to place and scale the BigTopo in your drawing.

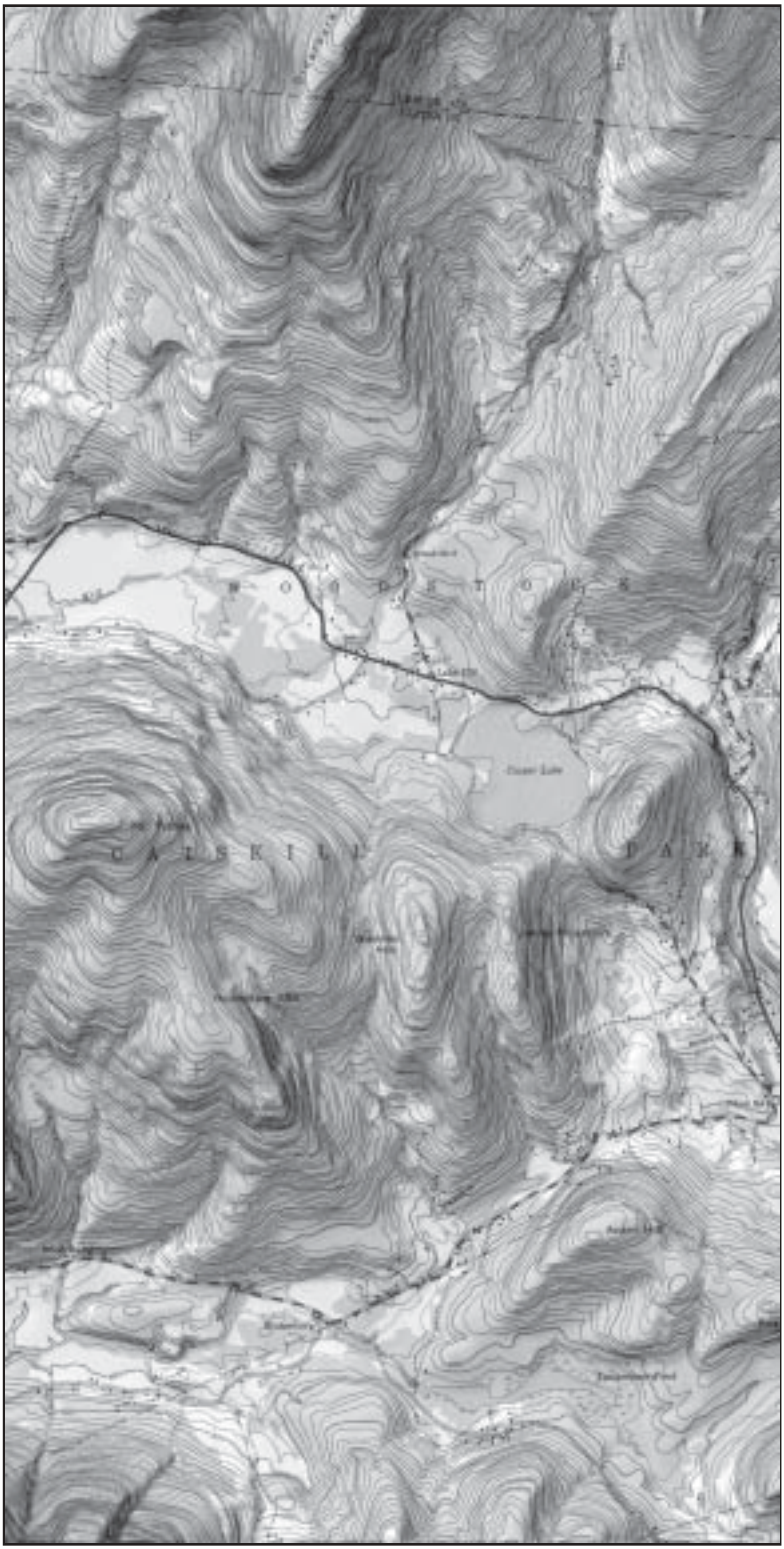
If your CAD program is not map aware, you may be able to use the information in the .TXT file to help scale and place the exported map in a drawing. Typically CAD programs request the scale factor or image width in engineering units. Both the scale factor in Units/Pixel and the image width in Feet and Meters are listed in the .TXT file.

The Build BigTopo Tab

After defining BigTopo coverage and configuring image options, press the 'Make BigTopo' button  to build the BigTopo. Once the image is built you can press the 'Preview BigTopo'  to verify that the correct map has been built.

The Activity Log Tab

The activity log records system start-up notes and messages that are encountered while building BigTopo maps.



18twb6757

Appendix A: Coordinates Primer

The All Topo viewer allows you to enter coordinate locations in many styles and formats. The following coordinate systems are automatically recognized by the All Topo viewer:

- Latitude Longitude (Geographic) coordinates (LL)
- Universal Transverse Mercator coordinates (UTM)
- Military Grid Reference System (MGRS)
- State Plane Coordinates (SPC)
- Public Land Survey (PLS) coordinates [Optional PLS Tool required]
- Relative coordinates based on bearings and distance (@...)

Coordinates may be entered in variety of common datum:

NAD27, NAD83, WGS84, WGS72, NAD27CO, NAD27AK, NAD27CA, OldHawaiian, International 1924

Relative points may be offset using three projections:

Lat/Lon (Geographic/Great Circle)

UTM

State Plane

Offsets may be entered using one of four North Reference styles:

True North

Magnetic North

UTM Grid North

State Plane Grid North

Distances can be entered using common linear units.

This section describes fully qualified and relative coordinate entry with the available coordinate styles, datum, projections and north references.

Distance Units

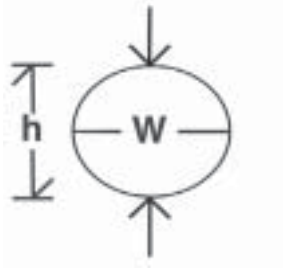
All Topo Maps accepts the following units for any horizontal distance measurement:

Units	Abbreviations	Description
Meters	M ME	1.0 Meter
Feet	FE FT IFE IFT	International Foot: 12.0 * 0.0254 Meter
Survey Foot	SFE SFT	(1200.0 / 3937.0) Meters
Miles	MI	5280.0 International Feet
Nautical Mile	NM	6076.11549 Feet
Yards	YA YD	3.0 * Feet
Rods	RO RD	16.5 International Feet
Poles	PO	16.5 International Feet
Perch	PE	16.5 International Feet
Chains	CH	66.0 International Feet
Links	LI LK	1/100 Chain
Varas	VA	33 1/3 inch

If no units are specified, All Topo assumes that distances are Meters.

Datum

For maps that show a very large area of the earth, it is sufficient to model the earth as a sphere. However for detailed coordinate use, the earth must be treated as an oblate ellipsoid also called an oblate spheroid (think of a basketball flattened at the North and South poles).



flattening ratio = w/(w-h)

Two geometric constants are used to define the ellipsoid, the semi-major (w) and semi-minor (h) radii. Typically we express these constants as the semi-major axis and the flattening ratio.

While the flattening ratio is only about 1 part in 300, it becomes an important part of equations modeling the earth and for calculating geographic coordinates.

The choice of the reference ellipsoid has been a major concern of geodesists since the early 18th century. In the 18th century Isaac Newton postulated that the Earth should be slightly flattened at the poles. The French Academy of Sciences in 1835 sent expeditions to Peru and Lapland to measure meridians at widely separated latitudes. Following this confirmation of Newton's hypothesis, there were 26 determinations of the Earth's dimensions between 1799 and 1951.

The Bessel ellipsoid of 1841 was used in the United States from 1844 until 1886 when the Clarke 1866 ellipsoid was adopted and used for almost every map covering North America until the present time.

In 1909 John Hayford derived a reference ellipsoid from U.S. Coast and Geodetic Survey measurements specific to the United States. This ellipsoid was adopted by the International Union of Geodesy and Geophysics (IUGG) in 1924 and is called the 'International Ellipsoid'. It is currently used in many parts of the world (most maps of the Hawaiian Islands use the International ellipsoid.) Because the Clarke 1866 ellipsoid was already so prevalent in North America, it prevailed over the International Ellipsoid.

With the introduction of satellite data, it has been possible to more accurately determine the ellipsoid. The U.S. military produced the World Geodetic System of 1966 and 1972 (WGS66 and WGS72). In 1980 the IUGG adopted the Geodetic Reference System 1980 (GRS80) from which the National Geodetic Survey has based the North American Datum 1983 (NAD83) replacement for the North American 1927 Datum (NAD27). U.S. Military agencies also developed the World Geodetic System 1984 (WGS84), based upon GRS80, that is the native basis for the GPS measured coordinate systems. The following list summarizes the common datum

Name	Date	Equatorial Radius(M)	Polar Radius(M)	Flattening	
Clarke	1880	6378249.1	6356514.9	1 / 293.46	
Clarke	1886	6378206.4	6356583.8	1 / 294.98	(NAD27)
International	1924	6378388	6356911.9	1 / 297	
WGS72	1972	6378135	6356750.5	1 / 298.26	
GRS80	1980	6378137	6356752.3	1 / 298.257	
NAD83	1983	6378137.0	6356752.3	1 / 298.257,222,101	

The U.S.G.S. is systematically converting many maps to NAD83 datum. As a result, the coordinates of most points in the United States change slightly from old NAD27 maps to new NAD83 maps. A location's coordinate can change over 1,000 feet in some areas between NAD27 and NAD83!

Converting Between Datum

The conversion from NAD27 to NAD83 is not a simple function. In fact, the conversion cannot accurately be expressed as a function.

There are two common methods for converting between NAD27 and NAD83/ WGS84 datum for coordinates in the United States and its territories:

NADCON interpolations
Molodensky approximations

NADCON interpolations use a grid of points defining the difference between NAD27 and NAD83 coordinates. The grid points are held in a matched series of .LAS and .LOS files generated by the National Geodetic Survey (NGS), based upon very accurate terrestrial, gravity and GPS measurements. Approximately 2 megabytes of data are required to hold complete interpolation data for the United States.

Molodensky approximations use a set of spherical constants to convert between NAD27 and NAD83 datum. Molodensky constants are computed to minimize errors over a small local area and as a result there are unique constants for Mexico, Continental United States (NAD27CONUS), Canada (NAD27CANADA) and Alaska (NAD27ALASKA).

NADCON interpolations are almost perfect conversions, but require large data files to cover the United States. NADCON style conversions are not available for worldwide conversions.

The Molodensky equations (with a set of transformation coefficients optimized for the local area) will convert from one datum to another and very closely match NADCON style approximations. Molodensky Errors are typically less than 20 meters over the area of intended coefficient use.

All consumer (and most professional) GPS devices convert from WGS84 datum to NAD27 / NAD83 datum using Molodensky approximations. Molodensky constants are available for worldwide conversion and do not require the use of large data files. However, it is very important to choose Molodensky constants that are optimized for the local area.

When you enter a coordinate in All Topo Maps it is assumed to be a NAD27 (NADCON) data coordinate. To enter a NAD83 coordinate add 'NAD83' after the coordinate value. To indicate that the coordinate should be treated as a CONUS Molodensky approximation, add NAD27CONUS after the coordinate.

The following table summarizes All Topo recognized keywords to indicate alternate datum:

Datum Code	Recognized Abbreviations
NAD27	NAD27 **(NADCON Conversions)**
NAD83	NAD83
WGS84	WGS84 **(Molodensky Conversions)**
NAD27CONUS	NAD27CO
NAD27CANADA	NAD27CA
NAD27ALASKA	NAD27AK
WGS72	WGS72
Old Hawaiian	OLDHA
International 1924 Datum	INTL24 INTL1924

Datum Supported by All Topo Maps

Datum Recommendations

If you are using a GPS on a boat on a large body of water, or for navigation in an airplane you should use latitude/longitude WGS84 datum. Most blue-water charts and aeronautical charts are drawn in WGS84 datum with Lat/Lon grids.

Most every quadrangle is NAD27 datum with 1,000 meter UTM grids. If you are working on the ground consider switching your GPS to UTM NAD27CONUS (or NAD27CANADA, NAD27ALASK as appropriate) so coordinates on your GPS will match those printed on the paper maps.

Molodensky Approximations - Datum Conversion Errors

The difference between coordinates converted with NADCON interpolations and Molodensky approximations is best shown with an example. Consider the Wyoming State Capitol dome in Cheyenne. Its NAD27 coordinate is:

41° 8' 25.000" N, 104° 49' 11.000" W WY Capitol Dome

Converting this coordinate using NADCON approximations yields an exact NAD83 result:

41° 8' 24.933" N, 104° 49' 12.886" W **Err=0Ft**

However, using the less accurate Molodensky approximation yields:

41° 8' 24.904" N, 104° 49' 13.086" W **Err=15.6Ft**

The difference between the NADCON and Molodensky conversions is about 16 Feet.

The use of Alaskan or Canadian Molodensky approximations is inappropriate for our Wyoming sample location and results in significant errors:

41° 8.388,7' N, 104° 49.036,0' W NAD27AK **Err=695.3Ft**

41° 8.375,2' N, 104° 49.028,4' W NAD27CA **Err=752.4Ft**

NADCON interpolations give exact results over the area where the NADCON grids are available. Molodensky approximations will exactly match the conversions performed by consumer (and most professional) GPS receivers.

Wrong Datum Errors

It is common for coordinates to be entered using the wrong datum. This typically results in significant errors. Consider our sample location, if we GPS the dome location with our GPS configured to display WGS84 Geographic coordinates (Lat/Lon) we would read:

41° 8' 24.904" N, 104° 49' 13.086" W WGS84

If we forget the actual datum and treat this coordinate as a NAD27 coordinate:

41° 8' 24.904" N, 104° 49' 13.086" W NAD27

the position error is **159.9 Feet**, a very significant difference.

The capitol dome location in UTM coordinates is:

515,129.9 M E, 4,554,132.9 M N Z13

If we configure our GPS to display coordinates in WGS84 UTM coordinates, then the capitol dome coordinate will be:

515,101.1 M E, 4,554,282.2 M N Z 13 WGS84

If we enter this coordinate in All Topo, but forget to record the datum (WGS84) the point will appear to be located at:

515,101.1 M E, 4,554,282.2 M N Z 13 NAD27

which results in an error of **498.9 Feet**!

If you choose to use UTM coordinates, it is very important to note the correct datum. Assuming an incorrect datum with UTM coordinates will

generate 4 times the error generated by using the wrong datum with latitude / longitude coordinates!

Entering Coordinates in All Topo

The All Topo engine accepts a variety of coordinate entry formats:

- Latitude / Longitude: DMS.s, DM.m or D.d
- Universal Transverse Mercator (UTM)
- Military Grid Reference System (MGRS)
- State Plane Coordinates (SPC)
- Public Land Survey (PLS)
- Relative coordinates (@...)

You can manually enter coordinates in the 'Find Loc' tool's 'Free Format' tab, the 'Location' box of the 'Coordinate Editor' and the 'Waypoint Source Editor'. The All Topo engine will dependably 'figure-out' what your intentions are.

If you enter a number proceeded by the word 'Zone' or the letter 'Z', All Topo assumes you are specifying a UTM coordinate and looks for two additional numbers, with optional units, to be interpreted as easting and northing:

1,689,810 Ft E, 14,940,739 Ft N **Z13**	'Z' followed by number
515,129.86 M E, 4,554,132.93 M N **Z13**	

If no Zone or 'Z' is found, and 2, 4 or 6 unique numbers are found; All Topo assumes you are entering a Latitude / Longitude coordinate. Degree-minute-seconds (DMS.s), degree-minute (DM.m) and degree (D.d) entries are supported:

41.140,278° N, 104.819,722° W	2 numbers	D.d
41° 8.416,7' N, 104° 49.183,3' W	4 numbers	D M.m
41° 8' 25.000" N, 104° 49' 11.000" W	6 numbers	D M S.s

Any coordinate that is comprised of a number, followed by three letters, followed by 2, 4, 6, 8 or 10 number characters is interpreted as a MGRS coordinate.

13T ER 15130 54133	10 number characters
13T ER 1513 5413	8 number characters
13T ER 151 541	6 number characters
13T ER 15 54	4 number characters
13T ER 15 54	2 number characters

A coordinate that contains a valid State Plane Zone code (like 'WYE') and two numbers is assumed to be a State Plane Coordinate:

595,562.0 Ft E 172,734.5 Ft N WYE

A coordinate that contains 'SEC' (section) and 'PM' (principal meridian), or 'SEC' and 'PRIN' is assumed to be a Public Land Survey coordinate (the PLS option is required):

3,024 W 3,253 N from SE Sec 31 T 14N R 66W PM6

All Topo removes formatting characters from coordinate entries before attempting to interpret coordinates. Commas (,); degree(°), minute (') and second marks (”); white space (consecutive space and tab characters) are removed; and capitalization is standardized. The following coordinates are treated as equals by All Topo:

41° 8.416,7' N, 104° 49.183,3' W
41 8.4167 N 104 49.1833 W

Once All Topo makes an assumption about the type of a coordinate; the coordinate is inspected for additional modifiers that control datum, distance units and zone codes.

Latitude / Longitude Geographic Coordinates

Geographic coordinates are based from a reference point at the intersection of an imaginary line drawn from the North Pole to South Pole through Greenwich England and the equator.

Latitude measures the angle from a coordinate to the equator. Latitude varies from -90 degrees (the South Pole) to +90 degrees (the North Pole).

Longitude measures the angle from the line drawn through Greenwich England to the equator, around the circumference of the earth. By convention, we describe points West of Greenwich as a negative angle from 0 to -180 degrees and points East of Greenwich as positive angles from 0 to +180 degrees.

All Topo supports three styles of angular measurements:

Style Name	Code	Written
Decimal-Degrees	D.d	41.140,28° N, 104.819,72° W
Degrees Decimal-Minutes	DM.m	41° 8.417' N, 104° 49.183' W
Degrees Minutes Decimal-Seconds	DMS.s	41° 8' 25" N, 104° 49' 11" W

Every geographic coordinate includes both latitude and longitude. All Topo requires that both use the same style, the expression:

41° 8.417' N, 104.819,72° W

is not acceptable.

Converting between DMS.s, DM.m and D.d Styles

It is fairly simple to convert between the three different styles of geographic coordinates. The concept is the same as telling time: '1½ hours = 1 hour and 30 minutes = 60 minutes + 30 minutes = 90 minutes'. Since a minute is 1/60th of a degree; and a second is 1/60th of a minute or 1/3600th of a degree; we can easily convert between coordinate styles.

Convert a DMS.s to DM.m

= 41° 8' 25" DMS.s
= forty-one degrees, eight minutes, twenty-five seconds
= 41 + 8 / 60 + 25 / 3600
= 41 + (8 + (25 / 60)) / 60
= 41 + (8 + 0.417) / 60
= 41 + 8.417 / 60
= 41° 8.417' DM.m

Convert DM.m to D.d

= 41° 8.417' DM.m
= forty-one degrees, eight-point-four-one-seven minutes
= 41 + 8.417 / 60
= 41 + 0.140,28
= 41.140,28° D.d

Convert D.d to DM.m

= 41.140,28° D.d
= forty-one-point-one-four-zero-two-eight degrees
= 41 + 0.140,28
= 41 + (0.140,28 * 60) / 60
= 41 + 8.417 / 60
= 41° 8.417' DM.m

Convert DM.m to DMS.s:

= 41° 8.417' DM.m
= forty-one minutes, eight-point-four-one-seven seconds
= 41 + 8.417 / 60
= 41 + 8 / 60 + 0.417 / 60
= 40 + 8 / 60 + (0.417 * 60) / 3600
= 41 + 8 / 60 + 25.0 / 3600
= 41° 8' 25.0" DMS.s

Pronouncing a Latitude Longitude Coordinate

41° 8' 25" N, 104° 49' 11" W is an eyeful, how do we pronounce this geographic coordinate? Here are spoken English pronunciations for all three geographic coordinate variations:

Pronouncing DMS Coordinates

41° 8' 25" N, 104° 49' 11" W is pronounced:

Forty-one degrees, eight minutes, twenty-five seconds north; one-hundred four degrees, forty-nine minutes, eleven seconds west.

Pronouncing DM.m Coordinates

41° 8.417' N, 104° 49.183' W is pronounced:

Forty-one degrees, eight-point-four-one-seven minutes north; one-hundred-four degrees, forty-nine-point-one-eight-three minutes west.

Pronouncing D.d Coordinates

41.140,28° N, 104.819,72° W is pronounced:

Forty-one-point-one-four-zero-two-eight degrees north; one-hundred-four-point-eight-one-nine-seven-two degrees west.

Entering Geographic (Lat/Lon) Coordinates in All Topo

The All Topo view will automatically recognize and accept almost any reasonable coordinate representation for a geographic location.

Coordinates containing two, four or six numbers are assumed to be Latitude / Longitude coordinates.

Northing/Easting Ordering

The All Topo engine assumes that Latitude is listed first:

41° 8.417' -104° 49.183'
Latitude first, no cardinal hints

You can override the default east/west order by including cardinal hints in geographic coordinates:

104° 49.183' W 41° 8.417' N
Cardinal direction after the number

or

W 104° 49.183' N 41° 8.417'
Cardinal direction before the number

Do not express coordinates in longitude first format without cardinal directions:

-104 49.183 41 8.417
NOT ACCEPTABLE!

the All Topo engine can not 'guess' the proper coordinate order.

Datum

Any latitude/longitude coordinate can be modified with a datum override. By default all coordinates are assumed to be NAD27 datum coordinates. You can add one of the datum keywords to specify a datum other than NAD27:

41° 8.415' N, 104° 49.218' W WGS84

Poor Coordinate Choices

All Topo can not understand the ill-formed and nonsensical coordinates that some GPS devices display (to save space). This coordinate is both nonsensical and the longitude should most likely be negative.

412615.9 1040453.4 NOT ACCEPTABLE!

Coordinates with misplaced decimal point / space separators:

41.26159 -104.04534 **D.d**

is interpreted as it is read, **NOT** as intended:

41 26 15.9 N, 104 4 53.4 W **DM.m**

Speeding Up All Topo .HWP Files

The All Topo coordinate engine can spend a great deal of time attempting to decipher coordinates you enter in .HWP files.

The All Topo coordinate interpreter first checks each coordinate description for a pair of signed floating point numbers. If exactly two numbers; in NAD27, latitude first style are found with no other components:

41.14028 -104.81972;

a significant reduction in the computation time required to read an annotation file will be realized. The use of this simple coordinate style, if convenient for the user, is highly recommended for annotation files with more than 10,000 coordinate annotations.

General Geographic (Lat/Lon) Coordinate Notes

Geographic coordinate styles have some unique advantages:

- Two numbers, latitude and longitude, can uniquely represent any location on the earth. D.d values are convenient when storing values in a computer, provide good precision, and are easy to manipulate.
- A given lat/lon coordinate maps to only one spot on the earth, and a spot on the earth has only one lat/lon coordinate. (A true function.)
- We can represent any point on earth with a 2 meter accuracy using only 20 significant characters: '±xx.xxxxx ±xxx.xxxxx'.
- GPS receivers directly generate geographic coordinates, all other coordinates are derived from these latitude and longitude coordinates.
- Most large and small scale maps have latitude / longitude grids.
- Latitude / Longitude coordinates are relatively tolerant of incorrect datum use.
- Surveyors have traditionally used instruments that read angles in DMS.s, most surveys continue to be reported as DMS.s values.
- Most GPS receivers come from the factory set to display geographic coordinates in DM.m.
- Many maps and charts are grided in minutes and interpolation is fairly convenient on these charts in DM.m format.

If you are going to travel quickly, or a long distance, then geographic coordinates are the best coordinate style to use. Latitude / longitude coordi-

nates are the standard for aeronautical and blue-water marine chart use.

Of course, geographic coordinate styles have several disadvantages:

- Equal measures of latitude and longitude represent vastly different distances at most latitudes. For example: in Salt Lake City Utah 1 second of latitude is 31 meters, while 1 second of longitude is 23 meters. These values change depending upon latitude.
- People have a difficult time relating to distance measured in geographic coordinates. If you are told to move 23.1 seconds North and 13.8 seconds West; you most likely have no idea how far to move. (Most people don't know if they should walk or drive!)
- Latitude and Longitude coordinates are often misinterpreted. Our service desk receives hundreds of angry calls each year from customers who are absolutely positive All Topo Maps is showing the WRONG COORDINATE for their home, driveway or street corner. In most every case, their GPS reads a number like:

  40 44.17 N 111 51.52 W

  which they are interpreting as:

  40.4417 N 111.5152 W
- Paper map users make significant interpolation errors when computing latitude / longitude coordinates for a spot on a map. (In contrast, users interpolating UTM coordinates make almost no errors, even without any mechanical roaming aids.)

Geographic Coordinate Accuracy

If you choose to use geographic coordinates, consider using the decimal degrees (D.d) style for highest accuracy. Given the same number characters, decimal-degree coordinates are significantly more accurate than decimal-minute or decimal-second coordinates. For example: consider six character representations:

Style	6-Character Value	Precision
D.d	00.0001	0.000,1 degrees
DM.m	00 00.01	0.000,17 degrees
DMS.s	00 00 01	0.000,28 degrees

Given the same number of digits of precision, the D.d value is almost three times more accurate than the DMS.s value.

This issue of numerical precision is well illustrated by an actual consumer grade GPS receiver. When configured to display DMS values the receiver shows coordinates as:

XX XX XX N XXX XX XX W 0.000,28 degree accuracy

A 0.000,28 degree (1 second) shift in both latitude and longitude results in a 127.8 Foot change in location (at the Capitol dome).

When configured to display D.d values the receiver shows:

XX.XXXXX N XXX.XXXXX W 0.000,01 degree accuracy

A 0.000,01 degree shift in both latitude and longitude results in a 4.6 Foot change in location. 28 times better accuracy!

Universal Transverse Mercator Coordinates (UTM)

UTM Zones for the Continental United States

The UTM coordinate system divides the surface of the earth into 60 strips covering 6 degrees of longitude and extending nearly from the North to South Pole. This relatively narrow strip, called a UTM Zone, is flattened and a base point is chosen at the center of the zone.

The base point is assigned a 'False Easting' value of +500,000 meters so all UTM easting values are positive. In addition, each zone overlaps its neighboring east and west zones by one degree.

Every coordinate has a 'Natural UTM Zone', that is the UTM Zone that holds the coordinate. Points that lie within 1 degree of a UTM Zone boundary may optionally be expressed in the adjacent UTM Zone.

The airport in Wendover Nevada provides a good example, Wendover Utah lies just west of the 114° longitude boundary between UTM Zone 12 (to the east) and UTM Zone 11 (to the west). Wendover naturally lies in UTM Zone 11, however it is acceptable to use a Zone 12 coordinate. These two coordinates describes exactly the same location:

751,497.2 M E, 4,511,833.8 M N Z 11
244,717.3 M E, 4,511,963.3 M N Z 12

Many users extend this concept of UTM Zone overlap (a little too far). For example, it is convenient to treat all of Montana as if it falls within a single UTM zone instead of three zones. The mathematical flattening of zone strips results in substantial stretching and distortion on the east and west edges of the resulting large zone.

By default All Topo displays natural UTM zones, however you can force All Topo to show coordinates forced to any zone. It is unwise to force a coordinate more than one zone away from its natural zone.

Entering UTM Coordinates in All Topo

UTM coordinates have an easting distance, a northing distance, distance units and the UTM Zone number.

515129.86 E 4554132.93 N Z13

A UTM coordinate is incomplete if it does not explicitly include the UTM Zone number. It is not acceptable to mix distance units for easting and northing (expressing northing in meters and easting in feet). All Topo assumes that UTM coordinates are expressed in Meters unless distance units are included:

1,690,058.6 Ft E, 14,941,381.0 Ft N Z13

Sometimes the northing will be listed first:

14,941,381.0 Ft N, 1,690,058.6 Ft E Z13

Sometimes the Z is replaced with the word Zone:

515129.86 E 4554132.93 N Zone 13

Often the Zone includes a N or S to indicate North or South of the equator:

515129.86 E 4554132.93 N Zone 13N

All Topo assumes all UTM Zones are North unless the Zone number is followed by an 'S' or the Zone number is less than zero:

515129.86 E 4554132.93 N Zone-13

UTM Units

It is customary to use Meters with UTM coordinates, however All Topo will accept any standard distance unit overrides:

Feet Yards Miles SFeet Rods Chains Links Varas NMiles Meters

Feet and Survey Feet

UTM coordinates are usually expressed in meters north of the equator and meters east of the false easting point to the west of the UTM Zone. Unless you specify another distance unit, All Topo Maps will always assume that UTM coordinates are expressed in Meters.

Occasionally you may find an application that uses UTM coordinates expressed in feet. Be careful! You need to know if the units are FEET or SURVEY FEET!

What is a Survey Foot?

There are two definitions for 1 foot. The common definition of a foot is called an International Foot:

12.0 inches * 0.0254 meters / inch = 0.304,800,000,0 feet / Meter

The second definition has roots in early survey methods and is called a Survey Foot:

1200.0 / 3937.0 = 0.304,800,609,6 sfeet / Meter

As you can see, the difference between feet and survey feet is not very much, about 1 foot in 1.64 million feet.

Since UTM coordinates include the distance from the Equator to the coordinate as the Northing value the small difference is important.

For the Wyoming state Capitol dome:

1,690,058.6 Ft E	14,941,381.0 Ft N	Z13	Feet
1,690,055.2 SFt E	14,941,351.1 SFt	N Z13	Survey Feet
3.4	29.9		difference

the difference between the International Feet and Survey Feet coordinates is 30.1 feet. This is three times the accuracy of a consumer GPS receiver!

As a general rule, if you are using UTM coordinates with any units other than meters, you are making a mistake!

UTM Datum

The All Topo engine assumes that all UTM coordinates are NAD27, unless a valid datum is found with the coordinate. Both NADCON interpolations and Molodensky approximations are supported.

Each of the following coordinates describes exactly the same location (Wyoming State Capitol):

515,129.9 M E, 4,554,132.9 M N Z13
515,085.5 M E, 4,554,342.9 M N Z13 NAD83
515,080.8 M E, 4,554,342.0 M N Z13 WGS84

515,080.8 M E, 4,554,336.8 M N Z13 WGS72
515,129.9 M E, 4,554,132.9 M N Z13 NAD27ConUS
515,120.5 M E, 4,554,151.3 M N Z13 NAD27AK
515,131.3 M E, 4,554,126.3 M N Z13 NAD27Canada
515,080.8 M E, 4,554,342.0 M N Z13 NAD83Canada

Only the first five coordinates make use of appropriate datum for a point in Wyoming. The Alaskan and Canadian datum are inappropriate for points in Wyoming.

Pronouncing a UTM Coordinate

515,129.9 M E, 4,554,132.9 M N Z13 is pronounced:

> Five-hundred-fifteen-thousand, one-hundred-twenty-nine-point-nine meters east; four-million, five-hundred-fifty-four-thousand, one-hundred-thirty-two-point-nine meters north; zone 13; nad-eighty-three.

Entering UTM Coordinates

When reading UTM coordinates, All Topo Maps looks for the word 'Zone' or the letter 'Z' followed by a number. If found, All Topo treats the coordinate as a UTM value and looks for an easting and a northing, Our example coordinate can be entered:

515129.9 E 4554132.9 N Z13

You may optionally insert commas to make the long numbers more readable:

515,129.9 M E, 4,554,132.9 M N Z13

If you don't specify cardinal directions (N and E) then All Topo will assume that the easting is listed first.

Remember that many UTM coordinates can be expressed in multiple UTM zones. Our example coordinate can also be expressed as a Zone 14 location:

11,464.9 M E, 4,570,470.8 M N Z14

By default all coordinates are assumed to be NAD27 datum metric coordinates. All Topo accepts the standard Datum and distance unit overrides:

515,129.9 M E, 4,554,132.9 M N Z13
11,434.0 M E, 4,570,683.4 M N Z14 NAD83
37,513.2 Ft E, 14,995,680.5 Ft N Z14 NAD83
37,513.1 SFt E, 14,995,650.5 SFt N Z14 NAD83

are equally valid descriptions of the exact same coordinate.

General UTM Coordinate Notes

UTM coordinates have advantages:

- UTM coordinates are very intuitive for people on foot in the field. Both Northing and Easting values have the same easy to use units (typically meters) and will always be positive (unless you extend a Zone too far West.)
- X and Y map scales are exactly the same. Horizontal and vertical scale match.
- Most new maps include a 1,000 meter or 10,000 meter UTM grid overlay. This makes interpolation using paper maps very easy and straight forward.
- It takes only 19 characters to describe a location with 1 meter accuracy:
  'XXXXXXX E XXXXXXX N ZXX'

And UTM coordinates have many disadvantages:

- You must record the UTM Zone number with the easting and westing.

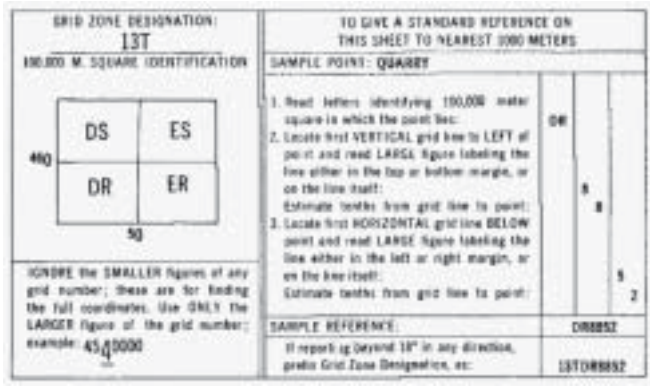
- A single point on the ground may be described by two or more UTM Zones with very different coordinates. Since both coordinates are valid, it is possible for GPS receivers to report very different locations even if they are only a couple of feet from each other.
- UTM coordinates are very, very intolerant of incorrect datum use. (This is covered more fully in the Datum description of this manual.)
- UTM coordinates are inappropriate for users who are traveling quickly (in a plane for instance) or a long distance (in a boat on the ocean or car on the interstate). It is nearly impossible to calculate distance when traveling across UTM Zone boundaries, and the chance of making a Zone mistake while using a GPS is quite high.

UTM coordinates are an excellent choice for GPS/Map users who are traveling on foot, within a single UTM Zone.

MGRS Coordinates

The U.S. Military Grid Reference System (MGRS) is a reference scheme used by the military to simplify and standardize coordinate and zone use. By substituting single letters for several numerals and alternating the use of letters the length of a coordinate is reduced and some error detection is achieved.

U.S.G.S. 1:250,000 scale maps typically show Military Grid designators, the Zone codes in a map collar annotation:



The MGRS coordinate for the Wyoming State Capitol looks like:

13T ER 15097 54231

Decomposing the MGRS coordinate:

'13' is the UTM Zone.

'T' indicates the coordinate lies within the 16th northing zone. Zones start at South 80° and are 8° latitude in height (except the north most zone which is 12° latitude in height), the south most Grid Zone is labeled 'C' and zones are labeled progressively from 'C' to 'X' (the letters I and O are omitted to avoid confusion with 1 and 0.)

'ER' indicates a particular 100,000 meter square within a Grid Zone. (The rules for numbering 100,000 meter squares are fairly complex, depend upon the underlying ellipsoid and are not described here.)

'15097 54231' indicates the position within the 100,000 meter square. The easting (15097) is always presented first, the northing (54231) second.

MGRS coordinates are routinely expressed with varying precision:

13T ER 15097 54231	1 meter precision
13T ER 1510 5423	10 meter precision
13T ER 150 542	100 meter precision
13T ER 15 54	1,000 meter precision
13T ER 1 5	10,000 meter precision
13T ER	100,000 meter precision

When using All Topo maps with MGRS coordinates, be certain that the displayed and converted coordinates are correct for the area you are working in. Since changing the MGRS datum, effectively changes the underlying ellipsoid, the same location on the ground may be expressed with different MGRS coordinates on two maps! The user must be responsible for choosing the correct datum and verifying coordinate conversion.

State Plane Coordinates

Like UTM coordinates, State Plane coordinates project Earth's surface to flat space with distance offsets from a local base point. Since State Plane Zones are relatively small, they generally introduce less distortion than UTM coordinates. However, since State Plane Zones are small there are many possible State Plane Zones (see Appendix B: State Plane Zone Codes).

Most U.S.G.S. topographic maps show the appropriate State Plane Zone for use with the map in the lower left corner:

This block lists the correct State Plane Zone for the map as 'Wyoming East Zone'.

Like UTM coordinates, State Plane Zones can overlap creating multiple coordinates for a single location. Some maps include neat line State Plane ticks for two State Plane Zones.

Entering a State Plane Coordinate

A valid state plane coordinate has at least three parts:

State Plane Zone Code (see the list of valid zones in Appendix B)

A Y coordinate value

A X coordinate value

State Plane coordinates may optionally include a datum (NAD27 is assumed) and distance units (feet, survey feet or meters are assumed based upon datum and zone as detailed by the tables in Appendix B.)

The All Topo engine assumes that State Plane eastings are listed first:

595,562.0 Ft E 172,734.5 Ft N WYE

You can override the default east/west order by including cardinal hints with State Plane coordinates:

172,734.5 Ft N 595,562.0 Ft E WYE

or

N 172,734.5 Ft E 595,562.0 Ft WYE

SPC Units

It is customary to use Feet or Survey Feet with NAD27 State Plane Coordinates, and Meters with NAD83 State Plane Coordinates. However there are many exceptions to this rule. All Topo accepts all of the standard distance tokens with State Plane coordinates:

Feet Yards Miles SFeet Rods Chains Links Varas NMiles Meters

If you use Feet units be absolutely sure you understand the difference between Feet and Survey Feet (SFeet) and use the correct units.

If you specify any units other than Meters, Feet or SFeet; you are undoubtedly making a mistake.

SPC Datum

The All Topo engine assumes that all State Plane coordinates are NAD27, unless the 'NAD83' datum code is found with the coordinate.

Each of the following coordinates describe the same location (Wyoming State Capitol):

595,562.0 Ft E 172,734.5 Ft N WYE
751,583.0 Ft E 233,446.4 Ft N WYE NAD83
751,581.5 SFt E 233,445.9 SFt N WYE NAD83
229,082.5 M E 71,154.5 M N WYE NAD83

Pronouncing a State Plane Coordinate

‘229,082.5 M E 71,154.5 M N WYE NAD83’ is pronounced:

Two-hundred-twenty-nine-thousand, eight-two-point-five meters east; seventy-one-thousand, one-hundred-fifty-four-point-five meters north, Wyoming East zone; nad-eighty-three.

Public Land Survey Coordinates

All Topo Map's 'PLS Tool Sets' are available for selected states with optional 'PLS Tool' products. Without a valid installation of the appropriate 'PLS Tool' the PLS functions and coordinates are not available.

'PLS Tool' products add huge databases of ¼ ¼ Section corner locations. Most of the PLS tools require an additional 50 to 150 megabytes of disk space for installation.

PLS Data Disclaimer

The Public Land Survey coordinates shown and exported from the product are not a part of the legal land record. The information is generated from coordinates which have no legal status for location or boundary description. These coordinates are not final and are subject to change without notice as new information becomes available. Many of the coordinates are based on hand snapped coverage from 1:24,000, 1:100,000 scale and even 1:250,000 scale maps.

A great number of known errors exist in the PLS Tool's Public Land Survey coordinate database!

The Public Land Survey coordinates are not intended to take the place of surveys or resurveys, nor do they improve inaccurate survey data. It is up to the user of the data, with advice and assistance from a Professional Surveyor, to determine whether or not a set of coordinates is acceptable for any given purpose, and when it is necessary to resort to the legal record and a corner

on-the-ground location.

Igage Mapping Corporation makes no warranties of the suitability of this data.

It is inappropriate to use the optional PLS Tool and the data contained for any property sale or legal description. Typically the use of the PLS Tool extensions for this purpose is a violation of State Law.

The user is cautioned to consult a Professional Surveyor for assistance in determining if this product is suitable for a purpose.

PLS Tool

Each 'All Topo Maps: PLS Tool Set' contains statewide databases of Township and Section perimeters and the All Topo high speed geographic search engine. Coupled with an existing All Topo map set, these tools

- Enable real-time cursor position tracking to ¼ ¼ section or footage offset within section.
- Enable direct conversion from geographic coordinates to PLS coordinates and from PLS coordinates to geographic coordinates.
- Finding a map by Township / Range / Section.
- Automatically annotating sections, half sections, ¼ sections and ¼ ¼ sections on maps.
- Enable the ‘PLS Magnet’ for use with the point-to-point route tool.

What Is the Public Land Survey System?

In 1796 the United States Congress enacted a method of dividing public domain lands into theoretical six mile square units known as 'Congressional Townships'. Townships are based from a central set of orthogonal axis, the North-South axis is called the 'Principle Meridian', the East-West axis is called the 'Base Line'. Townships are consecutively numbered to the North and South and Ranges are numbered from East to West.

Each Township is divided into a six by six grid of 1 mile squares called Sections. Sections are numbered in a serpentine fashion from the North East corner of the township. If perfect, each Section would encompass 640 acres.

Sections are additionally divided in to 160 acre quarters, and then into 40 acre quarter quarters. Further division into quarter, quarter, quarter Section (10 acre) parcels and beyond is also common.

Since the meridians and base lines are not truly parallel, no townships are perfectly square. Where Townships meet there can be significant errors. Early surveying errors added additional imperfections.

In spite of all the errors, the Public Land Survey system still accurately defines a point-on-the-ground or parcel by Principal Meridian, Township, Range, Section and offset. In the Western United States, PLS coordinates are the most common method of identifying property and its ownership.

The various scales of topographic maps have traditionally shown Sections and Townships. Section boundaries and numbers are shown in red. On a released 7½ minute quadrangle, Township and Range are identified in the map collars, on provisional maps Township and Range are typically handwritten just inside the map's neat line.

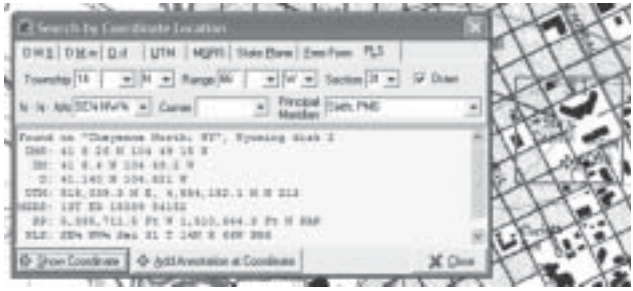
Most 'All Topo Map' standard edition state sets are searchable by Township and Range. To search a standard set, press the 'Find Place' button on the toolbar, then enter the desired township and range in the search box:

'T14NR88W'

Press the show location button to center the chosen Township.

The optional 'All Topo Maps: PLS Tool' makes working with PLS coordinates much easier. Each state's PLS tool adds a huge database of section information and provides real-time-display of the cursor's position to ¼ ¼ section, or as a footage offset from a section corner. Displayed cursor PLS coordinates can be copied directly to the Window's Clipboard for subsequent pasting to other applications.

The PLS Tool also adds searching by Township / Range / Section for quickly finding and annotating features by legal coordinate. In addition, All Topo can display locations by section, half section, ¼ section or ¼ ¼ section, drawing lines around the parcel.



While not accurate enough for survey or land division, the PLS Tool is great for locating maps and determining / displaying approximate legal coordinates and parcels.

Data is collected from government sources, and supplemented with hand digitized coordinates from the 1:24,000 scale USGS quadrangles.

Installing and Configuring the PLS Tool

The All Topo PLS tool should be installed from the appropriate PLS Tool disk:

Close the All Topo viewer and any helper applications (BigTopo and the GPS Tool) that may be running.

Insert the PLS Tool disk into your CD ROM drive. If autorun is enabled, the PLS Tool Installation will begin, if the installation does not automatically begin, follow the installation instructions on the CD.

After installing the PLS Tool set, start the All Topo viewer and use the License Manager to enter your dedicated PLS Serial Number.

After installing the PLS Tool, you may configure the viewer to display PLS coordinates in either the Primary or Secondary Coordinate Display. You can configure the displays from the main menu selection 'Options: Coordinate and System Options' or by double clicking in the appropriate coordinate display.

The following PLS coordinate display methods are available:

¼ ¼	Displays the ¼ ¼ section containing the cursor.
Best	Displays the offset distance with the lowest estimated error.
Offset	from NW, SW, SE or NE section corner displays the footage offset to the cursor.
NNN	¼ ¼ ¼ section callout computed from footage offset.

Pronouncing PLS Coordinate Descriptions

The following uniquely describes the 40 acre ¼ ¼ parcel containing the Wyoming State Capitol:

SE¼ NW¼ Sec 31 T 14N R 66W Sixth& Principal Meridian 1855

The southeast quarter of the northwest quarter, section thirty-one, township fourteen south, range sixty-six west, Sixth Principal Meridian 1855.

Entering PLS Coordinates

If the PLS option has been installed, All Topo Maps assumes that coordinates containing the keywords:

'SEC' and ('PM' or 'PRIN')

are PLS coordinates. At a minimum, every PLS coordinate must contain a valid Principal Meridian or PM code, a Township, a Range and a Section designation:

Section 31 Township 14 North, Range 66 West Sixth P. M.

The elements may be in any order, and may be abbreviated:

Sec 31 T 14N R 66W PM6

Each Principal Meridian has a PM code (see Appendix C), some have abbreviations which can be used to abbreviate the full Principal Meridian name:

T 5 S R 1 E Sec 27 PM26

T 5 S R 1 E Sec 27 PM Salt

Aliquot Sections

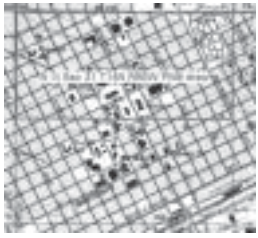
(a Lat. word meaning " some," " so many ") Generally occurring in the phrase ' aliquot part,' meaning that parts exactly add up to a whole. You can use several methods to accurately aliquot PLS coordinates with All Topo.

Half Sections

North Half Section 31 Township 14 North Range 66 West PM6

N ½ Sec 31 T14N R66W PM6

Both specify the North Half of section 31, when used with the Draw directive the section half is automatically annotated:



If used as a coordinate, the center of the section half is used unless a corner tag is also included (CNE, CNW, NSW, CSE specify the four corners of the half section.)

All Topo can aliquot the North, South, East and West halves of a section.

Quarter Sections

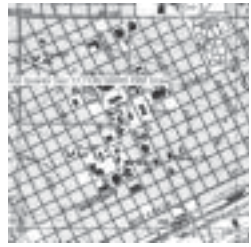
All Topo can aliquot the North East, South East, South West and North West quarters of a section. You can abbreviate these quarter sections as: NE, SE, SW and NW.

NW ¼ Sec 31 T14N R66W PM6

NW Sec 31 T14N R66W PM6

North West Quarter Sec 31 T14N R66W PM6 Draw

Like a half section, these coordinates specify the center of the quarter section unless a corner tag is also included.



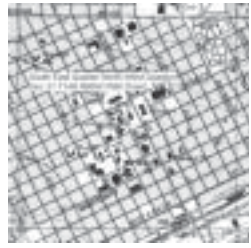
Quarter Quarter Sections

Specify two quarter designators to further aliquot a section into quarter, quarter sections.

SE ¼ NW ¼ Sec 31 T14N R66W PM6

SE NW Sec 31 T14N R66W PM6

South East Quarter North West Quarter Sec 31 T14N R66W PM6 Draw

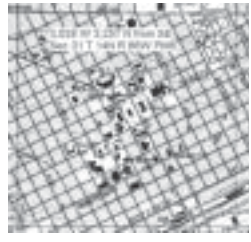


Footage Offsets From Section Lines

If you specify a footage call within a section, All Topo can calculate an exact location. You must specify a cardinal direction after each distance, All Topo will figure out which section lines to offset from (from the South and East lines in this example).

1,356 W 180 N from SE Sec 31 T 14N R 66W PM6

specifies the Wyoming State Capitol dome:



Specifying the Corner of an Aliquot Part

All Topo accepts corner tags to reference the corner of an aliquot part. For example:

SE NW Sec 31 T14N R66W PM6

Specifies the center of the south east quarter of the north west quarter of Section 31.

All Topo accepts the following corner designations:

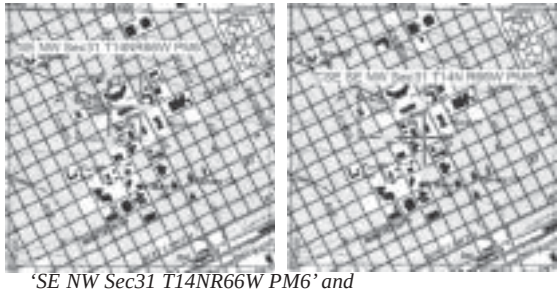
CNE - North East Corner

CSE - South East Corner

CSW - South West Corner

CNW - North West Corner

CEN - Center



'SE NW Sec31 T14NR66W PM6' and
'CSE SE NW Sec31 T14NR66W PM6'

Entering Relative Coordinates

In addition to fully-qualified coordinates, it is possible to enter relative coordinates that specify a new coordinate at an offset from a previous coordinate.

Relative coordinates always begin with the '@' (ampersand) and specify a distance and bearing from the previous base location. Relative coordinates may be stacked, however there must be a fully qualified coordinate before the first relative coordinate. To specify a relative coordinate you can enter:

Radial or Cartesian offsets with Rotation

Ex: '@ X=0.5 miles Y=-0.25 miles R=2.4'
Up ¼ mile, right ½ mile, plus 2.4 rotation

Offset Direction: Bearing and North Reference

Ex: '@ L=1.25 miles R=34.5' Compass bearing
'@ N55.5E 1.25 miles' Survey Angle

All Topo accepts True, UTM Grid, State Plane Grid and Magnetic North references; and Great Circle (Lat/Lon), UTM Grid and State Plane Grid projections. All Topo assumes True North Reference and Great Circle (Lat/Lon) projections unless explicitly overridden.

Automating Relative Coordinates

The 'Project New Annotation' tool automates the entry of relative coordinates. It can be found by right-mouse-clicking near the base coordinate, and selecting 'Project New Annotation: From …'

Compass, Azimuth Bearings

If you know a distance and a compass bearing (azimuth) you might enter:

@ L=0.5 mile R=45.0 MagN

to describe a point ½ mile distant at a Magnetic North compass bearing of 45 degrees (North East). All Topo interprets compass bearings as decimal degree clockwise rotation from Magnetic North. Compass bearings or azimuths may vary from 0.0 to 360.0 degrees. For convenience All Topo will also accept negative azimuths:

-45 = 315 degrees

and will rationalize too large and too small azimuths:

380 = 20 degrees

-380 = -20 or 340 degrees

Cartesian Offsets

If you know the X and Y offsets from the base, you can directly specify a relative coordinate:

@ X=0.5 miles Y=0.25 Miles

specifies a point ½ mile East and ¼ mile North of the base point.

All Topo will also accept mixed Cartesian coordinates with rotations:

@ X=0.5 miles Y=0.25 Miles R=0.5

defines a point ½ mile East and ¼ mile North of the base point rotated ½ degree clockwise.

Relative coordinates are Great Circle (Lat/Lon) projected with respect to True North by default. If you are working with UTM coordinates, you most likely will want to override the North Reference and projection:

@ X=0.5 miles Y=0.25 Miles GN UTM

Quadrant Bearings

Quadrant bearings are easier to enter than azimuth or Cartesian offsets. Enter a '@' followed by the quadrant bearing followed by a distance as a 'Location' or in an .HWP file.

@ N45.2314789E 2640 feet

specifies a point ½ mile True North East of the base point in the Lat/Lon projection. Since quadrant bearings are almost always expressed in feet, All Topo will assume footage distance calls unless overrided with acceptable units.

Quadrant bearings are entered with the degrees before the decimal point, two minute characters and two or more second characters. To enter N 12 degrees 34 minutes 5.678 seconds West:

@ N12.3405678W

You must zero pad the minutes and seconds if they are less than 10. To enter the bearing South 2 degrees 3 minutes 4.5 seconds West use:

South 02 degrees 03 minutes 04.5 seconds West
use => "**S2.03045W**"

All Topo also accepts cardinal directions like:

Due North

Or

DueN

So

@ DueN 1 mile

fully describes a point 1 mile True North of the base coordinate.

Quadrant Bearing/Distance Entry Shortcuts

If you are entering a series of quadrant bearings and distances, keypad shortcuts allows you to bypass the use of N/S and E/W. All Topo will accept the '+' for N and '-' for S; and '+' for E and '-' for W.

The keypad forward slash '/' may be substituted for the space character and the asterick '*' may be substituted for the initial '@' character.

This allows for quicker keyboard entry using only your right hand and the numeric keypad. For example:

Full Bearing Distance Call	Shortcut
@ N0E 500 feet	*+0+/500
@ N45.23145W 1272.8 SFeet	*+45.23145-/1272.8 sfeet
@ S13.23E 14.5 rods	*-13.23+/14.5 rods

North Reference: TN, MN, GN & SPN

All Topo accepts bearings entered relative to True North, Magnetic North, UTM Grid North or State Plane Grid North. You can override the default North direction (True North) by adding a North Code with optional arguments. The permissible North Codes are:

Code		Description
TRUEN	or TN	True North (default)
MAGN	or MN	Magnetic North
GRIDN	or GN	UTM Grid North
SPN		State Plane North

Magnetic North - Magnetic Declination

When you use a compass on the surface of the earth it measures a magnetic field that is a function of many forces:

- Earth's conducting, fluid outer core
- Earth's crust and upper mantle
- Ionosphere effects
- Magnetosphere effects

Stray magnetic forces: a nearby pocket knife, the wire rims of your glass frames, your watch and keys

Magnetic declination is the angular difference between a vector pointing towards True North and the direction a compass needle points. Surprisingly, magnetic declination changes by as much as 0.1º from the West to East sides of a single quadrangle. In addition, declination changes substantially from year to year.

All Topo Maps estimates magnetic declination using the World Magnetic Model (contained in the file .\db\wmm.cof). The World Magnetic Model estimates the first order effects for a location, assuming the date is January 1 of the current year.

Ex: a bearing of 143.3º clockwise from magnetic north, a distance of 1232 feet:

@ R=143.3 MN L=1232 feet
@ S36.4200E MN 1232 feet
@ -36.42+ 1232 fe

UTM Grid North Arguments

If you override a bearing North reference to UTM Grid, All Topo will assume you want to use UTM Grid North for the natural UTM Zone of the base coordinate. You can force an alternate UTM Zone by adding the zone number

to the North Code preceded by an underscore:

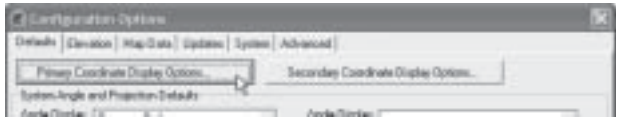
GN_12

If All Topo is reading an annotation file and a <D > meta tag has forced a non-natural UTM Zone, you can select the default/natural UTM Zone by using Zone 0:

GN_0

State Plane Grid North Arguments

If you override a bearing North reference to State Plane Grid, All Topo will use the State Plane Code and Datum from the State Plane section of the Primary Coordinate:



To force an alternate State Plane Code add the correct code and datum to the SPN North Code:

SPN_UTC_NAD27

Appendix B has a complete list of valid State Plane Codes. The datum must be NAD27 or NAD83.

To specify a point 2000 feet north and 1000 feet west using NAD83 Wyoming East State Plane grid as a the north reference:

@ Y=2000 feet X=1000 feet GN SPN_WYE_NAD83

Projection

Even though All Topo base maps are UTM Projected, All Topo can project relative coordinates using any of these projections:

Code	Description
LL	Latitude / Longitude - Great Circle
UTM	Universal Transverse Mercator Grid
SP	State Plane Grid

Don't confuse projection with north reference! It is possible to mix projection and north reference.

Controlling Projection in Relative Coordinates

By default All Topo will use the Lat/Lon (Great Circle) projection, a Projection Code may be used to specify an alternate projection:

@ DueN TN 1 mile UTM_Z12	1 mile true north applied to UTM Grid Zone 12
@ DueN TN 1 mile SP_UTC_NAD27	1 mile true north applied to Utah Central NAD27 Zone

To specify a UTM projection, add 'UTM' to the end of a relative coordinate. You may also add a datum and/or a zone to UTM. Separate the datum and zone with underscore characters: 'UTM_NAD83_Z14' use Zone 0 to specify the natural zone of the base coordinate.

To specify a State Plane projection, add 'SP' to the end of the relative coordinate. You may also add a state plane zone and datum. Separate the zone and datum with underscore characters 'SP_UTC_NAD83'. Valid state plane codes are listed in the appendix, only NAD27 and NAD83 datum are accepted for projection.

Example State Plane Base Coordinate

We would like to find the corner of a piece of property. The legal description for the property reads:

> "From the monument at the top of Bagpipe Butte 2,399.2 E 545,606.4 N Survey Feet Utah Southern Zone, a distance of 3,421.7 survey feet with a bearing of N 44 degrees 51 minutes 3 seconds to the East"

We are given the Utah Central Zone state plane coordinates in survey feet for a base point, from the description; we must make the assumption that the offset should be applied in the State Plane projection with a True North reference.

Press the 'Find Loc' button, choose the ‘State Plane’ tab and enter a fully qualified base coordinate:

2,399,258.1 SFt E 545,702.3 SFt N UTS

Press the 'Add as Waypoint and Show Location' button to add a new annotation at Bagpipe Butte.

Now press the 'F2' key to add a second annotation. (All Topo will temporarily place the new annotation at the location where the cursor was when you pressed F2.) Select the 'Details' tab and erase everything in the Location box, then type in the relative coordinate:

@ N44.5103E 3421.7 SFeet TN SP_UTS_NAD27

In addition to seeing the location plotted on the map, we are interested in the UTM Coordinate so we can enter it in our GPS so change the annotation description to:

%UTM NAD27%

Finally press 'OK'

All Topo will draw the second point in the correct location, and place the text

"578,574.7 M E, 4, 224,143.6 M Z12" adjacent to the projected point.

Example: 2 Metes and Bounds Survey Description

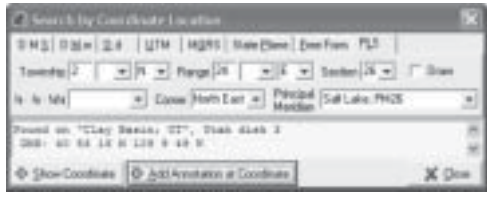
Plot the following survey description:

> From the North East corner of Section 26 Township 2 North Range 24 E, the Salt Lake Principal Meridian of 1855; the point of beginning; thence South 1 degree 2 minutes 29.83 seconds West, a distance of 5,366.1 Feet to the South East corner; thence North 89 degrees 59 minutes 9.65 seconds West, a distance of 5,260.7 Feet; thence North 44 minutes 9.88 seconds East, a distance of 5,346.5 Feet; thence North 89 degrees 47 minutes 37.59 seconds East, a distance of 5,288.4 Feet to the point of beginning. Containing 650.1 acres, more or less.

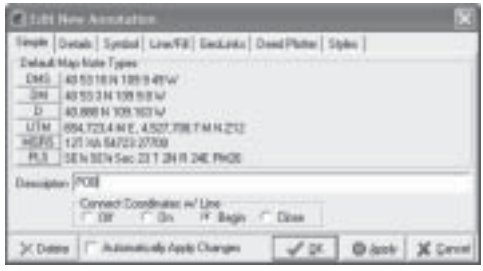
We don't know a Lat/Lon, UTM or State Plane coordinate for the point of beginning, but we do have the Public Land Survey coordinate and have purchased and installed the optional 'Utah PLS' tool.

From the description, we make the assumption that bearings are True North and the projection is Lat/Lon.

To place the initial point of beginning, press the 'Find Loc' button, and select the PLS tab. Enter Township 2 N, Range 24 E, Section 26, Corner North East. Press 'Add Annotation at Coordinate'.



Enter 'POB' for the first annotation's Description; Select the 'Line/Fill' tab and choose 'Line Begin' then press OK:



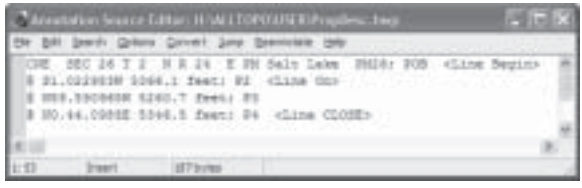
Next press F2, select the 'Details' tab, erase the default 'Location' and enter "@ S1.022983W 5366.1 feet", change the description to "South East", then press OK.

Next press F2, select the 'Details' tab, erase the default 'Location' and enter "@ N 89.590965W 5260.7 feet", change the description to "South West", then press OK.

Finally press F2, select the 'Details' tab, erase the default 'Location' and enter "@N 0.44.0988E 5346.5 feet", select the 'Line/Fill' tab and choose 'Line Close', then press OK.

All Topo Maps will draw the property boundary, automatically close the description to the point of beginning and display the enclosed area.

We could also enter the survey directly into the ‘Annotation Source Editor’:



Appendix B: State Plane Codes

NAD27 State Plane Codes:

AllTopo CODE	DESCRIPTION	NADCON CODE	DEFAULT UNITS
ALE	Alabama East	0101	Feet
ALW	Alabama West	0102	Feet
AK1	Alaska 1	5001	Feet
AK2	Alaska 2	5002	Feet
AK3	Alaska 3	5003	Feet
AK4	Alaska 4	5004	Feet
AK5	Alaska 5	5005	Feet
AK6	Alaska 6	5006	Feet
AK7	Alaska 7	5007	Feet
AK8	Alaska 8	5008	Feet
AK9	Alaska 9	5009	Feet
AK10	Alaska 10	5010	Feet
AZE	Arizona East	0201	Feet
AZC	Arizona Central	0202	Feet
AZW	Arizona West	0203	Feet
ARN	Arkansas North	0301	Feet
ARS	Arkansas South	0302	Feet
CA1	California 1	0401	Feet
CA2	California 2	0402	Feet
CA3	California 3	0403	Feet
CA4	California 4	0404	Feet
CA5	California 5	0405	Feet
CA6	California 6	0406	Feet
CA7	California 7	0407	Feet
CON	Colorado North	0501	Feet
COC	Colorado Central	0502	Feet
COS	Colorado South	0503	Feet
CT	Connecticut	0600	Feet
DE	Delaware	0700	Feet
FLE	Florida East	0901	Feet
FLW	Florida West	0902	Feet
FLN	Florida North	0903	Feet
GAE	Georgia East	1001	Feet
GAW	Georgia West	1002	Feet
HI1	Hawaii 1	5101	Feet
HI2	Hawaii 2	5102	Feet
HI3	Hawaii 3	5103	Feet
HI4	Hawaii 4	5104	Feet
HI5	Hawaii 5	5105	Feet
IDE	Idaho East	1101	Feet
IDC	Idaho Central	1102	Feet
IDW	Idaho West	1103	Feet
ILE	Illinois East	1201	Feet
ILW	Illinois West	1202	Feet
INE	Indiana East	1301	Feet
INW	Indiana West	1302	Feet
IAN	Iowa North	1401	Feet
IAS	Iowa South	1402	Feet
KSN	Kansas North	1501	Feet
KSS	Kansas South	1502	Feet
KYN	Kentucky North	1601	Feet

KYS	Kentucky South	1602	Feet
LAN	Louisiana North	1701	Feet
LAS	Louisiana South	1702	Feet
LAOS	Louisiana Offshore	1703	Feet
MEE	Maine East	1801	Feet
MEW	Maine West	1802	Feet
MD	Maryland	1900	Feet
MA	Massachusetts Mainland	2001	Feet
MAI	Massachusetts Island	2002	Feet
MIE	Michigan East	2101	Feet
MIC2	Michigan Central	2102	Feet
MIW	Michigan West	2103	Feet
MIN	Michigan North	2111	Feet
MIC	Michigan Central	2112	Feet
MIS	Michigan South	2113	Feet
MNN	Minnesota North	2201	Feet
MNC	Minnesota Central	2202	Feet
MNS	Minnesota South	2203	Feet
MSE	Mississippi East	2301	Feet
MSW	Mississippi West	2302	Feet
MOE	Missouri East	2401	Feet
MOC	Missouri Central	2402	Feet
MOW	Missouri West	2403	Feet
MTN	Montana North	2501	Feet
MTC	Montana Central	2502	Feet
MTS	Montana South	2503	Feet
NEN	Nebraska North	2601	Feet
NES	Nebraska South	2602	Feet
NVE	Nevada East	2701	Feet
NVC	Nevada Central	2702	Feet
NVW	Nevada West	2703	Feet
NH	New Hampshire	2800	Feet
NJ	New Jersey	2900	Feet
NME	New Mexico East	3001	Feet
NMC	New Mexico Central	3002	Feet
NMW	New Mexico West	3003	Feet
NYE	New York East	3101	Feet
NYC	New York Central	3102	Feet
NYW	New York West	3103	Feet
NYLI	New York Long Island	3104	Feet
NC	North Carolina	3200	Feet
NDN	North Dakota North	3301	Feet
NDS	North Dakota South	3302	Feet
OHN	Ohio North	3401	Feet
OHS	Ohio South	3402	Feet
OKN	Oklahoma North	3501	Feet
OKS	Oklahoma South	3502	Feet
ORN	Oregon North	3601	Feet
ORS	Oregon South	3602	Feet
PAN	Pennsylvania North	3701	Feet
PAS	Pennsylvania South	3702	Feet
RI	Rhode Island	3800	Feet
SCN	South Carolina North	3901	Feet
SCS	South Carolina South	3902	Feet
SDN	South Dakota North	4001	Feet
SDS	South Dakota South	4002	Feet

TN	Tennessee	4100	Feet
TXN	Texas North	4201	Feet
TXNC	Texas North Central	4202	Feet
TXC	Texas Central	4203	Feet
TXSC	Texas South Central	4204	Feet
TXS	Texas South	4205	Feet
UTN	Utah North	4301	Feet
UTC	Utah Central	4302	Feet
UTS	Utah South	4303	Feet
VT	Vermont	4400	Feet
VAN	Virginia North	4501	Feet
VAS	Virginia South	4502	Feet
WAN	Washington North	4601	Feet
WAS	Washington South	4602	Feet
WVN	West Virginia North	4701	Feet
WVS	West Virginia South	4702	Feet
WIN	Wisconsin North	4801	Feet
WIC	Wisconsin Central	4802	Feet
WIS	Wisconsin South	4803	Feet
WYE	Wyoming I E	4901	Feet
WYEC	Wyoming II EC	4902	Feet
WYWC	Wyoming III WC	4903	Feet
WYW	Wyoming IV W	4904	Feet
AS	American Somoa	5300	Feet
GU	Guam	5400	Feet
PRVI	PuertoRico/Virgin Island	5201	Feet
SX	St. Croix	5202	Feet

NAD83 State Plane Codes

Default distance units for NAD83 State Plane coordinates are legislated by several states:

U.S. Survey Foot - California, Colorado, Connecticut, Idaho, Indiana, Kentucky, Maryland, Massachusetts, Mississippi, New Mexico, New York, North Carolina, Oklahoma, Pennsylvania, Tennessee, Texas, Washington and Wisconsin.

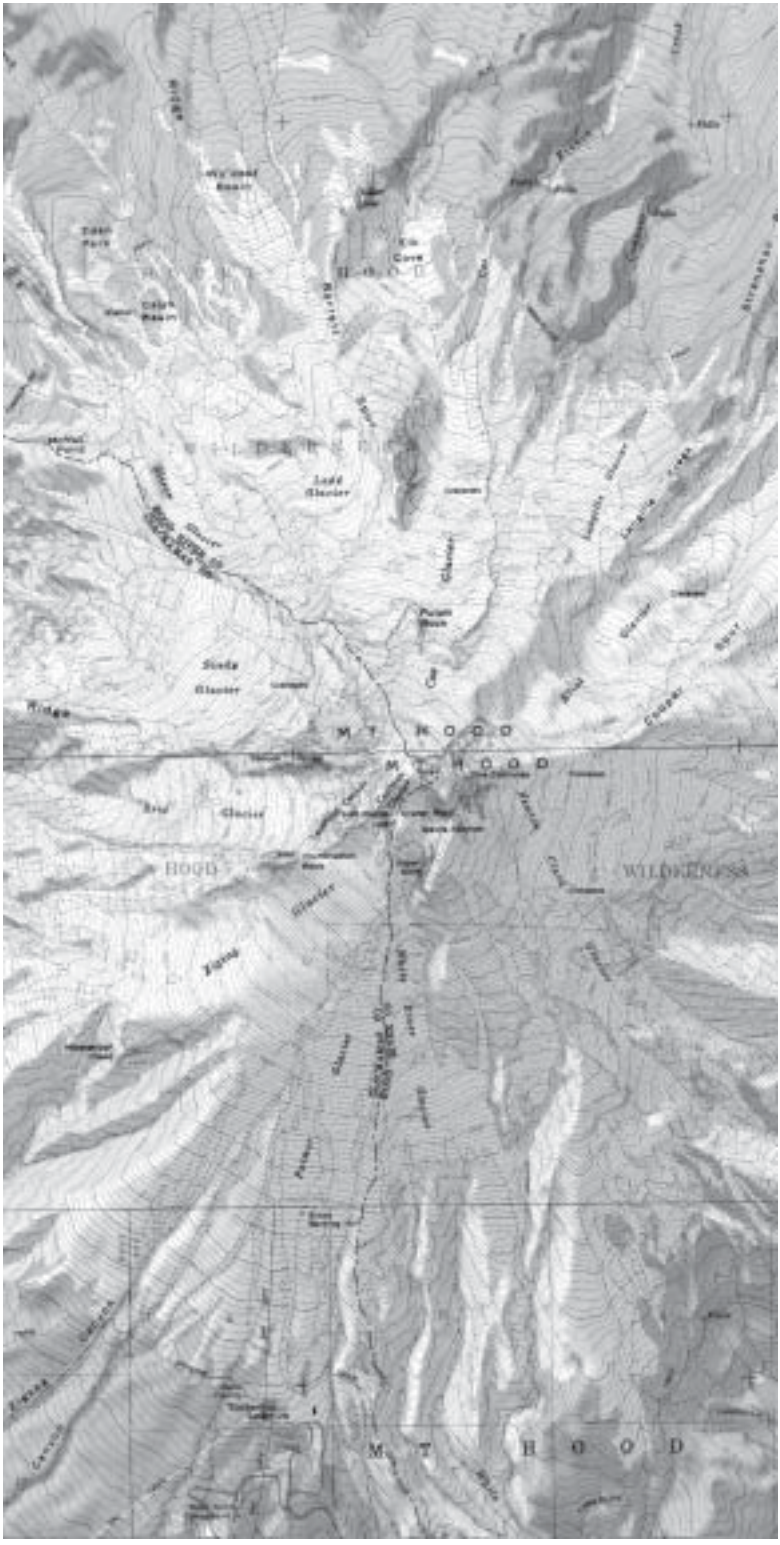
International Survey Foot - Arizona, Michigan, Montana, North Dakota, Oregon, South Carolina and Utah.

All Topo maps will display and convert State Plane coordinates using any valid distance unit (feet, survey feet, meters, yards, varas…), however the user is cautioned to consult a licensed professional surveyor for advice when using units other than the default units shown.

AllTopo		**NADCON**	**DEFAULT**
CODE	**DESCRIPTION**	**CODE**	**UNITS**
ALE	Alabama East	0101	Survey Feet
ALW	Alabama West	0102	Survey Feet
AK1	Alaska 1	5001	Survey Feet
AK2	Alaska 2	5002	Survey Feet
AK3	Alaska 3	5003	Survey Feet
AK4	Alaska 4	5004	Survey Feet
AK5	Alaska 5	5005	Survey Feet
AK6	Alaska 6	5006	Survey Feet
AK7	Alaska 7	5007	Survey Feet
AK8	Alaska 8	5008	Survey Feet
AK9	Alaska 9	5009	Survey Feet

AK10	Alaska 10	5010	Survey Feet
AZE	Arizona East	0201	Feet
AZC	Arizona Central	0202	Feet
AZW	Arizona West	0203	Feet
ARN	Arkansas North	0301	Survey Feet
ARS	Arkansas South	0302	Survey Feet
CA1	California 1	0401	Survey Feet
CA2	California 2	0402	Survey Feet
CA3	California 3	0403	Survey Feet
CA4	California 4	0404	Survey Feet
CA5	California 5	0405	Survey Feet
CA6	California 6	0406	Survey Feet
CON	Colorado North	0501	Survey Feet
COC	Colorado Central	0502	Survey Feet
COS	Colorado South	0503	Survey Feet
CT	Connecticut	0600	Survey Feet
DE	Delaware	0700	Survey Feet
FLE	Florida East	0901	Survey Feet
FLW	Florida West	0902	Survey Feet
FLN	Florida North	0903	Survey Feet
GAE	Georgia East	1001	Survey Feet
GAW	Georgia West	1002	Survey Feet
HI1	Hawaii 1	5101	Survey Feet
HI2	Hawaii 2	5102	Survey Feet
HI3	Hawaii 3	5103	Survey Feet
HI4	Hawaii 4	5104	Survey Feet
HI5	Hawaii 5	5105	Survey Feet
IDE	Idaho East	1101	Survey Feet
IDC	Idaho Central	1102	Survey Feet
IDW	Idaho West	1103	Survey Feet
ILE	Illinois East	1201	Survey Feet
ILW	Illinois West	1202	Survey Feet
INE	Indiana East	1301	Survey Feet
INW	Indiana West	1302	Survey Feet
IAN	Iowa North	1401	Survey Feet
IAS	Iowa South	1402	Survey Feet
KSN	Kansas North	1501	Survey Feet
KSS	Kansas South	1502	Survey Feet
KYN	Kentucky North	1601	Survey Feet
KYS	Kentucky South	1602	Survey Feet
LAN	Louisiana North	1701	Survey Feet
LAS	Louisiana South	1702	Survey Feet
LAOS	Louisiana Offshore	1703	Survey Feet
MEE	Maine East	1801	Survey Feet
MEW	Maine West	1802	Survey Feet
MD	Maryland	1900	Survey Feet
MAM	Massachusetts Mainland	2001	Survey Feet
MAI	Massachusetts Island	2002	Survey Feet
MIN	Michigan North	2111	Feet
MIC	Michigan Central	2112	Feet
MIS	Michigan South	2113	Feet
MNN	Minnesota North	2201	Survey Feet
MNC	Minnesota Central	2202	Survey Feet
MNS	Minnesota South	2203	Survey Feet
MSE	Mississippi East	2301	Survey Feet
MSW	Mississippi West	2302	Survey Feet
MOE	Missouri East	2401	Survey Feet

MOC	Missouri Central	2402	Survey Feet
MOW	Missouri West	2403	Survey Feet
MT	Montana	2500	Feet
NE	Nebraska	2600	Survey Feet
NVE	Nevada East	2701	Survey Feet
NVC	Nevada Central	2702	Survey Feet
NVW	Nevada West	2703	Survey Feet
NH	New Hampshire	2800	Survey Feet
NJ	New Jersey	2900	Survey Feet
NME	New Mexico East	3001	Survey Feet
NMC	New Mexico Central	3002	Survey Feet
NMW	New Mexico West	3003	Survey Feet
NYE	New York East	3101	Survey Feet
NYC	New York Central	3102	Survey Feet
NYW	New York West	3103	Survey Feet
NYLI	New York Long Island	3104	Survey Feet
NC	North Carolina	3200	Survey Feet
NDN	North Dakota North	3301	Feet
NDS	North Dakota South	3302	Feet
OHN	Ohio North	3401	Survey Feet
OHS	Ohio South	3402	Survey Feet
OKN	Oklahoma North	3501	Survey Feet
OKS	Oklahoma South	3502	Survey Feet
ORN	Oregon North	3601	Feet
ORS	Oregon South	3602	Feet
PAN	Pennsylvania North	3701	Survey Feet
PAS	Pennsylvania South	3702	Survey Feet
RI	Rhode Island	3800	Survey Feet
SC	South Carolina	3900	Feet
SDN	South Dakota North	4001	Survey Feet
SDS	South Dakota South	4002	Survey Feet
TN	Tennessee	4100	Survey Feet
TXN	Texas North	4201	Survey Feet
TXNC	Texas North Central	4202	Survey Feet
TXC	Texas Central	4203	Survey Feet
TXSC	Texas South Central	4204	Survey Feet
TXS	Texas South	4205	Survey Feet
UTN	Utah North	4301	Feet
UTC	Utah Central	4302	Feet
UTS	Utah South	4303	Feet
VT	Vermont	4400	Survey Feet
VAN	Virginia North	4501	Survey Feet
VAS	Virginia South	4502	Survey Feet
WAN	Washington North	4601	Survey Feet
WAS	Washington South	4602	Survey Feet
WVN	West Virginia North	4701	Survey Feet
WVS	West Virginia South	4702	Survey Feet
WIN	Wisconsin North	4801	Survey Feet
WIC	Wisconsin Central	4802	Survey Feet
WIS	Wisconsin South	4803	Survey Feet
WYE	Wyoming East	4901	Survey Feet
WYEC	Wyoming East Central	4902	Survey Feet
WYWC	Wyoming West Central	4903	Survey Feet
WYW	Wyoming West	4904	Survey Feet
PRVI	PuertoRico/Virgin Island	5201	Survey Feet
AS	American Somoa	5300	Survey Feet
GU	Guam	5400	Survey Feet


M T H O O D
M T H O O D
M T H O O D
HOOD
WILDERNESS
Ladd Glacier
Reid Glacier
Sandy Glacier
Eliot Glacier
Coalman Glacier
Zigzag Glacier
Cooper Spur
Timberline Trail

10tff0124

Appendix C: Public Land Survey Principle Meridians

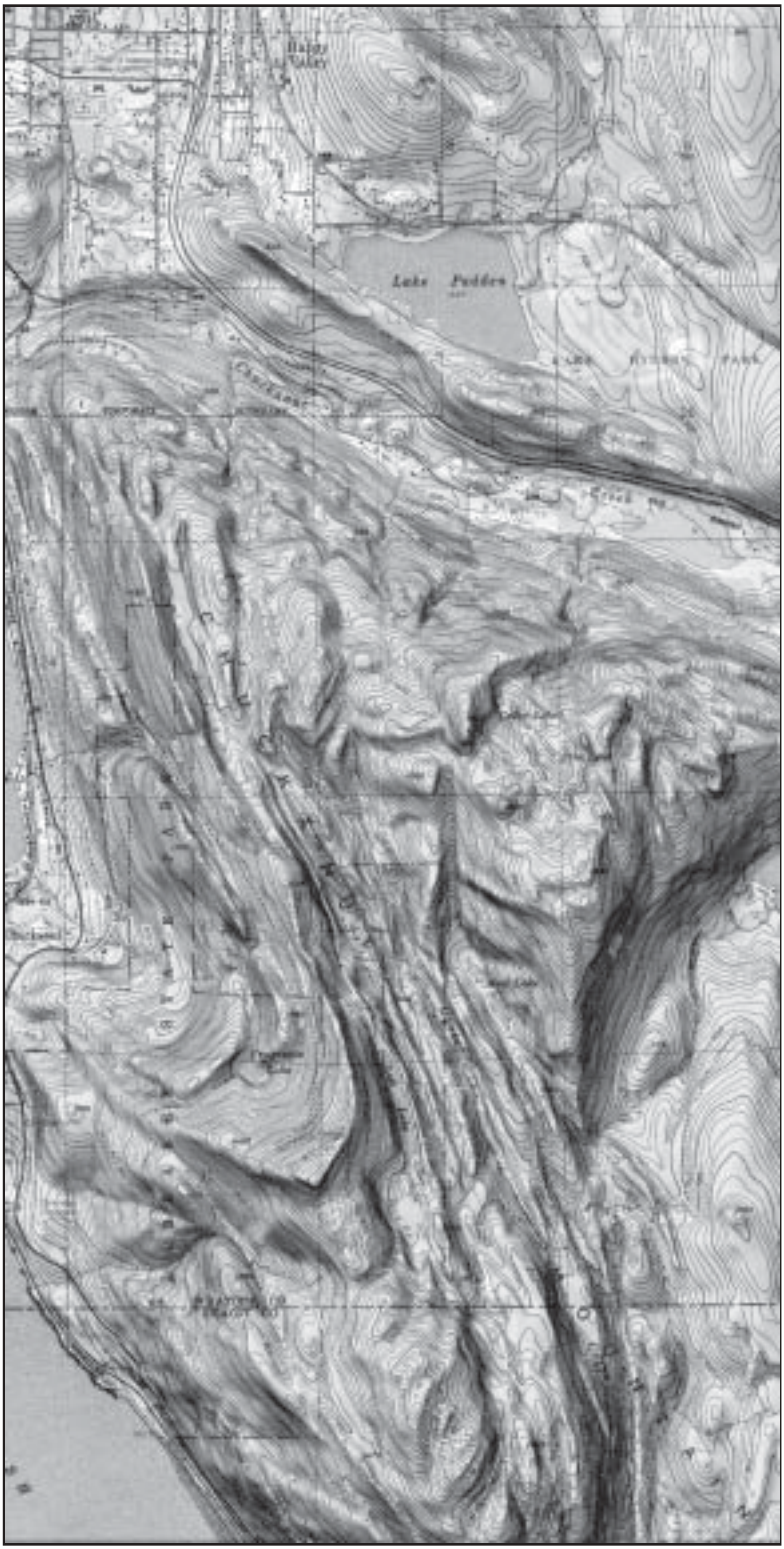
All Topo Maps requires that you specify the principle meridian for every Public Land Survey style coordinate. The following meridian codes and alternate abbreviations are accepted:

Principle Meridian	Abbreviations
First Principal Meridian 1819	First, 1st, PM1
Second Principal Meridian 1805	Second, 2nd, PM2
Third Principal Meridian 1815	Third, 3rd, PM3
Forth Principal Meridian 1805	Forth, 4th, PM4
Fifth Principal Meridian 1815	Fifth, 5th, PM5
Sixth Principal Meridian 1855	Sixth, 6th, PM6
Black Hills 1878	Black H, PM7
Boise 1867	Boise, PM8
Chickasaw 1833	Chick, PM9
Choctaw 1821	Choct, PM10
Cimarron 1881	Cimar, PM11
Gila and Salt River 1865	Gila, PM14
Humbolt 1853	Humb, PM15
Huntsville 1807	Hunt, PM16
Indian 1870	Indian, PM17
Louisiana 1807	Loui, PM18
Michigan 1815	Mich, PM19
Principal Montana 1867	Princ, Mont, PM20
Mount Diablo 1851	Diab, PM21
Navajo 1869	Nava, PM22
New Mexico 1855	New M, PM23
St Helena 1819	St He, St. He, PM24
St Stephens 1805	St Ste, St. St, PM25
Salt Lake 1855	Salt,SLB&M,SLBM,PM26
San Bernardino 1852	San Ber, PM27
Tallahassee 1824	Talla, PM29
Uintah 1875	Uintah, PM30
Ute 1880	Ute, PM31
Washington 1803	Wash, PM32
Willamette 1851	Wil, PM33
Wind River 1875	Wind, PM34
Umiat 1956	Umiat, PM45, PM-1
Kateel River 1956	Kateel, PM44, PM-2
Fairbanks 1910	Fairb, PM13, PM-3
Copper River 1905	Copper, PM12, PM-4
Seward 1911	Seward, PM28, PM-5

Using PM Codes

Sec 23 T14N R23E Chick
Sec 23 T14N R23E Chickasaw
Sec 23 T14N R23E Chickasaw 1833

are all valid Public Land Survey coordinates. The listed abbreviations may be expanded from the minimum abbreviation shown to include additional characters from the full meridian name.



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Appendix D: Escapes and %Tokens%

All Topo Map Escapes and %tokens% are replacement instructions that you can use to modify descriptions and notes. Tokens are always enclosed by percent signs and may have one or more arguments:

%XUTM%

%XUTM Feet NAD83 Z13%

Tokens usually are easier to enter than a long string of numbers, and are automatically updated if you change a coordinate location. Escape sequences encode characters that would be difficult to enter as a single character.

What are tokens good for?

Tokens abstract values that may change. For example, an annotation description might include its UTM coordinate:

427,498.8 M E, 4,509,613.4 M N Z 12

The coordinate could be explicitly typed into the description; however, when the annotation is moved or copied the coordinate would have to be manually updated. By inserting the %UTM% token in the description, we instruct the All Topo viewer to compute and display the UTM coordinate when the annotation is drawn on the screen.

Token Example: Multiple Coordinate Styles for an Annotation

You can use tokens to annotate a single location with multiple coordinate styles and datum. In this extreme example:

the description is set to:

%DMS NAD27%|%DM NAD27%|%D NAD27%|%UTM%
%DMS NAD83%|%DM NAD83%|%D NAD83%|%UTM NAD83%

which results in this annotation:

Tokens are also important when exporting All Topo annotations to a text file. The Export Wizard generates text export files using the tokens you provide:

%XUTM Z13 Feet%\t%YUTM Z13 Feet%\t

Escape Sequences

You can use escape sequences to represent special characters that you cannot easily type. There are several letter encoded sequences:

\t	Tab or Control-I
\r	Return (without linefeed) or Control-M
\n	New Line pair (^M^J)

or you can hex-encode any other 8-bit character:

\01	Control-A
\A9	0xA9 or ©

In addition you can use the pipe symbol "|" to represent a New Line pair (^M^J) in annotation descriptions and notes.

Token Arguments

Many tokens accept additional arguments that control formatting and coordinate display. For example, we can override the default UTM zone when we display a coordinate:

%UTM%	427,498.8 M E, 4,509,613.4 M N Z 12
%UTM Z13%	79,335.8 M W, 4,531,945.5 M N Z 13

Datum Arguments

The following Datum arguments are accepted by some tokens:

Datum	**Recognized Abbreviation**
NAD27	NAD27
NAD83	NAD83
WGS84	WGS84
NAD27CONUS	NAD27CO
NAD27CANADA	NAD27CA
NAD27ALASKA	NAD27AK
WGS72	WGS72
Old Hawaiian	OLDHA
International 1924	INTL24 INTL1924

Distance Unit Arguments

The following distance unit arguments are accepted by some tokens:

Units	**Argument**	**Description**
Meters	M ME	1.0 Meter
Feet	FE FT IFE IFT	International Foot: 12.0 * 0.0254 * 1 Meter
Survey Foot	SFE SFT	(1200.0 / 3937.0) Meters
Miles	MI	5280.0 International Feet
Nautical Mile	NM	6076.11549 Feet
Yards	YA YD	3.0 * Feet
Rods	RO RD	16.5 International Feet
Poles	PO	16.5 International Feet
Perch	PE	16.5 International Feet
Chains	CH	66.0 International Feet
Links	LI LK	1/100 Chain
Varas	VA	33 1/3 inch

UTM Zone Arguments

An integer preceded by the letter 'Z' or the word 'Zone' is a valid UTM Zone argument. Reasonable zones fall in the range 'Z-60' through 'Z-1' Southern Hemisphere; 'Z1' through 'Z60' Northern Hemisphere; or Z0 to force the natural UTM Zone for a coordinate.

%UTM Z14%

Format Arguments

The format of many values can be overridden using a format string. For example:

```
%Miles "#.###"%
```

will display the mileage with three decimals of precision.

```
9.135 Miles
```

The format string is always enclosed within quote marks "#.###", the following specifiers may be used within the format string:

#	Description
0	Digit place holder. If the value being formatted has a digit in the position where the '0' appears in the format string, then that digit is copied to the output string. Otherwise, a '0' is stored in that position in the output string.
#	Digit placeholder. If the value being formatted has a digit in the position where the '#' appears in the format string, then that digit is copied to the output string. Otherwise, nothing is stored in that position in the output string.
.	Decimal point. The first '.' character in the format string determines the location of the decimal separator in the formatted value; any additional '.' characters are ignored. The actual character used as a decimal separator in the output string is determined by Number Format of the International section in the Windows Control Panel.
,	Thousand separator. If the format string contains one or more ',' characters, the output will have thousand separators inserted between each group of three digits to the left of the decimal point. The placement and number of ',' characters in the format string does not affect the output, except to indicate that thousand separators are wanted. The actual character used as a the thousand separator in the output is determined by the Number Format of the International section in the Windows Control Panel.
E+	Scientific notation. If any of the strings 'E+', 'E-', 'e+', or 'e-' are contained in the format string, the number is formatted using scientific notation. A group of up to four '0' characters can immediately follow the 'E+', 'E-', 'e+', or 'e-' to determine the minimum number of digits in the exponent. The 'E+' and 'e+' formats cause a plus sign to be output for positive exponents and a minus sign to be output for negative exponents. The 'E-' and 'e-' formats output a sign character only for negative exponents.
'xx'	Characters enclosed in single quotes are output as-is, and do not affect formatting.

The locations of the leftmost '0' before the decimal point in the format string and the rightmost '0' after the decimal point in the format string determine the range of digits that are always present in the output string.

The number being formatted is always rounded to as many decimal places as there are digit placeholders ('0' or '#') to the right of the decimal point. If the format string contains no decimal point, the value being formatted is rounded to the nearest whole number.

If the number being formatted has more digits to the left of the decimal separator than there are digit placeholders to the left of the '.' character in the format string, the extra digits are output before the first digit placeholder.

Format Examples:

The following table shows some sample formats and the results produced when the formats are applied to different values:

Fmt	1234	-1234	0.5	0
None or ""	1234	-1234	0.5	0
"0"	1234	-1234	1	0
"0.00"	1234.00	-1234.00	0.50	0.00
"#.##"	1234	-1234	.5	
"#,##0.00"	1,234.00	-1,234.00	0.50	0.00
"#,##0.00;(#,##0.00)"	1,234.00	(1,234.00)	0.50	0.00
"#,##0.00;;Zero"	1,234.00	-1,234.00	0.50	Zero
"0.000E+0"	1.234E+3	-1.234E+3	.000E-1	0.000E+00
"#.###E-0"	1.234E3	-1.234E3	5E-1	0E0

Date Time Format

The following codes can be used to build a date / time format string to build a specialized time string:

c Displays the date using the format given by the Windows control panel settings ShortDateFormat global variable, followed by the time using the format given by the LongTimeFormat global variable.

d Displays the day as a number without a leading zero (1-31).

dd Displays the day as a number with a leading zero (01-31).

ddd Displays the day as an abbreviation (Sun-Sat) using the strings given by the ShortDayNames global variable.

dddd Displays the day as a full name (Sunday-Saturday) using the strings given by the LongDayNames global variable.

ddddd Displays the date using the format given by the ShortDateFormat global variable.

dddddd Displays the date using the format given by the LongDateFormat global variable.

m Displays the month as a number without a leading zero (1-12). If the m specifier immediately follows an h or hh specifier, the minute rather than the month is displayed.

mm Displays the month as a number with a leading zero (01-12). If the mm specifier immediately follows an h or hh specifier, the minute rather than the month is displayed.

mmm Displays the month as an abbreviation (Jan-Dec) using the strings given by the ShortMonthNames global variable.

mmmm Displays the month as a full name (January-December) using the strings given by the LongMonthNames global variable.

yy Displays the year as a two-digit number (00-99).

yyyy Displays the year as a four-digit number (0000-9999).

h Displays the hour without a leading zero (0-23).

hh Displays the hour with a leading zero (00-23).

n Displays the minute without a leading zero (0-59).

nn Displays the minute with a leading zero (00-59).

s Displays the second without a leading zero (0-59).

ss Displays the second with a leading zero (00-59).

t Displays the time using the format given by the ShortTimeFormat global

variable.

tt Displays the time using the format given by the LongTimeFormat global variable.

am/pm Uses the 12-hour clock for the preceding h or hh specifier, and displays 'am' for any hour before noon, and 'pm' for any hour after noon. The am/pm specifier can use lower, upper, or mixed case, and the result is displayed accordingly.

a/p Uses the 12-hour clock for the preceding h or hh specifier, and displays 'a' for any hour before noon, and 'p' for any hour after noon. The a/p specifier can use lower, upper, or mixed case, and the result is displayed accordingly.

ampm Uses the 12-hour nate by the GPS tool or generated when the point was added. The GPS date time stamp can be modified by clicking in the date/time box to the right of the Note on the 'Details' tab of the 'Edit Coordinate' box.

Ex:

%GPSTIME “hh:mm dd yyyy mmm”% 14:11 15 2003 Apr

%Tokens%

All Topo Maps will accept the following tokens in Annotation Descriptions and Annotation Notes. Each example assumes a base annotation of:

Coordinate: 41.140,259° N, 104.820,246° W NAD83
Name: WYSTCP
Description: Wyoming State Capitol
Note: Cheyenne Wyoming

Default Format: NAD27, DM.mmm

%C% Coordinate in Default Style

Displays the annotation's coordinate in the current default style. The default style is the same as the 'Primary Coordinate Style' which can be changed under 'Options: Coordinate & System Options:

Arguments: DATUM

Ex:

%C%	41 8.417 N 104 49.183 W
%C WGS84%	41 8.416 N 104 49.215 W WGS84

%DATUM% Datum of Base Coordinate

Displays the base datum of the annotation.

Arguments: none

Ex:

%DATUM% NAD83

%UTM% Full UTM Coordinate

Displays the Universal Transverse Mercator (UTM) coordinate for the annotation.

The default style for the display is set by the 'Primary Coordinate Display' settings (Main Menu: Options: Coordinate System Options…: Defaults tab: Primary Coordinate Display Options…: UTM tab)

If the default UTM Zone is not set to Auto (or 0) in the Primary Coordinate Display Options, you can use 'Z0' to display the UTM coordinate in the default/natural UTM Zone.

Arguments: DATUM, DIST_UNITS, UTMZONE

Ex:

%UTM%	515,129.86 M E, 4,554,132.93 M N Z13
%UTM WGS84%	515,080.82 M E, 4,554,342.01 M N Z13 WGS84
%UTM Z12%	1,018,817.02 M E, 4,572,564.83 M N Z12
%UTM NAD83 FEET Z0"	1,689,913.00 Ft E, 14,942,069.95 Ft N Z13 NAD83

%XUTM% UTM Easting

Displays the Easting portion of a Universal Transverse Mercator (UTM) coordinate for the annotation.

The default style (DATUM, FORMAT, UTMZONE) are set by the 'Primary Coordinate Display' settings.

Arguments: DATUM, FORMAT, UTMZONE, DIST_UNITS

Ex:

%XUTM%	515129.9
%XUTM "0.000" NAD83 FEET%	1689913.001

%YUTM% UTM Northing

Displays the Northing portion of a Universal Transverse Mercator (UTM) coordinate for the annotation.

The default style (DATUM, FORMAT, UTMZONE) are set by the 'Primary Coordinate Display' settings.

Arguments: DATUM, FORMAT, UTMZONE, DIST_UNITS

Ex:

%YUTM%	4554132.9
%YUTM "Y=#,##0.000" NAD83 FEET%	Y=14,942,069.950

%ZUTM% UTM Zone

Displays the default/natural UTM Zone for the annotation. This token does not accept any arguments, nor can you override the UTM Zone.

Arguments: none

Ex:

%ZUTM%	13

%MGRS% Military Grid Reference System Coordinate

Displays the MGRS coordinate string. The MGRS style is set by the 'Primary Coordinate Display' MGRS style.

Arguments: DATUM, MGRS_PRECISION

MGRS_PRECISION codes are:
1=1 KMeter, 2=100 Meter, 3=10 Meter, 4=1 Meter

Ex:

%MGRS%	13T ER 15130 54133
%MGRS 3 NAD83%	13T EF 1509 5434 NAD83

%SP% State Plane Coordinate

Displays the State Plane Coordinate for the annotation. The 'Primary Coordinate Display' style is used unless arguments override settings. It is important to select the correct State Plane Code! As shown below, All Topo will dutifully attempt to evaluate insanely inappropriate State Plane codes for

a coordinate!

Arguments: DATUM, UNITS, State Plane Code (see appendix B)

Ex:

%SP%	1,192,375.8 Ft E 182,542.4 Ft N WYEC
%SP NAD83 METERS WYE%	229,082.5 M E 71,154.5 M N WYE NAD83
%SP AK4 CHAINS%	197,170.5 Ch E 15,725.1 Ch S AK4

(Which is worse, an Alaska zone for a Wyoming coordinate or chain units? This is a example of very inappropriate units and zone!)

%DMS% Lat/Lon Coordinate in DMS

Displays the annotations coordinate in Lat/Lon DMS.s style. 'Primary Coordinate Display Settings' are used for defaults.

Arguments: DATUM

Ex:

%DMS%	41 8 25.00 N 104 49 11.00 W
%DMS NAD83%	41 8 24.93 N 104 49 12.89 W NAD83

%DM% Lat/Lon Coordinate in DM

Displays the annotations coordinate in Lat/Lon DM.m style. 'Primary Coordinate Display Settings' are used for defaults.

Arguments: DATUM

Ex:

%DM%	41 8.417 N 104 49.183 W
%DM NAD83%	41 8.416 N 104 49.215 W NAD83
%DM WGS84%	41 8.415 N 104 49.218 W WGS84

%D% Lat/Lon Coordinate in Degrees

Displays the annotations coordinate in Lat/Lon D.d style. 'Primary Coordinate Display Settings' are used for defaults.

Arguments: DATUM

Ex:

%D%	41.14028 N 104.81972 W
%D NAD83%	41.14026 N 104.82025 W NAD83

%PLSxxx% Public Land Survey Coordinates

%PLS…% tokens are available to show each of the PLS display styles.

Arguments: none

Ex:

%PLSQQ%	SE¼ NW¼ Sec 31 T 14N R 66W PM6
%PLSQQQ%	PM06 T14N R66W S31BDD
%PLSNW%	2,329 E 2,050 S from NW Sec 31 T 14N R 66W PM6
%PLSNE%	3,005 W 2,033 S from NE Sec 31 T 14N R 66W PM6
%PLSSE%	3,024 W 3,253 N from SE Sec 31 T 14N R 66W PM6
%PLSSW%	2,312 E 3,233 N from SW Sec 31 T 14N R 66W PM6
%PLSBEST%	2,329 E 2,050 S from NW Sec 31 T 14N R 66W PM6

The %PLSBEST% evaluates the estimated error of the coordinate based upon each corner's base accuracy and displays the distance from the most precise corner.

%MDEC% Magnetic Declination

Displays the calculated magnetic declination to True North for the annotation location. The declination is computed for the location from the world magnetic data file, based upon the first calendar day of the current year.

Arguments: FORMAT

Ex:

%MDEC%	10.166
%MDEC "#.#"%	10.2

%GDEC% Grid Declination

The declination from the UTM Grid to True North for the annotation location. The default/natural NAD27 UTM zone is assumed unless overridden.

Arguments: FORMAT, DATUM, UTMZONE

Ex:

%GDEC%	0.119
%GDEC Z12%	4.075
%GDEC NAD83 "0.######"%	0.118259

%ELEVF% Elevation in Feet

Returns the computed elevation in feet for the annotation. The NED database must be available for the coordinate, if All Topo is unable to compute an elevation, the value "-0.0" will be returned.

Arguments: FORMAT

Ex:

%ELEVF%	6089
%ELEVF "0.0 'Feet'"%	6088.8 FEET

%ELEVM% Elevation in Meters

Returns the computed elevation in meters for the annotation. The NED database must be available for the coordinate, if All Topo is unable to compute an elevation the value "-0.0" will be returned.

Arguments: FORMAT

Ex:

%ELEVM%	1855.9
%ELEVM "0.0 'Meters'"%	1855.9 METERS

%GPSELEV% GPS Elevation

Displays the GPS Elevation for the annotation. The GPS Elevation is entered in the Elev box of the 'Details' tab of the 'Edit Coordinate' box. If an elevation is not available the value "-0.0" will be returned. The GPS elevation is displayed in meters unless overridden with another distance unit.

Arguments: FORMAT, UNITS

Ex:

%GPSELEV%	1863.0
%GPSELEV FEET "0.00"%	6112.20

%GPSDATE% GPS Date Time Stamp

Displays the date time stamp associated with the coordinate by the GPS tool or generated when the point was added. The GPS date time stamp can be modified by clicking in the date/time box to the right of the Note on the 'Details' tab of the 'Edit Coordinate' box.

If no date time stamp is available "0/0/00 0:0:0.0" is returned.

Arguments: Date Time Format, Hours Offset

Ex:

%GPSDATE%	4/15/2003 11:36:31 AM
%GPSDATE -6 "HH:mm"%	05:36

%GPSICON% GPS Icon Number

Displays the GPS Icon number. This value typically is extracted from the GPS when Waypoints, Routepoints or Trackpoints are downloaded.

If no icon information is available "?Icon" is displayed.

Arguments: none

Ex:

%GPSICON%	7

%DIST% Traced or Line Drawn Distance

Displays the traced distance (path length drawn with the Pencil Tool) or the Line On distance (accumulated distance from the start of the current line) in the current default distance units.

Arguments: none

See also: *%UNITS%* to display arbitrary distance units

Ex:

%DIST%	3.1 Mi

%*UNITS*% Traced or Line Drawn Distance

Like the %DIST% token, the traced distance or Line On distance is displayed. Replace UNITS with one of these Unit arguments:

MILES FEET IFEET YARDS METERS RODS CHAINS LINKS SFEET VARAS NMILES

Arguments: FORMAT

Ex:

%MILES "0.000"%	5.685 Mi
%RODS "0.00"%	1819.18 Rd
%CHAINS%	454.8 Ch

%AREA% Traced or Line Enclosed Area

Displays the area enclosed by tracing with the Pencil Tool or the shape formed by line connecting annotations. The area is shown with the default area units. The trace does not have to be closed to the starting point, All Topo will automatically extend a line from the annotation to the starting point.

Arguments: none

Ex:

%AREA%	576.38 Acres

%*AREAUNITS*% Traced or Line Enclosed Area

Like the %AREA% token, the enclosed area is displayed. AREAUNITS may be one of the following:

ACRES SQMILES SQMETERS HECTARES

Arguments: FORMAT

Ex:

%ACRES%	576 Acres

%ACRES "0.000"%	576.382 Acres
%SQMILES "0.0"%	0.9 Miles^2
%HECTARES%	233 Hectares

%INC% Call Depth for Included HWP Files

Returns the stack depth for the annotation in included HWP files. If the annotation is in the master HWP file, then (1) is returned.

Arguments: none

Ex:

%INC%	(0)	if in master file
%INC%	(2)	2nd File

%UNCFILE%

%FILE%

%FILENAME%

%FILEPATH%

Displays the filename of the annotation file that contains the current annotation.

Arguments: none

Ex:

%UNCFILE%	\\Zippy\C\AllTopo\USER\NewWPTs.hwp
%FILE%	C:\AllTopo\USER\NewWPTs.hwp
%FILENAME%	NewWPTs.hwp
%FILEPATH%	C:\AllTopo\USER\

%FILEDATE% Date Time Stamp of Annotation File

Displays the date time stamp of the annotation file that holds the annotation in the default format specified in the international section of the control panel.

Arguments: Date Time Format, Hours Offset

Ex:

%FILEDATE%	4/15/2003 2:14:42 PM
%FILEDATE 10 “YY MM DD HH:MM:SS”%	03 04 16 00:14:42

%DATETIME%

Displays the current date and time. If no Date Time format is included, the Windows system default is used.

Arguments: Date Time Format, Hours Offset

Ex:

%DATETIME%	4/15/2003 2:21:52 PM
%DATETIME10 "DD MM YYY HH:MM:SS AMPM"%	15 04 2003 02:22:32 PM

%TIME%

%DATE%

Displays the current system time and day.

Arguments: none

Ex:

%TIME%	11:31:43 AM
%DATE%	7/25/2002
Map Printed: %DateTime%	Map Printed: 7/25/2002 11:32:25 AM

%NAME% Coordinate Name

%DESC% Coordinate Description

%NOTE% Coordinate Note

Displays the annotation Name, Description or Note.

Note: Strings are only evaluated once for tokens. If you include %DESC% within a coordinate description will **not** result in infinite recursion. For example this annotation description:

Desc = "%DESC% IS RECURSIVE"

will display

%DESC% IS RECURSIVE IS RECURSIVE

Arguments: none

These tokens have limited use in Annotation Descriptions and Notes, they are most valuable when exporting annotations to a file.

%COORSTR% User Coordinate String

Displays the coordinate string from the annotation file. The user coordinate string is displayed in the coordinate window of the Annotation Editor, and is the actual coordinate string saved in an annotation file.

Arguments: none

Ex:

%COORSTR%	41° 8' 25" N, 104° 49' 11" W

%LINK% Hyperlink

Displays the text representation of the hyperlink associated with an annotation.

Arguments: none

Ex:

%LINK%	"C:\Pic\W100.jpg" "C:\Pic\W101.jpg"

%QSF% Quick Shape File Evaluation

Displays the identity result for the coordinate location with the currently defined Quick Shape files. If there is no Quick Shape file open the result may be '[?QSF?]' or just a blank string.

Arguments: none

Ex:

%QSF%	WYown»FED_MIN: None WYown»STATE_O_: 24968 WYown»SURFACE: Private

%TAB% Tab Character

Inserts a single Tab (Control-I) character. Typically it is easier to use the \t escape sequence than the %TAB% token.

Ex:

```
Col 1%tab%Col 2     Col 1     Col 2
Coll1\tCol 2        Col 1     Col 2
```

%CR% Carriage Return

Inserts a new line character pair (CR-LF). Typically it is easier to use the \n escape sequence than the %CR% token.

Ex:

```
%DMS%%TAB%%DESC%%CR%%TAB%NAME%
%DMS%\t%DESC%\n\t%NAME%
```

Appendix E: Annotation Source Files (*.HWP)

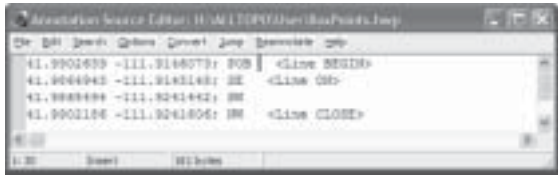
The annotations that are displayed by All Topo Maps are stored in simple text files called ‘HWP’ files.

Normally you won't need to be concerned with the format of these files; you can access the properties of annotations by right-clicking near an annotation and selecting 'Edit Annotation'. Groups of annotations may be altered by selecting a group within the Waypoint List tool and pressing the ‘Edit’ button.

Some users find it easier to edit the source files, while others export huge databases of coordinates using the HWP file format. This chapter discusses the format of these HWP files.

Annotation Source Editor

From the All Topo Maps viewer, select the 'Annotations: Edit Annotation Source' main menu option or press F8 to display the 'Annotation Source Editor'.



The Source Editor is a standard text file editor with a few All Topo specific twists. The V7 editor will support files with up to 10 million characters and includes numerous features to make editing source files easier:

The bottom status line shows the current text cursor position in 'Column:Row' format; 'Insert/Overwrite' mode, and the size of the annotation file in bytes.

The 'File' menu has options to control and print the current annotation file.

The 'Edit' menu supports Undo and Redo; edit functions Cut, Copy, Paste, Select All, Delete selected; and helpers that insert a file at the cursor, or insert a file by reference (<I "…">.

The 'Search' menu contains the Find, Find Next, Search and Replace; and a shortcut to jump to a specific line number.

The 'Options' menu contains settings for 'Line Numbers', 'WordStar Commands' and an option to arrange the map viewer window and the Annotation Source Editor on the screen.

The 'Convert' function will convert all of the selected annotations to alternate coordinate styles.

> *The Convert function can not evaluate relative coordinates, however relative coordinates can be converted by the ‘Convert’ button in the 'Edit Annotation' dialog.*

'Jump' will center the coordinate found on the line containing the text cursor.

'Reannotate' saves and reads the annotation file applying any changes to the map display.

Both the Jump and Reannotate functions are available from the right-mouse-click popup menu.

Annotation Source Files

Waypoint source files are line oriented. Each line may contain:

- **Comments Lines** have a semicolon (;) as the first non-white space characters on the line are ignored and treated as comments. If All Topo Maps rewrites a source file, all comments found before an annotation will be grouped together in one block. Optionally comments may be included in a meta command: <; This is a comment too>
- **Coordinate Specifications** lines that are not blank, and don't start with a ';' are parsed for coordinates.
- **Continuation Lines:** coordinate specification lines may be continued to the next line by placing a '\' as the last non-quoted character on a line.
- **<Meta Tag> Lines**: words enclosed by brackets '<' '>' are treated as formatting commands. Meta Tags apply to coordinates that follow the tag or are on the same input line as the tag.

The simplest format for an annotation marking a coordinate is:

location; waypoint description

The location can be any coordinate that the All Topo system can understand (Lat/Lon, UTM, MGRS, State Plane and optionally PLS.) For example:

40 46 37.1 N 111 53 14.9 W; Utah State Capitol

will display the text 'Utah State Capitol' at the front steps of Utah's capitol.

If two semicolons are placed on a line, the text following the first is used as the annotation Name, and the second is used for the annotation Description:

40 46 37.1 N 111 53 14.9 W; UTCAP; Utah State Capitol

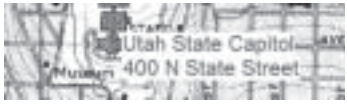
All Topo enforces a maximum length of 6 characters for the Annotation Name to facilitate data exchange with GPS receivers.

If three semicolons are place on a line, the final text is used as the annotation Note:

40 46 37.1 N 111 53 14.9 W; UTCAP; Utah State Capitol; granite building

A description or note can include more than one line by separating text lines with the pipe symbol ('|'):

40 46 37.1 N 111 53 14.9 W; UTCAP; Utah State Capitol|400 N State Street



A variety of other annotation features can be added using %Tokens%, \Escapes and <Meta> Tags. %tokens% and \Escapes are described in Appendix D. <Meta> Tags are described in this section.

Some of the simpler <Meta Tags> include commands to:

- Change text location, size, font, style and colors.
- Lines that connect waypoint locations: line styles and colors.
- Symbols: draw scaled boxes, lines, arrows over map images.

In addition, you can use the waypoint file to:

- Set the title displayed on the 'All Topo Maps' program.
- Set the {Measurement Spike} location.
- Automatically Center the viewer over a map location.

<Meta Tags> Waypoint Format Commands

Meta commands (much like the commands used to write HTML code for the World Wide Web) may be included in waypoint files. Meta tags are always enclosed within '<' '>' brackets and consist of a Meta command and optional

arguments.

Most of the tags and the arguments may be abbreviated with one or just a few characters. This speeds up annotation entry, often it is easier to type coordinates and comments into the source editor, than it is to enter them with a mouse. Arguments to Meta tags are case insensitive.

For example: The tag:

```
<Hyperlink "http://www.All Topo.com">
```

command may be abbreviated as

```
'<h "http://www.All Topo.com">'.
```

The fully specified <Meta> tag to select blue 12pt Arial text on a white background, placed at the top left corner of a coordinate is:

```
<Font "Arial" 12 Bold Blue _White Northwest>
```

but it may be abbreviated:

```
<F "Arial" 12 Bold Blu _Whi NW>
```

When you make changes to the waypoint file, using the waypoint editor, the map annotations are not automatically updated. You must press the 'Reannotate' button on the toolbar, or right-click and select 'Reannotate' to load any changes onto the map surface:

Waypoint files are read sequentially from their beginning to end. As each coordinate pair is encountered it is displayed with the fonts, lines, and symbols currently defined by <Meta> tags.

You can extend a tag to the next line by placing the '\' character at the end of the line to be continued. For example the two line pair:

```
40 46 37.1 N 111 53 14.9 W; UTCAP; \
  Utah State Capitol|400 N State Street <Font Green 14>
```

is treated as a single input line.

<Meta> Tag Types

There are several types of waypoint file Meta tags:

System Meta Commands

<H ...> Hyper link to web, file or multimedia content

<A ...> Center location on screen

<T ...> Set viewer Title

<M ...> Set Measurement Spike location

<@ ...> Set the defaults styles to the current style,
Restore the factory default styles

<+> Save all settings

<-> Restore all settings

<=> Keep settings on return from include

<I ...> Include another HWP file

Text / Font Meta Commands <F ...>

Font Name

Font Size

Text Color and Background Color

Text Position around coordinate

Test Position <P ...>

Text Position around coordinate

Text Offset from coordinate

Connecting Line Meta Command <L ...>

Line ON/OFF/BEGIN/CLOSE

Line Style

Line Color and Background Color

Line Width

Symbol Meta Commands <S ...>

Marker Type

Marker Size

Symbol Type

Symbol Color

Symbol fill Color

Symbol Width and Height

Marker size in points

Symbol Direction (Compass bearing)

Symbol Line Width

Pencil Trace <| ...> commands

Layer <# n>

Meta Tag Errors

The system logger is updated with descriptions of any errors that occur while All Topo Maps looks at and interprets waypoint coordinates and Meta tags. You may display the System Information Logger by selecting the main map window menu option: 'View: System Information Logger'.

System Meta Commands

Include <Include "...">

Annotation files may include the contents of other annotation files, which may in turn include additional annotation files. All Topo automatically prevents recursive inclusions.

Only the main annotation file (selected by 'Annotations: Open Annotation File' and listed on the second pane of the status line) can be directly edited by the user. This protects included annotations from inadvertent changes.

Annotations from the included file will be added to the annotation list, just as if they were included in the main file with one exception: the main file will restore the annotation style in use when the included file was called. To return from the included file with any style changes left intact, place '<=>' on the last line of the included file:

File1.HWP

```
<Font Normal>
38 43 9.016 N 109 28 33.072 W; ; File 1 Pt 1
<I 'file2.hwp'>
38 43 3.820 N 109 28 32.709 W; ; File 1 Pt 2
```

File2.HWP

```
<font Underline>
38.718,4° N, 109.475,8° W; File 2 Pt 1
```

results in:

Adding the < => tag to the end of File2.HWP will keep the font color change introduced in the included file:

File2.HWP

```
<font Underline>
38.718,4° N, 109.475,8° W; File 2 Pt 1
<=>
```

results in underlining the third coordinate:

Relative paths may be specified in the <I …> directive to evaluate paths with respect to the path of the including file. If no path is listed, All Topo will look in the same folder as the calling file.

Title <Title "...">

The Title command will place the specified text as the caption of All Topo Maps. The title must be enclosed by quotes. For example:

```
<T "Joes Mountain Trail">
```

places 'Joes Mountain Trail' as the form name:

Autojump <Autojump "...">

When All Topo first opens an annotation file, it will center the location specified in the last <Auto …> tag encountered in the file. If no <Auto …> tag is found, then the viewer will restore the last viewed location and map.

The location must be enclosed by quotes. Any fully qualified coordinate style supported by All Topo may be used.

AutoJump is only evaluated when a waypoint file is initially read from the disk (not on a re-annotation).

For example:

```
<A "40 46 38.62 N, 111 53 15.13 W">
```

will center the Utah State Capitol building on the screen.

Don't use a coordinate with embedded ‘ or “ marks like:

```
<A “40° 46' 38.62" N, 111° 53' 15.13" W">
```

as All Topo is not smart enough to figure out you want:

```
“40 46 38.62  N, 111 53 15.13 W”
```

not

```
“40 46 38.62”
```

Hyper-Links in Meta Files <Href "...">

```
<H "http://www.igage.com">
```

Any waypoint coordinate can include multiple hyperlinks to web sites, picture files, audio/visual clips or other multimedia sources. All Topo allows link evaluation using two methods:

The Auto GeoLink viewer will automatically display information associated with the coordinate nearest the mouse cursor. If the coordinate's hyperlink includes any picture references (links with file types : '.PCX', '.BMP', '.TIF', '.TIFF', 'GIF', '.PNG', '.JPG', '.JPEG') the pictures will be shown in the GeoLink viewer's preview pane.

Right clicking near the coordinate will present the opportunity to evaluate the link or multiple links. All Topo uses the Windows API (Application Program Interface) to perform the link evaluation so any registered file extension will be treated the same as if evaluated by double clicking within the Windows Explorer.

Measurement Spike Location <M "location">

<M "40 44 11.9 N 111 47 40.2 W">

Use the Spike tag to place the Measurement Spike at the passed location. The location must exist in the loaded map set. Any measurement format supported by the waypoint editor for coordinate entry may be used.

For example:

<M "40 44 11.9 N 111 47 40.2 W">

will set the Measurement Spike to the Utah State Capitol building.

The spike location meta tag is only evaluated when a waypoint file is initially read from the disk.

Setting/Restoring the Default Symbol Style

<@ SetDef> <@ GetDef> <@ ClrDef>

Use the <@ SetDef> command to save the current Line, Symbol and Text styles as the default values. The <@ GetDef> command will revert back to the saved style. The <@ ClrDef> Meta tag will restore the default symbol style to the factory defaults:

For example these waypoint entries:

```
<F 18 Bold Black _White Italic><@ SetDef>
430638.9M E 4528659.7M N Z 12; Coming Down...
<F 24 Norm _Black White "Times">
430492.6M E 4528547.5M N Z 12; 2
430346.3M E 4528425.6M N Z 12; 3
<@ GetDef>
430175.6M E 4528289.0M N Z 12; Done
```

result in this map display:

Annotation Text Font <Font ...>

<F "arial" 16 Blue>

The Text Font command accepts these arguments in any order:

Text Color

Background Color

Font Name (windows font name)

Font Styles (Bold, Italic, Underline or Normal)

Text Position (location around the coordinate)

Text Rotation

Default User Selection

<F default> will set all text attributes to the user's defaults defined by the menu option 'Options: System Options…: System (tab)' User settings.

Text and Background Color

Text Color and Background Color may be any of the following predefined colors:

Aqua Black Blue Dkgreen Fuchia Gray Green Limegreen Ltgray Maroon Navy Olive Purple Red Silver Teal White Yellow

Or you may alternatively specify a color with an RGB callout:

```
<F Color=78B04F>
```

Specify the background color (the color that fills the box behind the text) by placing an underscore before the color name:

```
<F Blue _White>                  blue text, white background
<F Color=0000ff _Color=ffffff>   same
```

Font Name

The Font Name may be any available font, it must be enclosed in quotes, and must be spelled correctly. If you share your waypoint files with others, use fonts which are widely available, the operating system will substitute fonts freely if it does not have the correct face.

```
<F “Tahoma”>
```

Font Style

These keywords are accepted for font styles:

Bold Italic Underlined Normal

You can specify multiple style keywords within a command, NORM or NORMAL will clear Bold, Italic and Underlined. For example:

```
<F Bold>41 38 54.2 N 113 6 46.1 W; Bold
<F Italic>41 38 50.3 N 113 6 45.7 W; Bold Italic
<F Underlined>41 38 47.1 N 113 6 45.4 W; Bold Italic Underlined
<F Normal>41 38 44.0 N 113 6 44.9 W; Normal
```

will generate:

Text Position

The text position around the coordinate location may be specified in a <Font> tag by including a position indicator:

Center, North, NorthEast, East, SouthEast, South, SouthWest, West, NorthWest

or abbreviated:

C, N, NE, E, SE, S, SW, W, NW

The input:

```
41 38 51.01 N 113 5 1.04 W; ; center; <F C>
41 38 55.70 N 113 5 1.19 W; ; north; <F n>
41 38 51.05 N 113 4 51.81 W; ; east; <F e>
41 38 45.82 N 113 5 1.03 W; ; south; <F s>
41 38 50.99 N 113 5 8.94 W; ; west; <F w>
41 38 54.34 N 113 4 54.23 W; ; northeast; <F ne>
41 38 47.42 N 113 4 54.33 W; ; southeast; <F se>
41 38 47.35 N 113 5 5.20 W; ; southwest; <F sw>
41 38 54.39 N 113 5 5.10 W; ; northwest; <F nw>
```

will generate this annotation:

Text Rotation <F R=...>

You can rotate the text associated with an annotation about its base position by adding a rotation argument to a <Font …> tag:

```
41 38 54.39 N 113 5 5.10 W; text on 45 deg angle <F W R=45>
```

will generate:

Text Position <Position NW 10>

Note: Text position may also be set in the <F…> tag, Text offset position must be set in this <P…> tag.

Use the <Position> Meta tag to change the position of text annotations about the map coordinate they are referencing. You may specify both a compass position and a distance in screen or printer pixels to move away from the coordinate. The Meta tag:

```
<P NW 10>
```

sets the annotation on the North West side of the coordinate, removed 10 points.

The text position around the coordinate location may be specified as:

Center, North, NorthEast, East, SouthEast, South, SouthWest, West, NorthWest

or abbreviated:

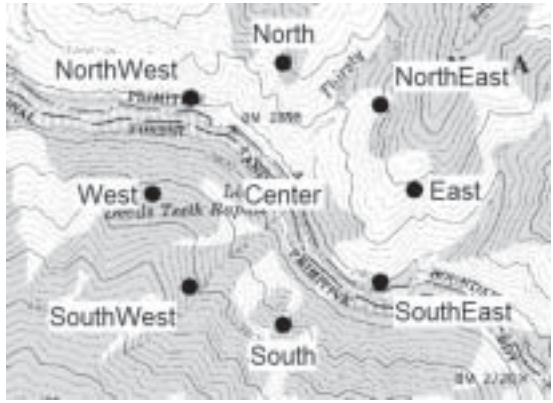
C, N, NE, E, SE, S, SW, W, NW

For example:

```
<P C>    45 27 50.5 N 114 56 38.6 W; Center
<P N 5>  45 28 6.6 N 114 56 37.8 W; North
<P E 5>  45 27 50.5 N 114 56 15.4 W; East
<P S 5>  45 27 34.3 N 114 56 39.0 W; South
<P W 5>  45 27 50.9 N 114 57 1.3 W; West
<P NE 5> 45 28 1.1 N 114 56 21.0 W; NorthEast
<P SE 5> 45 27 39.3 N 114 56 21.8 W; SouthEast
```

<P SW 5> 45 27 39.3 N 114 56 55.1 W; SouthWest
<P NW 5> 45 28 2.6 N 114 56 54.1 W; NorthWest

Will generate these annotations (on the Salmon River in Idaho):



Connecting Coordinates with Lines <Line ...>

You can connect successive map coordinates with lines to indicate paths or boundaries. The lines can be solid, colored and any width. All Topo performs circumference and area calculations on line connected coordinates. The results of circumference and area are available for display in descriptions and notes using special tokens.

The Line command accepts these arguments in any order:

ON/OFF: ON OFF BEGIN AFTER CLOSE

Width (any integer like 2,3,4)

Line Color

Background Color

Line Style

Shape Fill Color

Default User Selection

<L default> will set all text attributes to the user's defaults defined by the menu option 'Options: System Options…: System (tab)' User settings.

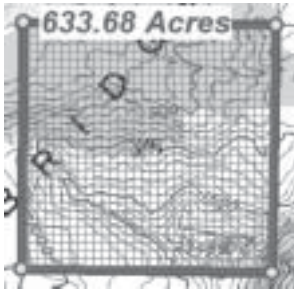
Line Enable

Connected line segments should begin with a <Line BEGIN> (the argument Begin and After are equivalent) directive. BEGIN instructs All Topo that a new line segment or closed shape is being drawn and disconnects the current coordinate with any previous line segments.

To define a closed shape, place a <L Close> directive before the last point in the polygon. For example:

<Line BEGIN>
60° 4' 8.79" N, 148° 9' 14.05" W; RA1
<Line ON>
60° 3' 16.98" N, 148° 9' 13.91" W; RA2
60° 3' 16.90" N, 148° 10' 57.12" W; RA3
<Line CLOSE brCross>
60° 4' 8.50" N, 148° 10' 58.14" W; RA4; %AREA%

displays this closed shape:



Line Width

Line width is set in 1/72" (points). Some line styles will only partially appear if the line width is not large enough.

Line and Background Color

Foreground color is set by adding a color name argument. Background color controls the secondary color of the line style and is set by adding an underscore to a color name:

<L 8 begin Dhwy Blue _Red>

<L 8 begin Dhwy Blue _Green>

Line Style

Style may be any of the following:

Style Argument	Example
Solid	**Solid**
Dash	Dash
Dash Dot	DashDot
Dash Dot Dot	DashDotDot
Stacked Line	Stacked
Primary Highway	PriHwy
Secondary Highway	SecHwy
Light Use Road	LdRd
Unimproved Road	Uimp
Trail	Trail
Dual Highway 1	Dhwy
Dual Highway 2	Dhwy2
Construction	Const

Coordinate Symbols <Symbol ...>

At each coordinate, a marker dot is displayed. You can also add additional symbols, and change the style of the marker dot.

All Topo V7 has an extensive array of programmable default symbols and over 700 standard graphic symbols. In addition any 16-bit or 256-bit windows bitmap graphic image can be displayed as a symbol over a coordinate location with an opaque or clear background.

These arguments may be included in Symbol tags:

Default selects User defaults for symbol

Marker Dot Type
Symbol Type

BrushStyle
Foreground and background colors
X= and Y= un-rotated symbol dimensions
L= symbol length in Meters Miles or Feet
W= Line Widths for symbol drawings
R= Rotation angle for symbols (in compass degrees)
M= Minimum marker size

Default User Selection

<S default>

will set all text attributes to the user's defaults defined by the menu option 'Options: System Options…: System (tab), User' settings. Within an annotation file, use the <@ SetDef> tag to store the current annotation settings as the default user style.

Dot Type

For each symbol style, including 'None', a small marker dot is placed at the annotation coordinate. Supported dot types are:

Dot Type	**Argument**
No Dot Type	NoDot (may also be set with M=0)
Dot	Dot
Small Cross	DotX1
Medium Cross	DotX2
Large Cross	DotX3

Symbol Type

The arguments to set the symbol types are listed below.

None <S None>

Line or **Arrow** <Symbol Line Y=0.1 mi R=45>

Triangle <Symbol Tri Y=0.1 mi R=45>

Circle <Symbol Circle X=0.1 mile brcross>

Ring <Symbol Ring X=0.1 mile>

Ellipse <Symbol Ellip X=0.1 mi Y=0.075 mi>

Square <Symbol Square X=0.1 mi>

Rectangle Centered <Symbol RC X=0.1 mi Y=0.075 mi>

Rectangle Bottom Left
<Symbol RBL X=0.1 mi Y=0.075 mi>

Rectangle Bottom Centered
<Symbol RBC X=0.1 mi Y=0.075 mi R=45>

Rectangle Bottom Right
<Symbol RBR X=0.1 mi Y=0.075 mi>

Cross <Symbol Cross X=0.2 mi Y=0.1 mi r=22.5>

Wind <Symbol Wind X=45Knots R=60 red>

Image <Symbol Pic W=2 "api_dh_red">

Picture <Symbol Img W=2 "api_dh_red">

Image and Picture symbol types overlay bitmap images onto the map surface centered at the coordinate. If no scaling arguments are provided, the image will be drawn as designed. This will result in drastically different image renderings on the screen and printer (typically images will be printed 1/10 as large as they are shown on the screen).

Use the X=… arguments to set the image width in map units. Images will appear the same on the screen and when printed.

<Symbol Pic "api_dh_red" X=0.1 mi>

<Symbol Pic "api_dh_red" X=0.2 mi>

The difference between picture and image types is the treatment of the image background. <S Image "…"> treats the color of the bottom left image pixel as a transparent color, the map image will be visible behind this color. <S Pic "…"> displays the image as designed with no transparency.

BrushStyle

Use the Brush Styles to change the Square, Circle and Ellipse fills from solid to clear or patterned.

Your print driver may not properly support the hatched fills! The filled shapes will display correctly on your screen but will be color filled when printed. Images exported to the clipboard will be properly hatched.

The following brush styles are available:

Solid (default) <Symbol Circle brSolid X=0.2 mi>

Clear <Symbol Circle brClear X=0.2 mi>

Cross <Symbol Circle BRDCross X=0.2 mi>

Diagonal Cross <Symbol Circle BRDCross X=0.2 mi>

Backward Diagonal <Symbol Circle BRBDiag X=0.2 mi>

Forward Diagonal <Symbol Circle BRFDiag X=0.2 mi>

Horizontal Lines <Symbol Circle BRHor X=0.2 mi>

Vertical Lines <Symbol Circle BRVer X=0.2 mi>

Foreground and background colors

The foreground color is used to render the symbol, while the background color is used to fill the symbol. The standard All Topo colors may be specified:

Aqua Black Blue Dkgreen Fuchia Gray Green Limegreen Ltgray Maroon Navy Olive Purple Red Silver Teal White Yellow

Or custom colors may be specified using a 'color=0xrrggbb' argument ('_color=rrggbb'); where rr is the hex representation of the red component, gg the green and bb the blue.

<Symbol Circle BRVer W=4 X=0.2 mi color=ff00ff>

defines a purple (red = 255, green = 0, blue = 255) circle. Placing a '_' character before the color indicates background color.

X= Y= L= Symbol Dimensions

Most symbol types accept optional sizes. The sizes can be specified using any legal All Topo unit (meters, feet, survey feet, varas, chains, links, nautical

miles and yards). Width is set by X=, while height is set by Y=:

<S RBC X=0.1 mile Y = 0.2 miles>

R= Rotation Angle for Symbols

Symbols (not images or pictures) may be rotated about the coordinate insertion point using the R= rot argument where rot is the angle to rotate in degrees clockwise.

W= Line Widths for symbol drawings

Use the W= argument within a Symbol meta tag to change the width of the line used to draw symbols. The line width is set in points (72nd of an inch).

M= Minimum Dot Size

Use the M= argument to set the minimum dot size in points (72nd of an inch).

Trace From Coordinate <| ...>

The <| ...> tag will draw a line from the next coordinate, as described by the auxiliary tags within the brackets. Auxiliary tags are separated by ';' (semicolons).

Three auxiliary tag types are defined:

Color Enter a color name (see text colors) or 'Color=ff8080' RGB tag

Line Width A single integer specifying line width in 1/72 of an inch units. Use zero for a hairline.

OffsetPair A pair of incremental offsets from the previous location.

Offset pairs may be expressed in Meters or millionths of a degree. If offsets are expressed in milli-degrees, then the keyword 'LL' should appear in the meta tag:

<| LL …>

By default, offset pairs are expressed in meters, however the 'UTM' keyword may appear in the tag:

<| UTM …>

For example, this HWP entry:

```
<| ;Red;3;-25,12;-12,25;-12,24;-12,25;-7,25;0,24;0,25;0,24;\
  19,25;24,18;25,13;25,6;24,0;25,-6;24,-19;13,-24;12,-25;6,-25;\
  0,-24;0,-25;-12,-24;0,-25;0,-24;0,-25;6,-25;12,-24;12,-55;13,-25;\
  0,-25;0,-24;-6,-25;0,-24;0,-25;0,-25;-19,-24;-24,-19;-25,0;-18,25;\
  0,31;0,24;0,25;0,24;0,25;-7,25;-6,24;-12,25;-12,24;\
  -13,25;-12,25;-12,24;-6,12>
48.802451 -116.913341; %MILES% %ACRES%
```

Generates this annotation:

Saving and Restoring Styles <+> & <->

Often, you would like to change the display attributes for a single map coordinate, then return to using the same styles that were in use before the change. It might be difficult to track down all of the styles that are currently

used, so a simple way to save and restore style is included.

Use the <+> Meta command to save all styles. Then make the desired style changes, drawing annotations with the temporary style, finally use <-> to restore the styles to the starting values.

For example this series of points:

```
40 46 11.8 N 111 49 21.1 W; Start
<+><P N 5><F "Courier New" 20 Yel _Blu Bold >
40 46 26.1 N 111 49 6.9 W; Stop for Lunch
<->
40 46 40.4 N 111 48 41.7 W; End
```

will be displayed as:

Saves and Restores may be nested up to 15 levels deep.

<# 1> Annotation Layers

The All Topo viewer supports placing annotations on up to 9 separate layers which can be independently enabled and disabled. By default, annotations are placed on the special 'All' or zero layer and are always enabled.

Place a layer meta tag:

```
<# 4>
```

to move subsequent annotations to an alternate drawing layer.

<; comment> Comment (logged) Meta Tags

It is possible to include meta tag text comments within an annotation file. Comments inserted within an annotation file using this <; ...> tags are not processed, but do result in an entry in the system logger.

These logged comments may be useful for debugging an annotation file.

<R 2.0> Default Rotation

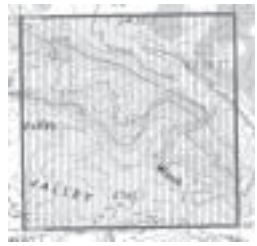
Relative coordinates are entered using True North, UTM Grid North, State Plane Grid North or Lat/Lon bearings.

The <R …> meta tag allows you to rotate all subsequent relative annotation calls by a fixed rotation. This option is typically used to rotate a survey to match section boundaries or align a survey to markings on the map.

For example the annotations:

```
<Line Begin>
38.7388 N 109.4440 W
@ DueSouth 1 mile ;SE
@ DueWest 1 mile ;SW
<Line Close>
@ DueNorth 1 mile ;NW
```

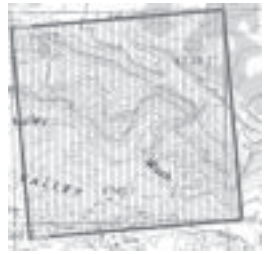
generate this polygon:



Adding a <R …> meta tag:

```
<R -4.0>
<Line Begin>
38.7388 N 109.4440 W
@ DueSouth 1 mile ;SE
@ DueWest 1 mile ;SW
<Line Close>
@ DueNorth 1 mile ;NW
```

rotates the polygon 2 degrees, counter clockwise about the base insertion point:



<D …> Datum, North Reference, Projection Override

By default, coordinates placed in HWP files are assumed to be Datum = NAD27CONUS; bearings are assumed to be with respect to True North and relative coordinate projections are assumed to be geographic (Latitude .Longitude / Great Circle.)

The <D …> meta tag will change the assumed defaults for all subsequent coordinates found in a file. For example the annotation file:

```
38.7369 N 109.4617 W NAD83; P1
38.7301 N 109.4613 W NAD83; P2
38.7294 N 109.4604 W NAD83; P3
```

may also be written:

```
<D NAD83>
38.7369 N 109.4617 W; P1
38.7301 N 109.4613 W; P2
38.7294 N 109.4604 W; P3
```

The <D …> meta tag will accept simultaneous overrides for datum, north reference and projections:

```
<D NAD83 GN_0_NAD27
```

Acceptable arguments to the <D …> meta tag are:

Coordinate Datum Overrides

Insert a valid datum name to set the default coordinate datum:

NAD27, NAD83, WGS84, WGS72, NAD27CONUS,
NAD27ALSKA, NAD27CANADA, NAD83CANADA

For Example:

<D NAD83>

Bearing Overrides

By default All Topo assumes all bearings are with respect to True North. You can change the default bearing base by adding a bearing override to a <D …> meta tag.

True North: To indicate that all subsequent bearings are with respect to True North, enter a 'TRUENORTH' or 'TN' argument:

<D TN>

Optionally, you may add an underscore followed by a datum specification to force All Topo to use a specific datum for the north reference at the point from whence the projection is made. (This may make some infinitely small difference for points converted using Molodensky approximations vs. NADCON interpolations.) For example:

<D WGS84 TN_NAD83>

Indicates that subsequent coordinates are WGS84 (Molodensky) datum, but relative offsets should be projected from the equivalent NAD83 position and north reference.

UTM Grid: To indicate all subsequent bearings are with respect to UTM Grid North, enter 'GRIDNORTH' or 'GN'. All Topo will use the UTM Zone and datum selected by the Primary Coordinate Display:

<D GN>

You can override the primary coordinate display and specify a UTM Zone by appending the zone number, and/or datum to the bearing override. For example: subsequent bearings with respect to NAD83 UTM Grid Zone 13:

<D GN_13_NAD83>

To specify the natural UTM Zone for a coordinate, select UTM Zone = 0:

<D GN_0_NAD83>

State Plane Grid: To indicate all subsequent bearing are with respect to a State Plane Grid, enter a 'SPN' argument. By default, All Topo will use the State Plane zone and datum selected by the Primary Coordinate Display:

<D SPN>

You can override the primary coordinate display settings and specify a state plane grid and datum. For example, to force a Utah Central Zone NAD27 state plane grid projection:

<D SPN_UTC_NAD27>

Acceptable state plane zone codes are listed in Appendix B, only NAD27 and NAD83 datum are appropriate for use with state plane grids.

Projection Overrides

By default All Topo computes projections using great circles. You can change the default behavior by adding a projection override to a <D …> meta tag.

Lat/Lon Projection: (Lat/lon projections may also be called Great Circle or geographic projections.) To select Lat/Lon projections add a 'LL' argument to the <D …> meta tag:

<D LL>

As with true north reference there may be some advantage to forcing a particular datum for Great Circle projections. Append the datum, underscore separated to specify a particular datum for the projection grid:

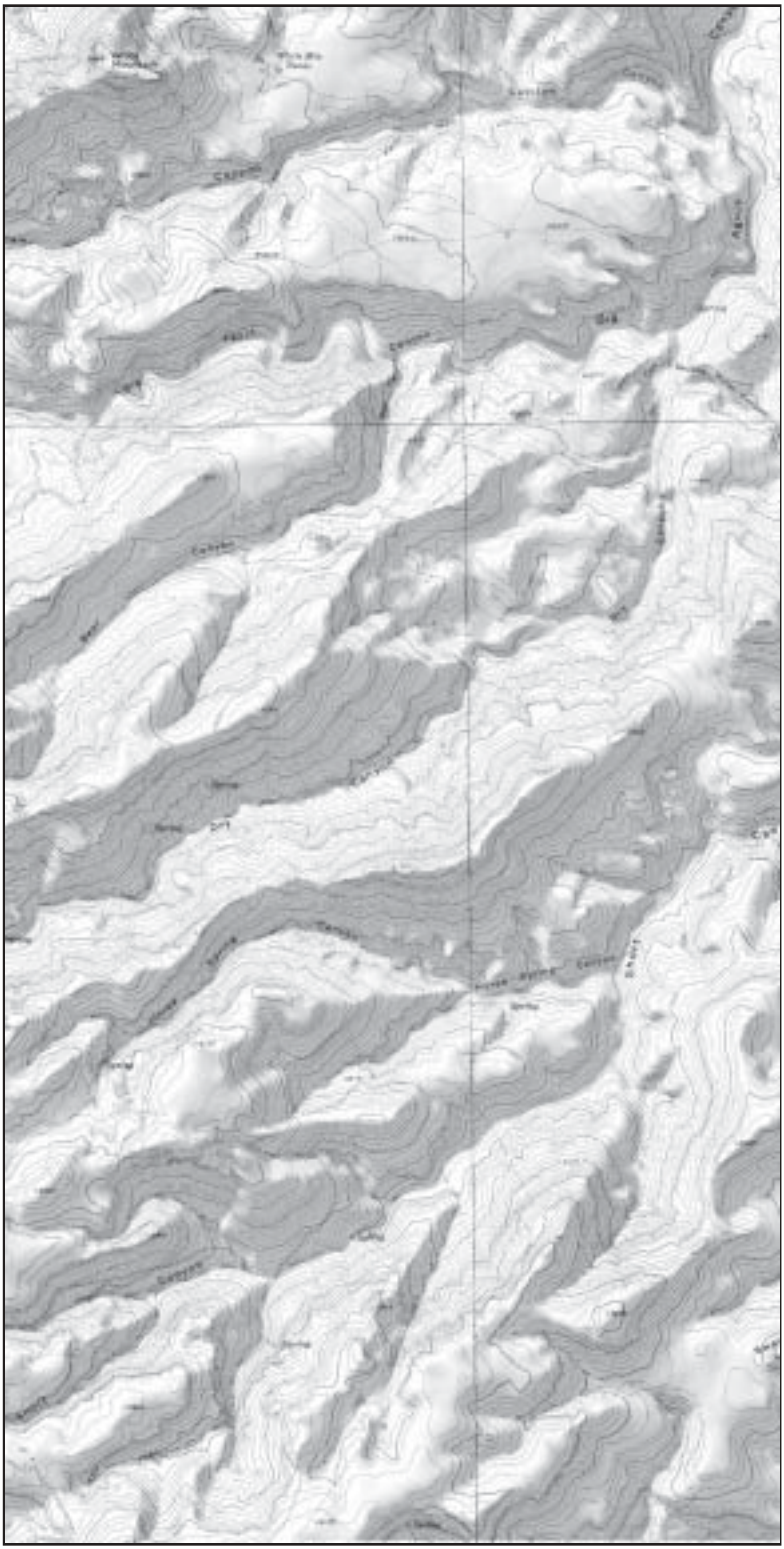
<D LL_NAD83>

UTM Grid Projection: To select a UTM grid for point projection, use the UTM argument. As with grid north reference, the primary coordinate display settings are used for UTM grid defaults. Append datum and UTM Zone to force the appropriate selection. For example, to select the natural UTM Zone with WGS84 datum:

<D UTM_0_WGS84>

State Plane Grid Projection: To select a State Plane grid for point projection, use the 'SP' argument. As with State Plane Grid north reference, you most likely will want to supply valid state plane zone code and datum arguments:

<D SP_UTC_NAD83>



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