Navigating to a GPS Coordinate Entered Manually for ArcPad 10

(Updated 12/13/2012, K. Ness)

Contents

Section 1: Setting Navigation Parameters

1. Start ArcPad and open a map or a New Map. *In this example, I opened a map centered on the Chief Blackbird Center, with wetlands layers.*

    a. Set the distance at which you prefer to have an alert for "Approaching Destination"

        i. Go to Open GPS Button  and select GPS Preferences (**Fig. 1**)

        ii. Look at bottom tabs and scroll to the farthest right tab, called "Location" (**Fig. 2**) In the Location tab, change the "DST Distance Alert" option to the distance of your choice (**Fig 3**) (*"DST" stands for destination*). Then press 

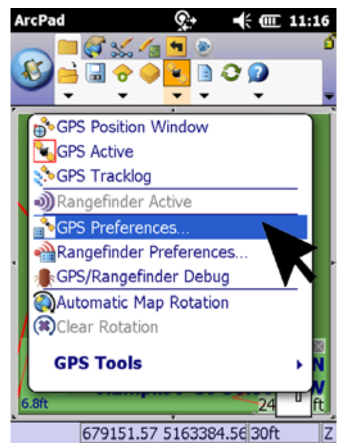


Fig. 1: GPS Preferences.

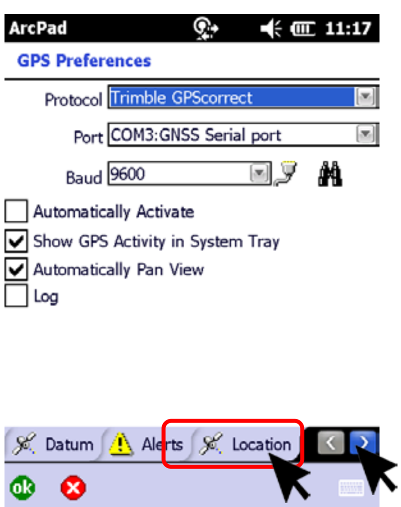


Fig. 2: Location tab.

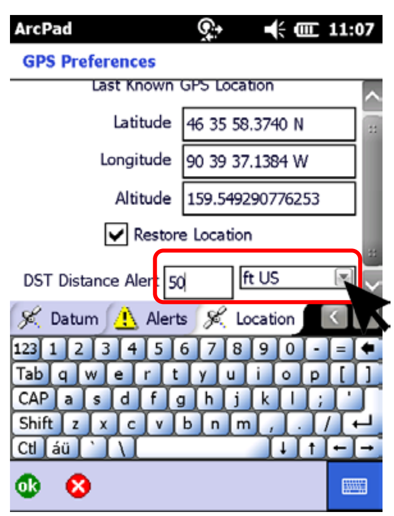
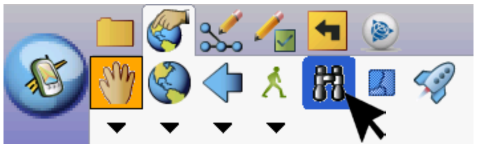


Fig. 3: Setting destination distance alert.

Section 2: Manually Entering Coordinates

1. Have your latitude and longitude coordinates ready to enter. (*Note: For the purposes of navigating to your location, the coordinate system (e.g., WGS84 or NAD83) are only 1-3 m different; therefore it makes little difference which coordinate system you use for your latitude & longitude coordinates.)*
2. Enter your coordinates using these steps:
   a. Press the Hand-holding the World Icon, and then the Binoculars Icon (Find Icon)



   b. Under the Find tabs, look at the bottom of the screen and press the Location Tab 

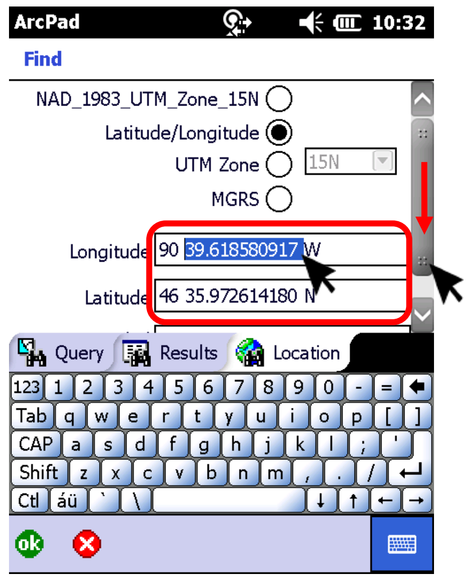


Fig. 4: Entering coordinates.

   c. Make sure you have the radio button "Latitude/Longitude" checked and not the "NAD_1983_UTM_Zone_15N" (***Fig. 4***). (*Note: your current map projection is NAD1983 UTM zone 15, which gives you the "X" and "Y" coordinates. "X" ["Easting"]is XXX,XXX meters east edge of Zone 15 and "Y" ["Northing"] is XXX,XXX meters north of the Equator]. More info on UTM on pg 5).*

   d. Replace YOUR LATITUDE & LONGITUDE COORDINATES with the current coordinates in the "Longitude" and "Latitude" rows and enter your coordinates. (*The coordinates that are already filled in are you current locations. You can simply highlight these and delete them or edit them as needed*).

   e. You can change the name of the "Label" to something different than "Mark" such as "Destination" or "Target". "Mark is simply the default label. Then press 

Section 3: Go To Your Coordinate (navigate to it)

1. Now begin to walk toward you destination. You will notice the compass bearing in the lower LEFT corner. There are 2 ways to view your navigation to your destination:
   a. Viewing the distance on a map (***Fig. 5***):

Shows the distance to your Destination (50.7 ft)

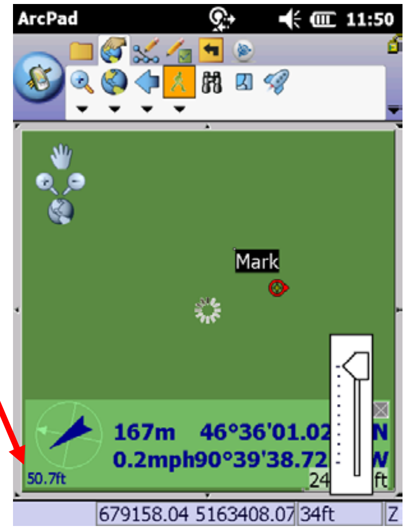


Fig. 5: Viewing distance to destination.

   b. Or, in the GPS Position Window (under the GPS Icon , select the GPS Position Window.

   c. The GPS Position Window will bring up additional menus (***Fig. 6***), click on the "Data" tab at the bottom of the screen (***Fig. 7***).

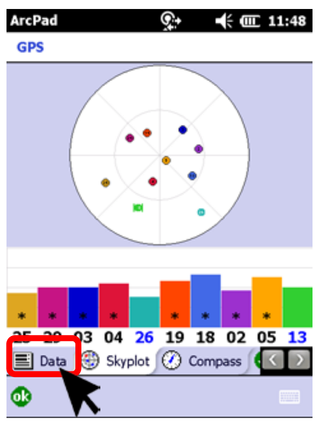


Fig. 6: GPS Position Window-Skyplot tab.

← Your current position

←"DST" gives the distance to your Destination. (*305 ft)*

Fig. 7: GPS Position Window-Data tab.

2. As you approach your destination, IF YOU SET TO RECEIVE AN ALERT, you should receive an alert once you arrive at the distance you specified. You will continue to receive these distance alerts every 5-10 seconds.

Fig. 7: Approaching destination alert.

3. To stop navigating to your location, press the "Clear" button () so that it becomes grayed-out. You will then see the PDOP or the overhead satellite icons appear in places of the compass bearing icon.

ArcPad (all versions) Acronym Definitions

(source: http://webhelp.esri.com/arcpad/8.0/userguide/index.htm#capture_devices/gps_position/concept_gpsposition.htm)

Differential

- **DGPS** indicates that real-time differential correction is being used to calculate the x, y, and z position coordinates.
- **SBAS** indicates that a real-time differential correction from a Satellite Based Augmentation System (SBAS) is being used to calculate the x, y, and z position coordinates. The Wide Area Augmentation System in the United States is an example of an SBAS real-time differential source.
- **RTK fix** indicates that a real-time kinematic (RTK) fixed solution is being used to calculate the x, y, and z position coordinates.
- **RTK flt** indicates that a real-time kinematic (RTK) float solution is being used to calculate the x, y, and z position coordinates.
- **PPS** indicates that a Precise Positioning Service is being used.
- Multiple **GPS modes** can be displayed simultaneously; for example, the 2D or 3D mode can be displayed simultaneously with the differential DGPS or PPS modes.

Navigation Information: The Navigation Information displays the following information:

- **SOG**: Speed Over Ground, as calculated by the GPS. SOG is the actual speed the GPS receiver is moving over the ground.
- **COG**: Course Over Ground, as calculated by the GPS. COG is the direction the GPS receiver is moving and corresponds to the direction of the black Compass arrow.
- **COG** is also a tap and hold menu field that provides the option of displaying the COG in one of the following formats:
- TCOG: True North Course Over Ground
- MCOG: Magnetic North Course Over Ground
- **DST**: The distance from the current GPS position to the selected destination. The DST is calculated by ArcPad.
- **BRG**: The bearing from the current GPS position to the selected destination. The BRG corresponds to the red destination direction on the Compass. The BRG is calculated by ArcPad.

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

- **PDOP**: Position Dilution of Precision.
- **DOP**: Horizontal Dilution of Precision.
- **VDOP**: Vertical Dilution of Precision.
- **TDOP**: Time Dilution of Precision.

Additional Information on Coordinate Systems (UTM, WGS84, and NAD83)

Latitude and longitude: these are the coordinates on the earth's 3D surface.

Definitions from the National Atlas Map: see this link to understand latitude and longitude. (source: http://www.nationalatlas.gov/articles/mapping/a_latlong.html)

Latitude: Lines of equal distance apart and parallel to the Equator. Degrees are only 0° to 90° in the northern hemisphere and 0° to (-90°) in the southern hemisphere.

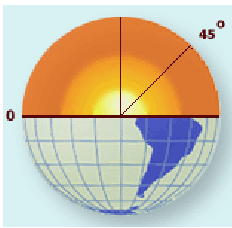


Fig. 8: Angle of latitude lines.

Longitude: Also called meridians (think of the Prime Meridian), these are lines that the poles.

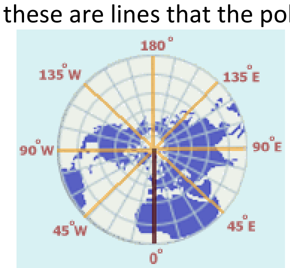
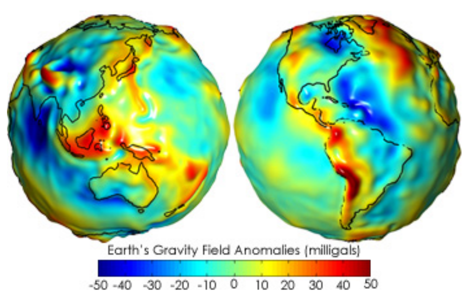


Fig. 9: Angle of longitude lines.

Coordinate Systems: WGS84 stands for World Geodetic System of 1984, which surveyors measured coordinates based on known locations to create a "datum" for the entire of the globe. NAD83 stands for North American Datum of 1983. Both of these "datums" (grids of latitude of longitude) provide mathematical approximations to locations on earth with slightly different accuracies.

In more detail, these datums are mathematical models that refer to a geoid and an ellipsoid. The geoid (***Fig. 10***) accounts for different gravitational field around the globe, while an ellipsoid smoothes these measurements into a mathematical model that approximates the 3D surface.

Fig. 10: Illustration of geoids. *(Image from http://en.wikipedia.org/wiki/Geoid)*



UTM: This stands for Universal Transverse Mercator. GPS coordinates (latitude and longitude) on a globe (3D surface) are transferred to flat maps using a mathematical formula called a *Projection* http://www.connect.net/jbanta/FAQ.html.

> ***Projection:*** We use *Projections* (such as the Universal Transverse Mercator *projection*) to convert 3D latitude and longitude coordinates to 2D flat surface maps—those we view on our printed maps or computer screens on Google Maps for example. If we take the latitude and longitude on the 3D globe and transform (stretch) them to a flat surface, we will inevitably introduce ***distortion*** in distance and area. Consider the size of Alaska on the globe, while in the 2D map, it looks as large as Brazil (***Fig. 11***).
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> ***UTM Zones:*** More specifically, the "UTM 15" refers to the Universal Transverse Mercator, Zone 15. UTM zones represent 60 "slices" around the globe. Consider the image 2 the 15th slice of the 60 slices

around the world (***Fig. 11***). Each slice is 6^{o}, and minimizes the distortion for the areas covered by the UTM Zone.

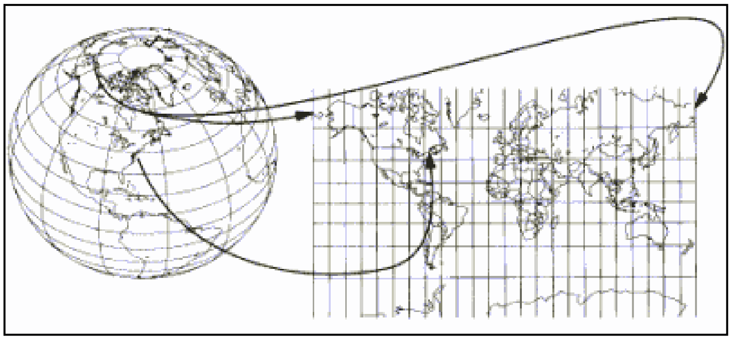

Fig. 11: Approaching destination alert. (Source: http://usmanqayyum.blogspot.com/2011/01/latitude-longitude-to-utm-conversion.html)

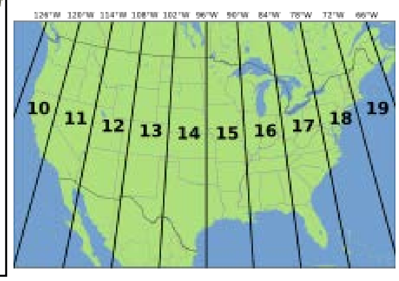

Fig. 11: Details of one UTM Zone. (Source: http://egsc.usgs.gov/isb/pubs/factsheets/fs07701.html#grid

Coordinates of UTM X and Y: To reduce the level of distortion, a method was developed to cut out sections of the globe and use these as individual coordinate systems with specific projection as the Universal Transverse Mercator. Each zone is 6^{o} in (longitude or "X") width and 10,000 km at the equator and 180^{o} in latitude (height or "Y") or 20,000km through the poles (***Fig 12***).

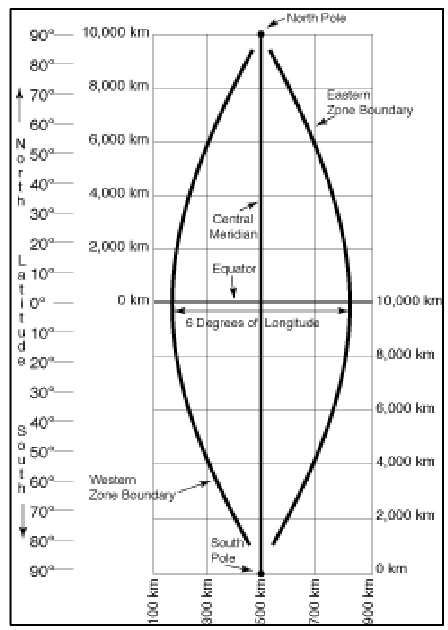

Fig. 12: Details of one UTM Zone. (Source: http://www.maptools.com/UsingUTM/UTMdetails.html

See this website for an interactive map identifying where each UTM zone is located: http://whatutmzoneamiin.blogspot.com/p/map.html