GPS Tutorial: Basic Applications

<u>Garmin models covered</u>

1. eTrex Legend
2. eTrex Venture HC
3. eTrex High Sensitivity

WYNDD
Wyoming Natural Diversity Database

ROCKY MOUNTAIN AMPHIBIAN PROJECT

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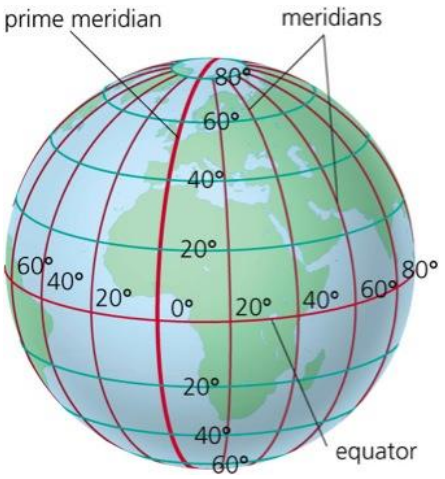
Coordinate Systems



- Coordinate system (CS): reference system used to represent locations on earth.
  - Provides common basis for communication about a particular place or area.

- Geographic CS: spherical (3-dimensions), such as latitude and longitude
- Projected CS: flat (2-dimensions), such as UTMs
  - Requires a GCS and map projection (to go from 3 to 2 dimensions)
  - Map projections are customized for a particular location/region

- The coordinate system you use depends on where you are and what you're doing – there is no single system that is right for every context.

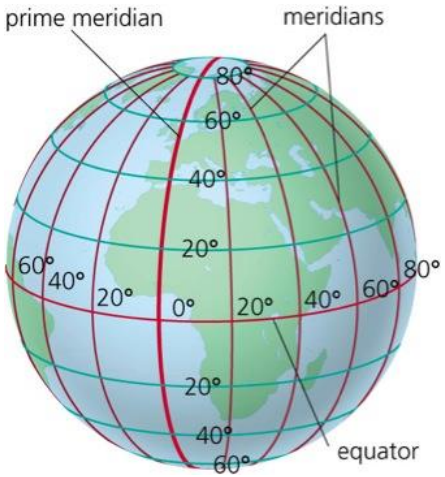
Want to know more?
resources.esri.com/help/9.3/arcgisengine/dotnet/89b720a5-7339-44b0-8b58-0f5bf2843393.htm
www.progonos.com/furuti/MapProj/Normal/TOC/cartTOC.html

Coordinate Systems

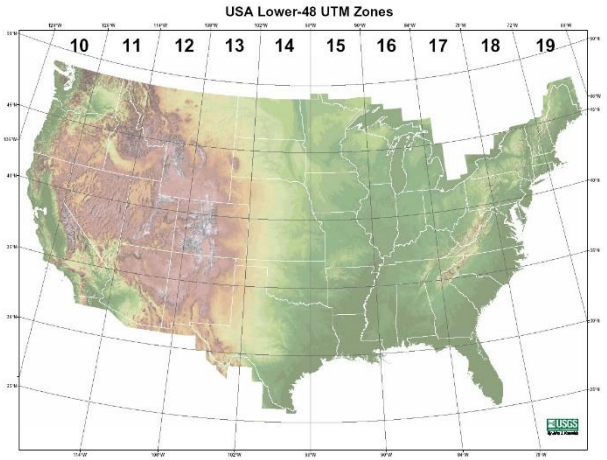
"Easting" is 6 digits but often has leading 0.

Coordinate Systems	Abbreviation	Example of the same point location
Decimal degrees (Lat and Long)	DD.DDDD	32.8303° N 116.7762° W
Universal Transverse Mercator	UTM	520944 meters E 3632496 meters N

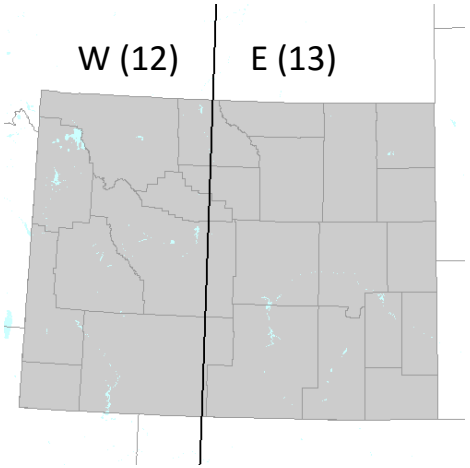
GCS: Decimal degress (lat and long)



PCS: UTMs

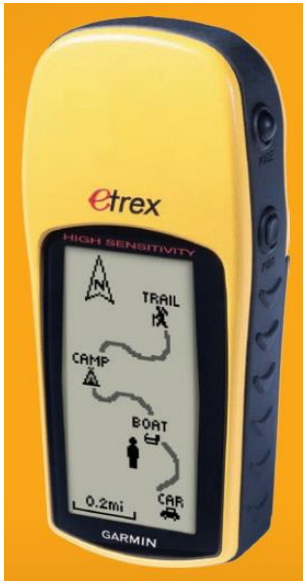


Wyoming UTM zones



www.extension.umn.edu/youth/mn4-H/projects/docs/geospatial-GPS-coordinate-systems-explained.pdf

Garmin eTrex *Legend* and *HC*



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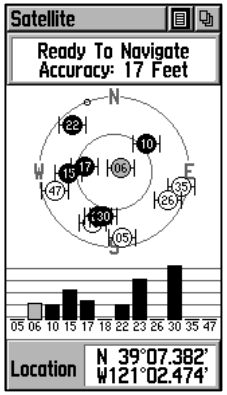
Main Screens

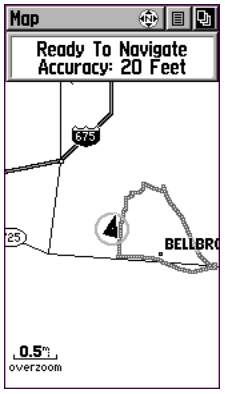
- After turning on the GPS (power button circled in red), click through pages using the page (or quit) key.

- Pages should be *similar* to this:

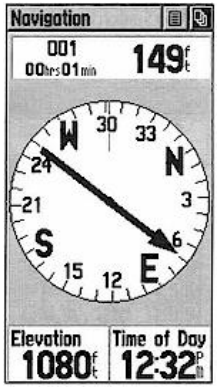
Satellite



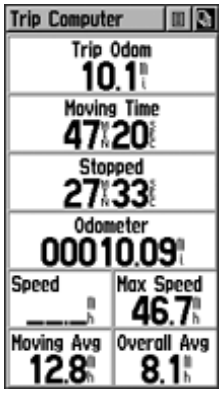
Map



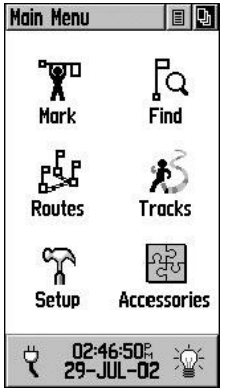
Navigation



Trip computer



Main menu



Moving between and selecting options in a menu

<u>eTrex Legend</u>

- Use toggle to move between options in a menu
- Push toggle in to select

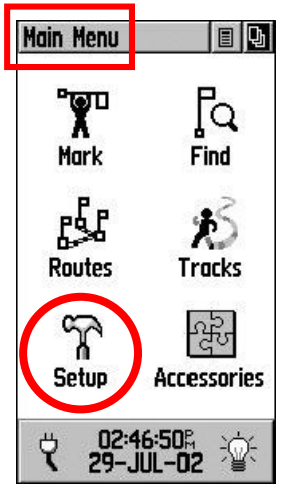
<u>eTrex HC</u>

- Navigate with up and down arrows
- Press enter to select

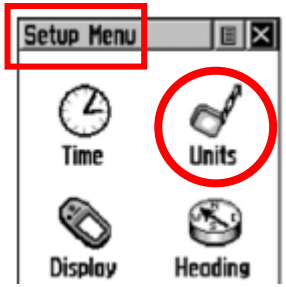
Before Anything Else, Set the Coordinate System

1. Navigate to Main Menu with page button

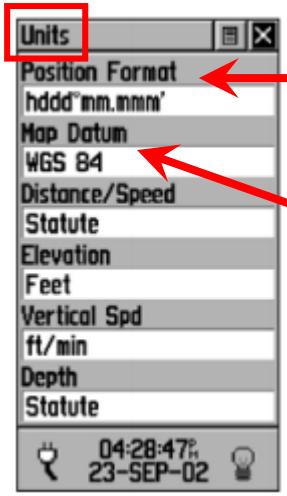
2. Select ‘Setup’



3. Select ‘Units’



4. Change units



In ‘Position Format’ select the coordinate system you’re using. For example, **UTM UPS** for UTMs (PCS) or **hddd.ddddd°** for decimal degrees (GCS).

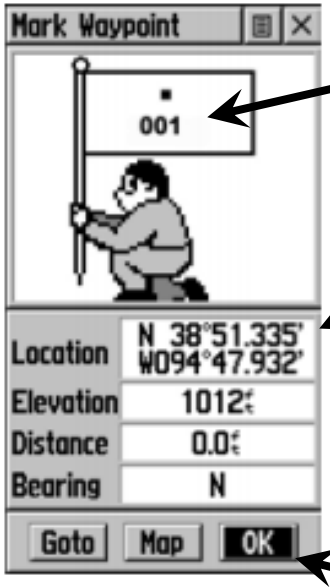
After change Position Format, select your Map Datum. For UTM UPS, you likely want NAD 83. For hddd.ddddd, you likely want WGS 84.

The coordinate system is now set. You do not need to do anything extra to save the settings – simply navigate to the next page you need with the page button.

How to Add a Waypoint by Entering Coordinates

- Regardless of the screen you are on, push in and hold toggle (legend) or enter button (HC)

→ "Mark Waypoint" screen will pop-up:

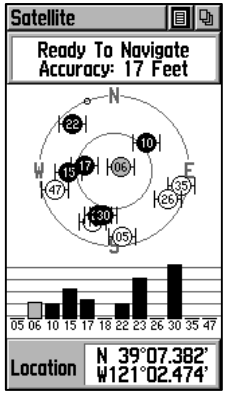


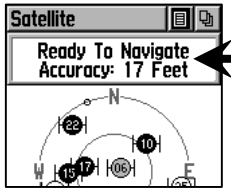
1) Toggle until the numbers within the flag are highlighted, then push toggle in. Name point then select 'OK'.

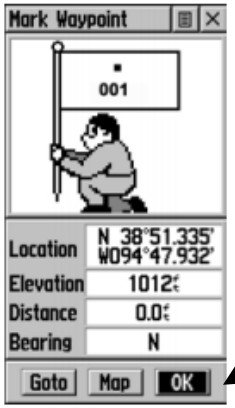
2) Toggle until the field next to 'Location' is highlighted, push toggle in. Move highlight box off of 'N' so box is on 1st number. Enter the desired N coordinates (Latitude), enter W coordinates (Longitude) on next line. Click 'OK' when done.
   - This screen shows decimal degrees. Screen will look slightly different for other coordinate systems but apply same steps.

3) After the point name and coordinates are entered, click 'OK' on the main screen to save the waypoint.

How to Add a Waypoint for your Current Location



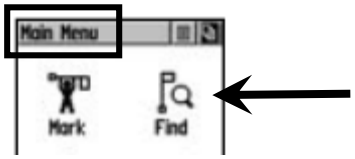




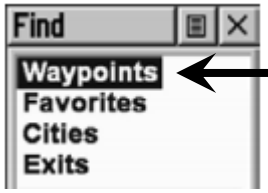
- This follows similar steps as the previous slide but 1st the GPS must find enough satellites.
- On the satellite page, the upper field will say “Waiting to find satellites” if the GPS is still looking.
- Once enough are found, the upper field will change to “Ready to Navigate” (this could take 5-10 min depending on location and conditions).
- The upper field also reports accuracy. Before marking your location, wait for accuracy to be below ~20 feet.
- Once accuracy is acceptable, push and hold the toggle in for ~2 seconds. Name the point and then click ‘OK’ on the main screen to save. Unlike the previous slide, do not edit coordinates in the location field – those coordinates already represent your current location.

How to Navigate to a Waypoint, Part 1

- After saving a waypoint, click the page button (circled in red) until you get the Main Menu page:



1) Click on 'Find'



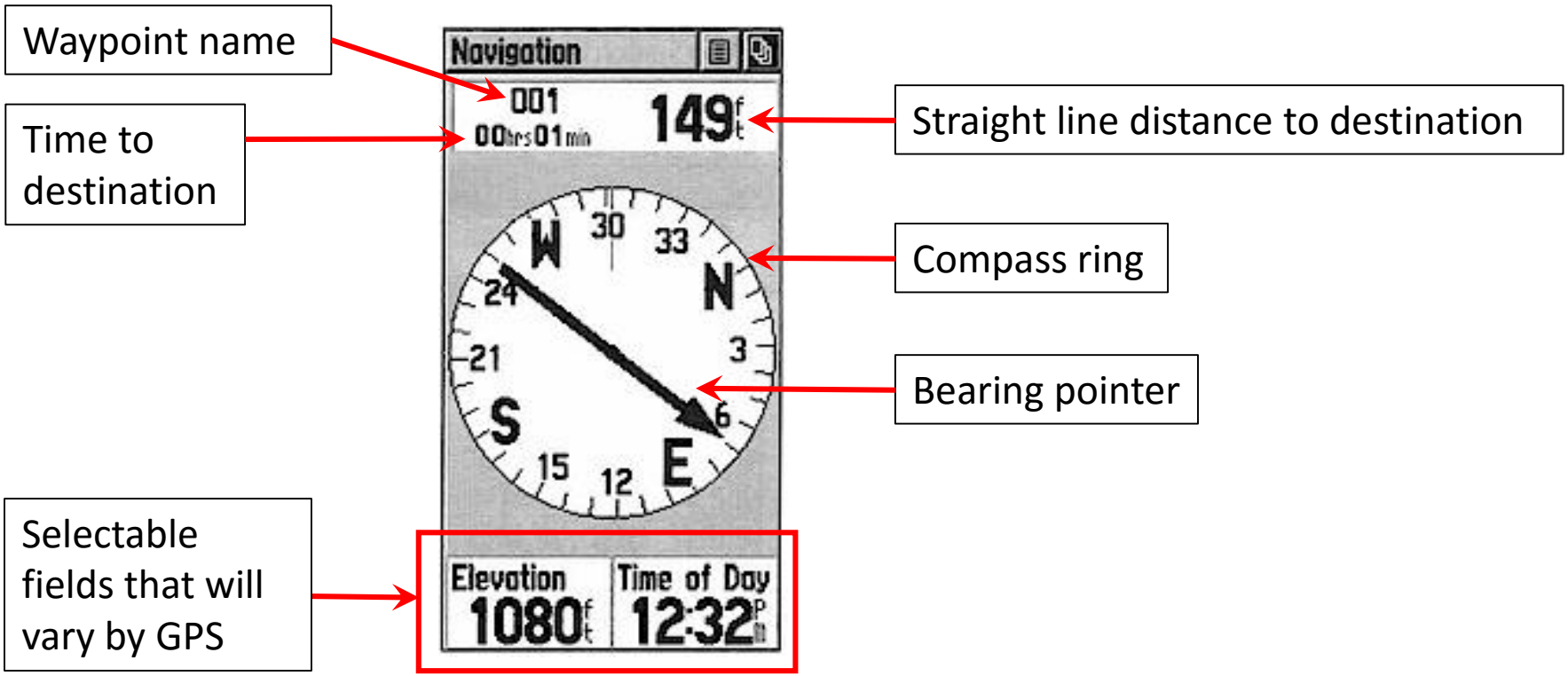
2) Click on 'Waypoints'

3) Another window will pop-up, if choose 'Nearest', it will return a list of points in order of how close they are to your current location. If choose 'By Name', it will return a list of points that you can search through. To search by name, toggle so the field under 'Waypoints' is highlighted, push toggle in, enter name.

4) Once find point need, toggle so point name is highlighted, push toggle in. Click 'Goto' on new screen that pops-up.

How to Navigate to a Waypoint, Part 2

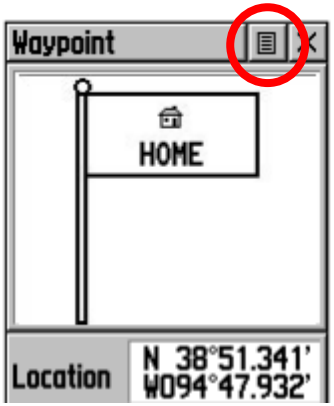
- After selecting 'Goto' for the desired waypoint, the Navigation page will pop-up.
- Walk in the direction of the *bearing pointer*.
- Can also navigate via the Map page, if you prefer.



Additional Tips

Delete a single waypoint

→ Main Menu > Find > click on waypoint need to delete. Within 'Waypoint' page, click on options symbol (circled in red), then select 'Delete Waypoint'.



Adjust screen brightness

→ Click and quickly release the power button (if you hold it down, the GPS will shut off) to adjust brightness.

Change settings for bearing pointer on navigation page

For example, the bearing pointer is not rotating to point in the direction you need to go.

→ Main Menu > Setup > Heading. Check the 'North Reference' field. If 'User' is selected, that is likely the problem. Select 'True' or 'Magnetic' and the bearing pointer will point you in the right direction.

Garmin eTrex Venture HC

- Buttons and screens are very similar to the eTrex Legend.
- The instructions for the Legend on the previous slides should be adequate for using the Venture HC as well.

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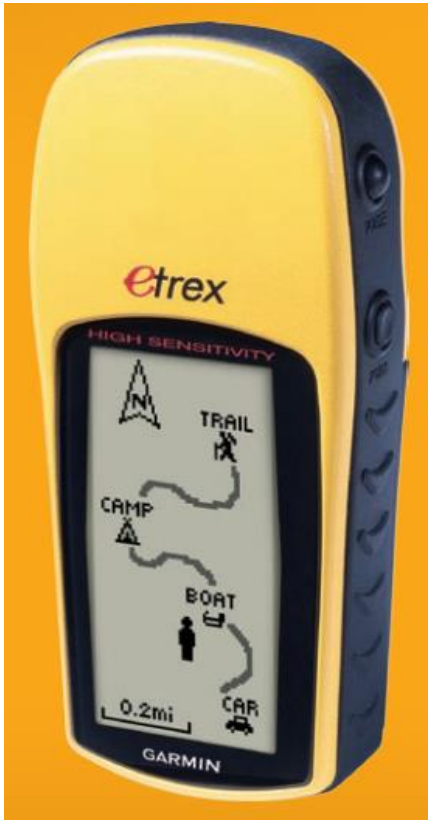
Garmin eTrex High Sensitivty



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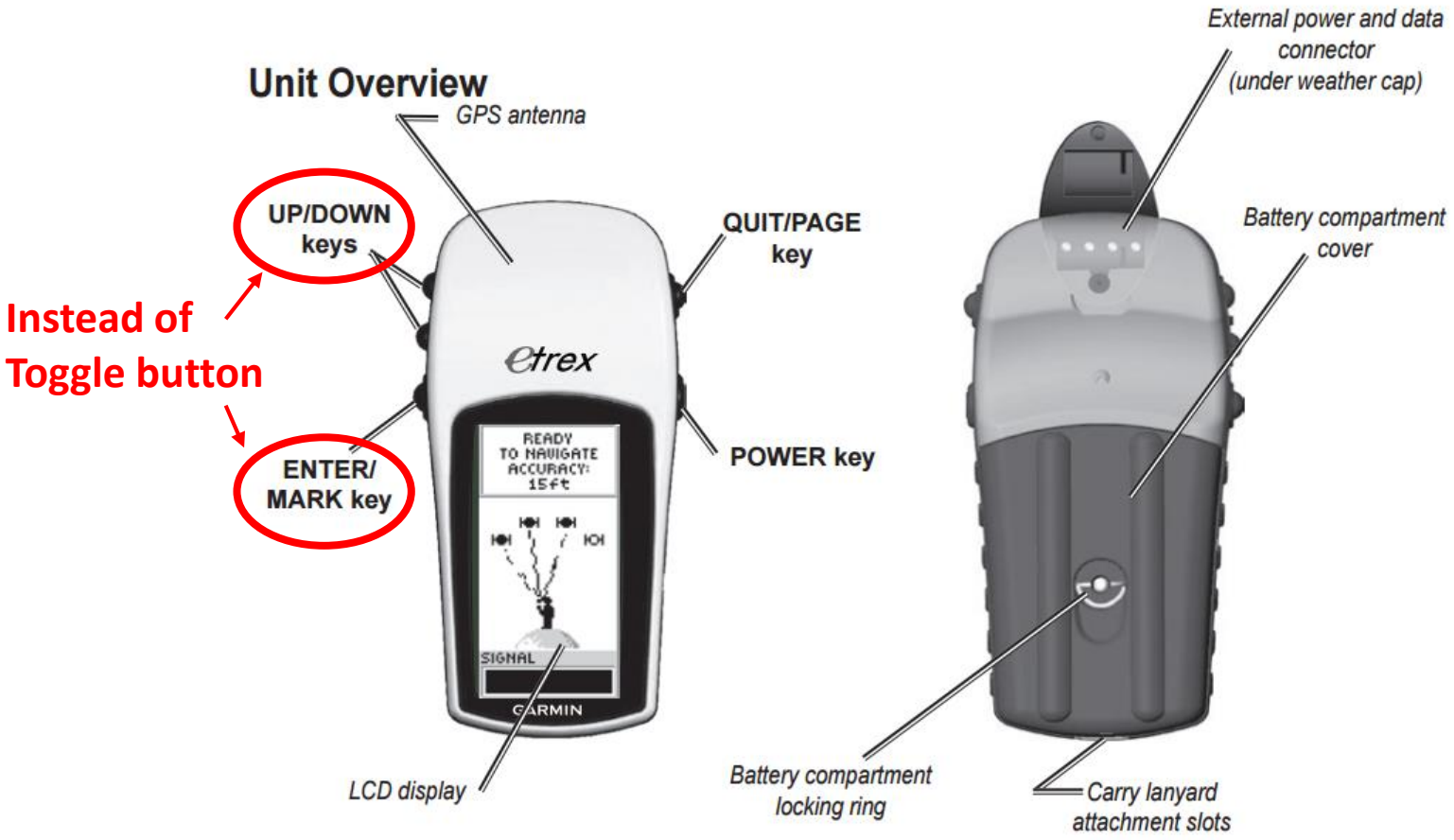
Garmin eTrex HS Buttons
(slightly different than eTrex Legend)

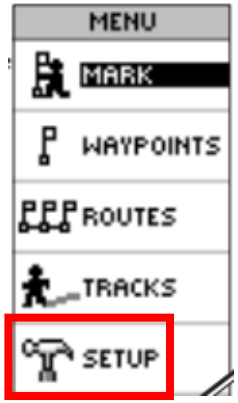


Set the Coordinate System

Same steps as the Legend model, but screen appearance is slightly different.

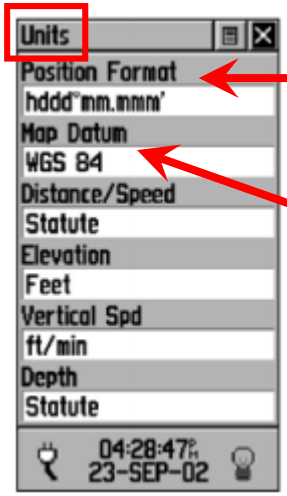
1. Navigate to Menu with page button

2. Select 'Setup'



3. Select 'Units'

4. Change units



In 'Position Format' select the coordinate system you're using. For example, **UTM UPS** for UTMs (PCS) or **hddd.ddddd°** for decimal degrees (GCS).

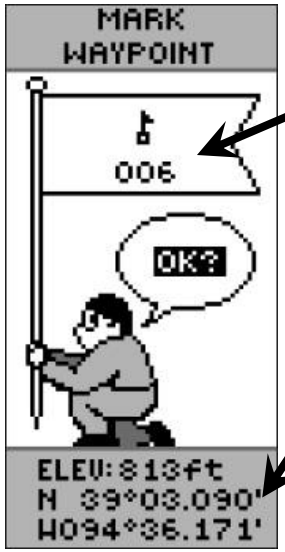
After change Position Format, 'Map Datum' should automatically change to WGS 84. If it doesn't, click on Map Datum field and select WGS 84.

The coordinate system is now set. You do not need to do anything extra to save the settings – simply navigate to the next page you need with the page button.

How to Add a Waypoint by Entering Coordinates

- Regardless of the screen you are on, press and hold the enter/mark key (circled in red).

→ "Mark Waypoint" screen will pop-up:



1) Use up/down keys until the numbers within the flag are highlighted, then push enter. Name point then select 'OK'.

2) Use up/down keys until the 'N' 'W' section is highlighted, push enter. Enter the desired N and W coordinates. Click 'OK' when done.
   - This screen shows decimal degrees. Screen will look slightly different for other coordinate systems but apply same steps.

3. After the point name and coordinates are entered, click 'OK' on the main screen (in the thought bubble) to save the waypoint.

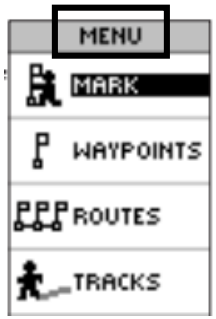
How to Add a Waypoint for your Current Location

- Same steps as the previous slide but 1st the GPS must find enough satellites.
- Once satellites are found and accuracy is less than 10 meters, press and hold the enter/mark key until the “Mark Waypoint” screen pops-up.
- Name the point but do not change the N/W coordinates – those coordinates already represent your current location.
- Click ‘OK’ in the thought bubble to save point.

How to Navigate to a Waypoint

- After saving a waypoint, page to the Menu screen:

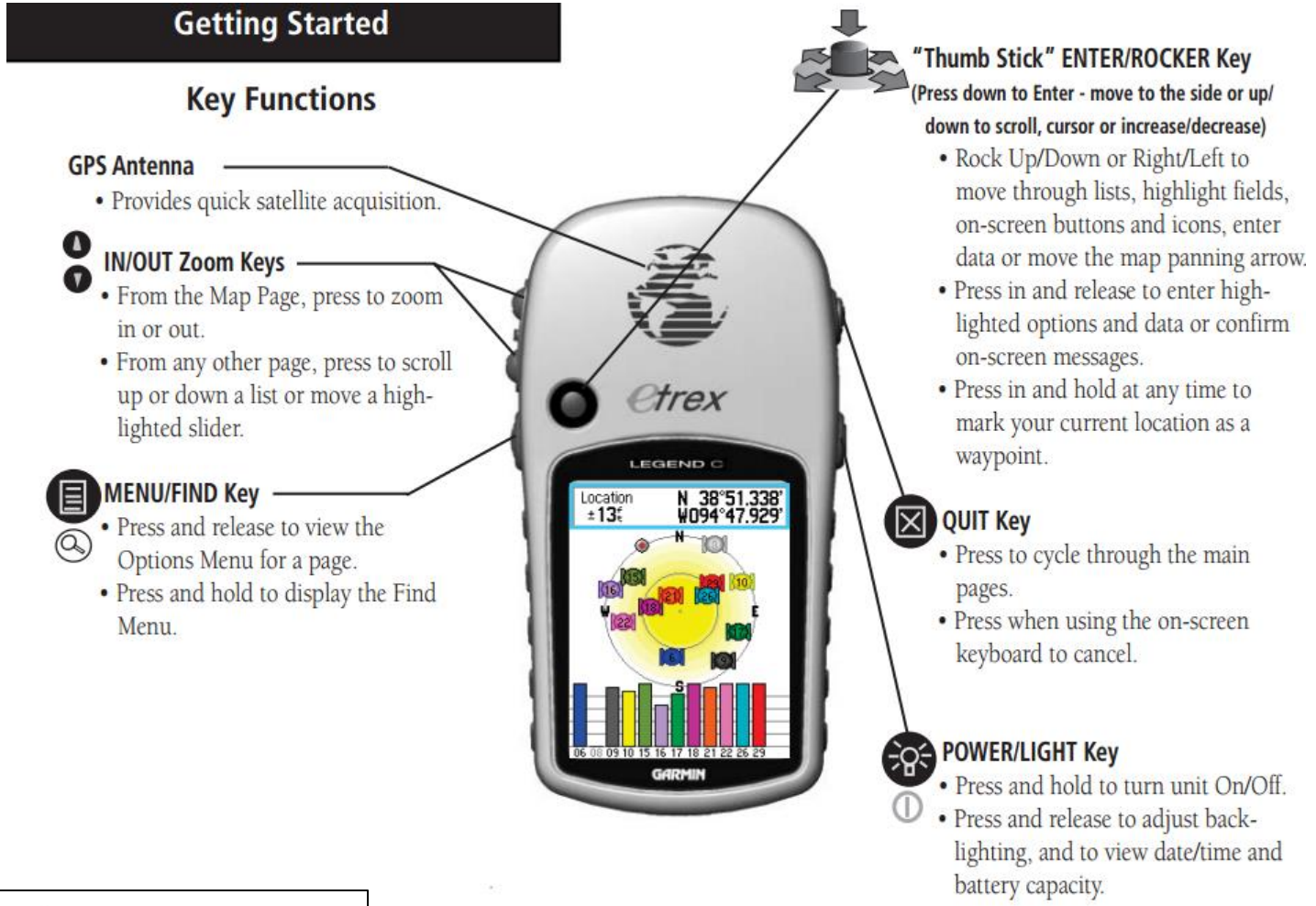
1. Select ‘WAYPOINTS’ →



2. Select desired point then click ‘GOTO’ on new screen that opens.

3. Use compass page to navigate to point

Garmin eTrex Legend Buttons



This shows the Legend C, but it also applies to the base Legend unit.

Links to More Detailed Manuals

eTrex Legend
www.uen.org/cmap/courses/CMap/files/gps/eTrexLegend_OwnersManual.pdf
www.pubs.ext.vt.edu/303/303-204/303-204_pdf.pdf

eTrex Venture HC
https://support.garmin.com/support/manuals/manuals.faces?partNo=010-00632-00

eTrex High Sensitivity
http://static.garmincdn.com/pumac/eTrexH_OwnersManual.pdf

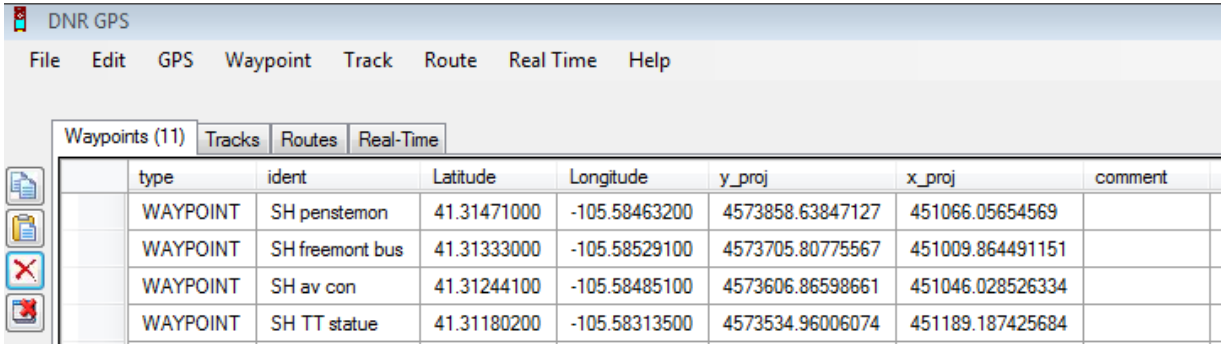
Advanced (but common) Uses

Upload and download points and tracks to and from a GPS and computer.

DNR GPS (freeware)

- **Save** waypoints and tracks from GPS to many different formats, like shapefile or text file.
- **Upload** waypoints and tracks from computer to GPS
- Make sure you tell DNR GPS what coordinate system you're using: File > Set Projection.

www.dnr.state.mn.us/mis/gis/DNRGPS/DNRGPS.html



GPS apps for smart phones

- GPS essentials (android)
- GPS kit (iphone)
- GPS tracks (iphone)

List of useful apps for field work:
www.brunalab.org/apps/