

## **Canberra Bushwalking Club**

### **NavEx #7: GPS3 - GPSr and PC 19 September 2013**

#### **1 What's About?**

Electronic devices, including Global Positioning System receivers (GPSr) evolve rapidly. At the time of writing, I'm aware of the following types/models used by CBC members:

Garmin etrex H (oldie but goodie, no longer supported by Garmin, lots of button pressing); Garmin GPSMap 62s; Garmin eTrex 10-20-30 series; Garmin Oregon 550, 600, 650; Garmin Montana.

#### **2 Read the Manual**

Garmin etrex H Owner's Manual at:

[http://static.garmincdn.com/pumac/eTrexH\\_OwnersManual.pdf](http://static.garmincdn.com/pumac/eTrexH_OwnersManual.pdf)

and Quick Reference Guide at:

[http://static.garmincdn.com/pumac/eTrexH\\_QuickReferenceGuide.pdf](http://static.garmincdn.com/pumac/eTrexH_QuickReferenceGuide.pdf).

Garmin eTrex 10-20-30 Owner's Manual at:

[http://static.garmincdn.com/pumac/eTrex\\_10-20-30\\_OM\\_EN.pdf](http://static.garmincdn.com/pumac/eTrex_10-20-30_OM_EN.pdf)

and Quick Reference Guide for 20-30 at:

[http://static.garmincdn.com/pumac/etrex\\_20-30\\_QSM\\_EN.pdf](http://static.garmincdn.com/pumac/etrex_20-30_QSM_EN.pdf)

and Quick Start Manual for 10 at:

[http://static.garmincdn.com/pumac/etrex\\_10\\_QSM\\_EN.pdf](http://static.garmincdn.com/pumac/etrex_10_QSM_EN.pdf).

Garmin Oregon 550 Owner's Manual at:

[http://static.garmincdn.com/pumac/2560\\_OwnersManual.pdf](http://static.garmincdn.com/pumac/2560_OwnersManual.pdf)

and Quick Start Manual at:

[http://static.garmincdn.com/pumac//Oregon450\\_QuickStartManual.pdf](http://static.garmincdn.com/pumac//Oregon450_QuickStartManual.pdf).

Garmin Oregon 600 series Owner's Manual at:

[http://static.garmincdn.com/pumac/Oregon\\_6xx\\_OM\\_EN.pdf](http://static.garmincdn.com/pumac/Oregon_6xx_OM_EN.pdf)

and Quick Reference Guide at:

[http://static.garmincdn.com/pumac/Oregon\\_600\\_Series\\_QSM\\_EN.pdf](http://static.garmincdn.com/pumac/Oregon_600_Series_QSM_EN.pdf).

Search the web for manuals for other brands/models of GPSr.

#### **3 Ensure your GPSr software is up-to-date**

For Garmin GPSr, download and install Garmin's WebUpdater application to your PC. You'll need a cable (proprietary serial connector for etrex H; mini USB for others) to connect your GPSr to your PC. Run WebUpdater and follow the instructions. The last software version for etrex H is 3.40 (Menu, Setup, System) and (as at Sep 13) the latest for the Oregon 600 series is 3.10 (Setup, About).

#### **4 Setup your GPSr**

Refer to notes from NavEx #5 on 3 September 2013.

**Position Format** – MGRS (for etrex H – Page to Menu, Setup, Units, Position Frmt, MGRS)

**Map Datum** – set this to the datum of the map being used. Locally, WGS 84 or the equivalent GDA, or AUS Geod '66. See Appendix 1-1 for an example of the ~200m difference between GDA94 and AGD66.

**Units** – Metric

**North Ref** – This sets the reference for any direction displayed on the GPSr. I prefer Mag, as a bearing can be transferred directly to a hand-held magnetic compass without consideration of the grid-magnetic angle. If Mag is used, the Variance (= grid-magnetic angle) is automatically set. For example, in Canberra, the Variance is automatically set to 012°E. If you check the Canberra 8727-3N 2<sup>nd</sup> edition 1:25000 topographic map, it says the Grid-Magnetic angle is 13.5 degrees correct at 2003. To use this value, set the North Ref to User and set the Variance to 013°E or 014°E. However, a big downside in doing this is if you are walking in a location where the grid-magnetic angle is significantly different and you forget to change the Variance!

**Angle** – Degrees

**Power Management** – GPSr power consumption is determined by many factors. The more the screen display is active, the more power is used. GPSr with an electronic compass will use more power when the electronic compass is in use (ie. when moving at less than 2-3kph). Set the Display Backlight Timeout and Contrast as low as possible; set Battery Save On and select the correct battery type being used (if these options are available). Carry spare batteries! Alkaline batteries are cheap, but will not last long if you are a heavy user. Lithium batteries are excellent, especially in the cold, but expensive. Rechargeable NiMH batteries are a good compromise.

**Identification** – if startup.txt is available when you have your Garmin GPSr USB connected to your PC, modify it to identify your ownership.

To provide a location in the required position format to emergency rescue services (Lat/lon in degrees and decimal minutes), change a field on the Trip Computer page to show your location in this format.

There are many other options which you may set to a value other than the default. RTM!

There are additional setup and basic use notes on the CBC web site at:

<http://www.canberrabushwalkingclub.org/documents/GPS101.pdf>. The notes contain screen shots for Garmin eTrex 30 and Oregon 550 GPSr.

## 5 How can free Software Help You?

Remember all the hassle of entering waypoints on NavEx #6 on 10 September 2013? You have to know how to do this in the field, but you can set up a lot of waypoints in your GPSr during your pre-trip planning.

Download and install Garmin's BaseCamp from:

<http://www.garmin.com/en-US/shop/downloads/basecamp>

or download and install Garmin's MapSource (if you are using an old etrex H) from:

<http://www.gpsaustralia.net/forums/showthread.php?t=2800> (use option 2)

or try/buy OziExplorer from <http://www.ozieplorer.com/>.

Connect your GPSr to your PC. Run the application and create navigation assists such as waypoints, routes, planned tracks. Download them to your GPSr.

There is heaps of GPS software on the web. As an example, see <http://garminoregon6xx.wikispaces.com/Software>.

## 6 Waypoints, Tracks, Routes

A waypoint is a location, described by at least a name and its position.

A route is a sequence of waypoints.

A track is a series of track points. A track point is a location, described by at least a unique identifier and its position. A track point can have many other properties, such as altitude and date-time recorded.

## 7 Software and Digital Maps

A combination of mapping software and digital maps allows you to automate walk planning and post-walk analysis.

Software – examples are OziExplorer and BaseCamp

Digital Maps – examples for use with OziExplorer are:

**LPI Topoview Raster 2006.** NSW topographic maps, mainly 2nd edition 1:25000, some 1st edition, some 1:50000 and 1:100000 out west. The product also has a seamless mosaic of all NSW, and non-current maps (eg. 1st edition 1:25000 maps around the ACT, handy for checking out old fire trails).

**SI 55-16 Canberra Special 1:250000.** A map of the ACT.

**NATMAP Digital Maps 100K 2010.** 1:100000 and 1:250000 maps of all of Australia.

**OZRaster maps of NSW.** Based on data from 2012, so more up-to-date than LPI Topoview Raster 2006. No mosaic.

**Scanned maps.** Any map can be scanned and calibrated for use with OziExplorer.

Digital Maps – examples for use with Garmin's BaseCamp are:

**OZtopo V4** topographic maps of all of Australia on GPSr and PC.

Other data - **GeoScience Australia 9sec DEM** height data.

## 8 Planning a Walk – using OziExplorer, Topoview Raster 2006 and Oregon GPSr

1. Set waypoints and save them
2. Create a route from the waypoints and save it
3. Draw the proposed track and save it
4. Create a Route Card by:
  - Summing the proposed track distances between waypoints (if the distance between waypoints was used, this is only a straight line distance)
  - Record the magnetic bearing between waypoints
  - Check the track profile for ups and downs
  - Check the going from map, non-current map, Google Earth
5. Download waypoints and route (an maybe planned track) to GPSr

## 9 Executing the Walk

1. Leave GPSr running to record actual track. Clear it first
2. Set waypoints at significant features
3. Navigate using map and compass and route card. Use GPSr for confirmation/emergency.

## 10 After the Walk

1. Upload actual track and waypoints from GPSr
2. View actual track profile
3. View in Google Earth and save kml/kmz file.

There are fuller details on points 8-10 at <http://www.johnevens.id.au/Pages/Armchair%20Bushwalking.htm>.

**11 Using BaseCamp and OZtopo** – pretty much the same. Note that etrex H model GPSr are no longer supported by Garmin and they will not interface with BaseCamp. Use MapSource instead.

**12 GPSBabel** – conversion between various data formats. Download it from <http://www.gpsbabel.org/>. Use it via the GUI, not the command line interface. There are some examples of use of GPSBabel at <http://www.johnevens.id.au/Pages/Data.html>.

For example:

- (a) simple data input –
  - Prepare a text file containing      Name,UTM  
    Home sweet home,55 H 685274 6088288
  - Input it to GPSBabel with 'Universal csv with field structure in first line' selected as the input format and your desired output format.
- (b) Say I gave you a file of waypoints in OziExplorer format. How would you get them into your GPSr? Use GPSBabel.

## 13 Blog

Blog at [www.johnevens.id.au](http://www.johnevens.id.au) contains trip reports, photos, video clips, embedded Google Earth, KMZ files, audio podcasts, map fragments, bagging lists, links to other useful sites, things that amuse and interest me. There is an RSS feed if you wish to be notified whenever a new walk report is available.

You might find <http://www.johnevens.id.au/Pages/Map%20Reading%20and%20Navigation.pdf> of interest.

## 14 Topographic maps on-board GPSr

Later model and higher end GPSr allow topographic maps to be stored on-board for access in the field. I use OZtopo V4.0 maps. See Appendix 1-2. Maps cannot be stored on eTrex 10 or etrex H. Check the specifications sheet of your GPSr.

## 15 Birdseye Imagery

BirdsEye imagery is a \$39 pa subscription service from Garmin which allows you to download satellite imagery into BaseCamp and later model GPSr (eg. eTrex 20 and 30, Oregon 600 and 650). See <https://buy.garmin.com/en-AU/AU/prod70144.html> for a list of compatible devices). If you have

vector maps in your GPSr the BirdsEye imagery can be layered onto it. See Appendix 1-2 for examples.

## **16 Custom Maps**

For some Garmin GPSr (eg. Oregon, GPSMAP 62&78 series, eTrex 20, 30 but not eTrex 10 or etrex H) you can store map images (eg. from paper or digital sources) on your device. See <http://www.garmin.com/us/products/onthetrail/custommaps#fragment-1>, particularly the Instructions tab, for details.

## **17 BaseCamp Mobile**

Allows you to Bluetooth data from some Garmin GPSr to a smart phone running BaseCamp Mobile. The data can be displayed on map/satellite imagery (as long as you have mobile reception to get the imagery).

## **18 Google Earth**

Download Google Earth from <http://www.google.com/earth/download/ge/agree.html>.

Very useful. For example, determine the profile, distance of a planned walk created via BaseCamp; check the total ascent, distance of an actual walk. See Appendix 1-3.

## **19 Do it all for free!**

Most of the stuff I do with proprietary products can be done at no cost.

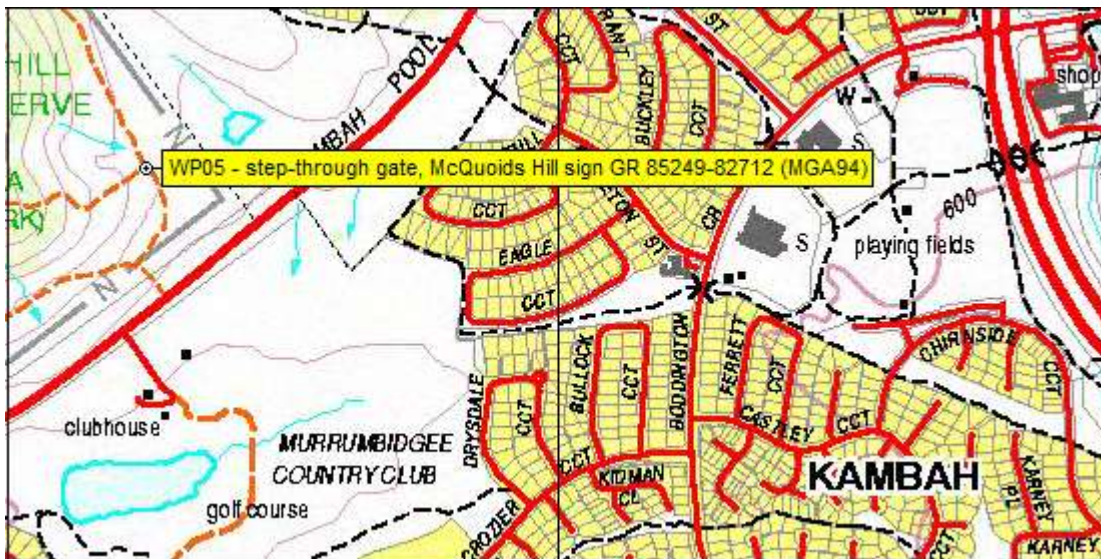
1. Get your map segments from the NSW LPI Spatial Information eXchange at <http://maps.six.nsw.gov.au>. Georeference them in Google Earth. Set up a Custom Map in your GPSr.
2. Use BaseCamp and Google Earth to plan trips. Check out distances, height profiles, expected going and make a route card.
3. Analyse actual trips using BaseCamp and Google Earth.

## **20 What's it all mean?**

All this might be very interesting, but it can take your eye off the ball. Strive to be proficient at map and compass navigation and understand what you are doing with all the techno-babble.

## Appendix 1

**1 Map datums.** WP005 from NavEx #6 plotted using datum Australian Geodetic Datum 1966 (pedantically called Australian Map Grid 66 when used with grid coordinates) on the Tuggeranong 1:25000 topographic map (AGD); and datum Geocentric Datum of Australia 1994 (pedantically called Map Grid of Australia 94 when used with grid coordinates) on the Tuggeranong 1:25000 topographic map (GDA).



## 2 BirdsEye imagery.

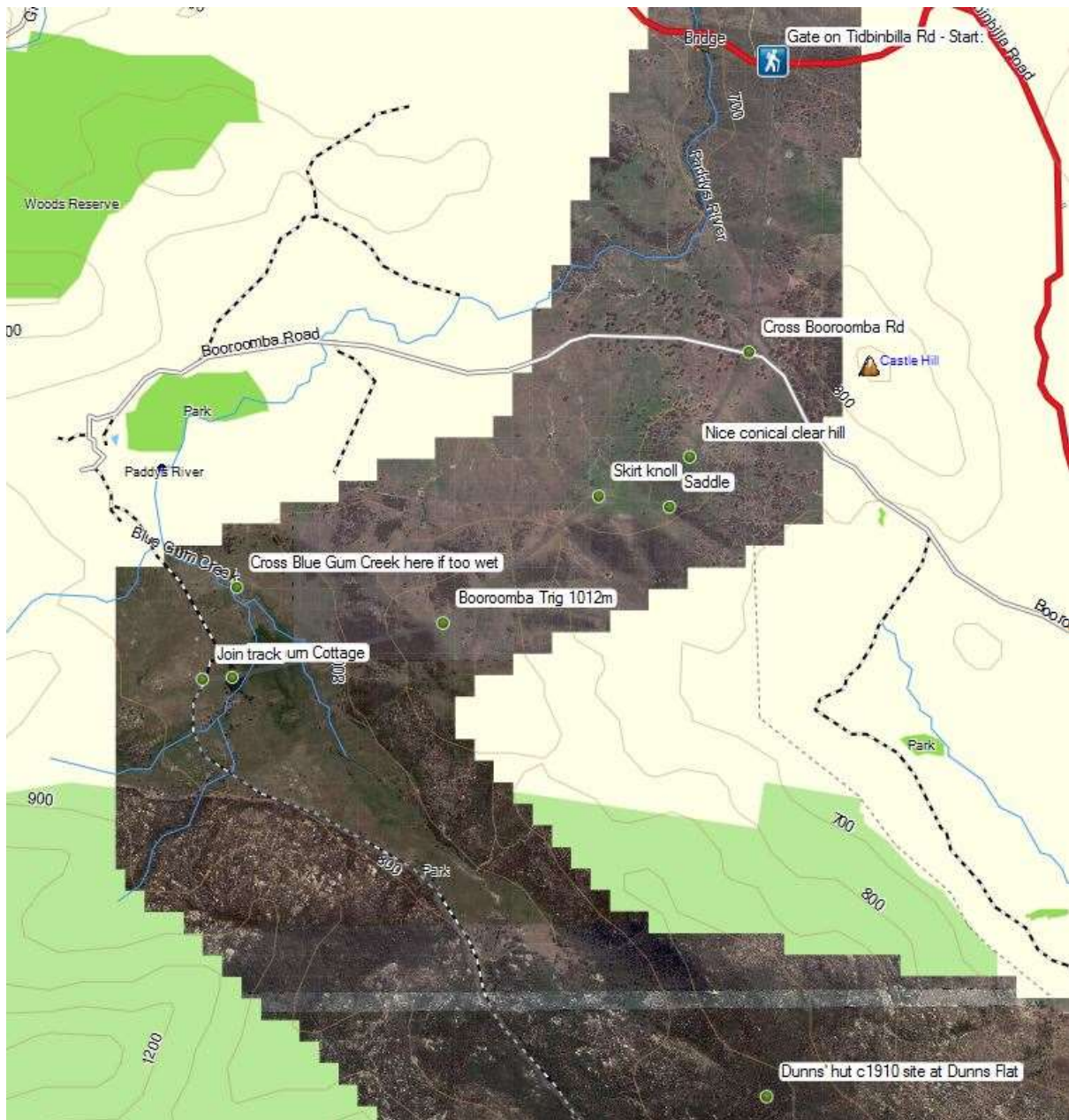
A screen shot of BirdsEye Imagery overlaid on OZtopo map on Garmin 650:



A screen shot of the same area of the OZtopo map without the BirdsEye Imagery:

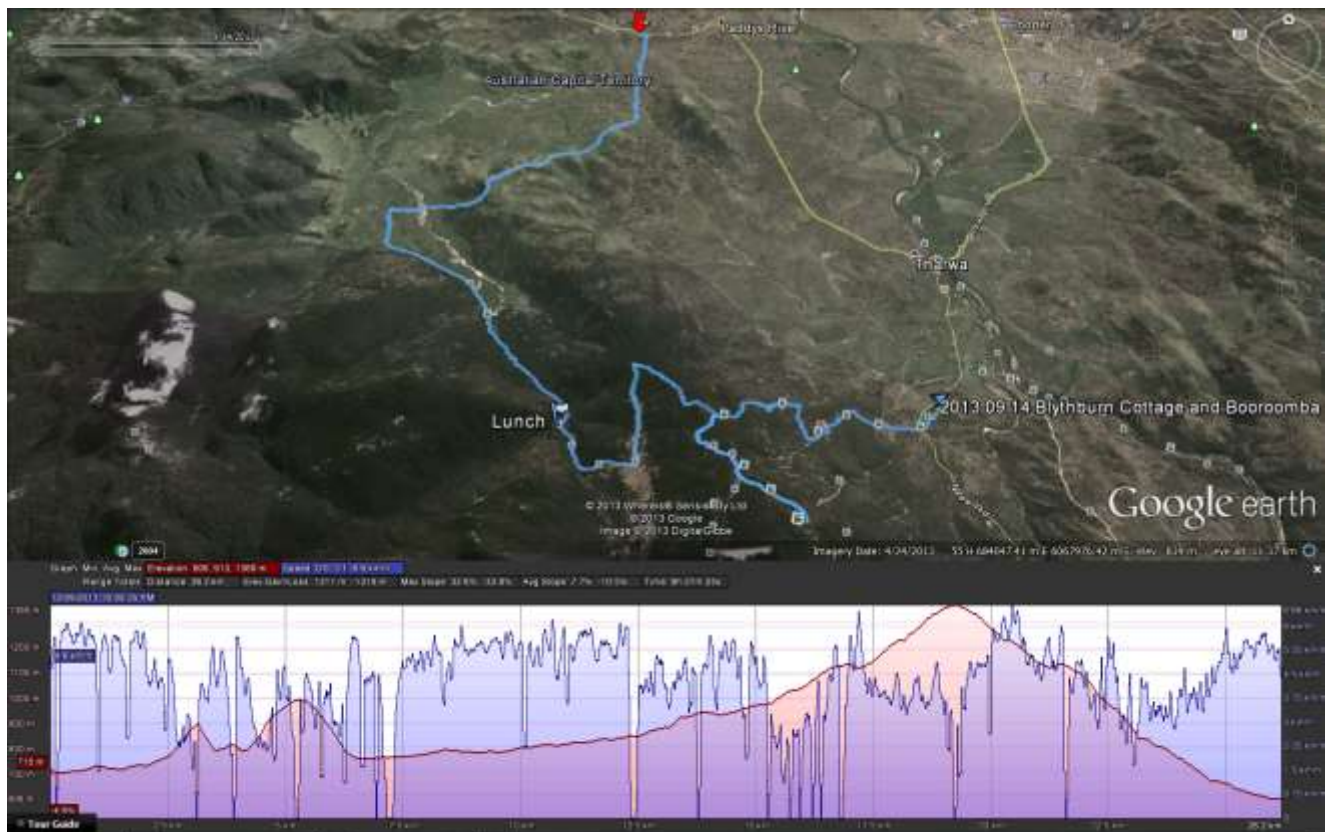


A snip of BirdsEye Imagery on OZtopo V4.0 in BaseCamp:





### 3 Google Earth



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