

CBC Navigation Refresher #7, September 2019: GPSr and PC

1 Revision

1 A waypoint is a known and identified position.

2 A route is a series of jointed waypoints.

3 A track is a sequence of track points, each point being at least a known and uniquely identified position. A track point can have many other properties, such as altitude, date/time recorded.

4 A map's datum is a mathematical model of the earth's shape on which that map is based. The 2 datum you will see on commonly used 1:25000 topographic maps for bushwalking are:

1 AGD66 (Australian Geodetic Datum 1966) or AGD or AMG. Used on older edition maps

2 GDA94 ('Geocentric Datum of Australia') or GDA or MGA

Check the datum on the map you are using.

5 A third datum you should know is WGS84 (World Geodetic System 1984), used by the GPS - Global Positioning System. For bushwalking navigation, WGS = GDA.

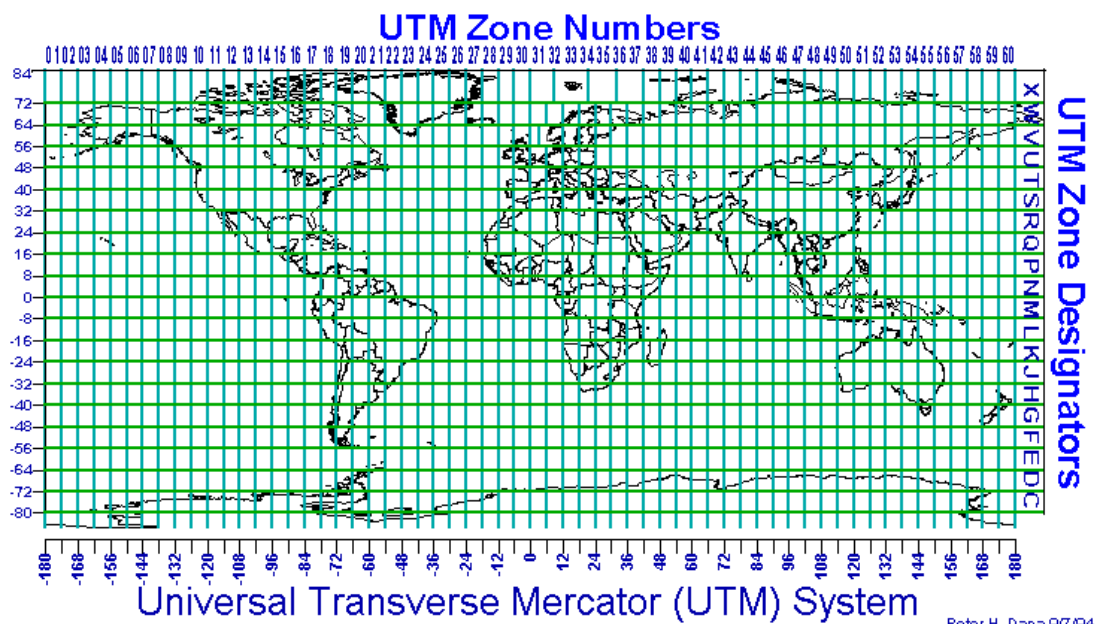
6 How are the coordinates of a location specified?

1 Lat/lon (Latitude/longitude). At least 3 different formats – ddd.ddddd°, ddd°mm.mmm', ddd°mm'ss.s''

Mount Tennent is at S35°33'5", E149°2'36" (GDA)

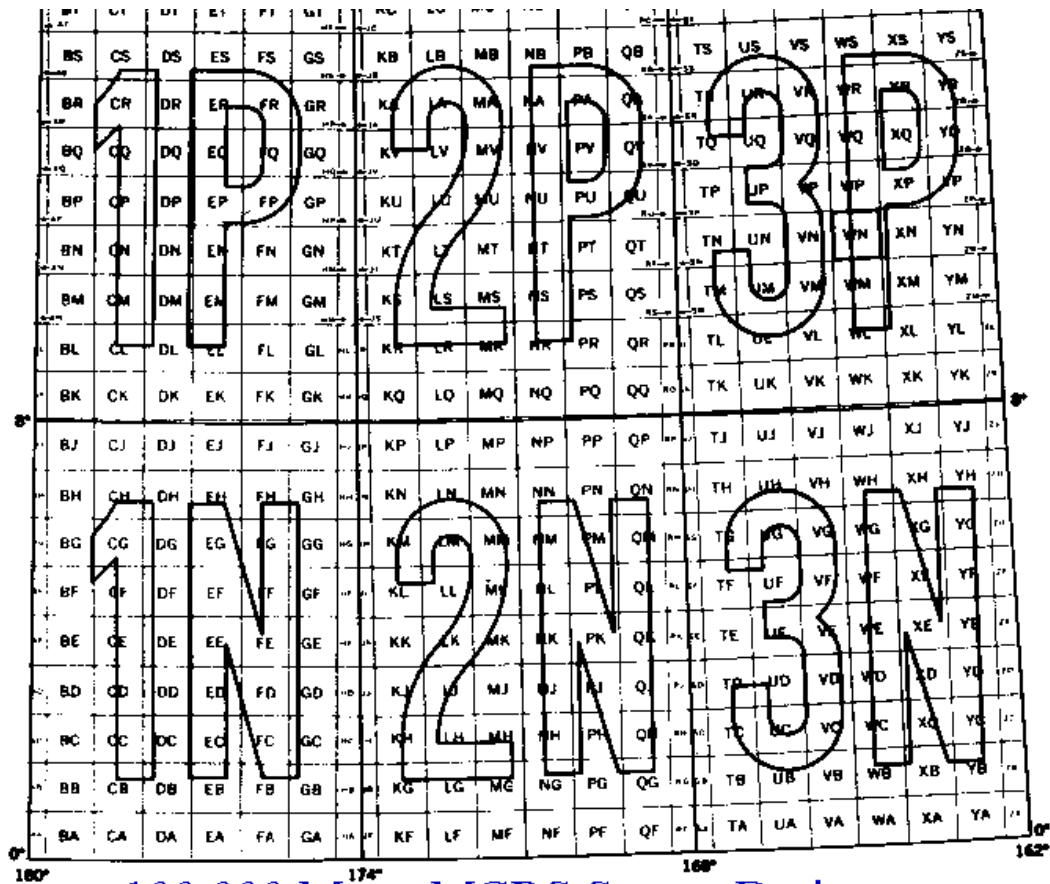
2 Rescue services use degrees and decimal minutes, ie. ddd°mm.mmm' . You may be able to customise your GPSr to show your location in this format, as well as your primary, preferred position format

3 UTM (Universal Transverse Mercator)



Mount Tennent is located at UTM 55H 68534E, 606405N (MGA)

4 MGRS (Military Grid Reference System) or GR



100,000 Meter MGRS Square Designators

Mount Tennent is located at UTM 55H FA 85346405 (MGA), or GR853641 (MGA94) on the Williamsdale 8726-4N map (giving 100m accuracy and with the nearest same GR being 100km away)

7 Ensure the datum on your map and GPSr are the same. The difference between AGD and GDA is ~200m. Ensure party members know the datum and position format you are using to navigate.

8 GPSr setup – datum, position format (usually found under Setup, Position Format, Position Format and Map Datum in Garmin devices). Many other options. RTM! Eg. units, time, north reference, power saving options, ownership identification. There are some extra notes at <http://www.johnevan.id.au/wp/other-resources/garmin-oregon-650-gpsr/>.

9 GPSr types – touch screen, button. The older eTrex H is no longer supported by Garmin.

10 Batteries – high quality rechargeable eg. Panasonic eneloop pro 2500mAhNi-MH. A good quality charger which can refresh and analyse, not only just recharge. In extreme cold, use single use Lithium batteries (expensive).

2 PC and Digital Maps

1 Apps and maps. There are many ways to skin a cat – many app and map combinations:

- OziExplorer (restricted free trial version, purchase from <https://www.ozieplorer4.com/eng/ozieplorer.html>), and TopoView 2006 (purchased) or OZraster (purchased from

<https://shop.gpsoz.com.au/products/ozraster-a-series-of-topographical-state-maps>) or NATMAP products (purchased) or State Mapping Authority Maps (eg Tasmanian purchased from <https://www.tasmap.tas.gov.au/>)

- Garmin BaseCamp (free from <https://www.garmin.com/en-AU/shop/downloads/basecamp>) using basemap (very rudimentary) or OZtopo (purchased from <https://shop.gpsoz.com.au/products/oztopo-v9-australian-topographical-maps-for-garmin-gps-units> ; these maps on GPSr)
- Google Earth
- GPSVisualizer - <http://www.gpsvisualizer.com/>
- Mobile phone apps such as Back Country Navigator (talk with Peter Conroy) (an iOS version of BCN is being developed); Avenza.

2 Planning a Walk – using OziExplorer, Topoview Raster 2006 and Oregon 650

1 Maps: 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; other State mapping authority products eg. Tasmania

2 Set waypoints with descriptions and save them

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 using GE; Check the going from sources such as map, non-current map, Google Earth, ortho photo.

5 Download waypoints and/or route and/or planned track to GPSr and save them.

IMPORTANT – Understand what it all means.

3 Executing the Walk

1 Set a waypoint at the start so you can get back to your car! Reset the trip odometer. Leave GPSr running to record actual track

2 Set waypoints at significant features

3 Navigate using map and compass and route card. Use GPS for confirmation/emergency, or be lazy.

4 After the Walk

1 Upload actual track from GPSr and save. Tidy up the track (eg. spurious points may be created when the GPSr is turned on and when not moving)

2 Compare with planned track

3 Upload waypoints from GPSr and save. Tidy them up

4 Analyse (eg. Distance/time)

4 View actual track profile in GE

5 Save gpx file for sharing.

3 BaseCamp and OzTopo

1 BaseCamp is a free product from Garmin which includes a world basemap. It can manage waypoints, tracks, routes, etc.

2 It can interact with a range of digital maps, including those loaded onto a Garmin GPSr. I use OzTopo.

4 Google Earth

1 You can use Google Earth (download from <https://support.google.com/earth/answer/21955?hl=en>) to create waypoints (Placemarks) and tracks (Paths) and export them in a .kml (or .kmz) file

2 Use GPSTabel from <https://www.gpsbabel.org/download.html> (free software to convert between various data formats) to convert to .gpx file.

3 Open a gpx file by changing the File type to Gps or All files.

5 GPSVisualizer

1 www.gpsvisualizer.com is a free online utility that displays geographic data on maps. Functionally, you could compare it to OziExplorer + digital maps.

2 Input can be stored geographic data such as gpx files containing waypoints and tracks, or data created directly onto accessed maps. Output can be in a variety of forms, usefully a .gpx file.

3 Try planning a walk:

1 Access www.gpsvisualizer.com

2 Activate the drawing function [Sandbox \(drawing\)](#)

3 Centre the default map at a known location (eg. type Canberra in Center the map on a location); Go

4 The default map is OSM + relief shading. Pan and zoom as required. Select a different map if required (eg. OpenTopoMap).

5 Use the Drawing tools to plan a walk by creating waypoints and tracks

6 Save the data in a desired format (gpx, kml or txt). This generates a download link to activate.

7 Use the downloaded data. Eg. view a kml file in Google Earth; load a gpx file into a GPSr.

4 Input a recorded walk to analyse:

1 Although a simple map output of recorded data can be quickly generated via the Get started now! Box, more flexibility can be gained from ... Access www.gpsvisualizer.com

2 Activate the drawing function [Sandbox \(drawing\)](#)

3 Activate [Import a GPS file](#) in the Drawing tools: box, Browse ... to a file and open it, activate IMPORT

4 This makes the pan, zoom and map selection features available

5 NB. If you don't easily see your waypoints, change the symbol.

6 Navigation using mobile phone

1 [BackCountry Navigator](#) is a popular, free app. Currently only available for Android devices. A new [Backcountry Navigator XE](#) app for Android and iOS devices is being developed. Not free.

2 Another app is Avenza Maps. Free version limits on board maps to 3. Purchase topo maps from the Store or ...

3 Download georeferenced pdf maps from <https://maps.six.nsw.gov.au/etopo.html> . Connect iPhone to PC, start iTunes, File Sharing, Select Avenza Maps, Add File, select file. On iPhone, My Maps, +, From iTunes File Sharing, ...

7 Garmin File Structure

F:\Garmin\GPX

8 Other things

1 Build a history of places (ACT Oracle). Eg. Open the gpx file in Google Earth.

2 Johnny Boy's Walkabout Blog at <http://www.johnevans.id.au>

3 Show content of gpx file.

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