

# GPS and OCAD9

## *How good is GPS for use with orienteering surveys?*

GPS is very usable with open areas (parks, moorland).

GPS use is possible for wooded areas at the right time of year – accuracy will reduce dependant on amount of tree cover and topography. Topography can have a significant effect as the 3 EGNOS differential satellites are quite low in the sky to the south.

Accuracy is also dependant on satellite positions at the time.

With WAAS / EGNOS switched on and working, accuracy is typically 2 to 3m and usually better than 6m.

Without WAAS, accuracy is 5-6m at best and often about 10m. This is not really good enough for orienteering surveys.

*EGNOS (European Geostationary Navigation Overlay Service) is a supplemental GPS system with 3 satellites and ground stations. To receive an EGNOS signal on a compatible GPS receiver you must switch on "WAAS". (WAAS is the US version of a similar system).*

*OCAD9 is only approved for Garmin GPS receivers. I don't know if it will work with other makes – it probably depends on the format that the receiver is setup for.*

## **OCAD setup – Real World Co-ordinates**

### **Options / Scales...**

Coordinate System. Change to 'British National Grid'

Change coordinates to Real World Coordinates

Set Grid Distance to 1000m

Set Horizontal and Vertical offsets to match the centre of the mapped area. These numbers are each 6 figure numbers (480000 and 131000 for Longmoor Camp)

Always set the last three digits of each offset to 000

Get these from an OS map or the bottom of a Multimap window

Set Angle to match the current magnetic variation

Use [http://www.geomag.bgs.ac.uk/gifs/gma\\_calc.html](http://www.geomag.bgs.ac.uk/gifs/gma_calc.html) to get the latest data

(-3.3 degrees for Longmoor July 2006) Map set to -3.2 degrees for 2007

### **'OS Landline' tile selector**

<http://www.ordnancesurvey.co.uk/oswebsite/products/landline/tileselector.html>

This is a webpage designed to preview OS landline map available to buy. It does however display a low resolution bitmap that is ideal for the alignment of aerial photography and previous maps to the OS grid (necessary to use GPS). The images also provide a good base for major boundaries in rural areas or quite a lot of useful info in urban areas. These images are continually updated so are very useful for features such as new road or housing.

Sample screen shots:

Use right-click Save As... to get the images.

### **Windows Live Local (aerial photos)**

<http://local.live.com>

The best source for free images in the UK. The images are sourced from Getmapping data so are a bit out of date (typically about 2000). Zoomed in to maximum, typically 60 yards, the resolution works out at 0.375m/pixel.

This is only slightly worse than bought images from Getmapping that are 0.25m resolution.

Some areas are available with another zoom level which is much clearer.

Use screen capture (such as print screen) to get the data and paste into a program such as Photoshop Elements or PaintShopPro. Note that you need to use a program that supports layers to allow you to align the captured screens and allow you to create a single large image.

### **NEXTMap**

It is possible to buy terrain data as a grid of points at 5m intervals from NEXTMap. This Digital Surface Model (DSM) data which is collected by radar. The heights are claimed to be accurate to <1m and from the data it is possible to generate contours at any interval (typically 1, 2, 2.5 or 5m).

The data is quite expensive but is an alternative to the use of OS contours.

## ***Alignment of templates (Background maps) to real world grid (OS or GPS)***

Adjust the background maps to align with the real world grid

First align the OS landline tiles to the grid

Use this OS background map (set to transparent) to align the aerial photos.

If you wish to use an existing O-map as a template open it with OCAD and export as a jpeg or gif and adjust this in a similar way to align with the OS landline template

## ***Adjustment of existing map data***

With OCAD9 it is possible to adjust an existing map to align with the real world grid. The first task is to save a version of the file with only the map content.

Import this into your setup base map (including the symbols and colour table from the map).

Note that if the existing map needs conversion to ISOM 2000 I would do that first.

Use the Extras... Transform Map function and then use this similarly to the template adjust function:

1 click for move,

2 clicks for proportional scale/rotate

3 clicks for non-proportional scale /rotate

4 clicks to distort the map

Unless the base map was already accurately drawn to scale it will be impossible to align the entire map to the real world grid!

*I would suggest that you are better saving the old map as a template (or partial templates). These can be individually adjusted and hidden as required and that you start again and draw a new map using the existing map for reference only.*

## ***Base map printing with grid for use with GPS assisted survey***

To make it feasible to plot your location whilst mapping using GPS it is necessary to print out a base map with an OS grid squares. Go into Options... Scales, Real World Co-ordinates and change the grid distance from 1000m to 100m. Now print out a base map with the grid switched on (File... Print, Options and tick the "Print grid" box. Use this grid together with a 100m scale (attached to your compass).

## ***Collection of GPS data – WAAS / EGNOS, waypoints, tracks, plotting current location***

Make sure WAAS is switched on in your GPS setup menu – by default it is off.

You only need to do this once – the WAAS settings will be remembered unless you revert back to default settings.

Switch on our GPS at the survey location

Wait a couple of minutes to acquire the satellites. With the satellite advanced view page you can see how many satellites are locked and the available accuracy.

Before you start any survey you should clear any existing waypoints and tracks. OCAD will give an error message if you try to import these and they are outside of the map area.

Walk around and record any waypoints, a track will be recorded automatically.

You can adjust the interval that it uses to record this data – I set it for a time interval of 2 or 5 seconds. Typically a GPS unit can record 10000 track points which is quite a few hours at this data rate.

When I record a waypoint I often make a note at the edge of the page of the waypoint number and what the feature is.

To plot your current location change GPS pages to display the OS grid reference and then use the map grid to plot your location.

When finished surveying, remember to switch the GPS off before driving away!

## Import of GPS data, OCAD symbols for GPS

Plug the GPS into the computer (Serial or USB port depending on the type of receiver and your computer).

Open the map file.

Switch on the GPS unit.

In OCAD9 go to GPS and then Import from GPS.... This opens a window and you should see the name of your GPS receiver and a status: GPS connected.

To import waypoints:

Go to GPS data and select Get Waypoints. OCAD will transfer the waypoint data and highlights all of them (if you only want some waypoints you need to selectively highlight those that you want to import). Click on Create. The data is imported into OCAD as a number of objects which are selected. Click on the required symbol and then use Change All on the toolbar.

It is also possible to create labels when you import the waypoints - tick the Set Labels box and then click on Create. Convert the waypoints and then select the remaining labels and assign them to a symbol.

Use a similar method to import tracks (usually only one is available). Note it can take a minute or two to import over a serial port. Assign the imported data to a symbol.

Don't forget to switch off and disconnect the GPS from the USB or serial port.

I have created a number of special symbols for use with GPS waypoints, waypoint labels and tracks. This uses the colour table from the BOF OCAD8 symbol set.

I intend to make this available to download from the BOF mapping pages.

You are now ready to use the data as a guide to your cartography.

