First use of Geography Teachers’ Association of Victoria GPS Units

Today we will use Garmin Oregon 600t handheld GPS units to take position measurements to learn about the accuracy (resolution) of GPS position measurements. I want you to try out the various features of the receivers to get a feel for the data quality and limitations.

The GTAV Webpage [http://www.gtav.asn.au/resources/teaching-gps-in-schools-worksheets](http://www.gtav.asn.au/resources/teaching-gps-in-schools-worksheets) has Background Material, these instructions and Activities. Please think about how this technology and the GPS units can be used in fieldwork and practical work for each of the Victorian Curriculum Units and the four VCE Units. Develop an activity and share it with your fellow teachers via our GTAV Webpage. Book the Units via the GTAV Office. If you can’t pick up/return, then you need to pay for Registered Mail.

First we will go outside and turn on the GPS units to get an initial position. We will then walk to a nearby field to try “writing” words in the field. The GPS unit will record position points at regular intervals as you walk across the field to trace out the letters. Later we will upload the GPS points to mapping software and “connect-the-dots” so your words will appear on the computer screen.

### Teaching GPS in Schools Worksheets

These worksheets are ready to use in the classroom to introduce GPS skills into Geography units for Fieldwork and as a geospatial skill to assist spatial analysis. All secondary students should have these quite sophisticated 21st Century skills as outlined in the澳VELS / ACARA and VCAA Geography curriculum documents.

- Master Worksheets - which include the answers:
  1. How GPS Works
  2. Basic Receiver Operation
  3. Applications of GPS
  4. GPS in Earth Sciences

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  1. How GPS Works
  2. Basic Receiver Operation
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### Part 1: Once you have your GPS

- First, check if there are batteries in the unit.
- Read pages 1-6 of the “Quick Start Guide” card in the Unit’s box and take note of the buttons, their names and functions.
- Once you turn on the GPS (press and hold the power button on the edge of the device) it will automatically search for satellites, wait for this to happen. The GPS acquires signals from the constellation currently visible in the sky; the signal strength bar will display more green bars as strength increases.
- You can also observe the position of the satellites relevant to the receiver. From the home screen, if you are holding the device horizontal, swipe the menu tab from left to right to
open the menu. Alternatively if the device is held vertically, swipe the menu tab from the bottom to the top to open the menu.

Scroll down to Satellites menu and click on the icon. To exit, click the escape button (X).

- Ensure the profile is set to Recreational by opening the main menu. Scroll down to select the “profile change” icon and select Recreational.

**We need to check the accuracy of the unit.**

1) Go to the Main Menu- swipe from the left to right from the home screen and scroll down to the satellite icon. Make sure the GPS reading is taken from a location where a large part of the sky/horizon can be seen. Ideally, the unit should remain still during this time. On the top right hand corner the device will say 3m or similar, record this number below. Also record your position.

Acquiring satellites: record the accuracy and location

_______________ m       S____________________

E____________________

2) Once an initial reading is taken, try to find a building or large tree to stand under, do you notice changes in the accuracy as the GPS recording level changes?

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**Move to the Map page**

- Return to an open area with a clear view of the sky
- Navigate to the home screen and click map on the GPS.
- Zoom in on the map page (click +), the arrow is showing where you are standing. If you accidentally drag the map away from the arrow, click the return button to centre the arrow within the map.
- Stand still and click the button to the right of the power button on the exterior of the unit to mark a waypoint. Click the number at the top of the page and rename it ‘start’ followed by your initials e.g. Start_LH. Click the tick, then done to save the waypoint. A flag should appear on the map to indicate a waypoint has been marked.
- Whilst walking, click the cross to return to the home page and experiment using the compass. Returning to the map page you may need to zoom in or out to see where you are.
- Whilst walking around for a minute or so changing speed and direction. Mark your final location ‘end’ followed by your initials.
- Return to the home page and select “where to”, then select waypoints and select “start and your initials” then go. Use the map page or compass page to guide you to your starting location. The GPS will alert you when you are close. When you reach the point the compass will turn to an opposite direction each time you take a step.
Part Two: Field Exercise.

We will now practice moving with the units and try to write your name across the oval using the map page as a guide.

1) You will need to consider the rate at which the receiver records points along the tracks.
2) Each of you will “write” your name on the oval by walking out the letters of your name on the oval, as the GPS records the track. Consider how large the letters will have to be given the resolution of the received signal (recall part one, where you identified the accuracy of the signal e.g. if you have 5 m resolution, how far apart to lines of the letters have to be so they won’t potentially cross due to measurement error?). Perhaps you will only be able to fit your initials if your name is “Alexander Anderson-Smith”. **Your writing will need to be continuous.**
3) Using the steps we learnt before; Mark the start ‘my name’ and the end ‘my name finish’.

**Back in the classroom**

Plug GPS into the computer. Navigate to the GPS via My Computer. Open the GPS and click the Garmin folder. Open the GPX folder. Copy the “Waypoints_DATE.gpx” and paste the file in your folder on your computer. These are the way points you created.

Returning to the GPX folder on the GPS, open the “Current” folder. Copy and paste the “current.gpx” to your computer in the same folder that you saved the waypoints. This file is the track of where the GPS has moved.

Open google earth: In google earth; go to file-open- (find the map, yourname.gpx) and it will automatically import it. Save this image, copy it into a word document.

You can copy any location and paste into google earth and it will show you exactly where you were standing. Or is it exactly where you were???

Note for teachers: before the lesson:

- Open the main menu
- Click setup
- Scroll down and select Reset option
- Click ‘Reset All Settings”
- Check the batteries are charged
To Access the batteries:
You might need to replace the batteries in some of the units as they run down. They take two AA batteries. Have packets of spares and show the kids how to change them over before you hit the field.

The Carabina Assembly clip on the back (if attached), slides on and off. You need to remove this to access the D Clip that secures the battery compartment of the unit.

Try this technique:

Important!! Metal Tab on GPS Unit.
Lift the plastic bottom of Carabina Assembly with Thumb to clear this Tab

Hold Unit in left hand. With right hand on Carabina and Thumb under the plastic tab and Lift

Slide Carabina Assembly down to expose the battery compartment D clip.

Rotate this D clip 90 degrees and the whole back of the unit comes off.

BATTERY Compartment D Clip UNLOCKED
(Turn clip 90 degrees anticlockwise)

BATTERY Compartment D Clip LOCKED
(Turn clip 90 degrees clockwise)