GPS 101: An Introduction to Effective Use of Your GPS

These notes should assist you to set up your GPS and use it for basic functions. Whilst the screen shots apply specifically to Garmin eTrex 30 and Oregon 550 GPS, the functions and operations should be common to all GPS.

1. Cold Start/Warm Start/Hot Start

Depending on when and where you last used your GPS, and your current location, it may take some time for it to give you a valid position fix. Be patient. Your GPS may be capable of displaying the satellites acquired, signal strength and accuracy:

For Garmin eTrex 30, select the Satellite *page from the main menu*
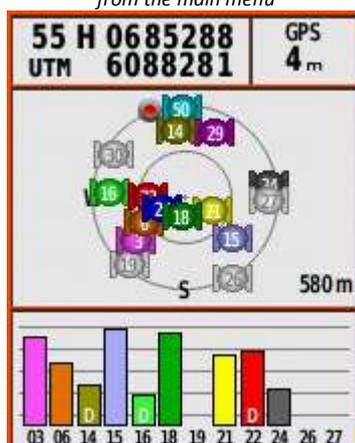
For Garmin 550, touch the Signal Strength icon at the bottom of the home screen
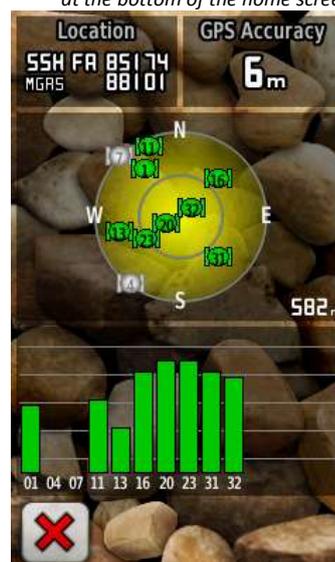
"Time To First Fix (TTFF) is a measure of the time required for a GPS receiver to acquire satellite signals and navigation data, and calculate a position solution (called a fix).

The TTFF is commonly broken down into three more specific scenarios:

Cold (or Factory): The receiver is missing, or has inaccurate estimates of, its position, velocity, the time, or the visibility of any of the GPS satellites. As such, the receiver must systematically search for all possible satellites. After acquiring a satellite signal, the receiver can begin to obtain approximate information on all the other satellites, called the almanac. This almanac is transmitted repeatedly over 12.5 minutes. Almanac data can be received from any of the GPS satellites and is considered valid for up to 180 days. Manufacturers typically claim the factory TTFF to be 15 minutes.

Warm (or Normal): The receiver has estimates of the current time within 20 seconds, the current position within 100 kilometres, and its velocity within 25 m/s, and it has valid almanac data. It must acquire each satellite signal and obtain that satellite's detailed orbital information, called ephemeris data. Each satellite broadcasts its ephemeris data every 30 seconds, and is valid for up to four hours.

Hot (or standby): The receiver has valid time, position, almanac, and ephemeris data, enabling a rapid acquisition of satellite signals. The time required of a receiver in this state to calculate a position fix may also be termed Time to Subsequent fix (TTSF).

Many receivers can use as many as twelve channels simultaneously, allowing quicker fixes."

Lifted from: http://en.wikipedia.org/wiki/Time_to_first_fix

The eTrex 30 can also use the GLONASS satellites, which is claimed to further reduce the time to obtain a fix.

2. Position Format and Datum

Position Format - Bushwalkers usually specify a location using the GR (Military **G**rid **R**eference System) or UTM (**U**niversal **T**ransverse **M**ercator) grid coordinates, not latitude/longitude geographical coordinates. Set your position format to MGRS.

(Your location in latitude/longitude may be required by rescue services, so be familiar with changing the position format on your GPS.)

Datum - The datum set in your GPS must be the same as that on the map you are using. If not, in Australia you may be about 200m metres away from where you think you are.

Mapping authorities are producing new editions of maps using the new GDA94 datum but the complete update will take many years, so maps for some popular walking areas may be based on either the older AGD66 datum or the GDA94 datum.

If the datum specified in the legend of your map is GDA94 (Geocentric Datum of Australia 1994):

then you should set your GPS datum to GDA94 (or WGS84, which is equivalent).

If the datum specified on your map is AGD66 (Australian Geodetic Datum 1966), then you should set your GPS datum to AGD66 (= Garmin's Aus Geod '66; = Magellan's AUS66).

For Garmin eTrex 30, select Setup, select Position Format, select Position Format, select MGRS. Select Map Datum, select GDA 94 or WGS 84 or Aus Geod '66

For Garmin Oregon 550, touch Setup*, touch* Position Format*, touch* Position Format*, touch* MGRS*.*
Touch Map Datum*, touch* GDA 94 *or* WGS 84 *or* Aus Geod '66 *as appropriate*
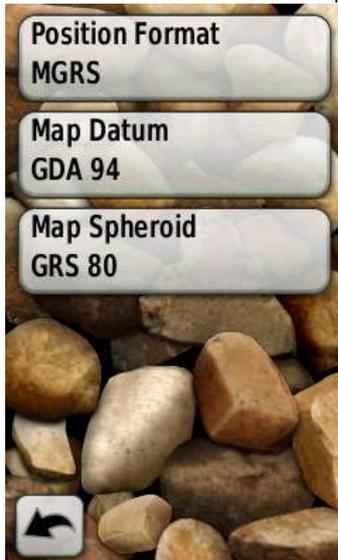
3. **Where am I?**

If you can't use your GPS to determine your location, either practise at home or take it on a walk and ask someone to show you how to use it.

There are many ways to do this:

- For the Garmin eTrex 30, from many screens, press and hold the thumb stick in for 2 seconds
- For both the Garmin eTrex 30 and Oregon 550, view the satellite screen
- For both the Garmin eTrex 30 and Garmin Oregon, have Location (Selected) as a data field on the Compass page and view the Compass page:

For Garmin eTrex 30, select Compass (as long as Location (Selected) is a data field on the Compass page)	*For Garmin 550, touch* Compass (as long as Location (Selected) is a data field on the Compass screen) *(Large Data Field to get this display)*
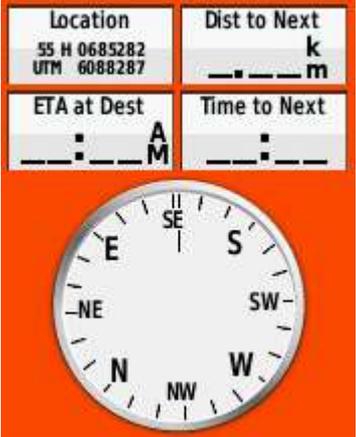
Your GPS will show your location to the metre if you are using a grid coordinate position format (ie. MGRS or UTM). In the field, it is more common to use 6-figure grid references composed of a 3-figure Easting plus a 3-figure Northing (because that's all you can really estimate on your map).

To convert your 10-figure GPS MGRS reading to a 6-figure GR, use the first three digits of the Easting plus the first three digit of the Northing. Thus, in the right hand screen capture above, it would be GR852882 (or, rounding each up, GR853883). Using this, you can locate your position on the map to within a 100 metre square of that 6-figure GR.

To convert your 14-figure GPS UTM reading to a 6-figure GR, ignore the first two digits of the Easting and use the next three digits. Do the same for the Northing and combine them. Thus, in the left hand screen capture above, it would be GR852882 (or, rounding each up, GR853883). (Be careful using UTM – a UTM Easting is always a 5-figure distance. In the left hand screen capture above, a leading zero has been added. Some GPS do not display this leading zero.)

Plot the GPS location on your map and check it against your actual surroundings for consistency. For example, if your GPS position when plotted on your map indicates that you should be on a hill top, but you are standing in a saddle, then something is wrong somewhere!

4. **Mark a Waypoint; GoTo a Waypoint**

A basic use for your GPS is to mark a waypoint and be able to return to the location.

Let's say you are camped by a stream in an unfamiliar area. Nature calls in the middle of the dark night and you know you should go 100 metres away. Companions in nearby tents are gently snoring, but that's not enough to guide you back.

Turn on your GPS, ensure you have a valid fix (see 1 above). Mark the waypoint and name it:

For Garmin eTrex 30, select Mark Waypoint*, select the automatically generated name,*
name the waypoint and Done*, select* Done
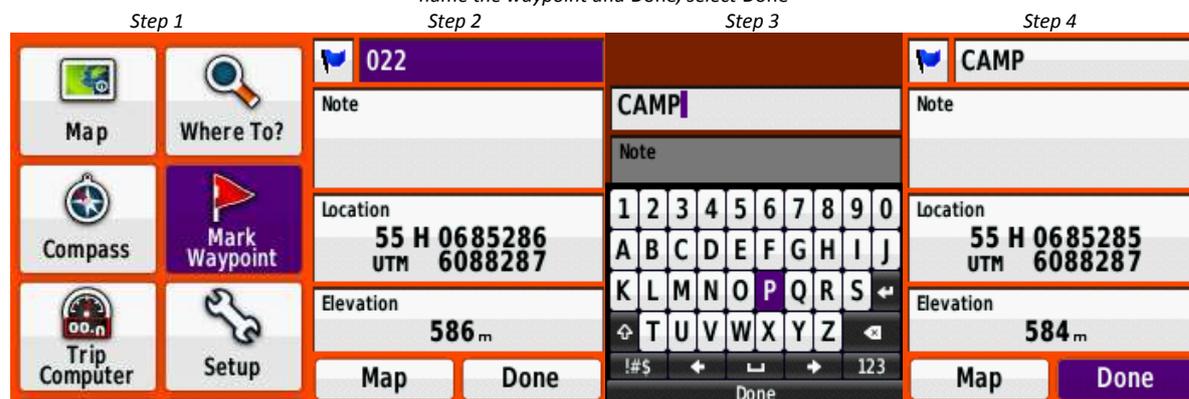
A shortcut for the Garmin eTrex 30 is to hold down the thumb stick for 2 seconds to create a waypoint, then select Done to save it with the generated name.

For Garmin Oregon 550, touch Mark Waypoint*, touch* Save and Edit*,*
touch Change Name*, name the waypoint, touch the* green tick
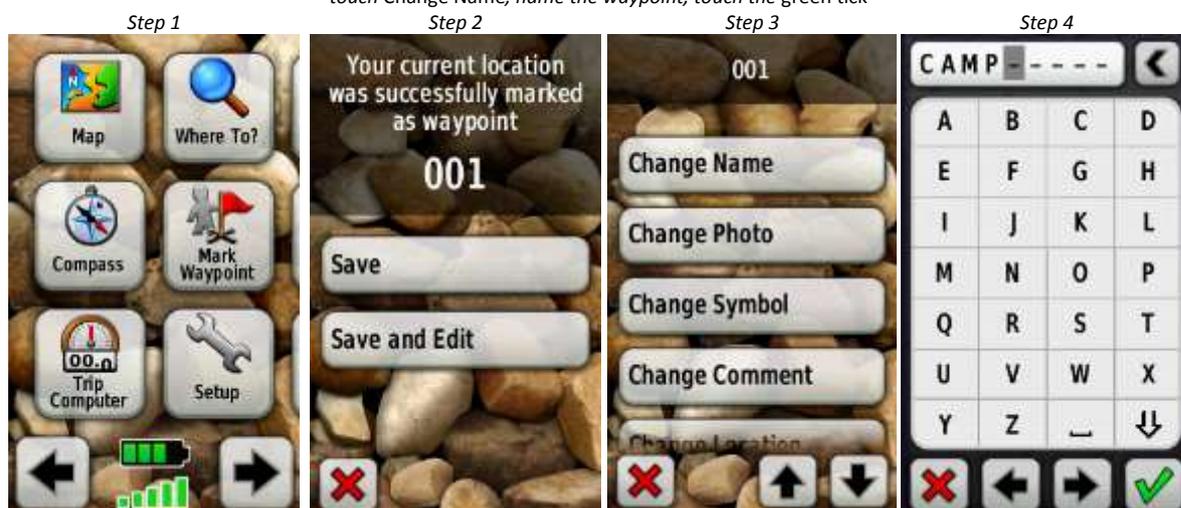
When you've finished your business, set the marked waypoint as a GoTo and navigate back to bed:

For Garmin eTrex 30, select Where To, select Waypoints*, select* the desired waypoint*, select* Go*, select* Compass*, navigate back*

	Step 1		*Step 2*		*Step 3*

	Step 4		*Step 5*		*Step 6*

For Garmin Oregon 550, Touch Where To?*, Touch* Find Another (if a current GoTo is set)*, Touch* Waypoints*, Touch* the desired waypoint*, Touch* Go*, Touch* X*, Touch* Compass, navigate back

	Step 1	*Step 3*	*Step 4*	*Step 8*

5. **Project a Waypoint**

You prop and check your location. By consulting your map you determine the location (and/or direction and distance) of the place where you will next check your progress. But a whiteout is suddenly upon you. How to continue?

You could proceed via 'dead reckoning' (ie. set off on a compass bearing and count your steps to estimate the required distance).

To assist (as long as your GPS is providing reasonably accurate position fixes in the conditions), you could augment your dead reckoning with your GPS.

There are 2 ways to do this:

- mark a waypoint, change its position to that required, then set the waypoint as a GOTO:

For Garmin eTrex 30, select Mark Waypoint*, select the* Location *field to be changed, change the* desired values*, Done, select* Where To?*, select the* desired waypoint*, navigate*

Step 1	Step 2	Step 3

Step 6	Step 7

For Garmin Oregon 550, touch Mark Waypoint, *touch* Save and Edit, *touch* Change Location,
change the location, *touch* Where To?, *touch* Waypoints, *touch* the waypoint just created, *navigate*

Step 1	Step 2	Step 3

Step 4	Step 7	Step 8

- Use your GPS Sight 'N Go function to set a direction and distance:

  (If, in this scenario, the whiteout is already upon you, measure the bearing from your location to the destination on your map and swing your GPS until the Sight 'N Go direction is the same)

For Garmin eTrex 30, select Sight 'N Go*, select* Lock Direction*, select* Project Waypoint*, select* the required distance unit*, enter* the distance*, select* Save*, navigate*

For Garmin Oregon 550, touch Sight 'N Go, touch Lock Direction, touch Project Waypoint,
touch the required distance unit, touch Enter Distance, enter the distance, touch Save, navigate

Step 1	Step 2	Step 3	Step 4
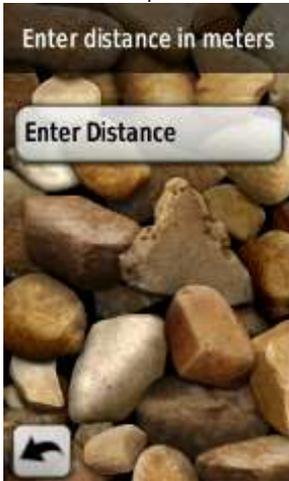
Step 5	Step 6	Step 7	Step 8
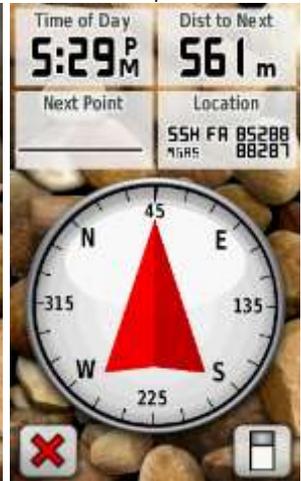
6. **Setup for Use**

'Out of the box' your GPS will need to be set up for your personal preferences, minimum power consumption, locality of use and other features. Customisation will vary, depending on the make and model of your GPS.

Some typical setup parameters for the Garmin eTrex 30 are:

- Position format and datum

    Setup, Position Format, Position Format, MGRS
    Setup, Position Format, Map Datum, GDA 94 (or Aus Geod '66, as appropriate).

- Use metric units

    Setup, Units, Distance/Speed, Metric
    Setup, Units, Elevation, Meters (m/min).

- Extend battery life

    Setup, System, Battery Type, Rechargeable NiMH (or whatever type you are using – Alkaline/Lithium/Rechargeable NiMH)
    Setup, Tones, Off
    Setup, Display, Backlight Timeout, 15 Seconds
    To set Backlight intensity (make it as low as possible): Tap power Switch, tap again to set, Tap Back to return.

- Compass

    Compass, press Menu button, Setup Heading, Display, Numeric Degrees
    Compass, press Menu button, Setup Heading, North Reference, Magnetic
    Compass, press Menu button, Setup Heading, Compass, Auto
    Compass, press Menu button, Calibrate Compass, follow the instructions.

- Customise the Compass page

    Compass, press Menu button, Change Data Fields, select the filed to change, select the field you want displayed.

Some typical setup parameters for the Garmin Oregon 550 are:

- Position format and datum

    Setup, Position Format, Position Format, MGRS
    Setup, Position Format, Map Datum, GDA 94 (or Aus Geod '66, as appropriate).

- Use metric units

    Setup, Units, Distance/Speed, Metric
    Setup, Units, Elevation, Meters (m/sec).

- Extend battery life

    Setup, System, Battery Type, Rechargeable NiMH (or whatever type you are using – Alkaline/Lithium/Rechargeable NiMH)
    Setup, System, Tones, Off
    Setup, Display, Backlight Timeout, 15 Seconds

Setup, Display, Battery Save, On
To set display intensity (make it as low as possible): Tap power switch, tap – (minus sign), Tap power Switch
Lock the screen when not in use: Tap power switch, touch Lock Screen
Carry the GPS so that the screen is not accidentally turned on.

- Compass

  Setup, Heading, Display, Numeric Degrees
  Setup, Heading, North Reference, Magnetic
  Setup, Heading, Compass, Auto (In "auto" mode the electronic compass is used to determine your heading when you moving slower than about 2-3kph. If you are moving faster than that the GPS is used to determine your heading
  Compass, long touch the Compass page, touch Start, follow the instructions.

- Customise the Compass page

  The default fields are not useful. They can be changed to any number of data fields. 4 useful fields to display are Time of Day, Distance To Next, Waypoint At Destination (or Waypoint At Next if you navigate using routes), Location (selected). For the short-sighted like me, a Large Data Field version of the Compass page can be chosen:

Garmin Oregon 550 customised Compass page

Oregon 550 customised Compass page small data fields	*Oregon 550 customised Compass page large data fields*

- Setup and/or Customise other features

  Camera, Altimeter, maximise internal storage, backup internal and extra storage to PC, customise startup message.

At the start of a walk:

- Zero any counter fields (eg. odometer, timer)
- Clear the current track
- Mark a waypoint at your start point.

7. Things to be Wary of

Your GPS may fail to provide a reasonable location fix for any number of reasons, including:

- Terrain (eg. in a gorge) or overhead cover (eg. dense foliage, blizzard) may prevent or hinder signal acquisition.

- Batteries fail – mitigate the risk by carrying spare batteries; using quality batteries (eg. single use Lithium are the tops, but expensive, or high capacity rechargeable LiMH). Cold affects batteries, so sleep with your GPS in low temperatures. Lithium batteries are recommended for sub-zero temperatures.

- Conserve battery power by switching off your GPS when not in use. Configure for minimum power consumption (see 6 above).

- If your GPS has an electronic compass, understand that if you set the compass to auto, when you are not moving or moving slowly (about 2-3kph), the electronic compass is used to determine your heading – thus consuming extra battery power. If you are moving faster, the GPS and satellite data is used to determine your heading.

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Last Updated: 23 May 2013