Setting up and using Garmin 72/76 GPS receivers

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GPS Setup

Turn on the unit by pressing the red power button and holding it down briefly, and press Page to agree to the terms when the warning screen appears.

The main GPS Information screen will be displayed showing the location, satellite positions and date and time.

Press Menu twice to display the Main Menu.

Press the lower side of the large centre rocker key (down arrow) to select Setup and press Enter.

The General Tab will be highlighted. The standard settings are:

- Mode = Normal,
- WAAS = Disabled,
- Backlight Timeout = 15 seconds,
- Beeper = Key and Message (or Message Only or Off) and
- Language = English (this setting may or may not be available depending on the GPS model)

To alter a setting, press the down arrow to highlight it, then Enter to select it. Once the setting has been selected, use the up/down arrow to select an option and Enter to set it. Press the up arrow to get to the Tab once more and the right arrow to move to the next Tab.

The next tab is Time. The standard settings are:

- Time Format = either 12 or 24 hour,
- Time Zone = Other, and
- UTC Offset = +10:00 (in daylight saving time, this should be altered to +11:00).
- Current Date – this is determined by the GPS and is not able to be altered.
- Current Time – this is determined by the GPS and is not able to be altered.

Unfortunately, Time Zones and the Daylight Saving Time option cannot be used outside North America. To alter the Time Zone to Eastern Standard Time, the UTC setting must be altered to +10:00. Press the down arrow to go to Time Zone, then the right arrow to move to UTC offset and press Enter. “+/−” will be highlighted. Use the up/down arrow to select “+” and then the right arrow to move to Hours, up/down to select 1 then the right arrow and up/down to select 0, and finally Enter to set the time zone. Press the up arrow until the Tab is highlighted again, and then the right arrow to move to the next Tab.
The next Tab is Units, where

- Elevation = metres,
- Depth = metres,
- Distance and Speed = metric (this setting may or may not be available)
- Temperature = Celcius,
- Direction display = Numeric Degrees (default), and
- Speed Filter = Auto.

The next Tab is Location.

The selection of the correct location format and datum in this section is critical.

**Location Format** should be hddd.ddddd° (for Hemisphere, Decimal Degrees).

If not, press the down arrow to highlight Location Format, then press Enter to select it, and the up/down arrow to scroll through the formats. When hddd.ddddd° is highlighted, press Enter.

**Map Datum** should be set to WGS 84.

If not, press the down arrow to highlight Map Datum, then press Enter to select it, and the up/down arrow to scroll through the formats. When WGS 84 is highlighted, press Enter. *Note that WGS84 is functionally equivalent to the new Australian standard datum, GDA94, shown in the map datum list as GDA. The WGS84 datum is used to be consistent with older GPS receivers that don’t have a GDA94 setting.*

North Reference is usually set to Auto (or True) if the location is set to a longitude/latitude format such as hddd.ddddd°. Auto provides magnetic north references, True provides true north references and Grid provides grid north references. Grid should only be set when a grid location format is being used, and you’re using a map to plot bearings.

Magnetic Variation will be blank unless North Reference is set to User (not recommended).

The next two tabs are Alarms and Interface.

Alarms are usually set to Off except for Approach and Arrival, which is usually set to Automatic.

Interface is usually set to Garmin (for PC connection) or None, but can be used to select a differential correction unit input (RTCM In). The setting for the PC data dump procedure is dependent upon the software being used (the setting is usually either Garmin or Text Out).

Press Page to exit back to the main GPS Information screen.

**GPS Operation**

*Turning the GPS on and off*

Turn on the unit by pressing the red power button and holding it down briefly, and press Page to agree to the terms when the warning screen appears.

The main GPS Information screen will be displayed showing the location, satellite positions and date and time.
Note that pressing the red power button briefly when the GPS receiver is on controls the contrast and backlighting. Pressing the red button again turns on the backlighting, and pressing the central rocker key to the right or left controls the contrast. The Enter button clears the contrast/backlight display.

To turn off the GPS receiver, press and hold the red power button once more.

**GPS use**

Hold the GPS receiver vertically for best results.

Always allow the GPS time to adjust to a new location before taking readings. This is particularly important if it has not been used for some time, or if the location has changed by 150 – 300km or more since last turning it on. Examine the position for a short time (a minute or so) to check that it is changing slightly (particularly the elevation). This indicates that the GPS is operating properly. Some GPS receivers will warn you if the position is old, or when the position accuracy is low.

GPS receivers require some time to adjust to a change of location of 300km or more, or to reinitialise if not used for some time. This process usually only requires about 5 minutes to complete.

In some circumstances, such as where the GPS is switched on for the first time, or has been stored for some time (particularly with the batteries removed), the process may take some time as the satellite almanac (orbital data and location) needs to be updated. In this case, an options menu will appear. The “New location” option can be used to manually enter an approximate location, which will speed up initialisation. The “Stored without batteries” or “Continue acquiring” options will force the GPS to continue acquiring satellites. In this case, it may require up to 15 minutes for the GPS to initialise or reinitialise.

**GPS position fixes**

The quality of GPS position fixes depends on a number of factors. The major causes of error in the location calculated by a GPS receiver are:

- the accuracy (quality) of the GPS,
- the effects of heat and electronic “noise” (from motors, etc.),
- the time of day/satellite geometry,
- the number of accessible satellites,
- satellite errors (errors in atomic clock timing or errors in transmitted location),
- atmospheric conditions,
- the shadowing of the signal (e.g. by trees, buildings, or the roof of the car if the GPS is sitting on the dashboard), and
- multipath errors (where the GPS receives reflected signals from fences, buildings, etc.).

A "normal" GPS reading is within about 15m of the actual position about 95% of the time, although it can often be better. At certain times during the day, the error can be as much as 30 – 50m. Accuracy can be improved to within about 5 – 8m by point averaging (see below), or even further by using a differentially corrected GPS.

GPS receivers are much less accurate for elevation than horizontal position. Also, GPS elevation is elevation from the datum, not elevation from mean sea level (the Australian Height Datum, which is the elevation shown on topographic maps). This difference can be as much as 80m.
A lock on at least three satellites is required to obtain a position. The more satellites that can be accessed by the GPS receiver, the better the accuracy of the readings that will be obtained. However, this can be limited by the position of the satellites.

Be wary of using a position fix if:

- The GPS receiver is not held vertically,
- “2D GPS Location” is shown rather than “3D GPS Location”,
- the accuracy figure is very high (substantially greater than 20m), indicating a high level of uncertainty (sometimes shown as a PDOP reading of more than 5 on other GPS receivers),
- the satellite strength indicator bars are low,
- only a small number of satellites are shown to be in use (black), or
- the satellite positions are primarily in the outer ring (i.e. are less than 45 degrees above the horizon), or are primarily clustered together in one quadrant of the display.

Poor satellite geometry usually only lasts for about 30 minutes.

For best results, move away from any obstructions. If this is not possible, stand on the northern side of an obstruction. Hold the GPS so it is tilted upwards rather than horizontal.

Note that many newer GPS receivers have the option of setting WAAS (Wide Area Augmentation System) for correction of GPS position to within 3m. WAAS should be turned off. WAAS is currently not available in Australia, although it is possible to pick up a WAAS signal in some locations along the east coast (northern Queensland). However, the lack of base stations in Australia (the nearest is in Hawaii) means that the signal is unlikely to improve accuracy, and may even increase positional error.

**Recording positions fixes and point averaging**

Record the latitude and longitude using the full number of decimal places reported by the GPS. Additionally, record the accuracy reported on the top right of the screen.

Your record should look something like:

30-AUG-07 10:48:00  
S 33.28667°  
E 149.10561°  
Accuracy 7.8m  

Store the position fix as a waypoint if possible. To do this, press and hold Enter/Mark to open the Mark Waypoint page, and then Enter again to store the waypoint. Prior to pressing Enter the second time, you can scroll up to the Name field at the top using the central rocker button, press Enter to select it, and enter a short description using up/down on the central rocker button to select letters/numbers. Press Enter to accept the name, scroll down to the OK button displayed on the screen and press Enter to store the waypoint.

Where possible, use the point averaging function rather than just reading the coordinates off the screen. A Garmin GPS will take a reading about once per second, and these will be used to give an average reading.

To do this, press and hold Enter/Mark until the Mark Waypoint page is displayed. Press Menu to view the options, and select Average Location and press Enter. The quality of the average is shown by the Estimated Accuracy field. This figure will fluctuate initially before stabilising. When finished averaging, press Enter to return to the Mark Waypoint page to save the waypoint.
**Using the GPS in a car**

If using the GPS in a car, the signal will not penetrate the car roof or even through some (athermic) windscreens, reducing the number of satellites the GPS can access and adversely affecting the accuracy of the readings. Ideally, connect the GPS to an external active antenna and use a 12V adapter.

While the Garmin GPS 72 has no external antenna socket, a reradiating antenna can be used with these receivers.

**Further Information**

For further information or assistance, contact any staff member from the Resource Information Unit at NSW Department of Primary Industries in Orange.

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