



Geographical Information Systems

Field Manual

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GPS surveying

These instructions relate to the Garmin GPS Ertex legend hand-held units only, and are not necessarily applicable to any other version.

Some important keys on the GPS unit

Bottom right button (On/Off button):

Turns the unit on and off and light switch for display

Top right button (Page button):

Scrolls through the 5 main pages and can be used to quit selection screens to return to the main screen.

Bottom left button (Find button):

Can be used to find recorded points of interest such as waypoint. Also can be used to delete (all) waypoints.

Top left buttons (Zoom buttons):

Zoom in and out on the Maps page

Left front rocker-key (Navigation/ENTER button):

To select menus, navigate through the menu options, change settings, delete and enter date

NOTE

You may need to delete data held within the GPS before you start. This tells you how to do this. (This is only when you already saved the necessary data from the GPS unit!!!)

Deleting waypoints from GPS

Press, Find button, Select Waypoints (with Navigation key), press on top of Navigation key to ENTER.

Select 'By name', ENTER, press Page button, navigate to Find page menu (left of x button), ENTER, select 'Delete all', ENTER.

Window asks you to confirm deletion. Select 'Yes' and Press ENTER.

Deleting tracklogs from GPS

Select 'Main Menu' from the main pages (top right button on all 5 main pages)

Select 'Tracks', press ENTER.

Navigate to Tracks page menu (left of x button), ENTER, select 'Delete all saved', ENTER.

Window asks you to confirm deletion. Select 'Yes' and Press ENTER.

A. Setting up the GPS

You can use a GPS: Indoors and Outdoors

After you switch on the GPS (Hold On/Off button pressed in) it shows several messages, you can quickly skip-through these by pressing the Page button several times. Then the GPS unit will automatically start looking for satellites (as shown on the Satellite page).

However when you are indoors it will not be able to connect with the satellites because the sky is obscured (NOTE: this is also an issue in dense canopy forests!)

Therefore, to do basic set-up tasks in the GPS when indoors:

On the Satellite page, navigate to the Satellite page menu (left of x button), ENTER, select 'Use With GPS Off', ENTER.

ESSENTIAL

First set-up steps to perform before using a GPS for a survey or navigating:

1. To set up Units (Position/coordinate Format, Map Datum and distance units):

Select 'Main Menu'

Select 'Setup'

In Setup Menu, Select 'Units'

Use the Navigation button to select and enter the following settings:

These are the settings used for the Survey in Kyrgyzstan

(NOTE: surveys in other countries will likely require different settings)

Position Format:

hddd°mm.mmm'

Map Datum:

WGS 84

Distance/Speed:

Metric

Elevation:

Meters

Vertical Spd:

m/sec

Depth:

Metric

(NOTE: When you have changed the batteries of your GPS device, ALWAYS recheck these settings!)

Check battery status, and date/time at bottom

If time is wrong:

Select 'Time' in 'Setup Menu'

Time Format:

24 Hour

Time Zone:

Almaty

UTC Offset:

+06hrs00min

(NOTE: When you have changed the batteries of your GPS device, ALWAYS recheck these settings!)

2. Positioning setup outdoors

After switching on the GPS on a certain location in the world it always needs to be initialised to the new location.

This needs to be done only once in every new location in the world (therefore if the GPS is only used in Kyrgyzstan then this step is not necessary. NOTE always check on the Map page if the GPS accurately positions you on the map by using the Zoom buttons)

On the Satellite page, select Satellite page menu (left of main selection menu in right corner of screen), ENTER

Select 'New Location'

Select 'Automatic'

Check on Map page if the GPS accurately positions you on the map by using the Zoom buttons.

If not, use the 'Use Map' option to find the correct position.

(NOTE: When you have changed the batteries of your GPS device, ALWAYS recheck these settings!)

(NOTE: Watch the satellite page while the position is being calculated. The satellite page is used to watch the satellites being fixed. The bars on the right hand of the satellites change from grey to black when locked – this is when the position has been found.)

Satellite strength

This varies according to whether you are in an open position or near a building. While standing in an open position:

Note the number of satellites in view

Note the general strength (high, medium, low)

Note the estimated positional error (Accuracy)

B. Survey methods Red list species in Kyrgyzstan - GPS data collection.

The survey consists of two parts:

Part 1:

Collecting Waypoints for individual trees.

Part 2:

Collect Tracks to record the surveyed area (size)

Part 1:

On the Satellite page a measure for Accuracy (in m) is indicated.

This measure needs to be between 5-10 meter (not higher!).

If this accuracy is acquired, the following actions need to be taken as quickly as possible, as the accuracy often changes rapidly when satellites move out and into range/view (especially in forests and mountainous areas!).

On the Satellite page:

Select from main drop down menu (in upmost right corner), 'Main Menu',
ENTER

Navigate to 'Mark', ENTER

(Record Waypoint number (related to the tree species with associated details (see Methods for tree recordings below), Location, Elevation)

Select OK, ENTER

Methods for tree recordings within each survey plot

For each individual tree record the following:

Plot number

1. Tree number (and Waypoint number (from GPS))
2. Tree Species
3. Position coordinates (from GPS)
4. Elevation (from GPS)
5. Diameter

6. If regeneration (<1.3m) is present (Y/N), if Y record the % of browse/grazing damage
7. Browse damage present on the tree, % of dead wood on the tree

Part 2:

After all the trees within the survey site are recorded the area (size) of the surveyed site needs to be recorded.

Select from main drop down menu (in upmost right corner), 'Main Menu',
ENTER

Select 'Tracks'

ESSENTIAL

First Setup the Track Log

On the Tracks page:

Select Tracks page menu (left next to x button)

Select 'Setup Track Log'

Use the Navigation button to select and enter the following settings:

Tick box of: Wrap When Full

Record Method:

Distance

Interval:

0.01km

Press x button when finished.

(NOTE: When you have changed the batteries of your GPS device, ALWAYS recheck these settings!)

For each individual site:

Make sure the Track log is empty when you start your track to record the size of the study site.

Select 'Clear'

Confirm by selecting 'Yes'

Switch on the Track Log from a starting point on the edge of a surveyed site.

Select 'On'

You can now start walking around the area that was surveyed including all the individual trees that were recorded. (The boundary of the surveyed area is defined by the geological features of the landscape (see [Methods site selection](#))).

When you have returned to your original starting point:

Select 'Save'

Save Back Through:

Select the appropriate starting time

(You can always check after you made your selection, on the map that is shown, if the track represents the site accurately, if not you can delete the track and select another option)

Record:

Name:

Distance:

In meters

Area:

In m²

Select OK, ENTER

Switch Track Log 'Off'

Move to a new location

(NOTE: You can only save 10 individual tracks (or sites), which means that you need to download the tracks to a computer frequently!! So bring laptop with the right software installed and the necessary cables to connect your GPS to the laptop!!)

Methods of fieldwork and site selection

An initial investigation of the study sites needs to be conducted to indicate locations where species of interest are present (combination of expert knowledge of local guides/foresters). Preferably an initial walk with a local guide is undertaken to record the areas of interest with GPS, so locations of interest can be visited independently afterwards.

The fieldwork is preferably conducted by 4 persons. At least one botanist needs to be present that can identify the tree species of interest. One couple goes in the plot to mark the trees and the second couple follows to record the individual trees (this work can possibly be undertaken by two persons, but it will take a long time to perform the individual surveys).

Individual areas are explored in more detail by surveying and marking all the trees of the species of interest. This is done by tying a ribbon to the tree. These are removed after the measurements are undertaken (see Methods for tree recordings within each survey plot).

The extent of the survey plots was determined by geological features present that were used as a 'natural' boundary. Features included: (small) streams, distinct ridges on mountain sides, top of a mountain ridge, a steep ravine edge.

C. Transferring data from GPS to ArcGIS 9.2

Launch the Map Source/ GPS utility on the PC by double clicking on the icon on the desktop, or selecting from the 'Programmes' menu.

Connect the GPS to the laptop via the cable supplied. Use COM4 (USB port on the right side of the laptop).

Select 'Main Menu'
Select 'Setup'
In Setup Menu, Select 'Units'

Position Format:
hddd,dddd°

Map Datum:
WGS 84

Distance/Speed:
Metric

Elevation:
Meters

Vertical Spd:
m/sec

Depth:
Metric

Go to the Map Source software.
Select the 'Edit' tab on the toolbar.

Select 'Preferences' > 'units' tab.

You need to make sure that values are in metric units. Area needs to be in hectares.

Select 'Position' tab > Lat/Lon hddd, dddd°

Datum: WGS 84

Select 'Apply' then 'Ok'.

You then need to go to the icons along the toolbar – select the icon 'Receive from device' – this is the one with the arrow that is pointing upwards. Select 'Get info'.

Make sure that the GPS is switched on.

Click 'waypoints' on the computer, which is a check box under the 'GETINFO' box.

Subsequently, click 'tracklogs' and repeat.

To export, select 'File' menu, 'Save as' **.txt file** - **this is important.**

Open ArcMap. In the Tools menu select 'Add x, y data'. Select Coordinate system (WGS84).