

LAO DATUM SETUPS
For
GARMIN eTrex
GPS Receivers



GEOMAP LAOS June 2008

This document describes how to set up a Garmin eTrex receiver to use the 3 map datums most commonly used in Laos: Indian 1960, Indian 1975 (UTM projection) & Vientiane 1982 (Gauss-Kruger projection). The more recent Lao 1997 datum is rarely used on printed maps. If you require a setup for this datum, please contact Geomap at the email address shown on the bottom of this page.

Note: The first version of this document used the Pulkovo 1942 datum with the Gauss-Kruger projection. This is the nearest approximation for the 100,000 scale topographic maps in the standard projections for MapInfo GIS software. The Vientiane 1982 datum is strictly correct, but must be written as a custom datum in MapInfo. The difference is about 60m

INDIAN 1960 and INDIAN 1975 DATUMS (UTM Projection)

The Indian 1960 datum is used on 1:50,000 scale topographic maps and the Indian 1975 datum is used on 1:25,000 scale topographic maps in Laos. Unfortunately, these datums are not included as standard datums in Garmin GPS receivers. However, Garmin does include a datum called "Indian Thailand" This datum is very close to Indian 1960 and Indian 1975. The maximum difference is approximately 15m. This is similar to GPS errors (10m) and insignificant at 50,000 scale (0.3mm) and at 25,000 scale (0.6mm) so the Garmin GPS receiver can be set to the Indian Thailand datum for use with both 1:50,000 and 1:25,000 scale maps in Laos. If more precise results are required (eg, for Differential GPS work), please contact Geomap Laos for further details.

SETUP INSTRUCTIONS

SET UNITS to METRIC.

Press PAGE several times until you see the **MENU** page.
Scroll down to **SETUP**. Press ENTER.
Scroll down to **UNITS**. Press ENTER.
Scroll to **UNITS** box. Press ENTER.
Scroll to **METRIC**. Press ENTER.
You should now be in the **UNITS** page.

SET POSITION FORMAT to UTM UPS (this may already be set)

In the **UNITS** page;
Scroll to **POSITION FORMAT** box. Press ENTER
Scroll down to **UTM UPS**. Press ENTER.
You should now be in the **UNITS** page.

SET MAP DATUM to INDIAN THAILAND

In the **UNITS** page;
Scroll to **MAP DATUM** box. Press ENTER.
Scroll to **Indian Thailand**. Press ENTER.
You should now be in the **UNITS** page.

RETURN to NAVIGATION PAGES

Press page repeatedly to go back to the positioning pages.

VIENTIANE 1982 DATUM (Gauss-Kruger projection)

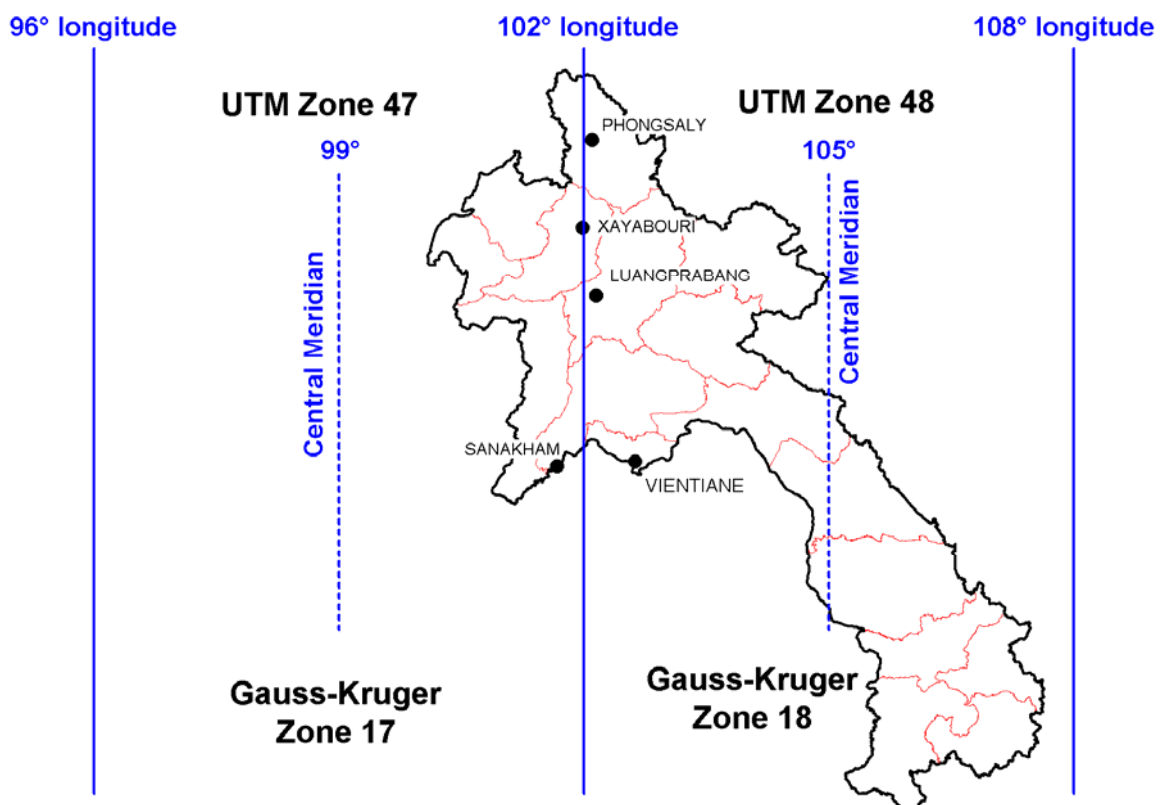
The Vientiane 1982 datum is used with Gauss-Kruger projection on 1:100,000 scale topographic maps in Laos. It is referred to as "Systeme de coordonnees de Vientiane" (Vientiane Coordinate System) with Krassovsky 1940 spheroid and "de Gauss" projection.

Note: The first version of this document described settings for the Pulkovo 1942 datum with the Gauss-Kruger projection for use with 100,000 scale topographic maps. The Pulkovo 1942 datum was used instead of Vientiane 1982 because it is available as a standard setting in MapInfo GIS software. The difference in calculated positions is approximately 60m. This is insignificant on 100,000 scale maps (0.6mm), but greater than GPS error so the Vientiane 1982 datum has been used here to improve accuracy. If the GPS output data is to be used in MapInfo software, a custom datum for Vientiane 1982 must be written into the projection file (email Geomap for details).

The Vientiane 1982 datum is not included as a standard setting in Garmin GPS receivers. So a USER DATUM must be defined.

Gauss-Kruger is a transverse Mercator projection, but it uses a different zone numbering system and scale factor to UTM (Universal Transverse Mercator). Consequently it is also necessary to set up a USER GRID.

Note: there are 2 UTM zones in Laos. Gauss-Kruger projection numbers these 17 and 18. These are equivalent to the UTM zones 47 and 48. The dividing line is 102° longitude. The central meridian for zone 17 is 99°. The central meridian for zone 18 is 105°.



Unfortunately, this also means that the value for the Central Meridian must be changed manually when crossing the 102° zone boundary (See instructions on last page).

Note that full coordinates from the Gauss-Kruger projection include the Zone number as the first 2 digits of the easting. Some Garmin receivers do not have enough digits to display these numbers so they have been omitted from this setup. If you use this setup to record coordinates, you must manually add the zone numbers to the front of the eastings if you quote the figures as Gauss-Kruger projection or enter the data into GIS software under this projection.

If you are familiar with the operating system of your GPS, you can use the parameters below to set up the User Datum and User Grid. If you need more help, there are step by step instructions below the data.

Remember, if you change back to WGS84 Datum or another datum, you need to reset both the **DATUM** and the **LOCATION FORMAT**.

PARAMETERS

MAP DATUM (Vientiane 1982)

Set up the **MAP DATUM** to **USER DATUM** with the following parameters:

dx +42.358

dy -124.688

dz -37.366

da -108

df -0.042776437

The eTrex interface does not allow decimal places in the x, y, z shift parameters so the above numbers need to be rounded to the following whole numbers. The resulting differences in position are less than the errors associated with normal GPS operation.

dx +42

dy -125

dz -37

da -108

df -0.0427764

USER GRID (Gauss-Kruger Projection)

Set the **LOCATION FORMAT** to **User UTM** with the following parameters for zone 48 (ie Zone 18 in Gauss-Kruger):

Longitude Origin E105°

False Easting 500000

False Northing 0

Scale Factor 1

For Zone 17, the numbers are the same except that the Longitude Origin is E99°.

SETUP INSTRUCTIONS

SET UNITS to METRIC.

Press PAGE several times until you see the **MENU** page.
Scroll down to **SETUP**. Press ENTER.
Scroll down to **UNITS**. Press ENTER.
Scroll to **UNITS** box. Press ENTER.
Scroll to **METRIC**. Press ENTER.
You should now be back in the **UNITS** page.

SET POSITION FORMAT to USER GRID

In the **UNITS** page;
Scroll to **POSITION FORMAT** box. Press ENTER
Scroll down to **User Grid**. Press ENTER.
You should now be in the **USER GRID** page.

SET LONGITUDE ORIGIN to E 105° (for zone 18)

In the **USER GRID** page;
Scroll to **LONGITUDE ORIGIN**. Press ENTER.
The **E/W** character should be selected. Press ENTER.
Scroll to **E**. Press ENTER.
The first digit should be selected. Press ENTER.
Scroll to **1**. Press ENTER.
The next digit should be selected. Press ENTER.
Scroll to **0**. Press ENTER.
The next digit should be selected. Press ENTER.
Scroll to **5**. Press ENTER.
Scroll down until the **OK** button is selected. Press ENTER.
You should now be in the **USER GRID** page.
The display should read **E 105° 00.000'**.

SET SCALE to 1

In the **USER GRID** Page;
Scroll until the **SCALE** box is selected. Press ENTER.
The first digit should be selected. Press ENTER.
Scroll to **1**. Press ENTER.
The next digit should be selected. Press ENTER.
Scroll to **0**. Press ENTER.
Repeat this process until all the remaining digits are set to **0**.
Scroll until the **OK** button is selected.
Press ENTER.
You should now be in the **USER GRID** page.
The display should read **1.000000** for **SCALE**.

SET FALSE EASTING to 500,000

In the **USER GRID** Page;
Scroll until **FALSE E (mt)** is selected. Press ENTER.
The first digit should be selected. Press ENTER.
Scroll to **0**. Press ENTER.
The next digit should be selected. press ENTER.
Scroll to **0**
The next digit should be selected. Press ENTER.
Scroll to **5**. Press ENTER.
The next digit should be selected. Press ENTER.
Scroll to **0**. Press ENTER.
Repeat this process until all the remaining digits are set to **0**.
Scroll to select the **OK** button. Press ENTER
You should now be in the **USER GRID** page.
The display should read **FALSE E 500000.0**.

SET FALSE NORTHING to 0.0

Scroll to select **FALSE N (mt)**. Press ENTER.
The left digit should be selected. Press ENTER.
Scroll to **0**. Press ENTER.
The next digit should be selected. Press ENTER.
Continue this until all digits are set to **0**.
Scroll to select the **OK** button. Press ENTER.
You should now be in the **USER GRID** page.
The display should read **FALSE N 0.0**.

Scroll to select the **OK** button. Press ENTER.

You should now be back in the **UNITS** page.

SET MAP DATUM to USER UTM

In the **UNITS** page;
Scroll to **MAP DATUM** box. Press ENTER.
Scroll to **User**. Press ENTER.
You should now be in the **USER DATUM** page.

SET DX to 42.

In the **USER DATUM** page;
Scroll to the **DX** box. Press ENTER.
The +/- sign should be selected.
Scroll until the 4th digit is selected. Press ENTER.
scroll to **4**. Press ENTER.
The 5th digit should be selected. Press ENTER.
Scroll to **2**. Press ENTER.
The **OK** button should be selected.
Press ENTER.
the display should read **DX 42**.

SET DY to -125

In the **USER DATUM** page;
Scroll to the **DY** box. Press ENTER.
The +/- sign should be selected. Press ENTER.
Scroll to **-**. Press ENTER.
The next digit should be selected.
Scroll to select the 3rd digit. Press ENTER.
Scroll to **1**. Press ENTER.
The next digit should be selected. Press ENTER.
Scroll to **2**
The next digit should be selected. Press ENTER.
Scroll to **5**. Press ENTER.
The **OK** button should be selected. Press ENTER.
The display should read **DY -125**.

SET DZ to -37

In the **USER DATUM** page;
Scroll to the **DZ** box. Press ENTER.
The +/- should be selected. Press ENTER.
Scroll to **-**. Press ENTER.
Scroll to select the 4th digit. Press ENTER.
Scroll to **3**. Press ENTER.
The last digit should be selected. Press ENTER.
Scroll to **7**. Press ENTER.
The **OK** button should be selected.
The display should read **DZ -37**.

SET DA to -108

In the **USER DATUM** page;
Scroll to the **DA** box. Press ENTER.
The +/- sign should be selected. Press ENTER.
Scroll to -. Press ENTER.
Scroll to select the 3rd digit. Press ENTER.
Scroll to **1**. Press ENTER.
The 4th digit should be selected. Press ENTER.
Scroll to **0**. Press ENTER.
The 5th digit should be selected. Press ENTER.
Scroll to **8**. Press ENTER.
The **OK** button should be selected.
The display should read **DA -108**.

SET DF to -0.0427764

In the **USER DATUM** page;
Scroll to the **DF** box. Press ENTER.
The +/- sign should be selected. Press ENTER.
Scroll to -. Press ENTER.
Scroll to select the 2nd decimal place. Press ENTER.
Scroll to **4**. Press ENTER.
The 3rd decimal place should be selected. Press ENTER.
Scroll to **2**. Press ENTER.
The 4th decimal place should be selected. Press ENTER.
Scroll to **7**. Press ENTER.
The 5th decimal place should be selected. Press ENTER.
Scroll to **7**. Press ENTER.
The 6th decimal place should be selected. Press ENTER.
Scroll to **6**. Press ENTER.
The 7th decimal place should be selected. Press ENTER.
Scroll to **4**. Press ENTER.
The **OK** button should be selected. Press ENTER.
You should now be in the **USER DATUM** page.
The display should now read **DF -0.0427764**.

Scroll to select the **OK** button. Press ENTER.
You should now be in the **UNITS** page.

RETURN to NAVIGATION PAGES

Press PAGE repeatedly to go back to the positioning pages.

CHANGING ZONES

If you are working in an area west of 102° longitude, you will need to change to Zone 17 (central meridian 99°).

CHANGE TO ZONE 17

Press PAGE several times until you see the **MENU** page.
Scroll to **SETUP**. Press ENTER.
Scroll to **UNITS**. Press ENTER.
Scroll to **POSITION FORMAT** box. Press ENTER
Scroll down to **User Grid**. Press ENTER.
Scroll to select **User Grid**. Press ENTER.
You should now be in the **USER GRID** page.

SET LONGITUDE ORIGIN to E 99° (for zone 17)

In the **USER GRID** page;
Scroll to **LONGITUDE ORIGIN**. Press ENTER.
Scroll to the second digit. Press ENTER.
Scroll to **0**. Press ENTER.
The next digit should be selected. Press ENTER.
Scroll to **9**. Press ENTER.
The next digit should be selected. Press ENTER.
Scroll to **9**. Press ENTER.
Scroll down until the **OK** button is selected. Press ENTER.
You should now be in the **USER GRID** page
The display should read **LONGITUDE ORIGIN E 99° 00.000'**.

RETURN to NAVIGATION PAGES

Press page repeatedly to go back to the positioning pages.