LAO DATUM SETUPS

For

GARMIN GPS-76

GPS Receivers

GEOMAP LAOS June 2008

info@geomap.net.au

This document describes how to set up a Garmin GPS76 receiver to use the 3 map datums most commonly used on printed maps 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.

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 the MENU button 2 times to show the **Main Menu**.
Scroll down **Setup**. Press ENTER.
Scroll right to the **UNITS** tab.
Scroll Down to the **Elevation** box. Press ENTER.
Scroll to **Meters**. Press ENTER.
Scroll right to the **Depth** box. Press ENTER.
Scroll to **Meters**. Press ENTER.
Scroll down to the **Distance and Speed** box. Press ENTER.
Scroll to **Metric**. Press ENTER.
You should now be in the **UNITS** tab.

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

In the **UNITS** tab;
Scroll up until the top of the **UNITS** tab is selected.
Scroll right to the **Location** tab.
Scroll down to **Location Format** box. Press ENTER.
Scroll down to **UTM UPS**. Press ENTER.
You should now be in the **Location** tab.

SET MAP DATUM to INDIAN THAILAND

In the **Location** Tab;
Scroll down to the **Map Datum** box. Press ENTER.
Scroll to **Indian Thailand**. Press ENTER.
You should now be in the **Location** tab.

RETURN to NAVIGATION PAGES

Press **QUIT** 2 times to go back to the positioning pages.

info@geomap.net.au

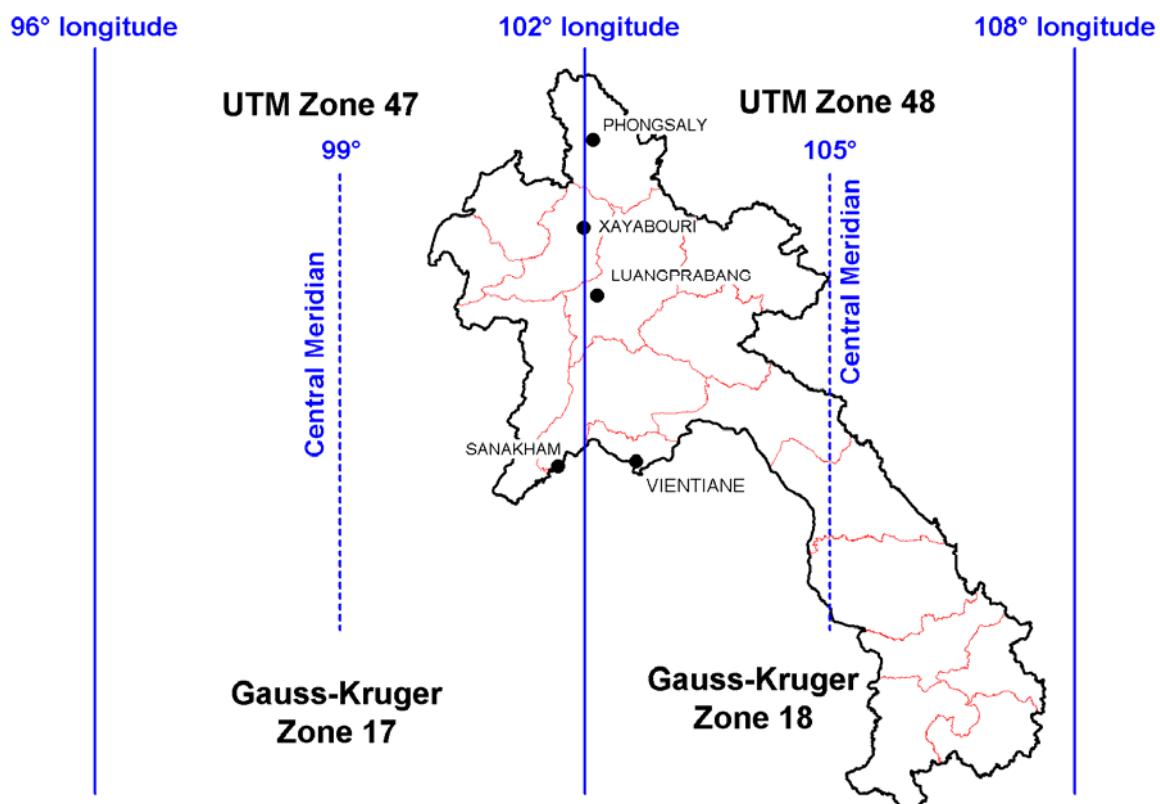# VIENTIANE 1982 DATUM (Gauss-Kruger projection)

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°.

info@geomap.net.au

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 GPS-76 interface only allows for 1 decimal place in the x, y, z shift parameters so the above numbers need to be rounded as shown below. The resulting differences in position are less than the errors associated with normal GPS operation.

dx +42.4
dy -124.7
dz -37.4
da -108
df -0.04277644

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°.

info@geomap.net.au

SETUP INSTRUCTIONS

SET UNITS to METRIC.

Press MENU 2 times to show the **Main Menu**.
Scroll down to **Setup**. Press ENTER.
Scroll right to the **UNITS** tab.
Scroll Down to the **Elevation box**. Press ENTER.
Scroll to **Meters**. Press ENTER.
Scroll right to the **Depth** box. Press ENTER.
Scroll to **Meters**. Press ENTER.
Scroll down to the **Distance and Speed** box. Press ENTER.
Scroll to **Metric**. Press ENTER.
You should now be in the **UNITS** tab.

SET LOCATION FORMAT to User UTM

In the **UNITS** tab;
Scroll up until the top of the **UNITS** tab is selected.
Scroll right to the **Location** tab.
Scroll down to **Location Format** box. Press ENTER.
Scroll down to **User UTM Grid**. Press ENTER.
You should now be in **User Grid Setup**.

Note: if the Location format is already set to **User UTM Grid** and you want to change the settings of the grid, just press MENU when in the **Location** tab and select **Setup User Grid**.

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

In the **User Grid Setup**;
Scroll to **Longitude Origin**. Press ENTER.
The **E/W** character should be selected.
Use the scroll button to set this character to **E**.
Scroll right to select the first digit.
Scroll down to **1**.
Scroll right to select the next digit.
Scroll down to **0**.
Scroll right to select the next digit.
Scroll down to **5**.
Scroll right to select the next digit.
Scroll down to **0**.
Continue this process until all the remaining digits are set to **0**.
Press ENTER to exit the box.
The display should read **E 105° 00.000'**.

info@geomap.net.au

SET SCALE to 1

In the **User Grid Setup**;
Scroll down to the **Scale** box. Press ENTER.
The +/- symbol should be selected.
Scroll down to +.
Scroll right to the first digit.
Scroll down to **1**.
Scroll right to the next digit.
Scroll down to **0**.
Repeat this process until all the remaining digits are set to **0**.
Press ENTER to exit the box.
The display should read +**1.0000000** for **Scale**.

SET FALSE EASTING to 500,000

In the **User Grid Setup**;
Scroll down to the **False Easting** box. Press ENTER.
The +/- symbol should be selected.
Scroll down to +.
Scroll right to select the second digit.
Scroll down to **5**
Scroll right to select the next digit.
Scroll down to **0**.
Repeat this process until all the remaining digits are set to **0**.
Press ENTER to exit the box.
The display should read False Easting +**500000.0m**

SET FALSE NORTHING to 0.0

In the **User Grid Setup**;
Scroll down to select **False Northing**. Press ENTER.
The +/- symbol should be selected.
Scroll down to +.
Scroll right to select the first digit.
Scroll down to **0**.
Repeat this process until all the digits are set to **0**.
Press ENTER to exit the box.
The display should read **False Northing 0.0m**

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

You should now be back in the **Location** tab.

SET MAP DATUM to USER

In the **Location** tab;
Scroll down to the **Map Datum** box. Press ENTER.
Scroll to **User**. Press ENTER.
You should now be in the **User Datum Setup**.

Note: if the **Map Datum** is already set to **User** and you want to change the settings of the **User Datum**, just press MENU when in the **Location** tab and select **Setup User Datum**.

info@geomap.net.au

SET DX to 42.4

In the **User Datum Setup**;
Scroll down to the **DX** box. Press ENTER.
The +**/-** symbol should be selected.
Scroll down to +.
Scroll right until the 7th digit is selected.
Scroll up to **4**.
Scroll right to the next digit.
Scroll up to **2**.
Scroll right to the first decimal place.
Scroll up to **4**.
Press ENTER to exit the box.
The display should read **DX +42.4m**.

SET DY to -124.7

In the **User Datum Setup**;
Scroll down to the **DY** box. Press ENTER.
The +/- symbol should be selected.
Scroll down to **-**.
Scroll right until the 6th digit is selected.
Scroll up to **1**.
Scroll right to the next digit.
Scroll up to **2**.
Scroll right to the next digit.
Scroll up to **4**.
Scroll right to the first decimal place.
Scroll down to **7**.

Press ENTER to exit the box.
The display should read **DY -124.7m**.

SET DZ to -37.4

In the **User Datum Setup**;
Scroll down to the **DZ** box. Press ENTER.
The +**/-** symbol should be selected.
Scroll down to **-**.
Scroll right until the 7th digit is selected.
Scroll up to **3**.
Scroll right to the next digit.
Scroll down to **7**.
Scroll right to the first decimal place.
Scroll up to **4**.
Press ENTER to exit the box.
The display should read **DZ -37.4m**.

info@geomap.net.au

SET DA to -108

In the **User Datum Setup**;
Scroll down to the **DA** box. Press ENTER.
The +/**-** symbol should be selected.
Scroll down to **-**.
Scroll right until the 6th digit is selected.
Scroll down to **1**.
Scroll right to the next digit.
Scroll down to **0**.
Scroll right to the next digit.
Scroll down to **8**.
Press ENTER to exit the box.
The display should read **DA -108m**.

SET DF to -0.0427764

In the User Datum Setup;
Scroll down to the **DF** box. Press ENTER.
The +/**-** symbol should be selected.
Scroll down to **-**.
Scroll right to the 2nd decimal place.
Scroll down to **4**.
Scroll right to the 3rd decimal place.
Scroll down to **2**.
Scroll right to the 4th decimal place.
Scroll down to **7**.
Scroll right to the 5th decimal place.
Scroll down to **7**.
Scroll right to the 6th decimal place.
Scroll down to **6**.
Scroll right to the 7th decimal place.
Scroll down to **4**.
Scroll right to the 8th decimal place.
Scroll down to **4**.
Press ENTER to exit the box.
The display should now read **DF -0.04277644**.

Scroll to select the **SAVE** button. Press ENTER.
You should now be in the Location Tab.

RETURN to NAVIGATION PAGES

Press QUIT 2 times to go back to the positioning pages.

info@geomap.net.au

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 MENU 2 times to show the **Main Menu**.
Scroll down to **SETUP**. Press ENTER.
Scroll right to the **Location** tab.
Press MENU.
Scroll down to **Setup User Grid**. Press ENTER.
You should now be in the **User Grid Setup**.

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

In the **User Grid Setup**;
Scroll to the **Longitude Origin** box. Press ENTER.
The **E/W** character should be selected (this should be E)
Scroll right to the first digit.
Scroll down to **0**.
Scroll right to the next digit.
Scroll down to **9**.
Scroll right to the next digit.
Scroll down to **9**.
Press ENTER to exit the box
The display should read **Longitude Origin E 099° 00.000'**.

Scroll down to the Save button. Press ENTER.

RETURN to NAVIGATION PAGES

Press QUIT 2 times to go back to the positioning pages.

info@geomap.net.au