

Mixing Leica and 3rd Party GPS Receivers

It is becoming increasingly common for GPS users to use GPS systems manufactured by different GPS suppliers.

One reason for this is that a previous 3rd party GPS user has now bought Leica System 500 and wishes to use the better system (the Leica) as the rover and his old GPS system as the reference. Another reason is that many construction projects will use one (or more) reference station to cover the whole site (which may or may not be Leica), but the site surveyors wish to use Leica System 500 as rover units.

Whatever the reason for mixing different GPS manufacturers equipment, there are some guidelines which should be followed. This newsletter describes some of the things that should be considered when using a 3rd party GPS receiver and Leica GPS equipment.

Antenna

Newsletter Vol. 01, No. 12 explained why it is important to ensure that the correct antenna models are used when using GPS. This is necessary to ensure that the correct antenna characteristics are used and in particular, that the correct antenna **phase centre variations (PCVs)** are applied.

As described in that newsletter, neglecting to use the correct antenna models may reduce the systems performance – possibly increasing the time taken to fix ambiguities or in some cases, preventing ambiguities to be fixed at all.

Imagine a user is using a **Trimble 4700** as the reference with a **Trimble Micro Centred**

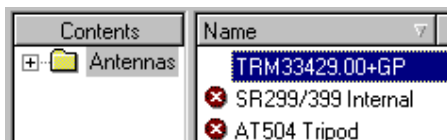
antenna with **Ground Plane** (s/n 33429.00).

As described in the Vol. 01, No. 12 newsletter, the correct antenna calibration file for this antenna can be downloaded from this **NGS** web site. (Note this web address has changed since Newsletter Vol. 01, No. 12).

<http://www.ngs.noaa.gov/ANTCAL/>

Within this web site, access the **Complete Relative Antenna Calibration File**. This text file contains many calibrated antennas including the **TRM33429.20+GP** which is the antenna we need. The easiest way to “download” this file is to right click and **Select All**, then **copy** everything into a text editor and then save this file as a text file.

In SKI-Pro, access the **Antenna Management** component and right click and choose **Import Antenna File....** Browse to find the antenna text file we have just created which will then import all the antennas listed in the text file. This antenna file contains many antennas – we only need the **TRM33429.00+GP** – the rest of the antennas can be de-



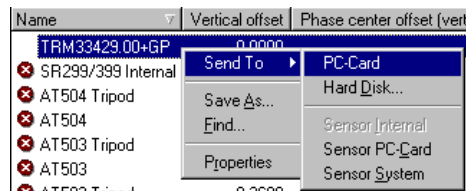
leted.

So now the correct antenna is stored in SKI-Pro. The next step is to transfer this antenna record to the System 500 sensor.

Access the **Sensor Transfer** component – right click on the **TRM33429.00+GP** antenna and choose **Send To**.

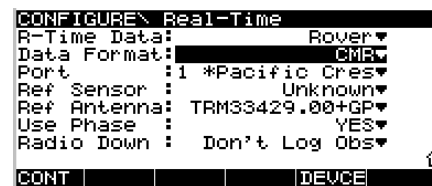
If the sensor is connected to your PC, then you can transfer the antenna directly to the **Sen-**

sor System - if not then transfer the antenna to the PC card. (For information, the antenna is stored in a file called **list.ant** which is stored in the **GPS** directory on the PC card).



If the antenna is stored on the PC card, then insert the PC card into the sensor and choose **04 Antenna Info** from the **TRANSFER/ Menu** panel. This will transfer the antenna from the PC card to the sensor system RAM.

Finally, it is just needed to edit the configuration set. Access the **CONFIGURE\ Real-Time** panel and choose the



TRM33429.00+GP antenna as the **Ref Antenna**. The **Ref Sensor** should be set to **Unknown**.

The Leica rover is now able to apply the correct antenna PCV values to the RTK reference station data.

RTK Messages

The Leica SR530 can receive most of the common RTK message data formats broadcast by most RTK reference stations including **RTCM** messages **18,19, 20** and **21** and the Trimble **CMR** RTK message.

Choose the correct **Data Format** in the **CONFIGURE\ Real-Time** panel.

Note that with RTCM messages, it is also possible to choose the **RTCM Version** and the number of **Bits / Byte** by choosing **F6 (RTCM)** in the **CONFIGURE\ Real-Time** panel. This may need to be configured for some reference stations.

RTK Data Link

The RTK data link used by the 3rd party reference station will in most cases be a radio modem.

If the radio being used by the 3rd party reference is a radio already supported by System 500 (such as a **Satellite** or **Pacific Crest**) then simply choose this as the real time device.

Most Trimble reference station set-ups use a radio modem that operate in **TrimTalk** mode. The **Pacific Crest RFM96W** (needs firmware 5.06) and the **Pacific Crest PDL** radio modems can be configured to operate in the **TrimTalk** mode. This can be done by using the configuration software available from Pacific Crest.

You must also ensure that the Trimble reference radio and the rover radio are operating on the same frequency. This can be achieved by changing the channel on the Pacific Crest RFM96W in the normal way with a System 500 sensor.

If the channel you require is not yet programmed into the RFM96W, then you should contact your local selling unit or dealer. They will have software from Pacific Crest which allows the frequencies which are programmed into the radio modem to be configured.

Post Processing

Raw observations collected by the 3rd party reference station can be imported into SKI-

Pro in RINEX format. It is necessary to first convert the data collected on the 3rd party receiver using the 3rd party's data converter.

As when using RTK with 3rd party receivers and antennas at the reference station - it is also important to ensure that the correct antenna record is used when processing data within SKI-Pro.

There is some information contained in the RINEX data imported from the reference station, but only the antenna number and type (**ANT #** and **TYPE**) and the antenna offsets (**DELTA H/E/H**), not the antenna PCVs. This means that it is important to already have the full antenna record information (including PCVs) stored within SKI-Pro.

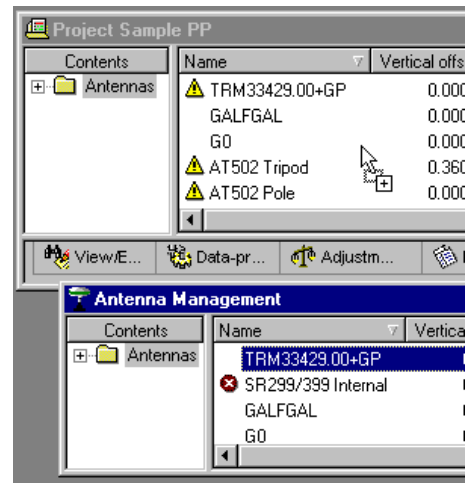
During import of the RINEX data, if an antenna of the same name is available within SKI-Pro as the antenna type (**ANT TYPE**) recorded in the RINEX file, then the imported data will be assigned this antenna.

If an antenna of the same name does not exist within SKI-Pro as recorded in the RINEX file, then a new antenna will be created within SKI-Pro (with the name as seen in the RINEX data) and the imported data will be assigned this new antenna. Of course though, this new antenna does not contain the necessary PCV information – it only contains the offset values.

In this case, it is then necessary to assign the correct antenna to the imported data once the data has been imported. This is a two stage process (assuming you have already imported the antenna records from the NGS web site as described earlier).

First, copy the antenna you need from the **Antenna Management** component of SKI-Pro into the **Antenna** tab view of the project where the RINEX data was imported. This is easy to do by dragging and dropping the antenna as shown in the screen shot below.

Second, within the **Data Processing** tab view of the project, right click on the interval on the point you wish to edit and choose **Properties**. In the **Interval Properties** dialog box, you

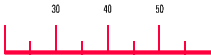


can now select the correct antenna.

The data can now be processed with the correct antenna assigned to the appropriate measured data.

Remember...

- It is possible to use 3rd party receivers and antennas with both real time in the field and during post processing with SKI-Pro.
- It is important to ensure that the correct antenna records are being used – both in the field and in SKI-Pro. If you are unsure why antenna records are so important then read Newsletter Vol. 01, No. 12 again.



- If the correct antenna records are not used then it is possible that both the field system and SKI-Pro may have problems resolving ambiguities.
- It is possible to listen to Trimble radios operating in TrimTalk mode by using Pacific Crest RFM96W or PDL radios.
- System 500 can receive RTCM corrections and Trimble CMR RTK data formats.
- RINEX files do not contain the full antenna records with PCV information. Ensure to assign the correct antenna to data imported into SKI-Pro. It is best to define the appropriate antennas before importing the data.

Ideas for Future Newsletters...

If you have any ideas or wishes for topics that you would like to be discussed in a future newsletter, please contact your local selling unit or representative. These ideas can then be passed to Heerbrugg. Thank you.