

Introduction

This month (July, 2002) we are pleased to announce the release of **firmware v4.00** for **GPS System 500**.

This newsletter briefly explains the new features and functionality contained in this new firmware.

For full details on all functionality with v4.00 firmware read the **Release Notes**. Either download these release notes from the internet -

<http://www.leica-geosys.com/gps/product/system500.htm>

or contact your local Selling Unit or Dealer.

Remember, this is one firmware for all sensors - SR510, SR520, SR530 and RS500. Ensure you update all your sensors with the new firmware!

Time Slicing

With new **time slicing** functionality it is now possible to use up to 4 reference stations covering the same area on the same radio channel at the same time.

It may be desirable to use more than one reference when you wish to survey a large area and do not wish to have to continually move a single reference station.

With previous firmware, it was only possible to use more than one reference station to cover the same area if the reference stations were operating on different radio channels. (If the references were to operate on the same radio frequency, there could be problems with jamming of the radio signal).

When configuring the references, each reference is assigned a **Time Slot** number – this defines the exact interval within each second at which the RTK reference data from that reference station is sent.

For example, if a user was to use 4 reference stations, he could configure the first reference station with **Time Slot 1**, the second reference station with **Time Slot 2**, the third reference station with **Time Slot 3**, and the fourth reference station with **Time Slot 4**. Thus, each reference will transmit its RTK reference station data at a particular and unique interval within each second. The first reference station will transmit its RTK data at the “start” of the second, the second reference station will transmit its RTK data at 0.25s, the third reference station will transmit its RTK data at 0.50s and the fourth reference station will transmit its RTK data at 0.75s.

This is how it is possible for the 4 reference stations to operate on the same radio channel without “interfering” with each other.

Time slicing is configured in the **CONFIGURE\ Real-Time** panel.

It is in this panel that the **Ref Stn ID** can be configured for each of the reference stations.

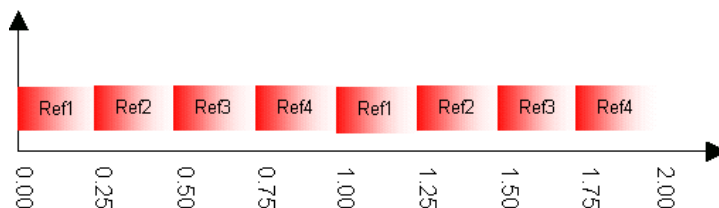


Note that it is necessary to assign a different reference station ID to each of the reference stations. This is how the rover knows from which reference station to accept RTK data. (On the rover, choose the required **Ref Stn ID** in the panel where the radio channel is set - **CONFIGURE\ Radio Channel**).



When you wish to receive RTK data from a different reference station, simply enter the **Ref Stn ID** for that reference station.

Note that with Leica instruments, time slicing is possible with all RTK data formats (Leica, CMR, CMR+ and RTCM) and for all devices.



Time slicing with 4 reference stations. Output rate 1s.

Scan Functionality

A problem sometimes experienced by users when using radio modems to conduct an RTK survey is after having started working, you find that someone else in the area is also using RTK GPS on the same radio channel that you are using. (You may see the messages **Reference Data Lost** or the RTK icon may flash erratically or intermittently).

It is now possible to find out if other RTK GPS users are in the area on the same channel before starting work by using the new **Scan** functionality. Press **F5(SCAN)** in the **CONFIGURE\Radio Channel** panel.



The sensor now “listens” to the radio channel on which it is currently operating to determine if any RTK users are in the area (the sensor listens to detect other RTK radio data links).

If other users can be detected, the following information is shown about the RTK data links being used –

- The **Ref Stn ID** of the reference station being used
- The **RTK Data Format** being transmitted by the reference station
- The **Latency** with which the data is sent from the reference station.



If other users are detected the user can now choose a different radio channel (and **Scan** this channel) before starting work.

Note, that scanning is particularly useful when using **time slicing** (described above). You can then always easily detect from which of the reference stations you can receive RTK data and which reference station to select.

Select Closest GSM Reference Station

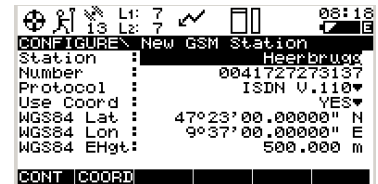
More and more RTK users are now using GSM as their data link. The advantages of using GSM are clear:

- There are no restrictions to the distance the user can work from the reference station.
- No possibilities of radio jamming
- To use GSM is as simple as using radio modem.

In a growing number of countries there is more than one reference station a user can dial into (in Denmark, GSM reference stations are spread over the entire country). But if a user drives to a different part of the country, how does he know which reference is now the closest to where he is working?

Prior to the survey and when configuring the rover, the user would have entered all reference stations that are avail-

able to be accessed (name of reference station, number to dial etc). It is now also possible to enter the WGS84 or local coordinates of the reference station (this is done in the **CONFIGURE\New GSM Station** panel).



When using the rover in the field, it is now possible for the user to press the **F2(NEAR)** key in the **CONFIGURE\GSM Connection** panel.



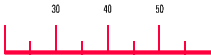
The sensor now compares its current position with the list of entered reference stations and chooses the closest.

RTK Data Links

Firmware v4.00 can now receive and transmit the **CMR+ RTK** data format.

Note, on the rover when choosing the **CMR+** format, the **CMR/CMR+** option is chosen – the rover can distinguish between the two formats and recognise which format is being used.

Additionally on the **SR510**, **SR520** and **GS50** receivers it is now also possible to receive Leica, **RTCM 18,19**, **RTCM**



20,21; CMR and CMR+, RTK data formats.

Previously, it was only possible to receive RTCM 1,2 and 9,2 data formats.

Of course, these sensors can still only compute code only (30cm or so accuracy) positions!

RTK Output rate up to 10 Hz

With all previous firmware versions, the highest output rate for RTK data from the reference station was 1Hz.

It is now additionally possible to output RTK data from the reference station at **2 Hz**, **5Hz** and even **10 Hz**.

The advantage of using higher output rates such as these is that the accuracy of the position on the rover may be slightly improved. The disadvantage is that the battery powering the radio on the reference will discharge more quickly.

We recommend that the higher output rates are only used where an application demands the highest possible accuracy from the rover (for example, machine control).

Point Annotations for Auto Logged Points

It is now possible to record annotations with auto logged points with System 500.

Remember, an annotation is different to coding - an annotation is more useful for "comments" to be recorded during a survey - for example you could add an annotation to a point to say "Ground Marker – bad condition".

Now for example, when measuring a path using auto logged points, you could add the annotation to these auto

logged points "Badly overgrown path".

But point annotations for auto logged points are possibly much more useful for when combined with the **ASCII input** functionality.

An example of this functionality is when connecting a depth sounder to a sensor and automatically storing the measured depth reading as an annotation to each measured point. Previously the user had to press **F1(OCUPY)** to measure each point in order to attach the annotation to the point – this means you could have been pressing **OCUPY** many times to survey even a small lake.

However, because it is now possible to store the annotation to an auto logged point, the depth sounder readings will be automatically attached as annotations to the auto logged points. Much more convenient!



Note, the next newsletter will focus specifically on the **ASCII Input** functionality and other applications for which it is being used.

Hidden Points

Newsletter Vol. 00 No. 24 focussed on the use of **hidden points**. Measuring a hidden point is basically a way of measuring points that cannot be directly measured with GPS – there are a variety of methods to do this including **Bearing and Distance**, **Double Distance** etc.

The easiest way to measure a hidden point is to use a measuring device such as the **Leica DISTO** or **Leica Laser Locator**. Until now however, it was always assumed that the height of the device above the ground is zero and the height of the hidden point above the ground being measured is zero.

With firmware V4.00 it is now possible to enter the height of the measuring device and the height of the target point above the ground.

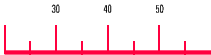


Taking this new information into account the **true height of the hidden point** can be calculated.

CSCS Models and Geoid Field Files

It is now possible to use geoid field files and CSCS model field files directly from the PC card.

Previously it was necessary to first transfer the field file from the PC card to the system RAM of the sensor and then use the field file from the



system RAM. This was fine for most users, but some users wished to use field files that cover a very large area or even a whole country. The maximum field file that can be used from the system RAM is 500kB.

With v4.00 firmware, users wishing to use large geoid and CSCS model field files do not need to transfer the field files to the system RAM, but can use them directly from the PC card.

Note – CSCS (Country Specific Co-ordinate System) models were introduced with v3.00 firmware and v2.10 SKI-Pro. The concept of CSCS models is proving extremely popular with users – countries now using CSCS models include **UK, France, Holland, Denmark, Canada, USA, Australia** and **New Zealand** with many other countries showing interest.

Read newsletter Vol. 01 No. 13 to find out more information about CSCS models and how and why they are used.

New Application Program and Improvements

A new application is also available in firmware v4.00 - the **Road Plus Editor**.

With this application, it is possible to **create, edit** and **delete**:

- Horizontal Alignments
- Vertical Alignments
- Cross Sections
- Cross Section Assignments
- Station Equations.

Road alignment files created in the RoadPlus Editor can be used in both the RoadPlus application and the RoadX application.

A new manual **General Guide to RoadPlus Editor** accompanies the new application and is available on the v4.00 firmware CD.

Improvements have been made in the application programs **COGO, RoadPlus** and **RoadX** applications. Refer to the release notes for detailed information.

Many Other Features

There are many other features in firmware v4.00 including...

- Use **ALT** and **B** to switch the terminal backlight illumination on and off.
- It is now possible to edit the point IDs of previously measured points.
- New devices are supported including the **Siemens TC35** and **Wavecom M1200 Series** GSM and the Teledesign TS4000 radio modem.

- The transferring of entered GSM reference stations between sensors.

- The transferring of the contents of the complete system RAM between sensors (code-lists, format files, coordinate systems, almanac etc etc).

- The transferring of measured data to a **Sokkia SDR33** data logger or to the **Leica TPS300/700** total stations (in addition to the **Zeiss Rec500** and **Geodimeter** instruments).

- Computed height positions can be smoothed – this may be beneficial for particular applications – for example, machine control.

- And many, many other features...

Ensure you read the Release Notes for detailed information on all features.

Remember

- Firmware v4.00 is now available. Investing in firmware v4.00 will make surveying with System 500 even easier, more efficient, and ultimately more profitable.

- This is one firmware for all sensors – SR510, SR520, SR530 and RS500. Ensure you update all your Sensors with the new firmware!