

RTK – Did You Know?

This newsletter continues from newsletter Vol. 01, No. 06 with the question: **How can we be even more certain of having found the correct ambiguities?**

The answer is that System 500 performs the same ambiguity search routine a **second** time.

Immediately after having completed the ambiguity search routine and computed the most likely ambiguities with one set of GPS observations, the rover then **repeats** the whole ambiguity search routine again using a different set of GPS observations. This leads to a second set of ambiguities.

The ambiguities computed from this second search routine are then compared with the ambiguities computed from the first ambiguity search. If the two sets of ambiguities are identical, then the ambiguities are considered to be correct and an RTK position to cm accuracy is computed on the rover.

It is at this stage, the sensor beeps, the icon changes to show it has a **high precision navigation** (phase) solution, and the CQ (co-ordinate quality) drops to the cm level. Typically, to measure enough satellite observations, solve the ambiguities twice, perform the statistical analysis, and then compute the rover co-ordinates takes **well under 30 seconds**.

And remember this is all done with signals transmitted from satellites 20000km above the earth. In addition, the rover could be used under trees where the signal is being interrupted or near to

buildings where signal disruption could be even greater.

And Then Do It Again and Again and Again...

So now, even though the system has fixed ambiguities twice and the system is measuring positions to cm accuracy, this is not the end of the story.

In order to ensure the highest possible reliability of the computed positions, the ambiguity search routine is **continually repeated** "in the background" as you survey.

The ambiguities computed from these repeated search routines are compared with the current solution. If they agree, all is fine, if they disagree, the system beeps, the solution type change to a **precision navigation** (code) solution and the whole ambiguity search routine starts again from the beginning.

Speed versus Reliability

If you are using System 500 in the field and simply want to complete your survey, quite rightly, you do not care about ambiguity search routines and statistical analysis. You need the system to give you co-ordinates as quickly as possible, but these co-ordinates must be correct. System 500 is not only one of the **quickest** RTK systems available, it is also certainly the **most reliable**.

We sometimes hear complaints that "I had to wait 30 seconds with Leica RTK to get cm accurate solutions – that is not good enough – the com-

petitor could do it in 27 seconds".

But always remember, which RTK system would you prefer? A system which in 30 seconds has resolved ambiguities **twice** and then is **continuing to check the reliability** of this solution by re-computing ambiguities, or a system which has only resolved **once** (and has therefore possibly a **wrong** solution) in 27 seconds and then conducts **no further ambiguity searches**? Really, there is only one answer.

If System 500 does not give cm accurate positions as quickly as you would like, remember, there is a reason for this – it simply does not want to give you the wrong answer!

The Future?

So what is possible in the future? Ultimately, surveyors want cm accurate positions immediately after starting to receive satellite data. This "single epoch" RTK is much talked about and is possible today. But the reliability of such solutions should be **seriously** considered.

Remember

- System 500 RTK is the fastest and most reliable RTK available today.
- Before cm accurate positions are available, ambiguities are fixed twice to give the highest reliability.
- After fixing ambiguities, the ambiguity search routine is continually repeated.
- Other RTK systems may occasionally solve ambiguities quicker, but are the results reliable?

