An Evaluation of New RTK GPS Systems using the Curtin Test Network

Degree:	Honours
Keywords:	geodesy, GPS, RTK, geodetic network, validation and calibration
Entry:	Bachelors degree in geoscience, physics, mathematics, or any related discipline, or invited entry to the Honours program in the Department
Supervisor:	Professor Will Featherstone (W.Featherstone@curtin.edu.au), Western Australian Centre for Geodesy, Department of Spatial Sciences, Curtin University of Technology
Project Funding:	Western Australian Centre for Geodesy
Student Funding:	The student will receive some assistance with the costs of thesis production and photocopying
Resources:	Some software and spreadsheets, control data over the network
Collaboration:	Western Australian Department of Land Administration, Main Roads Western Australia
Starting Date:	Unrestricted

Project Description:

In 1997, the Western Australian Department of Land Administration (DOLA) and Main Roads Western Australia (MRWA) established a first-order control network of more than 60 points in order to verify the results from several real-time kinematic (RTK) GPS systems. This was to ascertain whether this technology could be used to satisfy MRWA's survey specifications for hard and soft surfaces. The data were analysed for height determination (Featherstone and Stewart, 2001) and horizontal positions (Thomson, 2000).

However, these data sets are relatively old and several new (or updated) RTK systems are now available. Therefore this project will analyse data (collected by the student) for both horizontal and vertical coordinate components in order to determine what accuracy and precision the new RTK GPS equipment can deliver. The analyses will consider factors, such as the effect of loss of lock and on-the-fly (OTF) ambiguity initialisation on the solutions, the correlation of errors with distance, the effect of centring the antenna over the ground monuments, and the correlation of errors with the number of satellites and their geometry. If time permits, it may also consider the artificial introduction of multipath and how this affects the ambiguity initialisation and quality of the RTK GPS solutions.

Very little research has been conducted on the accuracy and precision of RTK GPS. Instead, users tend to rely on word of mouth or manufacturers' claims of precision and accuracy. This project will apply objective scientific methods to independently validate the results of RTK GPS systems. It will also ascertain what improvements to RTK GPS positioning have been achieved over the last few years.

Further reading:

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Stewart, M.P., Tsakiri, M., Martin, D. and Forward, T.A. (1998) Traceability and the calibration of satellite positioning systems, Survey Review, 34(269): 437-446.

Thompson, S.G. (2000) An evaluation of real-time kinematic GPS in three dimensions over the Curtin test network, *BSurv (Hons) thesis*, Department of Spatial Sciences, Curtin University of Technology, Perth, Western Australia.

Wylde, G.P., and Featherstone, W.E. (1995) An evaluation of some stop-and-go kinematic GPS survey options. *The Australian Surveyor*, 40(3): 205-212; reprinted (1996) in *The New Zealand Surveyor*, 34(286): 36-42.