بسم الله الرحمن الرحيم

شبكة المعلومـــــات الجامعية

التوثيق الالكتروني والميكروفيلم

شبكة المعلومات الجامعية

جامعة عين شمس

التوثيق الالكتروني والميكروفيلم

﴿ قـــســـم ﴾

نقسم بالله العظيم أن المادة التي تم توثيقها وتسجيلها
علي هذه الأفلام قد اعدت دون آية تغيرات

يجب أن

تحفظ هذه الأفلام بعيداً عن الغبار

في درجة حرارة من 15 – 20 مئوية ورطوبة نسبية من 20-40 %

To be kept away from dust in dry cool place of
15 – 25c and relative humidity 20-40 %

بعض الوثائق الأصلية تالفة

بالرسالة صفحات

لم ترد بالأصـــل

Accuracy Assessment for hand held GPS receivers Supported with WASS/EGNOS Corrections and its implication in Hydrographic survey

BY

Eng. Alaa Al- din Hamdy Wahba Sharawi

A Thesis submitted to

Faculty of Engineering - Cairo University

In Partial Fulfillment of the Requirements

For the Degree of MASTER OF SCIENCE

In

CIVIL ENGINEERING

Under the supervision of

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FACULTY OF ENGINEERING, CAIRO UNIVERSITY,

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رئيس مجلس القسم
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ABSTRACT

The Global Positioning System (GPS) has changed the concept of surveying operations from on ground to sky measurements. GPS is designed primarily as a navigation system to satisfy both military and civilian needs for real - time positioning. The differential GPS (DGPS) technique has improved the positioning accuracy. It enables the using of GPS in various applications replacing the time consuming and costly traditional surveying techniques. The differential concept of GPS has been used with at least two receivers to satisfy the required accuracy and to overcome the selective availability (S.A.). After (S.A.) had been turned off, the differential GPS techniques have been improved and became available for the users through Omnistar Network Control Centers (NCC) and Beacons differential corrections. With the implementation of the Wide Area Augmentation System WAAS and the European Geostationary Navigation Overlay Service EGNOS corrections in the recent GPS receivers, it could be used in different engineering applications with no fees and based on the accuracy claimed by the manufactures.

In Egypt, the European Geostationary Navigation Overlay Service EGNOS corrections have covered most of the country. The Differential GPS (DGPS) accuracy based on these corrections may reach less than 3m as claimed by manufactures. Such accuracy may be satisfied by using even handheld GPS receivers. In this research, an overview for GPS system is introduced with emphasis on DGPS systems. Handheld GPS receivers supported with EGNOS corrections are presented and used in the experimental work. The coverage of EGNOS correction is presented. The claim of the manufacturers of the recent receivers supported with EGNOS of satisfying the accuracy of better than 3m was tested using the handheld GPS receivers. The accuracy was checked with respect to fixed control points and during kinematic process. Also, the way of obtaining and recording the data from handheld GPS (Magellan map330) is discussed and the National Marine Electronics Association NMEA format is presented and how it can be handled from receivers.

The interface of handheld GPS receivers with computer and download of data during and after survey, i.e. download of tracks and waypoints are covered. The use of handheld GPS receivers in navigation along predefined tracks is illustrated. The optimum use of handheld GPS receivers in positioning is studied compared to the points done with total stations. The capability of handheld GPS receivers in performing bathymetric survey during navigations along perspective tracks and during the survey of bed points is studied. The accuracy is given compared with the survey with total station.

The results of testing handheld GPS receivers supported with EGNOS corrections, prove that the accuracy of such equipment is 3m. It is recommend for using Handheld GPS with EGNOS correction in static positioning by turning on the receiver from the start of survey up to end (avoid to switch on and off GPS during static and kinematics). The accuracy of static positioning by GPS with EGNOS correction is less than 2m at night and less than 4m in the morning time. The recommend sample rate is 60 sec during the kinematics position when using Handheld GPS with EGNOS correction with speed 10 ~15km. The Handheld GPS with EGNOS correction can be used to support the navigation process during the Hydrographic survey with accuracy less than 2m and positioning of sounding during the Hydrographic survey with accuracy less than 4m.

Finally, The Handheld GPS receivers, supported with EGNOS corrections, based on the tested accuracy is recommend in some applications, like route survey, and hydrographic survey, for mapping with scale 1: 10.000 or smaller.

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