

UNIVERSITI TEKNOLOGI MARA

**POSITIONING PERFORMANCE ASSESSMENT
USING DGNSS SATELLITE BASED
AUGMENTATION SYSTEM (SBAS) WITH
DIFFERENT SATELLITE COMBINATION**

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Thesis submitted in fulfilment
Of requirements for the degree of
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AUTHOR'S DECLARATION

I declare that the work in this thesis/dissertation was carried out in accordance with the regulations of Universiti Teknologi MARA. It is original and is the results of my own work unless otherwise indicated or acknowledged as referenced work. This thesis has not been submitted to any other academic institution or non-academic institution for any degree or qualification.

I, hereby, acknowledge that I have been supplied with the Academic Rules and Regulations for Postgraduate, Universiti Teknologi MARA, regulating the conduct of my study and research.

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ABSTRACT

Differential Global Navigation Satellite Systems (DGNSS) uses a fixed, ground-based reference station network which enables the broadcasting of differential information to the user to improve the accuracy of the position. It is important to provide a good indication of positioning and navigation performance by the availability of four-constellation integration with GPS, GLONASS, BeiDou, and Galileo. This study is to differentiate the accuracy of the results given between single satellite, double satellite, and triple satellite observation, which are GPS, GPS and BeiDou, and GPS GLONASS, and BeiDou using DGNSS Satellites Based Augmentation System (SBAS), that delivers the corrections and improved GNSS services through broadcasting messages from a geostationary satellite. Twenty-four hours static observation are performed with one DGNSS receiver for single, double, and triple satellite combination. The accuracy assessments are based on established reference point tied with Jabatan Ukur dan Pemetaan Malaysia (JUPEM) CORS station. After that, the data were filtered to remove unreliable data recorded. Statistical analysis was done to support the comparison of positioning data, which is descriptive analysis, T-Test analysis, horizontal error analysis, vector distance analysis and normal distribution graph. The positioning comparison between single, double, and triple shows that the deviations from the reference coordinate for single satellite combination do not exceed 1.963 m for the northern component, 1.649 m for the eastern component. In the case of double satellite combinations, the deviation for a horizontal component is much smaller which it is 1.586 for northing and 1.586 m for easting while triple satellite combinations horizontal component do not exceed 1.163 m for northing and 1.576 m for easting. Thus, it meets the tolerance of the International Hydrography Organization (IHO) acceptable tolerance for doing any hydrography survey works, which is ± 2 meter.

TABLE OF CONTENT

CONFIRMATION BY PANEL OF EXAMINERS	i
AUTHOR'S DECLARATION	ii
ABSTRACT	iii
ACKNOWLEDGEMENTS	iv
TABLE OF CONTENT	v
LIST OF TABLES	ix
LIST OF FIGURES	x
LIST OF ABBREVIATION	xii
CHAPTER ONE INTRODUCTION	1
1.1 Introduction	1
1.2 Research Background	1
1.3 Problem Statement	3
1.4 Aim	4
1.5 Objectives	4
1.6 Research Question	4
1.7 Study Area	5
1.8 Methodology	6
1.9 Significance of the Study	8
1.10 Limitation of Works	8
CHAPTER TWO LITERATURE REVIEW	9
2.1 Introduction	9
2.2 Positioning	9
2.3 Global Navigation Satellite System (GNSS)	10
2.4 Differential Global Navigation Satellite System (DGNSS)	11
2.4.1 DGNSS Code Phase Tracking	12

3.4.3	Topcon Tools	36
3.4.4	IBM SPSS	36
3.5	Equipment Used	37
3.5.1	Hemisphere Antenna A43	37
3.5.2	Hemisphere Receiver VS330	38
3.5.3	GNSS Receiver Topcon GR-5	40
3.6	Data Collection	42
3.6.1	Equipment Installation	42
3.6.2	Control Point	43
3.6.3	Positioning	44
3.7	Data Processing	45
3.7.1	Database Setup	45
3.7.2	Data Filtering	47
3.7.3	Statistical Analysis	48
3.8	Result and Analysis	49
	CHAPTER FOUR RESULT AND ANALYSIS	50
4.1	Introduction	50
4.2	The stability of SBAS Data Observation using Single, Double and Triple Satellite Combination	50
4.2.1	Single Satellite Combination	51
4.2.2	Double Satellite Combination	54
4.2.3	Triple Satellite Combination	57
4.2.4	Descriptive Analysis	60
4.2.5	Summary	62
4.3	Accuracy of Positioning Data	63
4.3.1	Horizontal Error for Single Satellite Combination	63
4.3.2	Horizontal Error for Double Satellite Combination	64