UNIVERSITI TEKNOLOGI MARA

PRIMARY SURVEILLANCE RADAR (PSR) AND SECONDARY SURVEILLANCE RADAR (SSR) OF MARTELLO S743D DETECTION OPTIMIZATION THROUGH AUTOMATIC DEPENDENT SURVEILLANCE-BROADCAST (ADS-B) ADAPTATION

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ABSTRACT

The ADS-B technology is becomes a crucial application for aircraft tracking. An ADS-B system is a system that pinpoint its own position using Global Navigation Satellite System (GNSS) and periodically broadcasts its four-dimensional position 4D (latitude, longitude, altitude and time), track and ground speed, aircraft identification, and other additional relevant data as appropriate without having to be interrogated from a ground station. This thesis highlights how the Primary Surveillance Radar (PSR) and Secondary Surveillance Radar (SSR) of Martello S743D radar detection can be amended by adapting aircraft information retrieved using the Automatic Surveillance – Broadcast (ADS-B) receiver. Such augmentation was achieved through exploitation of the detection information from both sensors; where semblance of information was carried out using the MATLAB Graphical User Interface (GUI). The preliminary findings of the study show that the functional of ADS-B receiver has the potential to mitigate the challenges of "cone of silence" in the PSR and SSR detection.

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CHAPTER ONE

INTRODUCTION

1.1 RESEARCH BACKGROUND

There are many studies in the future operational requirements for military long range sensors (surveillance radars) for the last 30 years [1]. These long studies have a clear indicated for the three-dimensional 3D radars preference with the very best possible Electronic Counter Measures (ECM) resistance. The use of (3D) radar is continually making progress in replacing the two-dimensional (2D) radar for military application [1].

The example of 3D radar is S743D which is a Long Range Radar (LRR) with a unique phased array concept that combined the advantages of synthesised stack beam and parallel receivers together with multiple distributed solid-state transmitters [2]. The radar outputs consist of parallel data from all the elevation receiving beams, height, being assessed on every return by monopulse elevation extractor. Transmission occurs within an approximately fan beam radiation pattern so that all targets within the radar cover are illuminated by every radar pulse.

In radar system, the height accuracy is dependent on whether the radar is operating in spot frequency or in a frequency agile mode and the azimuth beam position is unaffected by frequency changes within the operating bandwidth. Thus there is