In This Issue - Technically

LOCO GPSI:
Preserve the GPS Advantage for Defense and Security

Global Positioning System (GPS) has clearly emerged as a fundamental utility with widespread private and commercial civilian applications. Many of these applications are directly related to safety-of-life uses such as all-weather aircraft precision approach and landing, ship navigation in restricted waters, and emergency response vehicle tracking and management. GPS has significantly improved efficiency in commercial applications such as truck, train, and even, individual container tracking and dispatch. There is a similar dependency within the military – not only in vehicle navigation – but also in areas such as precision weapon guidance and "blue force" tracking. This dependency on GPS has brought significant attention on the potential for an asymmetric vulnerability on this low signal power radio navigation system. Threat systems to GPS exist, are commercially available, and have been used in combat. The technology is not complex, and even simple, low-cost systems could cause significant GPS denial. Furthermore, as other Global Navigation Satellite Systems gain maturity and widespread use, one can easily imagine the threat expanding to cover those systems as well. Herein, we describe a project directed by Congress, starting in 1997, to develop the capability to detect and locate sources of unintentional interference and intentional jamming, and to assess the effectiveness and utility of such a system. Under this project, SPAWAR and FALON, Inc. have successfully developed and demonstrated a prototype system small enough to be compatible with Unmanned Aerial Vehicles named Location of GPS Interferers (LOCO GPSI). The LOCO GPSI system employs short baseline antenna interferometry and a highly sensitive, rapidly scanning receiver to detect and precisely Direction Find (DF) the interference source. Interference source location is determined by triangulating successive DF lines of position. Ground and flight demonstration results suggest that performance objectives have been met.

Summary of Recent Australian Radar Developments

Australia is a landmass of just under 7.7 million square kilometres within a coastline of approximately 37,000 kilometres, and as such, is not an easy area to protect from potentially hostile interests. With a relatively small population and military capability, Australia has to maximise support from modern technology.

Over the last 30 years there has been a growing Australian capability in very long-range radar systems, especially Over The Horizon Radar (OTHR) and a related technology, Surface Wave Radar (SWR). Both operate in the high frequency (HF) band between 3 and 30 MegaHertz (MHz), which are wavelengths between 100 and 10 metres, respectively.

Doppler Measurements of Smooth and Rough Surface High Frequency Scattering from Spinning Steel Cylinders

Preliminary measurement results gathered using a fully coherent 77GHz phase coded pulse Doppler polarimetric radar and investigating the electromagnetic signatures of electrically large spinning steel cylinders are presented. New and novel results showing the Doppler contributions due to dynamic rough and smooth surface scattering effects are discussed and analysed. In the latter case, significant sideband conversion occurs together with a rapid fall off in the power density spectrum. Future work is proposed and discussed. A fuller analysis of these preliminary results and further results will be presented in due course.

Reacting to New Air Defence Threats
A Netcentric Approach to the Hungarian Air Defence System Augmented by VHF Radars

Different types of distributed radar systems and data fusion centers are increasingly used by surface-based Air Defense Systems. Besides the well-established airborne threats, new platforms for air surveillance and attacking devices have appeared and Recognized Air Picture (RAP) production needs to be revised and modified following the events of September 11, 2001. From a military operational and logistic support point of view, it is well-known that not only the long range radars currently in operation, but also the recently procured radars, degrade in performance rapidly and their maintenance costs are high. Using the possibilities offered by emerging technical developments, the problem is to upgrade sensors and existing infrastructure in a way that exploits the information gathered optimally. It is the opinion of this author that one of the most promising approaches to emphasis net-centricity is the use of radar-triangle netcentric structures augmented by netted VHF radars to solve these tasks in a cost-effective manner. This paper introduces an analysis of a solution that fully integrates newly required capabilities into the current long range radar net and infrastructure, keeping research and development (R&D) and maintenance at a low cost.

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Errata: 12th Saint Petersburg International Conference on Integrated Navigation Systems

In printing the data about this conference in our September issue (page 42), many errors crept in due to a number of factors. For any reader who finds that the inaccuracy of our printing has impeded their ability to contact the conference, we recommend you use their web site: http://www.elektropribor.spb.ru (Section "Conferences") for correct contact information.

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