The Radiated Emission Approach to Specific Emitter Identification

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The modern ESM/ELINT systems should be able to recognise emitters on the basis of the set of pulse measurements in order to provide surveillance, tracking and platform identification. One of the most principal functions of the ESM system is gathering basic information from entire electromagnetic spectrum and analysing communication and non-communication emitter's characteristics such as their technical parameters, operating role and main tasks. In this analysis there are of special importance methods of data acquisition. The methods of Specific Emiter Identification (SEI) are based on the Measurement and Signature Intelligence (MASINT). Non-intentional emission (calls–radiated emisssion) is a source of knowledge about the analysed emitter. Such information is crucial during the process of emitter identification. The results of classification and identification are presented on a display in a form of tabular or grapfical options.

This paper provides an overview of the methods of radiated emission measurement, for example: Open Area Test Site (OATS), full and semi anechoic chambers, Transverse Electromagnetic Cell (M. L. Crawford Cell–TEM) and Gigahertz Transverse Electromagnetic Cell (GTEM), which may be used to identify radar's equipment.

This paper presents selected aspects of radiated emission acquisiton (in a specially prepared procedure), analysis of their parameters, features extraction using "special linear transformation". According to the presented method of transformation, the "measured function $K(f_n)$" is determined. The function $K(f_n)$ is used to extract radiated emission features, which modify structure of Extended Vector Parameters (EVP). At the end of the procedure, radar emitter source identification is performed. During the process of emitter identification distance functions (Euclidean, Mahalanobis, Hamming) are applied. The process of recognition is connected with the data base, which is an important element in the modern electronic intelligence system. Dinstinctive features extraction from radiated emission is used for special "radar signature" description in the data base.

Taking all above into consideration, applying the radiated emission to the specific emitter identification is an essential element in formation of the examined system. The capability of an ESM/ELINT system to correctly identify detectable radar emissions in a dense environment is key to their application in modern commmand, communication and control system. The problem of radiated emission is essential with respect to Electro-Magnetic Compatibility (EMC).