

## MEASURES AGAINST DELIBERATE JAMMING

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**The essence and main trends in measures against deliberate jamming are considered, and classification of known techniques in this field is presented. The estimation of effectiveness of countercountermeasures and characteristics of some types of counter-jamming of the information at information-tactical levels are discussed.**

The conflict between radioelectronic devices (RD) of various purposes and devices intended to counteract them represents an active phase of the struggle for information superiority. In the broadest sense information superiority is a set of factors including the possibility to obscure the opposing party's understanding of real conditions, and the possibility to estimate the current situation, predict future events, and influence them in one's own interests under conditions of the preventing (interfering) actions by the other party [1]. A necessary condition for attainment of this superiority is to ensure the conflict immunity of all one's devices and of the side as a whole. By conflict immunity (CI) in this context is meant [2] the ability of radio devices to fulfill their tasks in the event of interfering actions of the other (opposing) party.

Historically, the first complex of measures for improvement of conflict immunity of RD of various purposes were circuitry solutions aimed at weakening the obscuring impact of interference, and at improving RD noise immunity [3]. Considering that these solutions concerned not only natural, but also deliberate interference, in the late 1970s a new term "countercountermeasures" (CCM) appeared in the USA. In its primary meaning, CCM was used in reference to traditional techniques for improvement of RD noise immunity, but adapted to characteristics of the main kinds of deliberate jamming. However, these measures turned out to be insufficient to meet the increasing requirements for RD CI under conditions of confrontation with the continuously improving means of deliberate counterradio measures. There arose a need for active countermeasures aimed at creating organized counteraction against deliberate jamming — in order to eliminate the very possibility of generation of interference with characteristics unfavorable for RD operation. As a result, the stock of CCM expanded considerably.

Today CCM is one of the most effective approaches to preserving CI of the main classes of radio devices. However, in open publications the key issues of CCM are not considered fully. The purpose of this work is to categorize the major CCM and to study the possibility to estimate their efficiency by criteria at the information ("signal") and information-tactical level.

**The main approaches to CCM.** The current essence of CCM includes a unified complex of measures aimed (1) at noise stability of RD with the use of various circuitry solutions, and (2) at preventive neutralization of the opposing means of deliberate counteraction by active intervention in the process of their functioning. As distinct from traditional radioelectronic suppression, CCM do not disrupt the forces and means of the opponent, but ensures the stable management of one's own forces and means. The latter task constitutes the current essence of radioelectronic combat (REC). Thus, CCM can be considered a separate but integral part of REC.

In order to attain this general objective, CCM protects its vitally important RD, and the information-management system as a whole, from the hostile means of deliberate counteraction. The current methods of RD protection can be

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24 April, 2003