

## **Russian Research of Intentional Electromagnetic Disturbances Over the Past Ten Years**

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Ten years ago the term «electromagnetic terrorism» was used for the first time at the plenary session of the AMEREM-96 symposium in Albuquerque. This term means the intentional use of electromagnetic field radiators or electric voltage generators in order to destroy the normal functioning of technical systems. The discussion in 1996 presented some cases of the use of radiators and generators. The report has resulted in a big interest of electromagnetic experts and has stimulated an enhanced attention to the given theme. Work on gathering information on cases of intentional and unintentional electromagnetic influence causing serious consequences for technical systems has been performed by many researchers.

During the past 10 years we have not received new information on cases of electromagnetic attacks on important technical systems on the part of traditional terrorists. However cases of intentional electromagnetic attacks on the part of hooligans have been registered. For example, several years ago the normal work of one automatic telephone station has been stopped as a result of remote injection of a voltage into a telephone line. For this reason a huge area with a population of 200 thousand people had no phone communications for one day. Also numerous cases of unintentional electromagnetic influences causing serious consequences are known. For example, satellite communications of a large telecommunication center was unexpectedly disconnected during the measuring of the characteristics of the earthing system. In view of these and other facts, a decision on carrying out of regular research in the following directions was accepted: development of scientific-methodical techniques for the accurate and inexpensive estimation of immunity of an infrastructure to intentional electromagnetic influences; development of means for carrying out tests; and estimation of immunity of typical objects of an infrastructure to intentional electromagnetic influences.

The following basic results have been achieved during our work according to the listed above directions: a cost-effective procedure has been developed to check the protection against electromagnetic disturbances penetrating into building power and earthing circuits; radiators of UWB electromagnetic pulses have been built, generators of a high voltage pulse injection have been made, measuring devices and a model of a typical power and earthing circuit for checking the efficiency of protection has been developed; tests of some infrastructure objects have been performed (automatic telephone station, office building, station of cellular communications, a telecommunication center, an electric substation, insulators of power transmission lines, an automatic access control system, etc.) and plenty of other electronic devices (computers, electronic cash machines, electric energy consumption meters, etc.) have been tested.

Results of the completed experiments have shown that the infrastructure of a modern state is vulnerable in relation to intentional electromagnetic influences. The basic directions of our future work will include additional tests of typical objects of the infrastructure and then the development of means of their protection against new threats.