
CHAPTER 9

ELECTRONIC COUNTER-COUNTERMEASURES

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9.1 INTRODUCTION

Since World War II both radar and electronic warfare (EW) have achieved a very high state of performance.^{1,2} Modern military forces depend heavily on electromagnetic systems for surveillance, weapon control, communication, and navigation. Electronic countermeasures (ECM) are likely to be taken by hostile forces to degrade the effectiveness of electromagnetic systems. As a direct consequence, electromagnetic systems are more and more frequently equipped with so-called electronic counter-countermeasures (ECCM) to ensure effective use of the electromagnetic spectrum despite an enemy's use of EW actions.

This chapter is devoted to the description of the ECCM techniques and design principles to be used in radar systems when they are subject to an ECM threat. Section 9.2 starts with a recall of the definitions pertaining to EW and ECCM. The topic of radar signals interception by EW devices is introduced in Sec. 9.3; the first strategy to be adopted by radar designers is to try to avoid interception by the opponent electronic devices. Section 9.4 is dedicated entirely to the analysis of the major ECM techniques and strategies. It is important to understand the ECM threat to a radar system in order to be able to efficiently react to it. To facilitate the description of the crowded family of ECCM techniques (Secs. 9.6 through 9.10), a classification is attempted in Sec. 9.5. Then, the techniques are introduced according to their use in the various sections of radar, namely, antenna, transmitter, receiver, and signal processing. A key role is also played by those ECCM techniques which cannot be classified as electronic, such as human factors, methods of radar operation, and radar deployment tactics (Sec. 9.10).

The ensuing Sec. 9.11 shows the application of the aforementioned techniques to the two most common radar families, namely, surveillance and tracking radars. The main design principles (e.g., selection of transmitter power, frequency, and antenna gain) as dictated by the ECM threat are also discussed in some detail.

The chapter ends with an approach to the problem of evaluating the efficacy of ECCM and ECM techniques (Sec. 9.12). There is a lack of theory to properly

Radar Electronic Countercountermeasures

Lauren Gardner



Radar Electronic Countercountermeasures:

Radar Electronic Counter-countermeasures Stephen L. Johnston, 1979 Radar Electronic Countermeasures (ECM)
and Electronic Counter-countermeasures (ECCM) Fernando Mendoza, 1991 Electronic Counter-countermeasures
Considerations in Radar Systems Acquisition, 1987 *Radar Electronic Warfare* August Golden, 1987 This text provides
students engineers and officers with a solid foundation for understanding electronic countermeasures It defines common
terms and principles used in the fields of radar and electronic warfare and describes the response of radar systems to
electronic countermeasures In depth analyses of the effects that various electronic countermeasure emissions have on
classes of radar systems follows Mathematical models are used to describe these effects although minimal mathematical
sophistication is required Introduction to Electronic Defense Systems Filippo Neri, 2006 This revised edition surveys
sophisticated electronic warfare systems with the latest technological advances New material covers current radar
techniques with the latest in IR techniques and EW weapons systems and defense equipment It also includes an introduction
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Center (U.S.), 1975 **Electronic Counter Countermeasures/Advanced Radar Test Bed (ECCM/ARTB)** T. King, 1992
Fundamentals of Strategic Weapons James N. Constant, 2013-12-01 The purpose of this book is to provide graduate
students professional engineers military officers and weapons systems planners with a comprehensive grounding in the
technology evolution functions costs impacts on society utility and limitations of modern strategic weapons systems Since
the subject is often left to the specialists this work should introduce the general reader to the fundamentals of such systems
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