

ELECTRONIC WARFARE FUNDAMENTALS: RF RADIATION / RADAR SIGNAL / JAMMING / IR COUNTERMEASURES / ELECTRONIC PROTECTION (EP) TECHNIQUES

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PREFACE
Electronic Warfare Fundamentals is a student supplementary text and reference book that provides the foundation for understanding the basic concepts underlying electronic warfare (EW). This text uses a practical building-block approach to facilitate student comprehension of the essential subject matter associated with the combat applications of EW.
Since radar and infrared (IR) weapons systems present the greatest threat to air operations on today's battlefield, this text emphasizes radar and IR theory and countermeasures. Although command and control (C2) systems play a vital role in modern warfare, these systems are not a direct threat to the aircrew and hence are not discussed in this book. This text does address the specific types of radar systems most likely to be associated with a modern integrated air defense system (lADS).

To introduce the reader to EW, Electronic Warfare Fundamentals begins with a brief history of radar, an overview of radar capabilities, and a brief introduction to the threat systems associated with a typical lADS. The two subsequent chapters introduce the theory and characteristics of radio frequency (RF) energy as it relates to radar operations. These are followed by radar signal characteristics, radar system components, and radar target discrimination capabilities. The book continues with a discussion of antenna types and scans, target tracking, and missile guidance techniques.

The next step in the building-block approach is a detailed description of countermeasures designed to defeat radar systems. The text presents the theory and employment considerations for both noise and deception jamming techniques and their impact on radar systems. This is followed by a chapter on decoys, both for defeating an IADS as well as for self-protection. Then, the next chapter discusses chaff characteristics, employment, and impact on specific radar systems.
The following two chapters are dedicated to the IR threat. The first covers IR

theory, IR target detection and tracking, and advanced IR missile flare rejection techniques. The second chapter presents IR countermeasures to include flare employment, maneuvers, and missile warning equipment.

Electronic Warfare Fundamentals then addresses an important aspect of EW, specifically electronic protection (EP). This section includes a description of the most common radar EP techniques designed to counter noise jamming, deception jamming, and chaff employment. The book concludes with an overview of the basic components and limitations of a typical radar warning receiver (RWR), current geolocation techniques, and it finally discusses the basic components of a self-protection jamming system.

In addition to the textual material, the book also contains a detailed glossary of EW-related terms and acronyms for quick reference. A list of references is provided to acknowledge the source material used in the preparation of this text. These sources also provide the interested student with a supplementary reading list to learn more about a specific topic.

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