

Read PDF Introduction To  
Electronic Warfare Modeling  
And Simulation

# **Introduction To Electronic Warfare Modeling And Simulation**

*An introduction to the subject for non-specialists: engineers, technicians, pilots, and aerospace industry marketing, public relations, and customer support personnel. Also a reference for specialists in the field. The completely rewritten and revised Second Edition updates the original published by the Hughes Aircraft Company.*

*A comprehensive and accessible introduction to electronic warfare and defense systems. Description of electronic defense systems and*

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*weapons systems. Explains vulnerable parts of radar and the limitations of weapons systems. Details effectiveness of defense systems.*

*Introduction to Electronic Warfare Modeling and Simulation*  
SciTech Publishing

*This book presents a comprehensive set of radar and electronic warfare principles including many of the latest applications in a clear and consistent manner. Following on from the 3rd edition of this book (2004) Radar and Electronic Warfare Principles for the Non-specialist, 4th Edition, remains true to the traditional strength of the book, providing radar principles for the non-specialist, and also now introducing EW principles. All radar-related material has been reviewed,*

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*revised and enhanced as necessary. New to this edition: Significant revisions to; target signal-to-noise ratio, target detection theory, array antennas, radar measurements and tracking, and target signatures The addition of new EW-related material addressing electronic support (ES), electronic attack (EA), and electronic protection (EP) The advanced radar concepts chapter has been revised, including the addition of a section on modern multi-function, -mode, -mission radar systems. Most of the chapters are stand-alone allowing the reader to be selective and still benefit from the content. Exercises at the end of each chapter are provided to reinforce the concepts presented and illustrate their applications, making*

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*this book ideal for academic learning, training courses or self-study. Topics covered include: electromagnetic propagation, target detection, antennas, measurements and tracking, radar cross section and system applications. By reading this book, you should expect to be able to conduct a respectable, first-order radar system design or analysis and perform a first-order EW system design or analysis. This book will also provide you with the skills to critique the designs or analysis of others.*

*U.S. airborne electronic warfare (EW) programs involve developing and procuring EW aircraft and EW systems that are mounted on U.S. aircraft. The President's FY2020 budget request for the Department of*

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***Defense (DOD) proposes funding for a number of airborne EW programs.***

***EW 105: Space Electronic Warfare***

***Communications, Radar and***

***Electronic Warfare***

***Instruments of Darkness***

***Introduction to Communication***

***Electronic Warfare Systems***

***Cognitive Electronic Warfare: An***

***Artificial Intelligence Approach***

This highly-anticipated second edition of the bestselling *Cognitive Radar: The Knowledge-Aided Fully Adaptive Approach*, the first book on the subject, provides up-to-the-minute advances in the field of

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cognitive radar (CR). Adaptive waveform methods are discussed in detail, along with optimum resource allocation and radar scheduling. Chronicling the field of cognitive radar (CR), this cutting-edge resource provides an accessible introduction to the theory and applications of CR, and presents a comprehensive overview of the latest developments in this emerging area. It covers important breakthroughs

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in advanced radar systems, and offers new and powerful methods for combating difficult clutter environments. You find details on specific algorithmic and real-time high-performance embedded computing (HPEC) architectures. This practical book is supported with numerous examples that clarify key topics, and includes more than 370 equations. Serving as a continuation of the bestselling book EW 101:

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A First Course in Electronic Warfare, this new volume is a second book based on the popular tutorials featured in the Journal of Electronic Defense. Without delving into complex mathematics, this book lets you understand important concepts central to EW, so you gain a basic working knowledge of the technologies and techniques deployed in today's EW systems. This practical resource provides you with a



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solid understanding of the essential engineering and mathematical fundamentals associated with communications electronic warfare (EW) systems. From an introduction to jamming and the properties of signals and systems, to channel coding and pulsed jamming, you get comprehensive coverage of the basics of EW systems, and find details on critical design factors.

Here's a unique new

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resource that offers you a solid understanding of the fundamental theory, operation principles and applications of short-range frequency modulated continuous wave (FM CW) radar. You learn how to choose the structural scheme of short-range FM radar, and determine the optimal algorithm of useful signal processing necessary for ensuring the technical characteristic of radar. Moreover, this practical reference shows you how

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to ensure the minimum level of radar signal parasitic amplitude, calculate modulation signal distortion, and compensate for nonlinear distortion.

This book provides readers a thorough understanding of the applicability of new-generation silicon-germanium (SiGe) electronic subsystems for electronic warfare and defensive countermeasures in military contexts. It explains in detail the

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theoretical and technical background, and addresses all aspects of the integration of SiGe as an enabling technology for maritime, land, and airborne / spaceborne electronic warfare, including research, design, development, and implementation. The coverage is supported by mathematical derivations, informative illustrations, practical examples, and case studies. While SiGe technology provides

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speed, performance, and price advantages in many markets, to date only limited information has been available on its use in electronic warfare systems, especially in developing nations. Addressing that need, this book offers essential engineering guidelines that especially focus on the speed and reliability of current-generation SiGe circuits and highlight emerging innovations that help to ensure the sustainable long-term

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integration of SiGe into  
electronic warfare  
systems.

Radar Principles for the  
Non-Specialist  
Signal Processing for  
Passive Bistatic Radar  
An Organizational  
Assessment of the United  
States Military's  
Ability to Control the  
Electromagnetic Spectrum  
in the 21st Century -  
Covering Electronic  
Warfare and Titan Rain  
Attack by Chinese  
Hackers  
Radar and Electronic  
Warfare Principles for

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the Non-Specialist

Fundamentals of Short-  
range FM Radar

*This cutting-edge resource introduces the basic concepts of passive bistatic radar, such as bistatic geometry, bistatic radar equation and analysis of different illuminating signals. These techniques, although known for almost a century, have not been developed intensively for decades, mainly due to technical limitations, but today, the passive radar concept can be realized in practice, and is of great interest for military and civilian users. This book provides insight into understanding the potential and limitations of passive radar systems, as well as the differences between signal processing in active and passive radar. Each of*

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*the signal processing stages typically applied in passive radar is described, including digital beamforming, clutter removal, target detection, localization and tracking. These concepts are illustrated with both simulated and measured data along with examples of passive radar systems. Correlation processing, which is crucial for passive radar operation, is presented, as well as practical approaches for calculating the cross-ambiguity function. The problems of range and velocity-cell migration are also introduced. The book analyzes and compares different antenna array geometries to show readers the appropriate solution for a particular scenario of passive radar. Cartesian tracking is also presented, based on the extended Kalman filter.*



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*Parallel and sequential updating approaches are introduced and compared. These concepts are illustrated with both simulated and measured data along with examples of passive radar systems, making this book useful for both novice and advanced practitioners.*

*This highly practical resource provides you with thorough working knowledge of the micro-Doppler effect in radar, including its principles, applications and implementation with MATLAB codes. The book presents code for simulating radar backscattering from targets with various motions, generating micro-Doppler signatures, and analyzing the characteristics of targets. You find detailed descriptions of the physics and mathematics of the*

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*Doppler and micro-Doppler effect. Moreover, you learn how to derive rigid and non-rigid body motion induced micro-Doppler effect in radar scattering. The book provides a wide range of clear examples, including an oscillating pendulum, a spinning and precession heavy top, rotating rotor blades of a helicopter, rotating wind-turbine blades, a person walking with swinging arms and legs, a flying bird, and movements of quadruped animals. Focusing mainly on the engineering aspects of communications electronic warfare (EW) systems, this thoroughly updated and revised edition of a popular Artech House book offers you a current and complete introduction to the subject. The second edition adds a wealth of new material, including*

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*expanded treatments of two critical areas RF noise and the effects of signal fading. Moreover, now you find a complete chapter on the important topic of jamming performance over fading channels. Supported with over 700 equations, this authoritative resource details the components, systems, and operations of electronic warfare systems dedicated to protecting and attacking military communications networks. You are provided with a complete understanding of how modern direction finders for communication signals work, along with their limitations. The book also helps you acquire a working knowledge of hyperbolic emitter location technologies, and shows you how to measure performance, defining*

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*the basic operations necessary for communication EW systems. You are provided with a technique for geolocation of low probability of intercept/anti-jam targets. Use this book to identify state-of-the-art EW technology, understand basic EW processes, and gain insight into the future direction of these systems. This new resource presents the principles and applications in the emerging discipline of Activity-Based Intelligence (ABI). This book will define, clarify, and demystify the tradecraft of ABI by providing concise definitions, clear examples, and thoughtful discussion. Concepts, methods, technologies, and applications of ABI have been developed by and for the intelligence*

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*community and in this book you will gain an understanding of ABI principles and be able to apply them to activity based intelligence analysis.*

*The book is intended for intelligence professionals, researchers, intelligence studies, policy makers, government staffers, and industry representatives.*

*This book will help practicing professionals understand ABI and how it can be applied to real-world problems.*

*This popular series of tutorials, featured over a period of years in the Journal of Electronic Defense, is now available in a single volume.*

*Organized into chapters with new introductory and supplementary material from the author, you get clear, concise and well-illustrated*

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*examinations of critical topics such as antenna parameters, receiver sensitivity, processing tasks, and search strategies, LPI signals, jamming, communication links, and simulation. The chapters define key terms and explain how and why particular technologies are relevant to electronic defense. Detailed charts, diagrams and formulas give you the practical knowledge you need to apply specific techniques in the field.*

*Introduction to Electronic Warfare  
Modeling*

*MATLAB Simulations for Radar  
Systems Design*

*Activity-Based Intelligence: Principles  
and Applications*

*Fundamental Principles of Radar*

*Introduction to Airborne Radar*

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A practical guide to the principles of radio communications for both civilian and military applications. In this book, the author covers both the civilian and military uses of technology, focusing particularly on the applications of radio propagation and prediction. Divided into two parts, the author introduces the basic theory of radio prediction before providing a step-by-step explanation of how this theory can be translated into real-life applications. In addition, the book presents up-to-date systems and methods to illustrate how these applications work

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in practice. This includes systems working in the HF bands and SHF. Furthermore, the author examines the performance of these systems, and also the effects of noise, interference and deliberate jamming, as well as the performance of jamming, detection and intercept systems. Particular attention is paid to the problems caused by Radio Controlled Improvised Explosive Devices (RCIEDs).  
Key Features: A practical handbook on the topic of radio communications and propagation Written by an expert in both the civilian and military applications of



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the technology Focuses on methods such as radio and radar jamming, and radio-controlled improvised explosive devices (IEDs) Contains problems and solutions to clarify key topics

Look to this informative new reference for an in-depth, comprehensive treatment of the principles of electronic warfare (EW). Written by leading experts in the field, this authoritative book takes a systematic approach to exploring EW theory, mathematical models, and quantitative analysis. You get a detailed examination of the basic targets of EW operations, a

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thorough presentation of critical radar jamming methods, and definitions of the effectiveness criteria for EW systems and techniques.

This edition features a wealth of new material on urban warfare, including a computer simulation of EW architecture alternatives for land-based forces based on urban constraints. It also includes an expanded section on time-hopped spread spectrum communications, more details on modern communication system technologies such as CDMA and OFDM, and an in-depth discussion on sources of urban noise. This

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practical resource is focused on showing the reader how to design and build jammers specifically targeted at spread spectrum, anti-jam communications. Moreover, it gives assistance in evaluating the expected performance of jamming systems against modern communications systems, and discover the best waveform to use to counter communication systems designed to be effective in jamming environments. While mathematical derivations in general are avoided, the book presents error rate performance equations for most modern digital anti-jam

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communication systems  
The third book in the bestselling Artech House EW 100 series is dedicated entirely to the practical aspects of electronic warfare against enemy communication. From communications math (mainly simple dB formulas), receiving systems, and signals, to communications emitter location, intercept, and jamming, this comprehensive volume covers all the key topics in the field.

This exciting new resource covers various emerging applications of short range radars, including people counting and tracking,

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gesture sensing, human activity recognition, air-drawing, material classification, object classification, vital sensing by extracting features such as range-Doppler Images (RDI), range-cross range images, Doppler Spectrogram or directly feeding raw ADC data to the classifiers. The book also presents how deep learning architectures are replacing conventional radar signal processing pipelines enabling new applications and results. It describes how deep convolutional neural networks (DCNN), long-short term memory (LSTM), feedforward networks,

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regularization, optimization algorithms, connectionist This exciting new resource presents emerging applications of artificial intelligence and deep learning in short-range radar. The book covers applications ranging from industrial, consumer space to emerging automotive applications. The book presents several human-machine interface (HMI) applications, such as gesture recognition and sensing, human activity classification, air-writing, material classification, vital sensing, people sensing, people counting, people localization and in-

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cabin automotive occupancy and smart trunk opening. The underpinnings of deep learning are explored, outlining the history of neural networks and the optimization algorithms to train them. Modern deep convolutional neural network (DCNN), popular DCNN architectures for computer vision and their features are also introduced. The book presents other deep learning architectures, such as long-short term memory (LSTM), auto-encoders, variational auto-encoders (VAE), and generative adversarial networks (GAN). The application of human activity recognition as well

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as the application of air-writing using a network of short-range radars are outlined. This book demonstrates and highlights how deep learning is enabling several advanced industrial, consumer and in-cabin applications of short-range radars, which weren't otherwise possible. It illustrates various advanced applications, their respective challenges, and how they are been addressed using different deep learning architectures and algorithms.

Background and Issues for  
Congress

Foundations of  
Communications Electronic



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Warfare

Tactical Battlefield

Communications Electronic

Warfare

Basic Radar Analysis, Second  
Edition

Understanding Communications  
Systems Principles – A  
Tutorial Approach

Written by a prominent expert in the field, this updated and expanded second edition of an Artech House classic includes the most recent breakthroughs in vital sign and gender recognition via micro-radar, as well as covering basic principles of Doppler effect and micro-Doppler effect and describing basic applications of micro-Doppler

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signatures in radar. The book presents detailed procedures about how to generate and analyze micro-Doppler signatures from radar signals. Readers will learn how to model and animate an object (such as human, spinning top, rotating rotor blades) with movement, simulation of radar returns from the object, and generating micro-Doppler signature. The book includes coverage of the Google project "Soli", which demonstrated the use of radar micro-Doppler effect to sense and recognize micro motions of human hand gesture for controlling devices. It also

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discusses noncontact detection of human vital sign (micro motions of breathing and heart beating) using radar, another important application of radar micro-Doppler sensors. Detailed MATLAB source codes for simulation of radar backscattering from targets with various motions are provided, along with source codes for generating micro-Doppler signatures and analyzing characteristics of targets. Wireless communications and sensing systems are nowadays ubiquitous: cell phones and automotive radars typifying two of the most familiar examples.

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This book introduces the field by addressing its fundamental principles, proceeding from its very beginnings up to today's emerging technologies related to the fifth-generation wireless systems (5G), Multi-Input Multiple Output (MIMO) connectivity, and Aerospace/Electronic Warfare Radar. The tone is tutorial. Problems are included at the end of each chapter to facilitate the understanding and assimilation of the material to electrical engineering undergraduate/graduate students and beginning and non-specialist professionals. Free

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temporary access to Keysight's SystemVue system simulation is provided to further enhance reader learning through hands-on tutorial exercises. Chapter 1 introduces wireless communications and sensing and in particular how curiosity-driven scientific research led to the foundation of the field. Chapter 2 presents a brief introduction to the building blocks that make up wireless systems. Chapter 3 focuses on developing an understanding of the performance parameters that characterize a wireless system. Chapter 4 deals with circuit topologies for modulation and

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detection. In Chapter 5 we cover the fundamental transmitter and receiver systems architectures that enable the transmission of information at precise frequencies and their reception from among a rather large multitude of other signals present in space. Chapter 6 introduces 5G, its motivation, and its development and adoption challenges for providing unprecedented levels of highest speed wireless connectivity. Chapter 7 takes on the topic of MIMO, its justification and its various architectures. Chapter 8 addresses the topic of aerospace/electronic warfare

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radar and finally Chapter 9 presents three Tutorials utilizing the SystemVue simulation tool. Offering engineers a thorough examination of special, more advanced aspects of digital wideband receiver design, this practical book builds on fundamental resources on the topic, helping you gain a more comprehensive understanding of the subject. This in-depth volume presents a detailed look at a complete receiver design, including the encoder. Moreover, it discusses the detection of exotic signals and provides authoritative guidance on designing receivers used in

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electronic warfare. From frequency modulation and biphasic shifting keys, to parameter encoders in electronic warfare receivers and the use of the simulation and probability density function to predict the false alarm parameter, this book focuses on critical topics and techniques that help you design digital wideband receivers for top performance. The authoritative reference is supported with over 310 illustrations and more than 180 equations.

This enhanced and fully revised 4th Edition of Radar and Electronic Warfare Principles for the Non-specialist presents a



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comprehensive set of radar and electronic warfare principles including many of the latest applications with the addition of new EW principles.

The important and fascinating topics of radar enjoy an extensive audience in industry and government but deserve more attention in undergraduate education to better prepare graduating engineers to meet the demands of modern mankind.

Radar is not only one of the major applications of electronics and electromagnetic communications, but it is also a mature scientific discipline with significant theoretical and

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mathematical foundations that warrant an intellectual and educational challenge.

Fundamental Principles of Radar is a textbook providing a first exposure to radar principles. It provides a broad concept underlying the basic principle of operations of most existing radar systems and maintains a good balance of mathematical rigor to convince readers without losing interest. The book provides an extensive exposition of the techniques currently being used for radar system design, analysis, and evaluation. It presents a comprehensive set of radar principles, including all

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features of modern radar applications, with their underlying derivations using simple mathematics. Coverage is limited to the main concepts of radar in order to present them in a systematic and organized fashion. Topics are treated not as abstruse and esoteric to the point of incomprehensibility, but the very complex and rich technology of radar is distilled into its fundamentals. The author's emphasis is on clarity without sacrificing rigor and completeness, thus making the book broad enough to satisfy a variety of backgrounds and interests. Thorough

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documentation provides an unusual degree of completeness for a textbook at this level, with interesting and sometimes thought-provoking content to make the subject even more appealing. Key Features: Covers a wide range of topics in radar systems Includes examples and exercises to reinforce the concepts presented and explain their applications Provides self-contained chapters useful for readers seeking selective topics Provides broad concepts underlying the basic principles of operations of most types of radars in use today Includes documentation to lead to further

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reading of interesting concepts  
and applications

Special Design Topics in Digital  
Wideband Receivers

Modern Communications

Jamming Principles and  
Techniques

Deep Learning Applications of  
Short-Range Radars

U.S. Airborne Electronic Attack  
Programs

EW 102

*This highly-anticipated second edition of an Artech House classic covers several key radar analysis areas: the radar range equation, detection theory, ambiguity functions, waveforms, antennas, active arrays, receivers and signal processors, CFAR and chaff analysis. Readers will be able to predict the detection performance of*

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*a radar system using the radar range equation, its various parameters, matched filter theory, and Swerling target models. The performance of various signal processors, single pulse, pulsed Doppler, LFM, NLFM, and BPSK, are discussed, taking into account factors including MTI processing, integration gain, weighting loss and straddling loss. The details of radar analysis are covered from a mathematical perspective, with in-depth breakdowns of radar performance in the presence of clutter. Readers will be able to determine the noise temperature of a multi-channel receiver as it is used in active arrays. With the addition of three new chapters on moving target detectors, inverse synthetic aperture radar (ISAR) and constant false alarm rate (CFAR) and new MATLAB codes, this expanded second edition will appeal to the novice as well as the experienced practitioner.*

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*EW 101 has been a popular column in the Journal of Electronic Defense for a number of years. This compilation of tutorial articles from JED provides introductory level electronic warfare instruction for students of the discipline.*

*This handbook is designed to aid electronic warfare and radar systems engineers in making general estimations regarding capabilities of systems. It is not intended as a detailed designer's guide, due to space limitations. Portions of the handbook and future changes will be posted on an internet link.*

*A thorough update to the Artech House classic Modern Radar Systems Analysis, this reference is a comprehensive and cohesive introduction to radar systems design and performance estimation. It offers you the knowledge you need to specify, evaluate, or apply radar technology in civilian or military systems. The book presents accurate*

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*detection range equations that let you realistically estimate radar performance in a variety of practical situations. With its clear, easy-to-understand language, you quickly learn the tradeoffs between choice of wavelength and radar performance and see the inherent advantages and limitations associated with each radar band. You find modeling procedures to help you analyze enemy systems or evaluate radar integrated into new weapon systems. The book covers ECM and ECCM for both surveillance and tracking to help you estimate the effects of active and passive ECM, select hardware/software for reconnaissance or jamming, and plan the operation of EW systems. As radar systems evolve, this book provides the equations needed to calculate and evaluate the performance of the latest advances in radar technology.*

*This military study executed a contingency theory based organizational analysis of*



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*command level EW organizations responsible for EW plans and management within the Department of Defense. The United States (U.S.) has the best-trained and equipped military in the world; however, these factors do not necessarily equate to success in operations. Information is a vital component of warfare that facilitates success. Electronic warfare (EW) organizations in the U.S. military are tasked to control battlefield information flow throughout the range of military operations. Historically, the U.S. has effectively accomplished this mission; however, recent events reveal symptoms of a decline in America's ability to exploit, attack, and protect information systems. The collective assessment using the combined open systems model and ORGCON (Burton et al., 1998) expert system revealed the organization has not adequately adjusted to the dynamic environment of the twenty first century.*

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*Implementation of recommended changes to the EW strategic task, leadership rank structure, education system, and division of EW may assist the U.S. military to maintain its information advantage in future operations. Chapter I is the introduction where the thesis purpose is identified. This is followed by a brief discussion of the mission and tasks of electronic warfare assigned by the Department of Defense and formalized in joint publications. Additional examples are provided to illustrate symptoms of the EW decline that can affect national security. Finally, research methodology and rationale for focusing the research scope to an analysis of command level EW organization within the EW community is discussed. Chapter II provides the reader a brief literature review on organizational design and introduces a combined open systems model developed for this analysis. The model is developed by*

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*incorporating components of the "Leavitt Diamond" (1965) model and the Mercer Delta presented Congruence model developed by Nadler and Tushman (1998). Components of the model and key terms of organizational design are identified and defined in this chapter. In Chapter III, the current structure of command level EW organizations are placed into the context of the combined open systems model. Information from joint publications, Department of Defense instructions, and interviews with personnel in command level EW staff positions are used to place command level EW organizations in the context of the model. Chapter IV is the analysis of the "fit" or congruence between components within the model. The terms fit and congruence are used synonymously in the thesis. Nadler and Tushman (1998) define fit as:*

**CHAPTER I \***  
**INTRODUCTION \* A. PURPOSE \* B.**

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*ROLE OF ELECTRONIC WARFARE \* C.  
SYMPTOMS OF ELECTRONIC  
WARFARE DECLINE \* D. THESIS  
ORGANIZATION \* E. RESEARCH SCOPE  
\* CHAPTER II \* OVERVIEW AND BASIC  
CONCEPTS \* A. THEORETICAL REVIEW  
OF THE OPEN SYSTEMS AND  
CONTINGENCY MODELS \* B.  
COMBINED OPEN SYSTEMS MODEL  
COMPONENTS, KEY TERMS, AND  
DEFINITIONS \* 1. Organizational  
Configuration and Structure: Key Terms \*  
2. Combined Open Systems Model  
Components \* 3. Analysis Methodology \*  
CHAPTER III \* ELECTRONIC WARFARE  
ORGANIZATION INTO CONTEXT OF  
COMBINED OPEN SYSTEMS MODEL \*  
A. OUTPUTS AND FEEDBACK \* B.  
INPUTS \* 1. Environment \* 2. History \* 3.  
Resources \* 4. Strategy \* C.  
TRANSFORMATION CORE \* 1. Task \* 2.  
Formal Structure \* a. Structural Divisions \**

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*b. Formal Relationships \* c. 'As-required'  
Organizations*

*Electronic Warfare an Introductory  
Example*

*The Micro-Doppler Effect in Radar  
Emitter Detection and Geolocation for  
Electronic Warfare*

*Introduction to Electronic Warfare  
Modeling and Simulation*

*The History of Electronic Warfare,  
1939-1945*

The fifth book in the bestselling Artech House EW 100 series explores electronic warfare (EW) in space. Practical problems – including intercept and jamming of hostile signals transmitted from the Earth ' s surface and the vulnerability of satellite links to attack from the Earth ' s surface are discussed.

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Spherical trigonometry is covered to provide the background necessary to understand the scope of satellite problems. Orbit mechanics, specifically the way the Earth and its satellites revolve around one another, is also explained. The basics of radio propagation and how it applies to communications Electronic Warfare are demonstrated, as well as the special considerations that apply to radio transmission to and from an Earth satellite. Satellite links and link vulnerability are discussed. Readers learn how to calculate the distance over which a

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satellite can view as a function of its orbital parameters, how long the satellite can see that point, and the frequency shift in signals received by the satellite or an Earth based receiver. EW applications of orbit mechanics, satellite links, radio propagation and link vulnerability. Written by an expert in the field, this book is useful for technical and non-technical professionals. Electronic Warfare is a unique and convenient introduction to electrical engineers and researchers. In scientific world it is an invaluable aid. For the students with limited time for researching data on anti-jamming and jamming war, the

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book in your hand is the most accessible. Inside, you will find out how to: Design and Simulation Direct Sequence Spread Spectrum Modem. Channel Characteristics and Channel Modeling. Design and Simulation of Direct Sequence Spread Spectrum Jammer. Simulation Results and Performance Analysis. Real-time testing and simulation of open- and closed-loop radio frequency (RF) systems for signal generation, signal analysis and digital signal processing require deterministic, low-latency, high-throughput capabilities afforded by user reconfigurable field



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programmable gate arrays (FPGAs). This comprehensive book introduces LabVIEW FPGA, provides best practices for multi-FPGA solutions, and guidance for developing high-throughput, low-latency FPGA based RF systems. Written by a recognized expert with a wealth of real-world experience in the field, this is the first book written on the subject of FPGAs for radar and other RF applications.

Here's an up-to-date, comprehensive review of surveillance and reconnaissance (S & R) imaging system modeling and performance prediction. This new, one-of-a-

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kind resource helps you predict the information potential of new surveillance system designs, compare and select from alternative measures of information extraction, relate the performance of tactical acquisition sensors and surveillance sensors, and understand the relative importance of each element of the image chain on S& R system performance. It provides you with system descriptions and characteristics, S& R modeling history, and performance modeling details.

This comprehensive book gives an overview of how cognitive systems and artificial

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intelligence (AI) can be used in electronic warfare (EW). Readers will learn how EW systems respond more quickly and effectively to battlefield conditions where sophisticated radars and spectrum congestion put a high priority on EW systems that can characterize and classify novel waveforms, discern intent, and devise and test countermeasures. Specific techniques are covered for optimizing a cognitive EW system as well as evaluating its ability to learn new information in real time. The book presents AI for electronic support (ES), including characterization, classification, patterns of life,

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and intent recognition.

Optimization techniques, including temporal tradeoffs and distributed optimization challenges are also discussed.

The issues concerning real-time in-mission machine learning and suggests some approaches to address this important challenge are presented and described.

The book covers electronic battle management, data management, and knowledge sharing. Evaluation approaches, including how to show that a machine learning system can learn how to handle novel environments, are also discussed. Written by experts with first-hand experience in AI-

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based EW, this is the first book on in-mission real-time learning and optimization.

Cognitive Radar: The Knowledge-Aided Fully Adaptive Approach, Second Edition

Electronic Warfare Target Location Methods, Second Edition

Electronic Warfare and Radar Systems Engineering Handbook  
A First Course in Electronic Warfare

Information Warfare and Electronic Warfare Systems  
*Simulation is integral to the successful design of modern radar systems, and there is arguably no*

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*better software for this purpose than MATLAB. But software and the ability to use it does not guarantee success. One must also: Understand radar operations and design philosophy Know how to select the radar parameters to meet the design req*

*Information warfare is emerging as the new war fighting paradigm of the U.S. and many of its allies. This book is the first in the field to address communication electronic warfare (EW)*

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systems in the context of information warfare. Authored by a recognized leading authority, the book includes a unique formulation of EW system performance and presents results of system simulations that have not appeared previously in any related literature. Essential reading for EW engineers and researchers working in defense, aerospace, and military capacities, the book explores the properties of information, the

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*properties of  
information  
communication means,  
information theory, EW  
system architectures,  
and two operational  
simulations, one in  
Northeast Asia and the  
other in urban terrain.  
What This Book Is This  
book is about radar. It  
will teach you the  
essentials of radar, the  
underlying principles.  
It is not like an  
engineering handbook  
which provides detailed  
design equations without  
explaining either*



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*derivation or rationale. It is not like a graduate school textbook which may be abstruse and esoteric to the point of incomprehensibility. And it is not like an anthology of popular magazine articles which may be gaudy but superficial. It is an attempt to distill the very complex, rich technology of radar into its fundamentals, tying them to the laws of nature on one end and to the most modern and complex*

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systems on the other. Who It's For If your work requires you to supervise or meet as coequals with radar systems engineers or designers, this book will allow you to understand them, to question them intelligently and perhaps to provide them with a perspective (a dispassionate yet competent view) that they lack. If you are trained in another discipline but have been made the manager of a

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radar project or a system program that has one or more radars as sub-systems, this book will provide you with the tools you need, not only to give your team members confidence, but also to make a substantive technical contribution yourself. Worldwide growth of space communications has caused a rapid increase in the number of satellites operating in geostationary orbits, causing overcrowded orbits. This practical

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*resource is designed to help professionals overcome this problem.*

*This timely book provides a solid understanding of the use of radio interferometers for tracking and monitoring satellites in overcrowded environments.*

*Practitioners learn the fundamentals of radio interferometer hardware, including antennas, receiving equipment, signal processing and phase detection, and measurement accuracies.*

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*This in-depth volume describes the nature of the targets to be tracked by the interferometer, helping to clarify the movement of target satellites and what specific information has to be caught by the interferometer. Additionally, engineers find details on applications to practical cases of satellite tracking, covering different types of interferometers, recent technical*

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developments, orbital monitoring and safety control.

The rapid evolution of radio and radar systems for military use during World War II, and devices to counter them, led to a technological battle that neither the Axis nor the Allied powers could afford to lose. The result was a continual series of thrusts, parries and counter-thrusts, as first one side then the other sought to wrest the initiative in the

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*struggle to control the other. This was a battle fought with strange-sounding weapons: 'Freya', 'Mandrel', 'Boozer' and 'Window'. It was a battle characterised by the bravery, self-sacrifice and skill of those who took part in it. During the war, however, and for many years after, electronic-warfare systems and their employment during the conflict remained closely guarded military secrets. When that veil*

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*of secrecy was finally lifted, the technicalities of the subject helped ensure that it remained beyond the reach of lay researchers and readers. Alfred Price, an aircrew officer with the RAF where he flew with V-Force and specialized in electronic warfare and air fighting tactics, was both inspired by the subject and in the unique position to lift the lid on this largely unexplored aspect of World War II. When it*



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*was first published in 1967, Instruments of Darkness came to be regarded as a standard reference work on this intriguing subject. Since its initial appearance, it has been expanded as important additional material has become available. This completely revised edition ends with the Japanese surrender in August 1945 and brings the analysis fully up to date in the light of what we now know.*

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Surveillance and  
Reconnaissance Imaging  
Systems*

*Fundamentals of  
Electronic Warfare*

**This comprehensive  
resource provides  
theoretical formulation  
for detecting and  
geolocating non-  
cooperative emitters.  
Implementation of  
geolocation algorithms  
are discussed, as well**

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as performance prediction of a hypothetical passive location system for systems analysis or vulnerability calculation. Comparison of novel direction finding and geolocation algorithms to classical forms are also included. Rooted in statistical signal processing and array processing theory, this book also provides an overview of the application of novel detection and estimation algorithms to real world

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problems in EW. The book is divided into three parts: detection, angle of arrival estimation, and geolocation. Each section begins with an introductory chapter covering the relevant signal processing theory (either detection or estimation), then provides a series of chapters covering specific methods to achieve the desired end-product. MATLAB® code is provided to assist readers with relevant probability and

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statistics, RF propagation, atmospheric absorption, and noise, giving readers an understanding of the implementation of the algorithms in the book, as well as developing new approaches to solving problems. Packed with problem sets and examples, this book strikes a balance between introductory texts and reference manuals, making it useful for novice as well as advanced practitioners.

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