

## 1. Amplitude Modulation & Demodulation

- Aim:**
1. To generate amplitude modulated wave and determine the percentage modulation.
  2. To Demodulate the modulated wave using envelope detector.

**Apparatus Required:**

Name of the Component/Equipment	Specifications/Range	Quantity
1. AM Modulation & Demodulation Trainer kit	FT 1501	1
2. CRO		1
3. CRO probes		2
4. Patch chords		

**Theory:**

Amplitude Modulation is defined as a process in which the amplitude of the carrier wave  $c(t)$  is varied linearly with the instantaneous amplitude of the message signal  $m(t)$ . The standard form of an amplitude modulated (AM) wave is defined by

$$S(t) = A_c [1 + K_a m(t)] \cos 2\pi f_c t$$

Where  $K_a$  is a constant called the amplitude sensitivity of the modulator

The demodulation circuit is used to recover the message signal from the incoming AM wave at the receiver. An envelope detector is a simple and yet highly effective device that is well suited for the demodulation of AM wave, for which the percentage modulation is less than 100%. Ideally, an envelope detector produces an output signal that follows the envelop of the input signal wave form exactly; hence, the name. Some version of this circuit is used in almost all commercial AM radio receivers.

The Modulation Index is defined as,  $m = (E_{\max} - E_{\min}) / (E_{\max} + E_{\min})$

Where  $E_{\max}$  &  $E_{\min}$  are the maximum and minimum amplitudes of the modulated wave.

# Digital Communication Lab Manual Analog Modulation

**Wayne Tomasi**



## **Digital Communication Lab Manual Analog Modulation:**

Networking and Data Communications Laboratory Manual Frances S. Grodzinsky, 1999 Designed for any introductory networking or data communications course This laboratory manual is designed for the purpose of enhancing the understanding of concepts discussed in a variety of networks and data communications texts This manual represents a work of dedication and collaboration by faculty from universities and colleges across the country

**Basic Electronics Engineering** Satya Sai Srikant, Prakash Kumar Chaturvedi, 2020-04-27 This book is primarily designed to serve as a textbook for undergraduate students of electrical electronics and computer engineering but can also be used for primer courses across other disciplines of engineering and related sciences The book covers all the basic aspects of electronics engineering from electronic materials to devices and then to basic electronic circuits The book can be used for freshman first year and sophomore second year courses in undergraduate engineering It can also be used as a supplement or primer for more advanced courses in electronic circuit design The book uses a simple narrative style thus simplifying both classroom use and self study Numerical values of dimensions of the devices as well as of data in figures and graphs have been provided to give a real world feel to the device parameters It includes a large number of numerical problems and solved examples to enable students to practice A laboratory manual is included as a supplement with the textbook material for practicals related to the coursework The contents of this book will be useful also for students and enthusiasts interested in learning about basic electronics without the benefit of formal coursework

**Laboratory Manual to Accompany Electronic Communications Systems** Wayne Tomasi, 2000-07 *Courses Catalog - University of Illinois at Urbana-Champaign* University of Illinois at Urbana-Champaign, 2002 Includes undergraduate and graduate courses

**Digital Communications With Lab Manual, 3/E** Bhat K. N. Hari, 2010-09 *Modeling, Programming and Simulations Using LabVIEW™ Software* Riccardo de Asmundis, 2011-01-21 Born originally as a software for instrumentation control LabVIEW became quickly a very powerful programming language having some peculiar characteristics which made it unique the simplicity in creating very effective Users Interfaces and the G programming mode While the former allows designing very professional controls panels and whole Applications completed with features for distributing and installing them the latter represents an innovative and enthusiastic way of programming the Graphical representation of the code The surprising aspect is that such a way of conceiving algorithms is absolutely similar to the SADT method Structured Analysis and Design Technique introduced by Douglas T Ross and SofTech Inc USA in 1969 from an original idea of MIT and extensively used by US Air Force for their projects LabVIEW practically allows programming by implementing straightly the equivalent of an SADT actigram Beside this academical aspect LabVIEW can be used in a variety of forms creating projects that can spread over an enormous field of applications from control and monitor software to data treatment and archiving from modeling to instruments controls from real time programming to advanced analysis tools with very powerful mathematical algorithms ready to use from full

integration with native hardware by National Instruments to an easy implementation of drivers for third party hardware In this book a collection of different applications which cover a wide range of possibilities is presented We go from simple or distributed control software to modeling done in LabVIEW from very specific applications to usage in the educational environment

**Radio Receivers for Systems of Fixed and Mobile Communications** Vasiliy V. Logvinov, Sergey M. Smolskiy, 2022-05-13 The textbook acquaints the reader with the architecture of receivers of analog and digital radio systems helps to study the stages of designing a modern radio receiver and reveals the reasons and methods for its effective operation in networks for various purposes Particular attention is paid to the methods of generating and processing signals in the receivers of digital systems with multiple access which make it possible to provide data transfer rates close to the maximum possible according to Shannon As a textbook for students studying methods of optimal signal reception the book will also be useful to specialists in the field of telecommunications involved in the development of radio receivers The book shows how the development of theoretical circuitry and integrated technologies led to the active introduction of algorithmic methods for signal processing changed both the design of receivers and the methods of forming the information flow in free space MIMO beamforming The creation of a global 5G network based on heterogeneous networks puts forward new requirements for the architecture of receivers which are determined by the requirements to achieve high data rates low time delays or use in networks with coordinated multipoint transmission and reception CoMP To consolidate the knowledge gained the book includes a complete set of materials for online classes including questions and answers a guide to solving problems for each chapter and computer modeling units of receivers in the MicroCAP environment based on preliminary calculations

**Electronic Communication** Wayne Tomasi, 1994      **An Introductory Guide to EC Competition Law and Practice** Valentine Korah, 1994      **Engineering Education** , 1990      **Control of Electric Machines** Irving L. Kosow, 1973      **Telecommunication Journal** , 1981      **Digital Communication- A Simplified Approach** Kn Hari Bhat, 2008-01-01 This book is designed to serve as a text for senior undergraduate level students in electronics and communication and telecommunication engineering It is as well designed to serve as a text for self study and reference book for practicing engineers working in the field of digital communications The main objective of penning this book has been to make learning intricate concepts a pleasant experience Features Integrated with Figures and diagrams in abundance Plentiful worked examples Lots of exercise problems with answers Basic principles of Fourier transform have been discussed Basic properties of Probability and Random Processes have been discussed to characterise random signals and noise An introduction discussing the building blocks of digital communication system has been added to prepare the student before diving deep into the subject Matched filters and correlators are discussed step by step with relevant signal constellation diagrams showing the decision boundaries with emphasis on understanding the concept of detection and estimation as foundation Different types of sampling multiplexing and reconstruction techniques have been discussed to understand the

link between analog and digital world Generation transmission and regeneration of signals using PCM and other coding techniques have been discussed in depth Different types of line coding schemes and effect of noise have been discussed before proceeding to digital modulation schemes Various digital modulation schemes have been discussed along with diagrams and importance is given to probability of error calculation Principle of spread spectrum modulation its advantages and applications are discussed A Manual on Advance Communication Lab Practice Contents The Fourier Transforms Probability Random variables and Random Processes Introduction to Digital Communications Detection and Estimation Sampling Process Waveform Coding Technique Baseband Data Transmission Digital Modulation Spread Spectrum Modulation Appendices Experiments on Digital Communication Experiments on Fiber Optical Communication Experiments on Wave Guides Experiments on Microstrip Transmission Lines Experiments on Microstrip Transmission Lines Experiments on Microstrip Transmission Lines

*Books in Print* ,1994      **Analog Communications** Kasturi Vasudevan,2020-08-14 This textbook covers the fundamental concepts of analog communications with a Q A approach It is a comprehensive compilation of numerical problems and solutions covering all the topics in analog communications Richly illustrated with figures this book covers the important topics of signals and systems random variables and random processes amplitude modulation frequency modulation pulse code modulation and noise in analog modulation It has numerical questions and their solutions clearing the concepts of Fourier transform Hilbert transform modulation synchronization signal to noise ratio analysis and many more All the solutions have step by step approach for easy understanding This book will be of great interest to the students of electronics and electrical communications engineering      The National Guide to Educational Credit for Training Programs American Council on Education,2005 Highlights over 6 000 educational programs offered by business labor unions schools training suppliers professional and voluntary associations and government agencies      **Simulation** ,1967      *Forthcoming Books* Rose Army,1997      *Graduate Catalog* Iowa State University,1987      Western Aerospace ,1959

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transform a young man's life At the age of sixteen, R. Dwayne Betts-a. A Memoir of Learning, Survival, and Coming of Age in Prison May 4, 2010 — Utterly alone, Betts confronts profound questions about violence, freedom, crime, race, and the justice system. Confined by cinder-block walls ... A Memoir of Learning, Survival, and Coming of Age in Prison by AE Murphy · 2011 — The book, A Question of Freedom, is the story of a young man, Dwayne Betts, whose decision to break the law at age 16 changed his life forever.