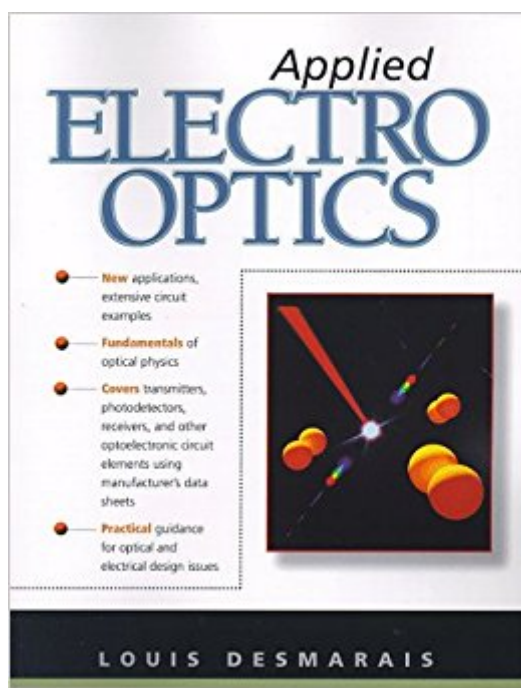


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# Applied Electro Optics



## Synopsis

A "back-to-basics" guide to opto-electronic circuit design and construction. To successfully build and optimize opto-electronic circuits, you need to understand both the fundamentals of optics and electronics. Applied Electro-Optics provides engineers, designers and technicians with a firm background in both optical physics and circuit design. In Part I, the book introduces the basic theory of opto-electronics, including: Maxwell's equations and the wave nature of light Reflection and refraction, with extensive coverage of Snell's Law Interference phenomena and the Fabry-Perot interferometer Diffraction effects and diffraction gratings Polarization and electro-optic modulation Photons, basic quantum theory, and spectroscopic techniques Then, in Part II, the book introduces each major element of an electro-optic system. Understand semiconductor light sources such as LEDs and diode lasers. Consider optical transmitters and discover how to minimize the impact of electromagnetic interference through careful circuit location, grounding, and shielding. Review the basic structure and operation of photodiodes, phototransistors, optocouplers, and photoconductors. Then, learn practical techniques for managing the trade-offs required to integrate these devices into useful circuits. A full chapter on optical receivers demonstrates how to integrate photodetectors into useful receiver circuits; both amplifier and hybrid circuits are covered. Finally, walk step-by-step through building and optimizing circuits for a variety of applications, including CD players and infrared data transmission. If your goal is to build the best possible opto-electronic circuits or just to understand how they operate, Applied Electro-Optics delivers just the right balance of theory and practice to help you.

## Book Information

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## Customer Reviews

Offers an applications-oriented introduction to the field of electro-optics. The author begins by discussing the fundamental principles of optics, semiconductor electronics, and electromagnetics. He then describes such optoelectronic devices as LEDs, diode lasers, and photodiodes, and shows how they are integrated into electronic circuits. Finally, he turns to electro-optical systems, including the compact disk player and infrared data transmission. For students who need it, there is a short tutorial on the basics of operational amplifiers. -- Book News, Inc., Portland, Or.

**Preface** The purpose of this book is to present the rapidly growing field of electro-optics in an applications-oriented manner. This presentation has been kept at an introductory level. To do this effectively, two major areas of scientific study must be considered. These areas are optics and electronics. The book deals with the fundamental principles in optics, semiconductor electronics, and electromagnetics. Optoelectronic devices such as LEDs, diode lasers, and photodiodes are studied in detail. The integration of these devices into useful electronic circuits is also covered in detail. This book is intended as a text for people with diverse backgrounds. It should be useful to freshman and sophomore college students for a course in electro-optics and to practicing engineers, scientists, or managers who have little or no knowledge of electro-optics. Anyone working in the field of electronics may find this book very useful since most electronic devices now use optoelectronic components. Areas where electro-optical systems are used include the biomedical field, communications, remote sensing, imaging, test and measurement, and surveillance. It is assumed that the reader has a basic knowledge of electronics that includes operational amplifiers. A short tutorial on the basics of operational amplifiers is given in Appendix B for those who need help in this area. Part I of this book provides the necessary background in optics. Numerous examples with full solutions are given. Many of these examples are taken from practical situations. In later chapters, practical circuit examples are given using manufacturers' data sheets for the optoelectronic components specified. In the last chapter, the electro-optical portion of the compact disc (CD) player is considered in detail. The presentation here relies upon many of the optical and electrical examples presented previously. Even though electro-optical systems tend to be very complex, we can understand their operation by considering some basic things that they hold in common. For example, the vast majority of receivers used in electro-optical systems rely upon only a few circuit techniques to convert the input optical signal into a useable electrical signal. This electrical signal then undergoes signal conditioning with the help of conventional electronics. This book discusses, in great detail, the most common circuit techniques used to convert the optical

signal into an electrical signal. In this way, the reader can use one of these techniques in a particular application. Unfortunately, it would be impossible to consider all of the electronic signal conditioning circuits. But, many common electronic amplifier techniques are discussed in detail.

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