

# Electronic instrumentation



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Second edition 2005

Published by:

VSSD

Leeghwaterstraat 42, 2628 CA Delft, The Netherlands

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internet: <http://www.vssd.nl/hlf>

URL about this book: **<http://www.vssd.nl/hlf/e008.htm>**

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Printed in The Netherlands.

ISBN 90-71301-43-5

NUR 959

*Keywords:* electronic instrumentation

# Preface

Electronic systems have made deep inroads into every aspect of daily life. One need only look around homes, offices and industrial plants to see that they feature almost everywhere. Indeed, it is practically impossible to name any appliances, tools or instruments that do not contain electronic components. In order to compete with rival companies or just remain a step ahead of them, the designers of technical systems and innovative products must be fully aware of both the assets and the limitations of electronic components and systems. Users of electronic systems also need to have a basic knowledge of electronic principles. In order to fully exploit an instrument's potential, to be aware of its limitations, to correctly interpret the measurement results and to be able to arrive at well-balanced decisions relating to the purchasing, repairing, expansion or replacement of electronic equipment, all users of such systems also need to have a basic knowledge of electronic principles.

This book offers such basic knowledge and provides guidance on how to obtain the relevant skills. The kinds of topics dealt with are operating principles, the performance of analog and digital components and circuits, and the precise characteristics of electronic measuring systems. Throughout the book, every endeavor is made to impart a critical attitude to the way in which such instruments should be implemented.

The book is based on various series of courses on electronics and electronic instrumentation that were given by the author during the many years when he lectured at Delft University of Technology in the Netherlands. The courses were designed for students from various departments such as: Mechanical Engineering, Aeronautical Engineering and Mining Engineering. When numbers of non-Dutch-speaking Master of Science students started to rise it became necessary to publish an English version of the book.

The particular way in which the book has been organized makes it suitable for a much wider readership. To meet the demands of divergent groups it has been structured in a modular fashion. Each chapter discusses just one particular topic and is divided into two parts: the first part provides the basic principles while more specific information is given in the second part. Each chapter ends with a summary and several exercises. Answers to all the exercises are given at the back of the book. This approach is conducive to self-study and to the composition of tailor-made course programs.

The required background knowledge is a basic grounding in mathematics and physics equivalent to any first-year academic level. No background knowledge of electronics is needed to understand the contents of the book. For further information on particular subjects the reader is referred to the many course books that exist on the subjects of electronics, measurement techniques and instrumentation.

I am indebted to all the people who contributed to the realization of this book. In particular I would like to thank Johan van Dijk who carefully refereed the original Dutch text. I am grateful also to Reinier Bosman for working out all the exercises, to G. van Berkel for creating the more than 600 illustrations, to Jacques Schievink for processing the original Dutch editions and this English version of the book and to Diane Butterman for reviewing the entire English text.

Paul Regtien

Hengelo, August 2004

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