This book presents a collection of analog electronic circuits based on the op amp, supported by a wealth of practical and technical detail which will enable the reader speedily to select, build and test a desired circuit.

The book is primarily intended to be a practical reference volume rather than a teaching text. Both students and professional engineers will discover in its pages an extensive and invaluable source of functional and established analog circuits, from integrators and differentiators to logarithmic amplifiers; from instrumentation amplifiers to filters. The circuits are conveniently grouped according to function, and the approach followed is to build up slowly from the basic textbook examples towards a series of practical, workable circuits.

Students who need to build and test particular types of analog circuitry as part of an assignment or project based activities will find this book invaluable. Professional engineers will also find the book useful for design and development work. The coverage is extensive and up-to-date, and provides a wealth of expert, technical advice on the selected circuits.
Analog Electronics with Op Amps
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Preface

In recent years we have seen the emergence of a new subject in electronics, that of digital signal processing (DSP). In DSP, which is based on the computational power of the microprocessor, many new application areas have been pioneered and at the same time old ones have been given a fresh impetus. Results have been produced, through various software techniques, which would previously have been possible, if at all, only through the prohibitively extensive use of hardware. Over this same period, a new technology has also come to maturity centred around the creation of monolithic integrated circuits which combine both analog and digital operations on a single silicon substrate. These hybrid ics and powerful DSP systems have produced enormous benefits for the design engineer in terms of reduced costs, increased performance and greater flexibility. Analog electronics, however, tends to have been overshadowed, based as it is on the more mature technology of the op amp. Yet a sound grasp of analog electronics is probably more important now than ever since DSP has opened up so many new applications, all of which require an analog front-end for their operation. There will also continue to be a need for prototyping new designs in hardware in the early stages of development work, whether this prototyping is done in the industrial laboratory by the experienced design engineer or in the college or university laboratory by students who are just setting out on the engineering path. Useful as software simulations of analog circuits are to the engineer and student, there is still no substitute for the ‘real-world’ experience provided by a hands-on approach.

We are conscious, owing to limitations of space, of the absence of conversion electronics in these pages, especially in the use of digital to analog converters and analog to digital converters. Apart from this omission, readers will find that many practical circuits from analog electronics are usefully described and outlined. However, this book is not intended to be a textbook in analog electronics, nor is it an introduction to the fundamentals of the op amp. Many other works carry out this role perfectly well. Instead, it is offered as a source of practical circuits in analog electronics so that the reader can readily and speedily obtain information and advice on the particular task which needs to be carried out using that work-horse of analog electronics,


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the op amp. Using this superbly flexible building block, and a suitable addition of resistors, capacitors, diodes and discrete transistors, a remarkable range of operations can be carried out. If this volume is the first book which readers consult when they begin their task of designing, building and testing a particular analog circuit, then our work will have succeeded.

I wish to thank my wife, Denise, for her constant help and encouragement, and my daughters Lucy and Anna. With thanks also to my parents. [AP]

I wish to thank my wife Mary and my children, Katherine, Sean, Nicola and Daniel for their tolerance and support during the writing of this manuscript. [VW]