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Digital Electronics Through Worked Examples

Norman Bonnett

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Preface

There are available many excellent textbooks on both analogue and digital electronics; these range from elementary texts that cover the subject at school level (with a mainly practical approach) to those that are highly advanced and at the fringe of the technologies. It is intended that this book will strike a balance between these two extremes.

This book is intended for first and second year students of electrical and electronic engineering, in particular those studying for Higher National Certificates and Diplomas; it will also be valuable for undergraduates and should complement lecture and other source material. The aim is to enable the student to solve real world problems in a systematic and professional way.

There is a wind of change in engineering education at the moment. It is no longer sufficient to treat engineers and technician engineers simply as the recipients of information, subject them to a heavy diet of lectures, and then demand them to regurgitate these facts in an examination room. In the United Kingdom there is also pressure firstly to move away from conventional laboratory work (where the only decision that generations of students have had to make is whether to have the graph paper vertical or horizontal or what scales to use for the axis;) by moving towards assignment work. Secondly there is pressure to improve the efficiency of the teaching and lecturing process. For too long it has been believed that engineers and technician engineers are an odd body, who unlike other students appear only to be able to receive information when they are lectured to; unlike other students who can obtain and absorb information from source material! Of course this is quite untrue. A student centred approach consistently produces results that are of a higher quality, are easier to transfer to other situations, and more

thoroughly learned than those obtained by conventional rote learning.

The approach adopted in this book is that of worked examples, using both the traditional examination question and also assignments that are based both on laboratory work and on literature searches; these latter types of examples use manufacturers' data as the prime source. There is no attempt either to choose, or of choice to ignore, devices at the forefront of technology; a thorough knowledge of the characteristics of key devices is more transferable to new products than a nodding acquaintance with every device in a data book. It is this quality of transferring knowledge from known situations to new and concrete situations that is the hall mark of sound learning.

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Texas Instruments for extracts concerning the following devices: 7400, 7473, 7476, 74LS76A, 7490, 7493A, 7497, 74143, 74LS139A, 74151, 74161A, 74180, 74194 and TBIBPPAL16LB.

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CYM1421

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Ben Bennett at The Polytechnic Huddersfield ran the HILO simulations for me, and the students there and at Bradford College provided me with the initial encouragement to pursue the line of teaching

and assessment that this book uses; all have my thanks.

Last, and by no means least I must acknowledge the support of my wife Annedore. She tolerated my moods, my irregular hours at the keyboard and shared my joys. *Danke Liebste.*

TO ANNEDORE