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MASTERING ELECTRONICS

SECOND EDITION

JOHN WATSON

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EDUCATION

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This one, at last, is for Olly

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PREFACE

Mastering electronics with one book is a tall order.

I set out to write this preface as a rationale for the book, and as an explanation of the reasons why I wrote it this way. I was going to describe the electronics industry and the way it has grown almost beyond recognition in the last couple of decades. I was going to say how the changes in the technology have resulted in changes in the way the subject is—must be—taught. But, well into the third page, I decided not to. Much of it is in the first and the final chapters, anyway.

Instead, I will simply (and briefly) explain what I have done. *Mastering Electronics* is intended as an introduction to the subject for anyone who wants to understand the basics of most areas of electronics. I have tried to make the coverage as broad as possible within the confines of an affordable book. Most aspects of electronics—from basic semiconductor theory to television and computers—have been fitted in, but with deliberately unequal coverage. In what is intended to be a fairly basic book, it seems sensible to devote proportionately more space to the more fundamental topics.

On the principle that if a picture is worth a thousand words, a circuit diagram must be worth five thousand, I have been lavish with the illustrations. The concomitant is that the text is, in places, on the dense side and will repay rather careful reading.

I have written the book in a way that reflects modern thinking and requirements for the electronics technologist, placing an emphasis on systems and on electronics in 'real life' rather than in the laboratory. Following the structure of most recent syllabuses, I have reduced the number of mathematical descriptions to an absolute minimum, including only such formulae as are essential for calculations. This has saved a certain amount of space, which I have used to put in suggestions for practical circuits and experiments. Wherever I recommend a circuit for practical work, I have built and tested the design before committing it to paper.

Mastering Electronics can be used as a self-teaching book or as a textbook; I think that on balance it has probably gained something in being designed for this dual role.

It appears to be usual to use the end of the preface to thank everybody who helped me produce the book. I think I will apologise instead, to my wife and boys, for a certain degree of preoccupation during the last few months. . . .

SYMBOLS AND UNITS

Successive attempts to 'metricate', both in the UK and in the USA, have left the electronics industry a little confused about units in some areas. Similarly, different 'standards' have been issued in different countries regarding the symbols to be used in circuit and logic diagrams, and although there are general similarities, there are disagreements about the details.

I have tried to take a middle and sensible course in *Mastering Electronics*. I have used SI metric units for all measurements, except where the original is clearly in Imperial units, imported, paradoxically, from the USA. For example, the plastic DIL pack (dual in-line) for integrated circuits has a standard spacing between connecting pins: it seems silly to assert that the spacing is 2.54 mm, when it is clearly $\frac{1}{16}$ inch!

I have used British Standard symbols in all circuit and logic diagrams except where, for reasons of its own, the electronics industry has obstinately refused to use them. In such cases I have bowed to the majority opinion and done what everybody else does. Where symbols are distinctly different, for example BS 3939:1985/IEC 617-12: 1983 and ANSI Y32.14: 1973 standard logic symbols, I have shown both and then stuck with the BS/IEC version.

For component values, I have generally omitted the units in circuit diagrams; thus a $1.8\text{ k}\Omega$ resistor becomes 1.8 k on the diagram. I have avoided the 1k8 convention.