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R. K. Livesley

Frontmatter

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**AN INTRODUCTION TO AUTOMATIC
DIGITAL COMPUTERS**

AN INTRODUCTION TO
AUTOMATIC DIGITAL
COMPUTERS

BY

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University of Cambridge*

SECOND EDITION



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- I (a) Binary digits displayed on a cathode ray tube
- (b) Part of a magnetic core storage system

- II The first Manchester computer, built in 1948

(Between pages 40 and 41)

- III An English Electric DEUCE computer, built in 1955

- IV (a) The magnetic drum of a DEUCE computer
- (b) Punched cards and punched paper tape

ACKNOWLEDGEMENTS

Plates I(a) and II are reproduced by courtesy of Ferranti Ltd., Manchester; Plate I(b) by courtesy of the Director of the Mathematical Laboratory, Cambridge University; Plates III and IV(a) by courtesy of the English Electric Co. Ltd., Stafford; and Plate IV(b) by courtesy of the British Tabulating Machine Co. Ltd.

PREFACE TO FIRST EDITION

This brief account of digital computers has been written mainly for engineers and others who are faced with tedious calculations, so that they can judge the possibility of using these machines in their own numerical work. It describes in general terms what digital computers can do and how they are made to do it, and also gives an account of some of the calculations for which they have so far been used. The emphasis is on the application of machines to routine computing work rather than to research.

Since the book is merely an introduction and is not intended for the specialist, I have made no attempt to discuss the design of computing circuits, nor have I tried to make the reader expert in the operation of any particular machine. The reader who wishes to take the subject further will find a more detailed treatment, together with a comprehensive bibliography, in Dr M. V. Wilkes's book *Automatic Digital Computers* (Methuen, 1956), while most computer laboratories issue training manuals for those who wish to become skilled users of their machines. When referring to existing computers I have used the names or initials by which they are generally known. In many cases the full title from which the initials were originally taken has almost been forgotten.

I have avoided as far as possible any detailed discussion of mathematical techniques. It is often assumed that a digital computer can only be used effectively by those with very advanced mathematical training, but this is largely because many of the problems so far solved on computers have been mathematically complex. The preparation of a normal engineering calculation for a digital computer certainly requires care and precise thinking, but it does not usually demand great mathematical skill.

Although I have tried to avoid giving undue prominence to the idiosyncrasies of particular machines, the discussion of engineering problems in Chapter 4 is largely based on my knowledge of work carried out by members of the group using the Manchester University computer during the period 1951–6. I feel, however, that the conclusions I have drawn are valid for other machines as well.

The book is based on a course of lectures first given at Manchester in the autumn of 1954 to post-graduate apprentices of the Metro-

politan-Vickers Electrical Co. Ltd. I am particularly indebted to Professor D. R. Hartree for his comments and suggestions during the preparation of the lectures for publication.

R. K. LIVESLEY

CAMBRIDGE, 1956

PREFACE TO SECOND EDITION

The development of computing machines is proceeding so rapidly that any book on the subject must inevitably be out of date in some respects. In revising the first edition I have tried to remove the most obvious anachronisms, while keeping the general pattern of the book the same.

While machines have increased in speed, capacity, and diversity of application, the basic ideas of programming outlined in chapters 1 and 3 have not changed. These chapters are virtually unaltered, except that the section on automatic coding has been revised in view of current interest in this topic. The account of existing machines in chapter 2 has been brought up to date, although there are many current developments which I have not attempted to describe.

The applications of computers to engineering problems discussed in chapter 4 still remain valid illustrations of general principles, and I have accordingly retained them, even though they relate to work carried out some years ago. The reader will find accounts of new applications in many places in the technical press.

I am indebted to Eric Mutch for his suggestions during the preparation of this edition.

R. K. LIVESLEY

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