(2) *Life and Annuity Policies (excluding Group)*

Complete Valuation requirements produced on four bases.

Mortality statistics and miscellaneous requirements.

New business, Claims and Surrenders, Accounting statements, statistics, and analysis of surplus.

Bonus Certificates and ancillary work.

Programs written 21, of which 12 are used once a year only.

(3) *Share Registration and Dividend Warrants.* From Share Transfer to Certificate.

Programs written 13.

(4) *Annuity Payments.* Includes printing of cheques and Tax Deduction vouchers.

Programs written 4.

(5) *Mortgage and Loan Interest Collections.* Renewals, yearly statement of loans in various categories. Calculation of accrued interest to 31st December.

Programs written 10.

(6) *The Company's Monthly Payroll.* With various extra requirements.

Programs written 9.

(7) *Stock Exchange Securities.* Yearly Valuation and Statistics.

Programs written 6.

(8) *Marine Hull Statistics and Reinsurance.* This application is thought to be unique and is being extended to other spheres of Marine business.

Programs written 9.

Book Review

Digital Magnetic Recording, by A. S. HOAGLAND, 1964; 154 pages. (New York and London: *John Wiley and Sons Ltd.*, 60s.)

As Mr. Hoagland points out, this book is intended for the person just entering the field of digital magnetic recording, or for someone wishing to acquire some knowledge of the techniques and problems involved. Judged from this point of view the book is an excellent one and one which companies concerned with data processing would find a useful addition to their libraries.

The desire for very high packing-densities without loss of pulse resolution and with short access time has created the need for research into the subject to take a specialized form. This specialization means investigation into the possibilities of thinner magnetic coatings on various substrates, the problems of head and transport design, and improvements in the design of reading and writing electronics. Mr Hoagland has written a book which shows how the need for this specialization arose, the problems which have confronted the research engineers in the past and how some of them have been overcome, and what problems will face them in the future.

In the introductory chapter, the author describes the various methods of digital magnetic recording and the different circumstances in which each would be used. The second chapter gives a brief history of the recording process and the form this process will take in the future, including the prophecy that the magnetic strip wound on a bobbin, with random-access bobbin selection, will provide the answer to the need for mass storage with shorter access time for on-line working.

Chapter 3 explains the theory of electromagnetics, and since this is a subject forgotten by many engineers as soon as their studying for qualifications is complete, this chapter is useful as a refresher, particularly as the author translates the magnetic field problem into an equivalent electrical circuit one. The fourth chapter is concerned with the theory of digital magnetic recording showing, by comparison with an idealized ring head, the effects of head gap, head-to-surface spacing and surface thickness on output pulse resolution and amplitude. A chapter on magnetic heads and storage media follows, and this gives an insight into the problem of magnetic head design, including the steps taken to reduce cross-talk between heads on a multi-head stack and the effect of using tapered pole tips. The last chapter deals with the different methods of presenting data on the individual tracks such as RZ (return to zero), NRZ (non-return to zero), phase modulation etc., together with an explanation of how higher packing densities leads to pulse crowding with consequent signal distortion. Chapter 6 also explains the means employed to read the data by peak sensing and amplitude sensing.

Since the book is intended partly for the engineer just beginning in the field of magnetic recording, I think a description of different data formats for magnetic tape would have been useful, together with an evaluation of them, but this is not to be taken as a criticism of the information in the book which is presented in a very pleasing readable form with excellent illustrations. I particularly commend the author's decision to include sub-titles in each chapter.

R. S. PIGGOTT.