

# CONTENTS

INTRODUCTION	xiii
PREHISTORY	
1 On Alan Turing and the origins of digital computers. B. RANDELL	3
PROGRAM PROOF AND MANIPULATION	
2 Some techniques for proving correctness of programs which alter data structures. R. M. BURSTALL	23
3 Proving compiler correctness in a mechanized logic. R. MILNER and R. WEYHRAUCH	51
COMPUTATIONAL LOGIC	
4 Building-in equational theories. G. D. PLOTKIN	73
5 Theorem proving in arithmetic without multiplication. D. C. COOPER	91
6 The sharing of structure in theorem-proving programs. R. S. BOYER and J. S. MOORE	101
7 Some special purpose resolution systems. D. KUEHNER	117
8 Deductive plan formation in higher-order logic. J. L. DARLINGTON	129
INFERENTIAL AND HEURISTIC SEARCH	
9 G-deduction. D. MICHIE, R. ROSS and G. J. SHANNAN	141
10 And-or graphs, theorem-proving graphs and bi-directional search. R. KOWALSKI	167
11 An approach to the frame problem, and its implementation. E. SANDEWALL	195
12 A heuristic solution to the tangram puzzle. E. S. DEUTSCH and K. C. HAYES, Jr.	205
13 A man-machine approach for creative solutions to urban problems. P. D. KROLAK and J. H. NELSON	241
14 Heuristic theory formation: data interpretation and rule formation. B. G. BUCHANAN, E. A. FEIGENBAUM, and N. S. SRIDHARAN	267
PERCEPTUAL AND LINGUISTIC MODELS	
15 Mathematical and computational models of transformational grammar. JOYCE FRIEDMAN	293
16 Web automata and web grammars. A. ROSENFELD and D. L. MILGRAM	307
17 Utterances as programs. D. J. M. DAVIES and S. D. ISARD	325
18 The syntactic inference problem applied to biological systems. G. T. HERMAN and A. D. WALKER	341
19 Parallel and serial methods of pattern matching. D. J. WILLSHAW and O. P. BUNEMAN	357
20 Approximate error bounds in pattern recognition. T. ITO	369
21 A look at biological and machine perception. R. L. GREGORY	377

## CONTENTS

### PROBLEM-SOLVING AUTOMATA

- |    |                                                                                      |     |
|----|--------------------------------------------------------------------------------------|-----|
| 22 | Some effects in the collective behaviour of automata.<br>V.I.VARSHAVSKY              | 389 |
| 23 | Some new directions in robot problem solving.<br>R.E.FIKES, P.E.HART and N.J.NILSSON | 405 |
| 24 | The MIT robot. P.H.WINSTON                                                           | 431 |
| 25 | The Mark 1.5 Edinburgh robot facility.<br>H.G.BARROW and G.F.CRAWFORD                | 465 |

- |  |       |     |
|--|-------|-----|
|  | INDEX | 481 |
|--|-------|-----|