Such is Beniger's thesis which he sets down in his Preface and Introduction. The great substance, however, of this ranging and information-rich book is concerned with the diverse and diffuse historical influences which have variously and collectively contributed to the advent of the Control Revolution. The author acknowledges a heavy debt to Alfred Chandler, and his seminal work *the Visible Hand,* 'one of the few historians to exploit the view of societies as material processing systems', and to the Australian economist, Colin Clark, for his similarly path-breaking *Conditions of Economic Progress;* and he seeks to relate the notion of society as a processor to biological metaphors of control.

Yet the major strength of the book would appear to lie in its scholarly assault on a vast body of historical material relating to the evolution of control systems — automatic feedback control in the early industrial period; the development of a national infrastructure in the pre-steam period; early methods for controlling financial and insurance sectors; innovations in nineteenth century control of production; the develoments of market and retail control of distribution; the rise of advertising and mass communication technology for the control of consumption; the emergence of office technology and its consolidation as a control technology; innovations in automatic control across a century; market feedback technologies for the control of consumption; data processing innovations and developments; and even broadcasting.

This is dense territory but Beniger offers a useful range of tables of developments and innovations which offer convenient access to the reader. Less successful is his attempt to synthesise this body of information. His concept is overarching and fertile, but the book is structurally confusing. It remains, however, an ambitious and important endeavour to bring a thematic and multi-disciplinary approach to the study of the Information Society. It is supported by an impressive bibliography.

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Australian Made: Success Stories in Australian Manufacturing since 1937 *by Brian Carroll*
(Institution of Production Engineers Australian Council, Parkville, Victoria, 1987) pp. ix + 230, ISBN 0-909546-10-X.

During a visit to the Australian colonies in 1836 Charles Darwin caught a steam ferry across the Derwent in what was then Van Diemen's Land, and recorded in his journal: 'The machinery of one of these vessels was entirely manufactured in this colony, which, from its very foundation, then numbered only three-and-thirty years!' Australia has a long tradition of innovative and successful manufacturing, yet the 'Lucky Country' syndrome, the notion that we have always been able to reply on our commodity exports and have hence been lax in developing a maufacturing sector, continues to pervade the writing of economists working from a largely ahistorical perspective. Carroll's *Australian Made* is a timely and much-needed corrective to this kind of mentality. It is much easier to build on a tradition already there than to try to create one, and

Carroll's book unarguably demonstrates that a strong manufacturing traditionis indeed well and truly in place in this country.

While primarily concerned with the period since 1937 (in which year the British Institution of Production Engineers established a Section in Sydney), the book has an excellent 'prologue' going back to 1788, when Governor Phillip reported that 'very good bricks' were being made at Brickfield Hill. By 1848 New South Wales had 223 flour mills, two distilleries, fifty-one breweries, thirty soap and candle works, sixty-two tanneries, *twenty-seven foundries,* eight potteries, two sugar refineries, seven rope works, five salt works, and four hat manufacturers. By shortly after Federation over a quarter of a million Australians (about a fifteenth of the country's *total* population at the time) were employed in manufacturing, making everything from locomotives at the Toowoomba Foundry, Queensland, to body parts for the new-fangled motor car in a small workshop at the back of Messrs. Holden & Co., saddlers, in Adelaide (from 1908). But we seem to have forgotten all this. The image of the bronzed stockman and shearer persists, in spite of the fact that even a hundred years ago Australia had one of the most heavily urbanised populations in the world. Moreover, what has been achieved has so often been put down to overseas expertise as to become something of a joke on ourselves. The Australian Broadcasting Corporation television series *Last Chance for the Lucky Country* last year, for instance, made much of the fact that the much vaunted first complete Holden was produced by what was by then an almost entirely American owned company. Perhaps so, but as Carroll points out, it was largely the design work of Australian engineers working at GM in Detriot, not to mention the vision of entrepreneurs like Lawrence Hartnett and the faith in the project of politicians like Ben Chifley which made the concept of an 'Australian' car possible. And notwithstanding our persistent misrepresentation of ourselves this same tradition of engineering excellence continues. In 1986, Carroll points out, Holden Motor Company exported seven 2000i engines, entirely built in Australia from Australian materials, to Europe for every one sold in Australia. The company is currently Australia's largest exporter of manufactured goods, its Fishermen's Bend plant (where the first Holden was made) exporting engines worth over $1 million every working day.

These stories should warm the heart of any Australian convinced that we are going down the proverbial economic plug-hole. I wish I had more space to talk about some of the others. On the subject of motor vehicles, I should also mention Ford and Journeyman robots. This is a combination success story. The new Australian-designed Falcon has just started (February, 1988) coming off the production line with the help of 27 robots supplied by Machine Dynamics. The latter company is the brainchild of Les Whelan, who started out as a one-man consultancy business designing and developing special purpose machinery in 1968. The firm's major advance came in 1980, when it began working on a 6-axis motor-driven servo-controlled robot. With government assistance, and with access to the CSIRO Division of Manufacturing Technology's computer simulation facilities, the project resulted in the Journeyman, which won a $4 million contract with Ford Australia in 1987 against five overseas robotics companies.

Holden's and Ford's recent success is generally well covered by Carroll, although undoubtedly part of this success has been due to the good working relationship both companies have been able to develop with their workforce, and this aspect might have received more attention. In an article in the *Times*

on Sunday last September, Dr Danny Samson of Melbourne University's Graduate School of Management noted that Ford Australia's employee-involvement program included workers in the improvement process and that this had had much to do with the company's improved product quality and competitiveness. Similarly, Holden's managing director, Peter Thomas had 'put a great deal of effort into involving factory-floor employees in his mission for cost and quality effectiveness'.[1] To be fair, Carroll does devote some space to this dimension in his chapter on Mitsubishi. As he explains: 'Every six months, senior union and company officials meet to discuss future plans and tends . . . The old idea of workers doing what they are told and not asking questions has no place at Mitsubishi' (pp. 192-3). Carroll's account of Pacific Dunlop's recent outstanding success with its Pulsar battery perhaps might also have included something about that company's excellent relationship with its workers, which was also described by Samson.[2]

Another inspiring story is that of the over 100 year-old Toowoomba Foundry's many recent successes, such as its securing a highly lucrative contract to supply BPW, Europe's largest manufacturer of truck wheels and axles, with precision-machined wheel hubs and brake drums. This has been made possible by a $9 million modernisation program, including the installation of a semi-automatic moulding line incorporating the latest CAD/CAM technology and a $1 million conversion and upgrading of the machine shop to fit 'Just-in-Time' manufacturing methods. Among the advantages of these improvements, besides ensuring higher casting accuracy, has been a considerable reduction in noise, dust (from sand moulding) and heat levels, making for a better working environment. Carroll also notes (p. 217): 'Handing back responsibility for quality to shop floor people has markedly reduced scrap.'

In all this is an attractively produced (it is in large format — 28.5 x 22 cms — and is packed with photographs), highly readable and authoritative survey of some of Australia's more remarkable manufacturing achievements. Its ground has not recently been covered in quite the same way in any other volume (the multi-authored *Made in Australia: A Sourcebook of All Things Australian* [Heinemann, 1986] has only one chapter on manufacturing, among others on such topics as music, visual arts, etc.), and while readers seeking depth of analysis will want to supplement it with other works (such as C.B. Schedvin's just published *Shaping Science and Industry*), I heartily commend this book to anyone worried about out economic future as we think over our past achievements and mistakes during this Bicentennial year.

NOTES AND REFERENCES

1. D. Samson, 'How the Best Manufacturers Keep Winning', *Times on Sunday,* 20 September 1987, p. 19.
2. *Ibid.* (I am grateful to Pacific Dunlop and to John Pellegrini Holden, Kingsford, N.S.W. for additional information about the Pulsar battery and the 2000i engine).

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