Engineering stories of success

Donald S.L. Cardwell

From Compass to Computer.

By W.A. Atherton.

Macmillan Press, London/San Francisco Press, Box 6800, San Francisco, CA 94101: 1984. Pp. 337. Hbk £20, \$30; pbk £9.95.

DR ATHERTON'S account of the rise of electrical and electronic engineering is the first attempt at a general history since Dr Dunsheath's *A History of Electrical Engineering* was published over 20 years ago. It is an ambitious undertaking. Following an introductory chapter dealing with progress before 1800, there are chapters on the electric telegraph, the experimental and theoretical advances of the nineteenth century, electric power, electric lighting, radio, miniaturization and the computer.

In the nature of the case Dr Atherton has had to compress so much and cut so many corners that, at times, his narrative comes close to being a breathless recital of names and inventions. Attempts to cope with the complexity of the subject matter have led to other problems. Thus, having described the development of Maxwell's theory up to relativity and quantum theory, the author gives his readers a cultural jolt by taking them back to the invention of the electric telegraph in the early nineteenth century. There is also some, probably unavoidable, repetition: Davy's arc light, Schweigger's "multiplier", the Gramme dynamo are described twice. In fact, so complicated is the story that what we are given is a series of autonomous essays on key historical developments. If the book is read in such fashion, these criticisms lose some of their force.

Dr Atherton explains that he is writing for the engineer and the general reader, not for the historian. Fair enough; but more attention to the historical record would have saved him from some mistakes and some omissions. For example, it was not Faraday but Whewell who coined the words "anode", "ion", etc; Joule's papers on the mechanical equivalent of heat were *not* denied publication by scientific journals; lamination, to reduce eddy currents, was introduced in the 1830s, not in 1870. Had the author used standard sources, such as the *Dictionary of Scientific Biography*, he would have avoided these and some other slips.

On the other hand Dr Atherton does not mention what I have called the "electrical euphoria" that swept Europe and the United States in the late 1830s. It was widely, and plausibly, believed that the electric motor, driven by voltaic cells, could be made more efficient than the best steam engine. This was not the last time that there were great hopes of cheap electric power.

The next occasion — also not mentioned by Dr Atherton — was just over 40 years later.

In this context, the observant reader may be puzzled by the *Punch* cartoon of 1881, reproduced on page 148 of the book and also here. It shows King Steam and King Coal anxiously contemplating a baby in a cradle. The baby has the word "electricity" over his head and is holding a large feeding bottle with "Storage of Force" written on it. Enigmatic though these three words are, the reader is left to infer that the cartoonist foresaw the modern electrical supply industry. This would be quite wrong. In 1881 Faure's improved secondary cell, or rechargeable storage battery, caused great excitement. It was greeted as the invention that would bring about the hoped-for revolution in electricity. It offered complete flexibility, for every little stream, every hill-top open to the winds meant an opportunity to charge and recharge storage batteries that could be used for all practical purposes. But the way ahead was that followed by Edison and Ferranti; and the forecasts of 1881 have not been realized, beyond today's "alternative technology". In short, this work has little to say about false starts and misplaced hopes. It is a success story; a thoroughgoing Whig interpretation of the history of technology.

Dr Atherton writes clearly and wittily

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"WHAT WILL HE GROW TO?"

and his book, apart from one or two unsatisfactory diagrams, is well produced. It should interest electrical engineers and in that respect it will serve its purpose. But a rather more modest programme and a little more care with historical material would have meant a better book. □

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Power and power

Eli B. Roth

The State and Nuclear Power: Conflict and Control in the Western World.

By J.A. Camilleri.

Harvester Press/University of Washington Press: 1984. Pp. 347. £25, \$25.

IN *The State and Nuclear Power*, Professor Camilleri's thesis is that the pro- and anti-nuclear elements in society present a new destabilizing and potentially fatal challenge to the State. By "the State" he means "capitalist" countries, taking the United States, France, Britain, West Germany, Sweden and Brazil as specific cases. He explicitly excludes from his analysis centrally-planned, "non-capitalist" economies, otherwise known as authoritarian states. The reason, he says, is brevity, but one might suspect a more important reason to be the difficulty in getting dependable data from such nations.

Camilleri notes of the countries he has chosen for discussion:

The actual strategies adopted by each state in response to the ethical challenge posed by anti-nuclear activism varied considerably from country to country. A critical factor in all cases was the distribution of power in the political system, that is, the degree of centralisation in the exercise of state authority. As a broad generalisation, it would appear that where the state apparatus operated as a cohesive, well-

coordinated, monolith entity faithfully reflecting the interests of a dominant power group, its actions tended to dismiss the relevance of normative considerations and to reinforce the supremacy of technical rationality [p.115].

This tendency to criticize or ignore technical problems and solutions is one of the shortcomings of the book, and may also explain why Camilleri omits Canada from his list of case studies. Canada is as much of a capitalist country as any of the other nations he does examine. But while Canada generated in 1983 a larger percentage of its electricity from nuclear power plants than the United States, Britain or West Germany, it has suffered no noticeable internal political strains because of it. The most obvious distinction between Canada and the others lies in the type of reactor programme followed, one based on the home-grown CANDU plant which is fundamentally different from the power plants used by his chosen examples.

The book raises some crucial questions about the impact of possibly faulted, ill-conceived or incomplete nuclear programmes on democratically-run governments. Camilleri asks, "What factors account for the commitment of major western governments to commercial developments? . . . To what extent, and in what respect, has the performance of these [economic and administrative] functions varied from state to state? How may those differences be explained?". The questions are especially well-formulated in his preface, while the case-histories which