the point of departure for any serious effort to appraise the meaning of genius in the era of apocalyptic science. Highly recommended.

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Computers and Instrumentation: A Practical Handbook of Measurement, Interfacing and Control Circuits

A. Carrick
256 pp. Heyden, Philadelphia, 1979. $19.50

Minicomputers with performance rivaling that of batch-mode "mainframe" computers of a decade ago can be had for thirty thousand dollars; a modest microcomputer, complete with plenty of memory, floppy disks, graphic printer, terminal, and analog/digital interfaces costs one fifth as much. The ready availability of computational power in the laboratory is merely convenient; connecting a computer "online" to an experiment is revolutionary, seen from the framework of scientific experimentation of merely two decades ago.

This ability to gather data from an experiment while controlling the various parameters (perhaps in response to the data just gathered) can now be considered a pleasant fact of scientific life. The essential skills—assembling the computing system, interfacing to the experimental apparatus, writing and debugging the software—are, unfortunately, far harder to come by than that elegant hardware harvest from Silicon Valley.

In this volume, subtitled *A Practical Handbook of Measurement, Interfacing and Control Circuits*, Alan Carrick, an experienced British industrial designer of electronic instrumentation, has attempted to set down "a basis for questioning about computers in scientific surroundings." In fact, he grapples with the specifics of computer architecture, analog and digital hardware fundamentals and, of most importance, the interfacing of small computers to laboratory instrumentation.

Computing hardware, the most rapidly changing area of electronics, is therefore the most difficult to write about and get into print without it appearing hopelessly dated by the time the ink has dried. Carrick's solution is to take a historical and generic approach, avoiding the specifics that would make the book a true "practical handbook." In my opinion, the volume is greatly weakened by the intentional omission of the specifications and names of parts. We are shown an example of microprocessor architecture, but *which* microprocessor? The feeling of loss is most poignant in the otherwise admirable collection of analog and digital instrumentation examples: schematic diagrams with unnamed and unknowable resistors, capacitors, amplifiers. Carrick avoids the specifics in software as in hardware: Barely a dozen lines of programming accompany as many interface examples.

By contrast, the most successful and enjoyable sections are those in which the author allows himself the luxury of naming names: the fine summary of the standardized interfaces (RS232C, IEEE488, CAMAC and the British BS4421). Carrick is in fine form, too, when general advice is what is needed: what to look for when choosing a computer; software languages, standards, benchmarks; good advice on the use (*non*use!) of monostables; the hardware/software choice in design; when to avoid computers.

While this volume makes interesting reading, particularly for those already acquainted with small computers, it does not succeed as a handbook. Those looking for detailed help should consider J. W. Cooper's *The Minicomputer in the Laboratory* (Wiley, 1977) and M. Sargent and R. Shoemaker's *Interfacing Microcomputers to the Real World* (Addison-Wesley, 1981). The former is a fine introduction to assembly-language programming (PDP-11) with laboratory applications; the latter covers all aspects of microcomputer hardware and software, including interfacing, control and signal processing, based around the specific example of the Z80. Both feature very detailed and complete examples.

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Nuclear Nightmares: An Investigation into Possible Wars

N. Calder
175 pp. Viking, New York, 1979. $10.95

I can think of few, if any, books of recent years that I would recommend as strongly—but with as little pleasure—as Nigel Calder's *Nuclear Nightmares*. Out of his sense of responsibility as a journalist he has taken on the most worrisome and intractable problem of our times, the threat of nuclear war, and found the situation worse than he had expected: not just risky but insane, a peril from which there is little hope of escape.

My strong recommendation for this disquieting book has its basis in the belief that whatever small hope there is might be increased if enough people, particularly those professionals concerned with nuclear arms and policy, read it.

The subject divides naturally into four components: technology; the consequences of the use of nuclear arms; the ways in which nuclear war might begin and develop, including all the esoteric doctrinal questions; and what, if anything, might be done to make nuclear war less likely or to mitigate its consequences.

It is difficult for someone like myself, who has lived with these matters for decades, to judge whether Calder has treated them at a level that is meaningful and understandable to the intelligent nonexpert, but I believe he has. I feel more comfortable in giving him accolades for accuracy—I don't recall any technical errors—and for giving balanced and reasonable judgments on matters of some dispute, such as how "conventional" war is changing as a result of the introduction of precision-guided munitions and what are the likely near-term prospects (very poor) for charged-particle-beam weapons.

He is at his best in dealing with doctrine and concepts for use of nuclear weapons, including differences between the East and the West, and in highlighting the uncertainties that must attach to their use. Although advocates of "flexible response," "extended deterrence" and "limited nuclear war" will resist his arguments, I find them persuasive in demonstrating that nuclear weapons cannot be used for these purposes without risks that are unreasonable.

Nearly all of this material is woven into the four central chapters, each of which deals with a type of possible origin of nuclear war: the East-West conflict in Europe; the spread of nuclear weapons to additional countries; failures of command and control; and disarming attacks by one of the superpowers against the nuclear forces of the other. I find the first of these chapters flawed in that Calder has accepted too much of the conventional wisdom about the superiority of the Warsaw Pact forces relative to NATO's. After all, the personnel balance in the European theater is about even; by any reasonable measure, NATO has been spending more each year on its military establishment than the Pact; and the Soviets have a Chinese problem for which some allowance ought to be made. I am also troubled about his giving the first and fourth scenarios as much weight as he does. Perhaps he is right, as a reporter, in doing so. They have certainly been the scenarios stressed in the development of policy and the rationalization of weapons-acquisition decisions. However, overemphasis on them underlies, in my