

dilution refrigerators) are covered in considerable detail, secondary subjects related to these topics are often omitted. For example, Betts's treatment of dilution refrigerators has profited from the understanding that Georgio Frossati has brought to the field, and it is quite a bit more current than the earlier description given by Lounasmaa. However, the properties of large-surface-area heat exchangers used in modern dilution refrigerators are barely mentioned, and no mention whatsoever is made of vibrational heating in ultra-low-temperature cryostats or strategies by which it can be minimized. Although such issues are of greater importance in the actual design and construction of a refrigerator than they are in its use, I think even the novice should be alerted to potential problems in these areas.

Overall, this short volume is a pleasure to read, and the reader can absorb an impressive amount of information with little effort. Indeed, its principal strength is its brevity. At the same time, the treatment of most subjects, although not superficial, is limited and serious experimenters will find many of their questions unanswered. Even so, this is definitely a volume that will appear on my bookshelf and one that I expect to see used frequently among my graduate students and more interested undergraduates.

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The Cuckoo's Egg: Tracking a Spy Through the Maze of Computer Espionage

Clifford Stoll
Doubleday, New York, 1989.
326 pp. \$19.95 hc
ISBN 0-385-24946-2

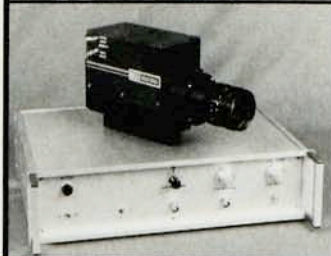
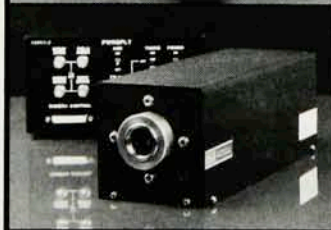
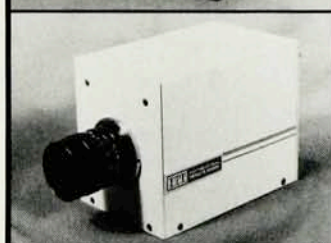
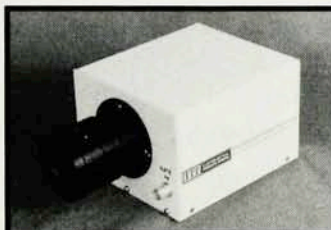
As far as I know, this is the first popular book written about what is perhaps the most interesting (and useful) scientific apparatus ever built. The book is written in an entertaining yet informative manner, so that non-scientists and scientists alike can learn a great deal from it.

The subject is the global interactive computer network, which is so new that even the experts who built it do not yet understand how it works. This is not surprising, because this network consists of thousands of computers interlinked by new and sophisticated software codes, many of which are homemade and almost all of which are uncoordinated.

Clifford Stoll, a physicist, treats his subject in a thoroughly scientific way, as an exploration of the unknown and as a way to have some fun. He may be the first author ever to include his electronic mail address under his name in the introduction. As a reality check, I sent him a message and found that he may now regret this innovation: The sudden fame of his best-selling book has resulted in a deluge of electronic correspondence—

and not a little abuse from hackers around the world.

His story begins with the discovery of a trivial discrepancy in an accounting program and ends with the prosecution of a hacker who may be a spy in the employ of the KGB. In between is a step-by-step account of how Stoll, using his scientist's innate sense of curiosity and a thorough knowledge of network procedures, connects the two. Along the way, the reader learns



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about the defects of the computer operating system Unix, pseudo-superusers and the details of how "Internet"—the network of networks—functions. One also learns that the network security experts, some of whom belong to those Washington agencies no one talks about, are sometimes amazingly ignorant of their own specialty.

Media attention has focused on the excitement of lone "gunslingers,"

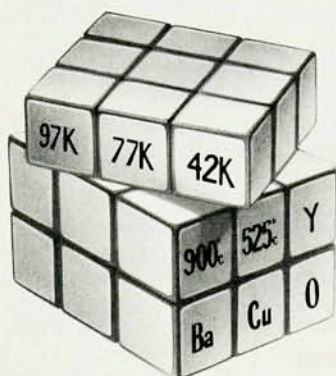
computer trespassers who audaciously penetrate the formidable bastions of the military-industrial complex. However, this unexplored laybrinth itself has serious problems. No one is managing Internet (nor does anyone want to). The digital highway system has no troopers—or should that be night watchmen? Thieves are stealing information, and such theft is hard to detect, because what has been stolen is still there, unchanged.

Certainly the network should be regulated but how, and with what penalties to abusers? There are no precedents for this type of policing. Invading a computer file is like peeking at someone's mail: It is certainly unethical but the criminal code is out-of-date on whether it is a crime or not. Washington is ignoring the problem as unsolvable or not serious, or is assuming that someone else should solve it.

Stoll is certainly to be commended for publicizing these problems. His book should be required reading for everyone who uses a computer network.

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