which the President can contact the U.S. nuclear forces. These include a plethora of cables, satellites, microwave relays, and special radio transmitters. However, reams of congressional testimony concerning the state of U.S. military communications and the EMP threat tell a different story. Consider the statements made in 1980 by Gerald P. Dinneen, at the time the Pentagon's ranking specialist on communication issues. The United States, Dinneen said, should never do anything that would "reduce the deterrent," that is, never do anything that might tell the Soviets the United States is anything less than ready to massively retaliate in the event of a Soviet first strike. "That is why I think discussions of these things . . . should be held in closed session," he said. "Some of the comments about the weaknesses of our command and control system must be kept at a very high level of classification." —WILLIAM J. BROAD

References and Notes

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FDA Sees No Radiation Risk in VDT Screens

Eye strain may be a problem, but federal officials are unpersuaded by x-ray and microwave complaints

Staring at classified ads on a flickering television screen for 7 hours a day, 5 days a week may very well produce headaches and other pains, but it does not produce deformed children—the scare raised last year by several employees of the Toronto *Star* in Canada. There is no reason, according to testimony given in Congress in May, to think that the video display terminals (VDT's) used by millions of computer operators and typesetters around the world emit harmful radiation. That is the essence of the testimony given by engineers and radiological specialists at hearings on 12 May chaired by Representative Albert Gore, Jr. (D–Tenn.), before the investigations subcommittee of the House Committee on Science and Technology.

"One of the beautiful things about radiation," according to John Villforth, director of the Bureau of Radiological Health at the Food and Drug Administration (FDA), is that "anyone who's paranoid can blame their problems on it." The FDA, which is one of several federal agencies investigating video hazards, essentially sees the problem as a case of misplaced blame. People with legitimate but mundane complaints about VDT's have latched on to the radiation theme, in the FDA's view, because radiation threats are general enough to subsume all dissatisfactions under one heading. The folly of this attitude, as the FDA sees it, is that there is no physical evidence to support it. Some FDA officials worry that, in the search for more and more definitive information on the VDT-radiation theme, money will be frittered away on dead-end research projects, while the more important hazards of medical radiation will be left not fully explored. At the same time, the real problems associated with VDT's—eye strain, headaches, boredom—may not get the attention they deserve.

The first VDT-radiation scare arose when VDT's were being installed in newsrooms in the middle 1970's, according to Charles Perlik, president of the Newspaper Guild. Speaking at the 12 May hearings, Perlik said, "There was concern at the very start among our members that these machines might be emitting radiation. . . . Their concern was about the possibility of x-rays, since the introduction of VDT's came only a short time after x-ray emissions had been discovered in the VDT's lineal ancestors, color television sets." But Perlik said the potential x-ray hazard was studied by the Occupational Safety and Health Administration (OSHA), and dismissed as minuscule. The Guild did not want to take any chances, however. As part of its collective bargaining program, it demanded routine testing of VDT's in certain newsrooms to reassure Guild members that they were not being riddled with x-rays.

Soon the focus of concern shifted from x-rays (ionizing radiation) to low-frequency radio wave emissions (nonionizing radiation) coming from VDT transformers. The "cause célèbre" of this phase of the controversy, as Perlik called it, appeared in 1976. Two young *New York Times* employees, Samuel Weiss and John Woodford, discovered at the same time that they had developed cataracts. They were 29 and 35 years old, ages at which cataracts rarely appear. Neither was judged to be particularly susceptible by virtue of having diabetes or showing a family history of cataracts. Was it possible that the VDT's were causing the trouble? High doses of heat-inducing radio waves, more than 10,000 times the frequency of VDT emissions, have produced cataracts in rabbits' eyes. Perlik said the *Times* case "awoke us to the possibility that our members might be exposed to the hazards of nonionizing radiation." A new study was undertaken, this one directed by the National Institute for Occupational Safety and Health (NIOSH). Like earlier investigators, NIOSH found no threat from VDT radiation: the levels were too low and of too low a frequency.

The two newspaper employees, however, consulted an ophthalmologist named Milton Zaret, who diagnosed their ailments as "radiant energy cataracts" caused by exposure to microwave emissions from the VDT's. A physician for NIOSH, Jacqueline Messite, looked at the same medical data and found that the cataracts were "compatible with those reported from radiant energy, but . . . also compatible with those seen congenitally or those associated with other etiologies." Since NIOSH investigators had found no evidence that microwave radiation was reaching the VDT operators, Messite concluded that "the etiology of the cataracts remains undetermined." More bluntly, NIOSH removed the substantiation for Zaret's diagnosis.

Zaret objected vociferously on half a dozen technical grounds, compelling the Guild and the *Times* to enter into arbitration on the technical dispute. They agreed on an arbitrator, Maurice

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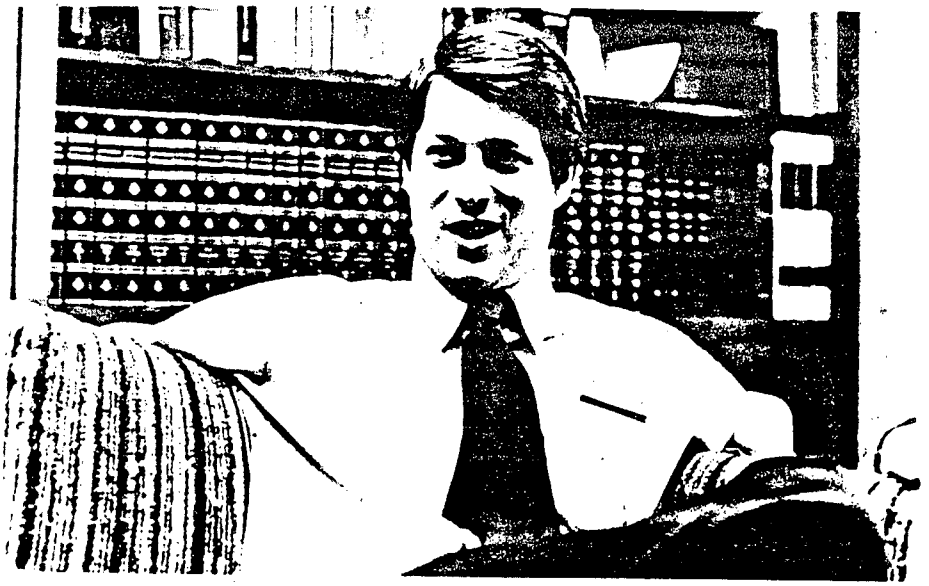
Benewitz. With both parties' approval, he hired an engineering consultant and three physicians. New tests were undertaken. The result was that in September 1977 the VDT's were cleared of blame once again. As an afterthought and gesture of their concern, the physicians and Benewitz recommended that the *Times* periodically check the VDT's to be sure they had not gone amok and begun to emit more potent radio waves. One of the physicians added that he could not rule out the possibility that VDT microwave radiation was a "precipitating factor" in the creation of cataracts, but that "my overall conclusion is that the VDT's *were not* [emphasis in original] a proximate cause of the lens changes in Mr. Weiss and Mr. Woodford." The other two physicians absolved the machines in more generous terms, and Benewitz himself concluded that they "do not pose any ocular radiant energy hazard to the employees of the *New York Times* assigned thereto, based on reasonable standards of industrial safety."

Since then, several other studies have been published. All report that VDT's present no microwave or other radiant energy hazard to the users. Perhaps the most sensational of these was the investigation conducted by the Ontario Ministry of Labour in 1980. In a 12-month period, four out of seven babies born to Toronto *Star* employees who had used VDT's while pregnant were discovered to be deformed. During the same period, three *Star* employees who did not use VDT's gave birth to normal babies. Worried by these events, the newspaper asked the government to investigate. The report came out in August 1980. There were no measurable traces of x-ray or microwave radiation present, and no identifiable chemical hazards. The labor ministry concluded that there was probably no common cause of the deformities, because the "nature of the deformity was different in each of the four cases."

The FDA also gave computer video screens a clean bill of health this year. The new report said: "The consensus of the studies is that VDT's emit little or no harmful radiation under normal operating conditions; the emissions that are detectable are well below any existing national and international standards. Compared to some other common sources of radiation, VDT's present a much lower risk." Similarly, IBM looked into the cataract furor last year and concluded: "There are no known biological hazards from electromagnetic radiation associated with the visual display unit. In most cases, the emission level was below that known to have any biological effect at all, much less approaching any hazardous levels. . . ." IBM is hardly a disinterested source, but it seems unlikely that the company would issue such a confident report when so many investigators are in the forest. A false report should be quickly spotted.



Representative Albert Gore, Jr.

Zaret, who has had a long and controversial career diagnosing radiant energy cataracts, remains unmoved by these expressions of doubt. Identifying himself as a "professional scientist-physician," he told the 12 May congressional audience that his analysis of the problem has not changed. "Even today," he charged, "there is nothing recognizable by me as being meaningful that is being done about this serious problem." In his view, the FDA, OSHA, and NIOSH have been "consistently wrong from the start" and interested only in obfuscation. "Rather than having the good sense to keep quiet until they learned something," Zaret said, the federal research centers issued bad reports, bringing discredit upon themselves. He said he had not had time to analyze the new FDA study in detail, but fired off a couple of general complaints about measurement techniques and assumptions. Finally, he claimed to have many clients suffering from microwave-induced cataracts, and he concluded with a blast at the "defense-intelligence-academic-industrial complex" which he claims is ignoring his work.

Villforth, the FDA official, says one cannot indict VDT's simply because some people who use them have developed cataracts at an early age. The charge must be substantiated with evidence of how the VDT's damage eyesight or with epidemiological data showing that VDT users have a higher-than-average incidence of cataracts. No one has made the case against VDT's on mechanical or epidemiological grounds, Villforth says.

The FDA has completed two studies of people exposed to low frequency radiation from other sources and found no ill effects. Villforth is unimpressed by Zaret's claim that he knows of 10 to 50 VDT users who have developed cataracts at an early age. Villforth points out that about 4 percent of the population between 35 and 45 suffers from natural cataracts. By his estimate, 7 million people in this country regularly use VDT's. He calculates that it should be within statistical norms for 280,000 VDT users to have cataracts at an early age.

None of this is meant to suggest that there are no health problems associated with VDT's. Indeed, Villforth says he is glad that his jurisdiction limits him to radiation risks, for that makes his job simpler. NIOSH, which must consider headaches, backaches, and eye problems not linked to radiation, has a much more difficult task. Preliminary surveys have found that VDT's produce a variety of ill effects if they are poorly designed, used in a setting that is too bright, or used for prolonged periods without relief. NIOSH has begun an epidemiological study of these problems, with particular emphasis on threats to eyesight, using the staff of the Baltimore *Sun* as a study population. The early results are due in 2 months.

The FDA's message for now is simply that video screens do not produce levels of radiation known to be hazardous, and that the low-frequency waves they do produce have never been shown in clinical or epidemiological studies to have any biological effect.

—ELIOT MARSHALL