Eisenhower's other warning

In his farewell address, President Eisenhower issued two warnings to the American people. The first of these is very well known, it fits easily into a variety of ideological frameworks and it is often quoted or paraphrased. We must, he said, be wary of "the acquisition of unwarranted influence, whether sought or unsought, by the military-industrial complex."

Eisenhower's second warning is much less well known, it is not so easily understood and it is seldom quoted except by specialists studying the Eisenhower administration. After noting that research played an increasingly crucial role in our society and that the ways in which it was conducted had changed radically in recent years, Eisenhower said, "Yet in holding scientific research and discovery in respect, as we should, we must also be alert to the equal and opposite danger that public policy could itself become the captive of a scientific-technological elite."

To understand this second warning, it is necessary to recall its context. This context consisted of the events that took place during the forty months from the launching of Sputnik to the end of his administration. The particular segment of the "scientific and technological elite" that he had in mind consisted of the hard-sell technologists who tried to exploit Sputnik and the missile-gap psychosis it engendered. We should be wary, he said, of accepting their claims, believing their analyses, and buying their wares. They and their sycophants invented the term "missile gap," they embellished that simple phrase with ornate horror stories about imminent threats to our very existence as a nation, and they offered a thousand and one technical delights for remedying the situation. Most of their proposals were expensive, most were complicated and baroque, and most were loaded with more engineering virtuosity than good sense. Anyone who did not immediately agree with their assessments of the situation and who failed to recognize the necessity of proceeding forthwith on the development and production of their solutions was said to be out of touch with reality, technically backward, and trying to put the budget ahead of survival.

The claims of such people that they could solve the problem if only someone would unleash them carried a lot of weight with the public and with large segments of the Congress and the press. Other

GEORGE TAMES, NYT PICTURES

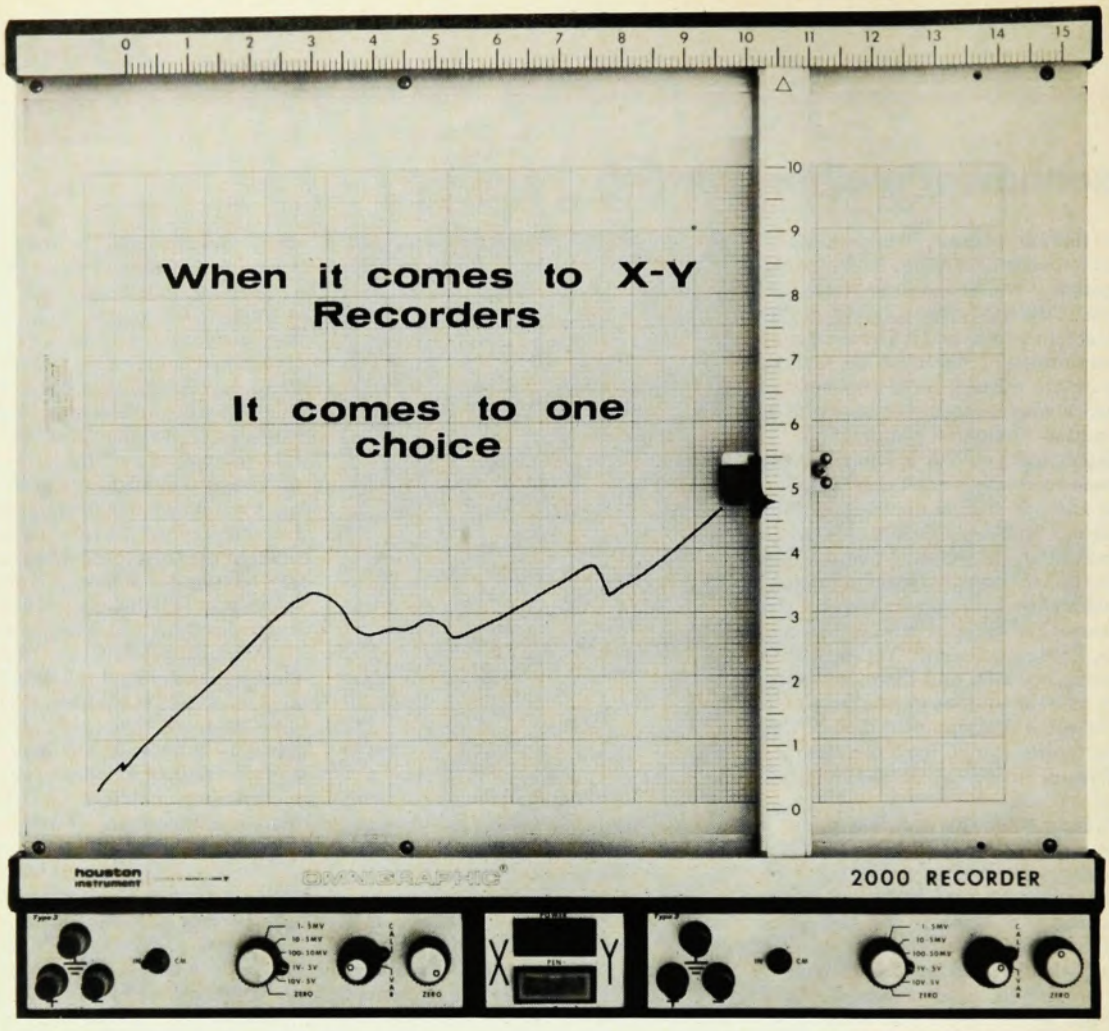
DWIGHT D. EISENHOWER—1956

scientists and technologists had performed seeming miracles in the recent past, and it was not unnatural to suppose that they could do it again. It seemed that radar had saved Britain, that the A-bomb had ended the war, and that the H-bomb had come along in the nick of time to save us from the Russian A-bomb. On the home front, the relatively recent introduction of antibiotics had saved our children from the scourges of earlier times, and airplanes and electronics had become capable of carrying us, our words and our images great distances in short times. Scientists and technologists had acquired the reputation of being magicians who had access to a special source of information and wisdom out of reach of the rest of mankind. A large part of the public was therefore more than ready to accept the hard-sell technologist's view of the world and to urge that the government support him in the manner to which he wanted to become accustomed. It seemed as if the pursuit of expensive and complicated technology as an end in itself might very well become an accepted part of America's way of life.

But it was not only the general public that believed the technologists understood something the rest of the world could not. Many of the scientists and technologists themselves believed that only they understood the problem. As a consequence, many of them believed it was their patriotic duty to save the rest of us whether we wanted them to or not. They made their own analyses of what the Soviets had done. They used their own narrow way of viewing things to figure out what the Russians ought to do next. They then argued that since the Russians were rational (about these things anyway), what they ought to do next is what they must in fact now be doing, and they then determined to save us from the consequences of this next real or imaginary Russian technological threat. The Eisenhower Administration was able to deal successfully and sensibly with most of the resulting rush of wild ideas, phony intelligence, and hard sell. But some of these ideas did get through, at least for a while. Beyond that, dealing with self-righteous extremists who have all the answers—and there were many among the scientists and technologists at the time—is always annoying and irritating.

As we now know, the commonly baroque and occasionally bizarre technological ideas urged on us in those years were in fact a portent of things to come. Weapons systems and other high technology devices have become still more complex in the years since Eisenhower's farewell address. And this complexity is creating serious social and political problems of the general kind that Eisenhower warned us about. Today, there are even more people who tell us that because major weapons systems are so complicated only weapons experts can decide if they are needed, only those in on all the secrets and up on the most arcane elements of operations analysis can tell us whether arms control and disarmament is good or bad, and only nuclear experts are fit to decide whether, when, and where nuclear power plants should be built. There are today many scientists and engineers, and many members of the general public as well, who believe that basic issues like these are simply beyond the ken of the people and their elected representatives, and that public policy concerning such matters should indeed be made by a scientific technological elite. Eisenhower's second warning is even more pertinent today than it was when he made it.

As fate would have it I worked fairly closely with Eisenhower during the last three years of his presidency, first as a member of the Science Advisory Committee he set up immediately after Sput-



BEST VALUE - MOST FLEXIBILITY

This versatile 11" x 17" recorder is adaptable for laboratory or field, production or process, OEM (with or without modules) or dedicated applications in either bench or rack mounted. Inch/centimeter scaling by front panel switch.

Differential input is potentiometric with no less than 2 megohms slewing resistance. High common mode rejection. Acceleration, slewing speed, phasing and damping of X and Y axes drives are matched for minimum error under dynamic conditions. Amplifiers are interchangeable as are input modules.

Overall accuracy ±0.2%. Linearity ± 0.1% full scale. Repeatability ± 0.1% full scale. Resetability ± 0.05% full scale. Overshoot is less than 1%. Basic sensitivity 1 mv/inch (0.5 mv/cm). Zero is fixed or can be remotely controlled. Local or remote control electric pen lift. Dozens of selections for input modules.

OEM discounts available.

Need more information? Call or write:

houston instrument | DIVISION OF **BAUSCH & LOMB**

ONE HOUSTON SQUARE (at 8500 Cameron Road) AUSTIN, TEXAS 78753
(512) 837–2820 TWX 910–874–2022 cable HOINCO
TELECOPIER
EUROPEAN OFFICE Rochesterlaan 6 8240 Gistel Belgium
Phone 059/277445 Telex Bausch 81399

"the recorder company"

® A registered trademark of Houston Instrument.

Circle No. 10 on Reader Service Card

letters

nik under the chairmanship of James R. Killian Jr, and second as the first Director of Defense Research and Engineering, a new position created in 1958 as another part of the response to Sputnik. In these positions, I was directly concerned with precisely those scientific and technological programs in which the President himself was most involved and my own view of the world gradually changed as I came to see and understand the overall situation in which we found ourselves. I had gone to Washington a technological optimist, full of confidence in the technological fix. I came away three and a half years later gravely concerned about the all too common practice of seeking and using technological palliatives to cover over serious persistent underlying political and social problems. In particular, I became convinced of the futility of always devoting our main efforts to finding a technical solution to the problem posed by the steady decrease in our national security that was being brought about by the spread of high technology weapons throughout the world. This, it seemed to me, was not only futile but basically absurd, because nearly all of the weapons which in the hands of others were (and are) threatening our national security, and indeed our very existence, had been invented or perfected by us in the first place. In sum, my views on the relationship between technology and security did not arise out of Eisenhower's warnings; rather his warnings and my views both arose out of the same set of circumstances, but his formal warnings did very much help to crystallize my views on the subject. I found it very reassuring that the Commander-in-Chief, a professional military man himself, shared my own growing doubts about the value and efficacy of placing such a relatively high priority on finding technical solutions to what were really political problems.

Eisenhower's warnings, which were based largely on his remarkable intuition, pointed up very real and extremely serious problems. If we forget or downgrade his warnings, it will be to our peril.

HERBERT F. YORK
University of California, San Diego
La Jolla, California

* * *

Abridged version of the author's response on receipt of the Forum on Physics and Society Award on 27 April 1976. Further discussion of this subject may be found in York's recently published book "Race to Oblivion" reviewed in December (page 49).

Ether drift tested

This letter is in response to the letters of H. C. Dudley (February 1975, page 73) and Dale C. Scheetz (March 1976, page 15). Both letters address themselves to the question of the detectability versus the non-detectability of "ether-drift." The first letter suggests the possibility of using lasers or masers to provide useful data regarding "ether-drift." I should like to point to the paper by T. S. Jaseja, A. Javan, J. Murray and C. H. Townes[1] as a possible candidate. The fact that neither of the above-mentioned correspondents mentioned the work of Jaseja *et al* might be viewed as an oversight. This experiment used "one-way" light paths of two cross-fired infrared masers and drew the conclusion that there was no effect greater than 1/1000 of the v^2/c^2 term, over a period of six consecutive hours.

Once again you are vindicated, Albert!

Reference

1. T. S. Jaseja, A. Javan, J. Murray and C. H. Townes, Test of Special Relativity or of the Isotropy of Space by Use of Infrared Masers, Physical Review, 133, A1221 (1964).

J. W. HASLETT
University of Illinois at Chicago Circle
Chicago

3/25/76

Thermodynamic paradoxes

The article by Frank Weinhold on "Thermodynamics and Geometry" (March, page 23) gives an interesting new representation of an old branch of physics. However, I wish to point out that the formulation in terms of Riemannian geometry with a positive-definite metric is somewhat more restrictive than the second law of thermodynamics. The second law states that the entropy of an isolated system is maximized at equilibrium.[1] Since the energy of an isolated system cannot vary, the second law by itself says nothing about how the energy U varies with entropy, or with any other extrinsic variable X_i. Therefore, the second law does not require

$$|\mathcal{R}_i|^2 \equiv \left(\frac{\partial R_i}{\partial X_i}\right)_{X_1 \ldots X_{i-1} X_{i+1} \ldots X_{\ell+2}} \equiv \left(\frac{\partial^2 U}{\partial X_i^2}\right)_{X_1 \ldots X_{i-1} X_{i+1} \ldots X_{\ell+2}} \geq 0 \quad (1)$$

as stated in the article (page 26).

In general, the stability criterion (equation 1) is necessary only if one assumes a strong version of the zeroth law of thermodynamics, namely that two isolated systems each in stable equilibrium at the same temperature (or another intensive variable R_i) will be in stable equilibrium if placed in thermal contact (or contact for exchange of another extensive variable X_i). However, if equation 1 is violated, the two systems may be unstable to the transfer of entropy (or another X_i) when in contact, without there being an instability for either system when in isolation with the extensive