employ itself, I would certainly not hold this to be true for the bachelor or master degrees. On the contrary, the programs for these courses have been far too strongly oriented towards the student who will eventually go into research. Physics is an excellent training for the mind, and it is one of the scandals of our time that men in public life are, for the most part, scientifically illiterate. Physics departments have been sadly derelict in failing to develop rigorous undergraduate programs for those who will eventually do something else: economics, law, sociology, politics, etc. But once a man goes as far as the PhD in physics, it must be assumed that this is what he wants to do.

J. MICHAEL PEARSON
Université de Montréal

Unethical promise of jobs

William Silvert writes of (1) an "employment crisis," and (2) of a crisis . . . far deeper and more bitter than a matter of jobs (PHYSICS TODAY, August, page 9).

Regarding the employment crisis, it is hardly reasonable to expect any course of study to lead surely to well paid permanent employment. No institution can properly hold out such a promise to its students unless it has the power to enforce it. Lacking this power, such a promise is unethical. Unemployment is common among actors, playwrights, musicians, poets and composers, but they did not expect their studies to guarantee jobs. They studied for the love of the subject.

Beginning about 1950, many public statements appeared that alleged a "shortage" of scientific personnel—at first, mainly of engineers. This publicity began at about the time that the defense contracting business started to grow rapidly, on a cost-plus-fixed-fee basis. One writer suggested that such contractors made profits on the mere buying and selling of technical labor, the customer being the government. This has not been proved and is not provable, but it is a fair hypothesis. The allegations of a "shortage" were shown to be poorly justified, at best, as long ago as 1957, when the National Bureau of Economic Research published its book-length study, *The Demand and Supply of Scientific Personnel*. It is surprising that any highly skilled group, such as physicists, should still believe official statements from any source as to the demand for its services, instead of drawing its conclusions independently from factual sources.

Silvert's second remark suggests deep and widespread disillusionment. But it fails to advance reasons for this second "crisis." In so failing, it becomes unscientific. This crisis clearly exists, but it is a symptom. The disease seems to be hidden. This disease is probably rooted in practices in industry and politics. Nobody seems to know what they are.

Students, at least, are in a position to search for the underlying disease, and to try to explain it. I hope that they will do so instead of merely reacting to pronouncements from still other sources. Persons in responsible positions are likely to be under pressure to protect and extend these positions as we all know, and so students may properly question their motives. What appears to be needed is the clear application of the human brain to the political problems that beset young physicists. They, able to think clearly, will always do better than specialists in the more pseudo sciences.

LAWRENCE FLEMING
Pasadena, California

Manpower contradictions

In your August issue there is an apparent contradiction between the letters of William Silvert and the reply of Susanne Ellis, on the one hand, and the reply by Hugh Wolfe to Robert C. Johnson's letter on the other. The first letters complain about lack of positions for physicists. Wolfe complains of staff losses and difficulties in recruiting competent people. I have also heard that the National Accelerator Laboratory encounters recruiting problems.

The resolution of the contradiction might well lie in the areas of work for which young physicists strive and the editorial work that the American Institute of Physics can offer. However, it would be good to have a more detailed review of positions available and positions sought by applicants for jobs.

I know from first-hand information that many of the smaller colleges are eager to find good physics teachers, and I think there are also some job openings in national laboratories. On the other hand, I also know of some young physicists who had considerable difficulty in locating positions to their liking even though, in the cases about

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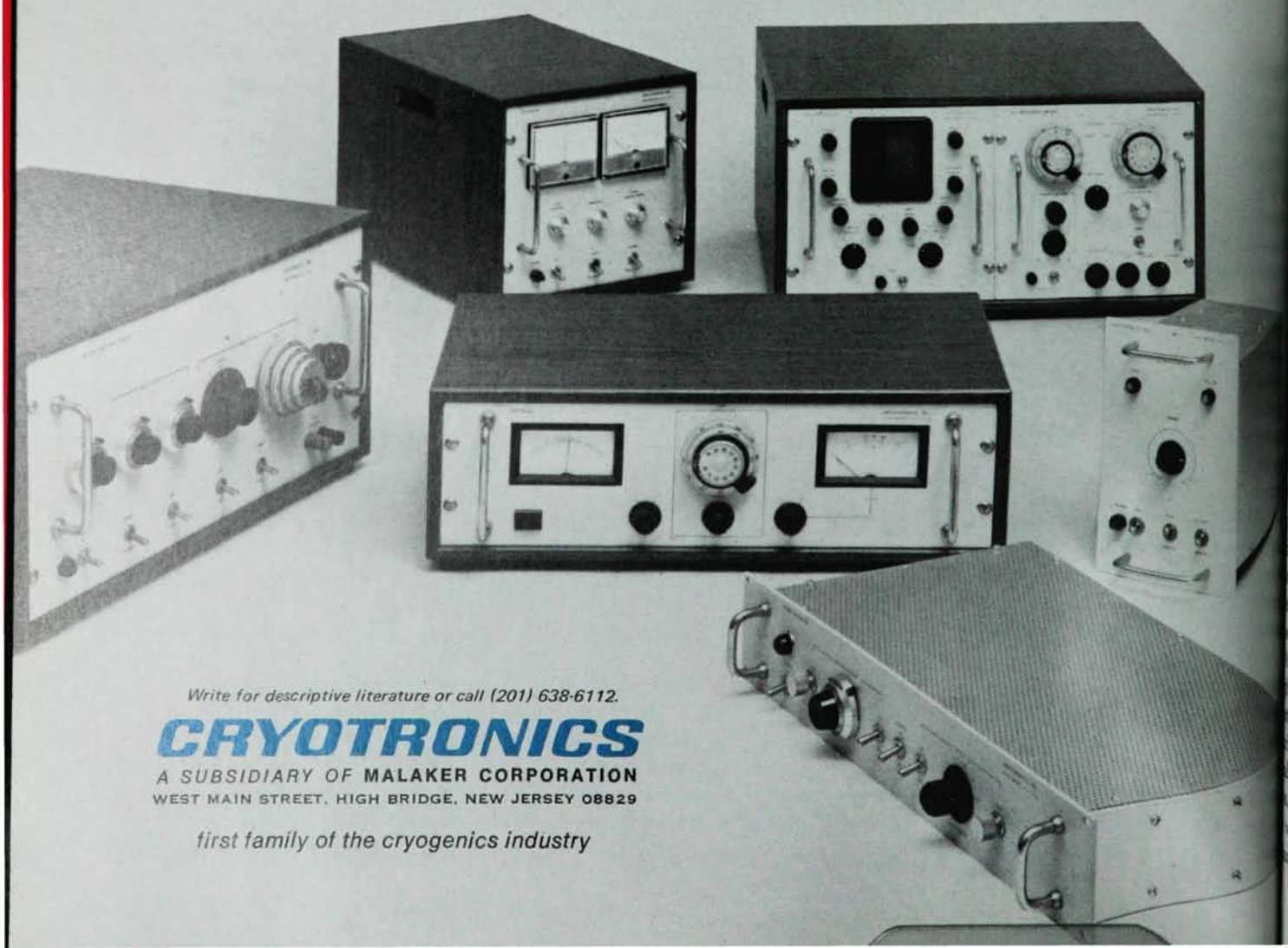

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which I know, they eventually succeeded. An article that would resolve the apparently conflicting statements of the letters would, I think, attract considerable interest.

EUGENE P. WIGNER
Princeton University

Personal ivory towers

As a physicist turned engineer (by choice) I could not help commenting on two things in PHYSICS TODAY. First the job shortage for PhDs. It exists because some people got the idea the US owed them a personal ivory tower—equipped with secretaries, technicians and an unlimited supply of money. Now the coach has turned into a pumpkin; the horses are mice, and a cold cruel employer asks, "What can you do for the corporation?" I fear it is just about time that Alice returned from Wonderland.

Second, the journals of the American Physical Society. They are excellent. Try submitting a paper to some engineering journal. Six months later (honestly) you get a letter saying, "We regret that the reviewer . . ."

STUART A. HOENIG
University of Arizona

Modifying lunar atmosphere

The lunar atmosphere (vacuum) is a source that has become available to mankind only within the last few years. It appears likely that studies of residual gas near the moon's surface will provide useful information concerning the history and composition of the body. It is possible that the moon will find important use as a support for large infrared and ultraviolet telescopes, thermionic devices and other apparatus that requires high vacuum for operation. Perhaps it is worthwhile to point out that this environment may be changed appreciably by the process of lunar exploration and that in particular some consideration should be given to the effects of injection of large amounts of rocket gases into that environment.

A typical manned landing module will exhaust 5000 pounds of gases, mainly water and carbon dioxide in nearly equal molar amounts with measurable amounts of heavier hydrocarbons. At a mean temperature of 300 K the vertical distances required for $1/e$ reduction of atmospheric pressure on