letters

dependent upon them. We need them in order to compete. This, I think, is the real dilemma that animates the American Physical Society's discovery of applied physics: if the universities can no longer absorb our issue, we will tailor our issue for other ends. The alternative, which is unthinkable, would be to do without all those students.

To see just how deep the dilemma is (and why applied physics is not the solution) consider for a moment that alternative. The PhD production rate needed for a stable physics population would be about three per university professor per lifetime—one to replace him (or her) when he (she) retires, the other two to go into nonreproductive jobs (industry, government laboratories, four year colleges, etc). Assuming that by means of a resolute effort we could increase by a substantial factor the number of our (applied) physics graduates wanted by industry, that equilibrium ratio might increase, say, from three to four. That result would have no serious effect on the fundamental dilemma. The rate that we must decrease from is an average roughly fifteen PhD's per professor per career. What is needed is not curriculum reform, but a fundamental change in the system of academic research.

Even if we were willing to change the system, one might reasonably ask, what are we to do with the hordes of brighteyed students who present themselves at our doorsteps each year, faces shining with the eager desire to learn physics? The question is a complex one that needs to be studied, although parts of the answer are easy to see. Graduate school is, after all, a kind of job. If the assistantships dry up, so will much of that eager desire. In any case, the point is that the system must change; that much is predictable from the inexorable mathematics of exponential growth. The only questions are, how? Into what? At the expense of whom? Those are questions we will not even begin to ask ourselves until we admit that change there must be.

Nevertheless, the education of students in applied physics is a worthy goal in its own right. I have avoided setting out in detail Caltech's curriculum in Applied Physics because it need not be copied. Each institution, deciding to initiate such a program, ought to build it (as Caltech did) around the particular predilections and strengths of its own faculty. However, on the basis of our experience, perhaps I can offer some suggestions for what ought not to be done.

Applied physics ought not to be presented offhandedly, as a sideline, by people who are physicists and would rather be doing pure physics. Here the matter of professorial titles enters. Applied physics students need Applied Physics professors whom they can copy, with whom they can identify, by observing whose behavior they can learn what an applied physicist is and what one does. Otherwise applied physics just becomes second class physics, and the students we turn out will be neither very happy nor very good. The other side of this argument is that we are very good at training pure physics students (even if we train too many of them) and that kind of education should remain available and untampered with, both for the benefit of the students who remain dedicated to it, and for the future of our discipline.

To conclude then, let us by all means create the new discipline of applied physics. On intellectual, scientific and technological grounds it is more than justified. And let us face up squarely to the dilemma that disturbs all of us in the profession of academic physics. But let us not deceive ourselves into thinking that the first will resolve the second.

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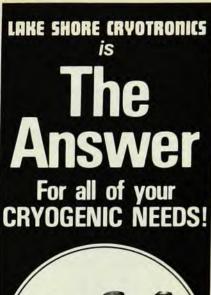
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DAVID L. GOODSTEIN California Institute of Technology Pasadena, California

Emigre scientist work fund

Of the many libertarians, activists, or refusnik scientists in the Soviet Union, each year a few obtain visas and emigrate to the United States. Their plight is usually desperate. They leave stripped of whatever limited financial reserves they may have accumulated in the Soviet Union. Many have no family here. Some have little knowledge of spoken English. But their most pressing need is for employment, and this need is difficult to fill, since they have few professional contacts, no security clearance and, noncitizens, are ineligible for most government jobs.

Fortunately, the Program for Soviet Emigre Scholars of the American Council for Emigres in the Professions (345 East 46th Street, New York, N.Y. 10017, telephone 212 697-0520), offers a helping hand. The Program, operating on a small grant from the Ford Foundation, offers guidance and counseling, provides intensive instruction in conversational English, aids in the preparation of resumes, and arranges interviews between emigre scientists and American scholars in the field who can evaluate and advise the emigre. In some cases this leads to job interviews. The Program also sends emigre scientists to academic conferences and to college and university campuses to lecture—all this to gain exposure and familiarity with American academic life. In





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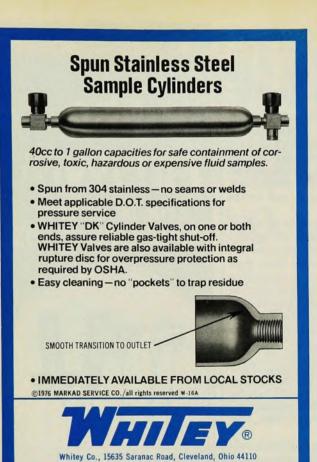
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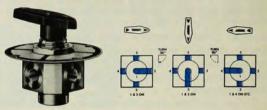
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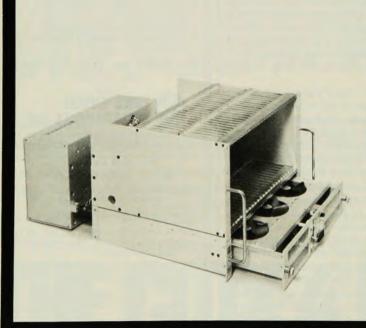
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some special cases where a university wants to hire an emigre but does not have sufficient funds to offer a full-time position, the Program provides small supplementary grants.

But in spite of the best efforts of the dedicated staff, the story has been a grim one. Those who, at great personal sacrifice, leave the Soviet Union and come to our shores in search of freedom often find a harsh life of penury, dependency, temporary menial jobs, and disillusionment. And they cannot go back.

We in the physics profession could, and should, do something to help our fellow professionals. With a fund of money we could partially subsidize a retraining effort during which the immigrant physicist could obtain on-the-job training, improve English language skills, and learn to accommodate generally to a strange, frightening insecure new life. Along with a matching support fund, what is needed is a small roster of employers willing to hire for one year at shared, reduced salary, as an earnest of commitment, those who

have chosen freedom.

The undersigned have offered to assist the Program for Soviet Emigre Scholars in soliciting and administering the fund and the employment schedule. What is most needed are contributions, but also job leads, and, of course, volunteers who would like to participate in what promises to be a small but long-term program. With \$12 500 we should be able to place two or three persons for a year, in jobs that might get them started again.

Contributions are tax-deductible. Make checks payable to ACEP Emigre Scientists Work Fund and send them either to the New York address or to one of the undersigned. Please inform us if you as an employer are willing to participate or know of a firm that is willing to participate in this program.

EARL CALLEN
The American University
Washington, D.C.
GEORGE A. SNOW
N. S. WALL
University of Maryland
College Park, Md.

Split up Bell Labs?

The February issue (page 69) contains a news story reporting the concern by Bell Labs executives over the Justice Department suit against the Bell System claiming violations of the Sherman Antitrust Act. The Bell Labs executives oppose the suit and claim the interests of telephone customers would best be served by continuing the existing vertically integrated regulated monopoly.

It is surprising that PHYSICS TODAY presented only one side of this complex issue without presenting the views of ei-

ther the Justice Department or those firms who oppose Bell's monopolistic grip on telecommunications in the United States.

A key concern in deciding the fate of the Bell System should be the public and its needs for telecommunications products and services. In the past, the need was to create an integrated national telecommunications network. To achieve that goal, a vertically integrated regulated monopoly run by private industry indeed appears to have been the best organizational structure. However, the national network has now been achieved, and the need for the future appears to be innovative products and novel services. To achieve this new goal, it would appear that a competitive organizational structure would be best.

All too long, telecommunications has been equated with the Bell System. Now is the time for this equality to cease and for Bell to realize that the death of the Bell System in its present form is not equivalent to the death of telecommunications in the United States.

Bell Labs President, William O. Baker, is quoted in the story as stating that "the disintegration of the Bell System will destroy Bell Laboratories." Indeed, the prime thrust of the Bell Labs executives argument against the Justice Department suit is that if the Bell System were split up, Bell Labs would suffer. Probably Baker is correct, but the destruction of Bell Labs as an institutional entity in its present form is not equivalent to the destruction of the research and development in communications that Bell Labs conducts.

If Western Electric were divested from the Bell system, then that portion of Bell Labs supported presently by Western (nearly one-half) would undoubtedly be incorporated directly within Western. Since research and development are usually most relevant when they are directly under the mission which they should support, such a move could be viewed as a good thing.

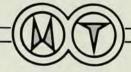
If the AT&T Long Lines department and Bell telephone companies continued to exist as entities within the Bell System, then support for the remaining half of Bell Labs would not be a problem. If the whole Bell System were fragmented, then the basic research portion of Bell Labs could be supported either by the communications industry as a whole or by the Federal government. The basic researchers at Bell Labs are so noted in their fields that most of them would be eagerly sought by many universities and industrial laboratories. The remainder of Bell Labs could be scattered around the remnants of the Bell System or perhaps held together as a systems engineering and standards laboratory under Bell sup-

The options available to Bell Labs ex-Continued on page 74

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