letters

We cannot ignore Soviet rights violations

The undersigned past and present members of the American Physical Society Committee on the International Freedom of Scientists are responding to the editorial by Harold Davis, "Restoring US–Soviet communications in science" (March, page 168). We do not take issue with the broad thesis of this editorial, that the community of American physicists should seek to restore communications with its Soviet counterpart "as individuals through correspondence and visits or by encouraging institutions to revive formal exchanges." We fear, however, that the way the editorial presents this thesis, especially the editorial's assertion that "the US physics community can no longer have a realistic hope of exerting any influence on the Soviet government," may give the Soviet bureaucracy a very mistaken impression, namely that American physicists will welcome increased scientific communication with our Soviet colleagues in official favor without *any* regard to the human-rights violations being suffered by our many Soviet physics colleagues out of official favor.

These out-of-favor colleagues of ours have been jailed, exiled to remote areas of the USSR, or otherwise cut off from contacts with all physicists—Soviet as well as American—for applying to emigrate or for seeking Soviet compliance with the Helsinki agreements. The editorial recognizes that Norman Zabusky (a mathematical physicist at the University of Pittsburgh) recently was expelled from the Soviet Union just for agreeing to give a scientific lecture to a small group of as-yet-unjailed or unexiled out-of-favor physicists. American physicists cannot and should not be expected to ignore completely this blatant Soviet interference with scientific communication. We are certain that the American physics community refuses to condone the forced exile to Gorky of Andrei Sakharov (whom the editorial does not mention) or his increasingly humiliating treatment there at the hands of the KGB (April, page 75; see also N. V. Hesse, "The Sakharovs in Gorky," *New York Review of Books*, 12 April 1984, page 25). The Soviet government should comprehend that the decreased US–Soviet scientific exchanges subsequent to Sakharov's exile reflected deep outrage in the American scientific community; certainly the Soviet government should be under absolutely no illusions about the additionally deleterious effects on US–Soviet scientific communications that would result from further deterioration of Sakharov's situation. Correspondingly, the Soviets should understand that improved treatment of their refuseniks and dissidents very probably would significantly increase the willingness of American physicists to initiate and maintain contacts with Soviet physicists. The Soviets also should understand that many American physicists who undertake renewed contact with Soviet-favored physicists expect to bring up the impediments to those contacts engendered by Soviet human-rights violations. Moreover, these American physicists are unlikely to visit the Soviet Union under threat of the treatment afforded Zabusky—expulsion for attempting to extend contacts to the officially disfavored.

In the foregoing connection, we stress our belief that many American physicists do not agree with the editorial's renunciation of boycotts as a sanction against Soviet-favored physicists for unforgivably egregious violations of the human rights of unfavored physicists. In our view, American physicists prefer to make their own judgments about the appropriateness of sanctions against Soviet-favored physicists on a case-by-case basis. For this reason CIFS, after due consideration, has made no policy recommendations on boycotts to the APS Council or the APS membership. The editorial in PHYSICS TODAY does not represent official American Physical Society policy.

We trust this letter will clarify for all PHYSICS TODAY readers—domestic as well as foreign—the interrelationship between US–Soviet scientific contacts and Soviet treatment of their disfa-

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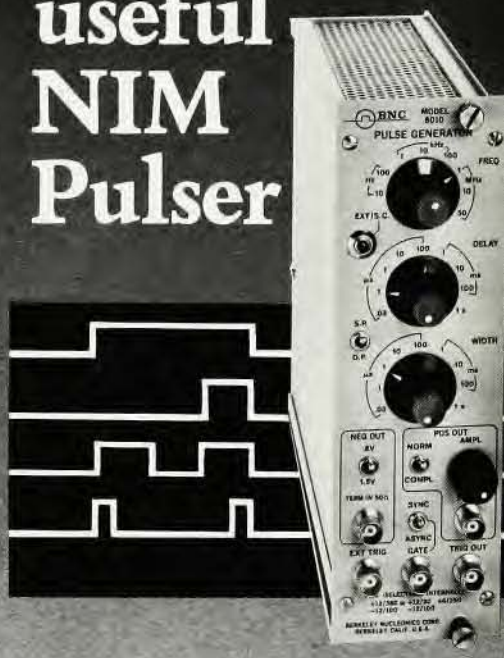

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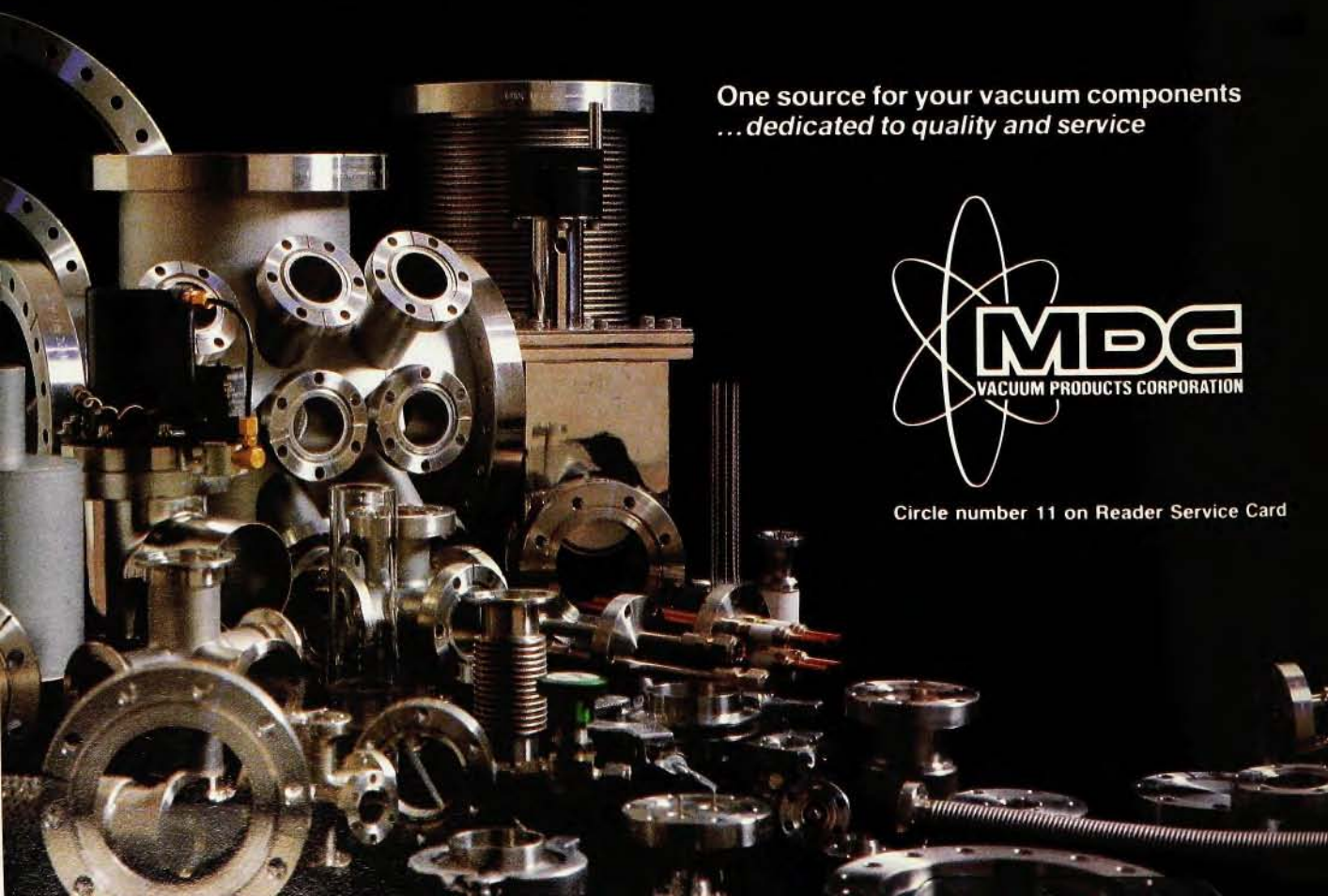

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5/84

In taking the position that in the light of present US–USSR relations it is more prudent to restore lines of communication with Soviet scientists than to maintain boycotts as a response to Soviet human-rights violations, we did not intend to convey in any way the impression that this position is official policy of the American Physical Society. (Opinions presented in PHYSICS TODAY *editorials generally do not express the official policy of AIP or its member societies.) We are in enthusiastic agreement with the Committee on the International Freedom of Scientists that those physicists who choose to reopen contact with Soviet physicists can and should, whenever the opportunity arises, express their outrage about the human-rights violations to their Soviet counterparts and to the Soviet government.*

—The Editor

Physics on microcomputers

In his interesting article, "Doing Physics with Microcomputers," Per Bak (December, page 29) arrives at a number of thought-provoking conclusions. As a person whose background is in physical science (astronomy), who is the owner of a microcomputer and whose position is director of a computing center, I would like to comment on some of these conclusions.

That the microcomputer is more than a toy and can be used for serious scientific research is undeniable. My latest paper was based largely on calculations made on my micro. Only the most demanding calculations were performed on the computing center's VAX-11/780. Interestingly, in the advantages attributed to the micro Bak fails to mention that computations performed on a micro can be *more* accurate than those made on a large computer. If the latter truncates the results of floating-point arithmetic operations (as does an IBM 4331/4341, for instance) and the former rounds, there will be less statistical accumulation of round-off error in the micro. With rounding, the total error in a numerical integration, for example, is proportional to the square root of the number of arithmetic operations executed, rather than linearly proportional to the number, as with truncating.

Having said this, I nevertheless feel that Bak stacks the cards too much in favor of the micro. His economic considerations do not include the time a physicist needs to develop a correctly working program. Large computers come equipped with more powerful text editors, interactive debuggers and more flexible and reliable software than is encountered on micros, and the computing center offers access to standard subroutine packages and consultations with computer professionals, all of which significantly decrease program-development time. This is an important consideration if we assume that a physicist should primarily do physics rather than programming. Furthermore, Bak's estimate of a ratio of 40 to 1 between a micro's and a large computer's CPU processing time appears too optimistic. In an actual comparison between the VAX-11/780 and my Radio Shack Model-II (the benchmark being an n-body solar system integration), I found the ratio to be nearly 1600 to 1 for computations performed in double-precision floating-point with machine code produced by FORTRAN compilation. A typical VAX four-hour run would need 267 days on the micro.

It is no longer true that large computers' speeds are adversely affected because they use "inefficient FORTRAN or similar programs." Modern compilers generate extremely efficient machine code. One may be able, as Bak states, to minimize program-execution time by coding in machine language (which is *not* simple if the computer has a large instruction set) or, better, assembler program sections where instructions are executed many times, inside nested DO loops for example. But one should not get carried away and code the entire program in assembler out of misplaced concerns for "efficiency." The few seconds of CPU time typically saved will not compensate for the enormously increased program-development time compared to that needed when one codes in a high-level language.

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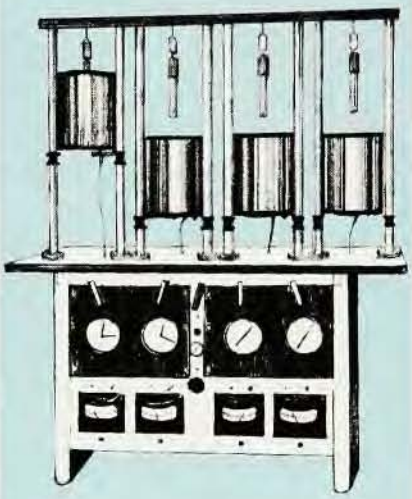
As manager of a physics-department computing center, I would like to comment on several points made in Per Bak's article. First, I'd like to state that I know absolutely nothing about physics but have been intimately involved in scientific computing for more than 7 years.

Crystal Clear



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