Physics & Society

THE NEWSLETTER OF THE FORUM ON PHYSICS AND SOCIETY, PUBLISHED BY
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PHYSICS AND SOCIETY is a quarterly newsletter of the Forum on Physics and Society, a division of the American Physical Society. The newsletter is distributed free to members of the Forum and also to physics libraries upon request. It presents news of the Forum and of the American Physical Society and provides a medium for Forum members to exchange ideas. PHYSICS AND SOCIETY also presents articles and letters on the scientific and economic health of the physics community; on the relations of physics and the physics community to government and to society, and the social responsibilities of scientists. Contributions should be sent to the Editor: John Dowling, Physics Department, Mansfield University of Pennsylvania, Mansfield, PA 16933, 717-662-4275.

Forum on Physics and Society
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RESPONSE OF APS CANDIDATES TO FORUM QUESTIONNAIRE

The **Forum** traditionally asks candidates for the American Physical Society Office of Vice-President Elect and Councillor at Large to respond to a set of questions. The following questions were constructed by the **Forum's** Voting Questionnaire Project (Kristl Hathaway, Earl Callen, and John Dowling) and approved by the **Forum** Executive Committee.

1. In the May **Physics Today**, George Keyworth takes the APS Council to task for passing a resolution on "Nuclear Arms Limitation."

   A. Do you think such a resolution was an appropriate activity of the APS Council?

   B. If you agree with the Council's resolution how do you suggest the Council implement it?

   C. If you don't agree with the Council's resolution why do you think the resolution was an inappropriate activity? How would you have changed it?

2. What is the single most important thing that the APS Council should be doing to help increase the numbers of women and other minorities in physics?

3. The Forum has formed ad hoc study groups to examine vulnerability of ICBMs, verification, proliferation, EMP, and Civil Defense. Should the APS fund these study groups. If so why so, if not why not?

4. The present administration in its attempt to reduce technology transfer appears to be imposing some rather severe restrictions on the scientists in general. What balance would you strike between security and scientific freedom?

5. What role should the APS play in the Mathematics/Science Teacher Crisis?

The candidates' responses are as follows:

Sidney D. Drell: Candidate for Vice-President
Stanford Linear Accelerator Center, Stanford, CA 94305

1. A. I believe that it was appropriate for the APS Council to express its views on this issue. I was a member of the group that drafted this resolution on "Nuclear Arms Limitation" for the Council. What would be inappropriate would be for the Council to take positions on specific political issues. That was not the case in this instance. The Council also should not allow the APS to be diverted substantially from its primary responsibility to advancing physics.

1. B. The resolution has been disseminated widely and has served as a model for similar statements by other professional organizations. See answer below to question 3 for further actions.

2. The APS should maintain a complete, up-to-date roster of women and other minorities in physics and make it available, particularly to schools and colleges. This information, supplemented by APS organizational and funding support to help meet expenses, will help expand and facilitate efforts by women and other minorities in physics who are interested in serving as role models to visit and speak at these institutions and to encourage able students to enter the field of physics.

3. The APS Council, after careful review, should sponsor and help initiate those studies which it judges can add new technical understanding on the basis of unclassified information. For example, the phenomenon of EMP can be understood from open literature and basic physics and it would be profitable to study such questions as the cost, difficulty, and uncertainties of shielding communications networks and guidance systems to various hardness levels based on different technologies. I believe the present policy by which the APS Council provides limited seed money to help initiate the studies it sponsors is appropriate.

4. I endorse in its entirety the recommendation made last year by the Panel of Scientific Communications and National Security of the National Academy of Sciences. In addressing unrestricted areas of research the Panel recommended:

"that no restriction of any kind limiting access or communication should be applied to any area of university research, be it basic or applied, unless it involves a technology meeting **all** the following criteria:

- The technology is developing rapidly, and the time from basic science to application is short;
- The technolgy has identifiable direct military applications; or it is dual-use and involves process or production-related techniques;
- Transfer of the technology would give the U.S.S.R. a significant near-term military benefit; and
- The U.S. is the only source of information about the technology, or other friendly nations that could also be the source have control systems as secure as ours."

5. The APS should work together with the AAPT and with other professional societies to form new links of cooperation between research scientists in industry and the universities, science teachers in the schools, and the faculty responsible for training science teachers. Valuable forms of cooperation include:

- assistance in curriculum development

• identification and supervision of summer jobs and research observer posts during the school year in local research laboratories for interested and qualified students and teachers; and

• preparation of booklets and video materials describing career opportunities in science and emphasizing the recent technological advances.

D. Allan Bromley: Candidate For Vice-President
Physics Dept., Yale University, New Haven, CT 06511.

No reply available at press time.

B.S. Chandraskhar: Candidate for Councillor at Large, Physics Dept., Case Western Reserve University, Cleveland, OH 44106.

1. A. Yes.

1. B. A reading of the resolution shows that, in a narrow sense, its implementation only requires transmission of the resolution to all the parties named in the paragraph which begins "Be it therefore resolved.....". I imagine that the **Forum** has something more than that in mind, such as, what should the Council do to continue to urge those parties to achieve the goals listed. I believe that the Council is already doing it right: supporting the activities of the **Forum** and the POPA, and bringing the results of their studies to the peoples and governments involved.

1. C. Not applicable.

2. I really do not see at the moment what the Council can do more than it is already doing. The law in these matters is clear, and good. What is needed is adherence to the spirit, not just the letter. Those members of the Society who sit on appointment committees, admission committees, and such, can perhaps do better. Complex problems rooted in history do not have, alas, "a single most important thing" that can be done about them.

3. To be considered for funding, a study must have predominant physics content, and must be totally objective. As regards the studies listed in this question, I might support funding EMP and not Civil Defense.

4. I am content with the Corson panel's recommendations (Physics Today, February 1983).

5. Continue and strengthen our efforts to improve public understanding of our work as physicists. Support the efforts of industry and government to do something about the Crisis. I do not see much scope for direct involvement of the Society as such.

A. M. Clogston: Candidate for Councillor at Large P. O. Box 485, Tesuque, NM 87574 (formerly of Bell Labs).

1. A. I found parts of the resolution on Nuclear Arms Limitation to be based on a scientific appreciation of the effects of nuclear war and to constitute appropriate action on the part of the APS council, but some parts of the resolution I found less appropriate.

1. B. The Council's resolution was implemented by its publication, and could be further implemented by targeted dissemination.

1. C. As indicated above I found parts of the resolution to be less appropriate because they seemed to me to involve matters of opinion or experience, not especially based on physics, about the wisest course of action to reduce the risks of nuclear war. I would have looked for another way to approach these parts of the resolution or omitted them altogether.

2. The APS should assure that women and other minorities in physics have access to high quality education in science and mathematics at the secondary school level.

3. The APS should welcome proposals made by the Forum for study groups on various subjects such as those mentioned, but the studies should be screened and conducted by POPA following the regular guide lines.

4. Restrictions should be applied by government to scientific communications only in very special instances of clear potential near-term damage to national security. In most cases the national interest is best served by open communications as the best route to rapid scientific and technological progress.

5. The APS should cooperate in the development of science curricula at the secondary school level for both general students and science-oriented students. The APS should also cooperate in explaining to the public why science education is important to national security and industrial competition with other nations in areas of high technology.

Judy Franz: Candidate for Councillor at Large
Physics Dept., Indiana University, Bloomington, IN 47401.

1. A. Yes.

1. B. It is clear that the statement already has had a substantial impact; Keyworth's response is evidence of this. Implementation of the statement depends on many people far removed from the Council. The President of APS should continue to speak on this issue, using the statement as evidence of Council support.

2. It is important to continue to appoint effective people to the APS Committee on Minorities and Committee on the Status of Women in Physics. The Council can then continue to give strong support to most of the activities proposed by the committees. These committees are in the best position to decide what actions are needed at a particular time. The new APS Office of Public Affairs can help the committees make contacts in Washington that will ensure that their efforts have the greatest possible impact.

3. Yes, if expenses are kept to a moderate level. It is not possible for all physicists to find the time to keep themselves adequately informed on these critical issues. Small groups of physicists with special expertise can provide a valuable service by informing the APS membership and the public about scientific and technical aspects of these topics. Reports from Forum study groups may sometimes lead to Council statements or larger scale studies of particular topics.

4. I support the recommendations of the Corson report.

5. I believe that the APS Council, committees and membership can and should play an important role in resolving the Mathematics/Science Teacher Crisis, and as Chairperson of the APS Committee on Education, I have been working hard to ensure that this occurs. Our joint APS - AAPT committee on College -High School Interaction has established liasons in more than 450 colleges and universities with the hope of promoting more interaction between physics faculty and local physics teachers. An APS sponsored workshop is planned for this fall to bring together experienced people to write guidelines for physics teacher training institutes. A joint subcommittee of POPA and the Committee on Education has prepared a statement of principle on this issue and a list of possible endorsements for presentations to the Council in November. We are also trying to get more information on physics education included in **Physics Today** on a regular basis. A better informed membership will be more apt to become active and effective on the local level.

J. D. Garcia: Candidate for Councillor at Large
Physics Dept., Univ. of Arizona, Tucson, AZ 87521

1. A. I believe that the APS Council acted appropriately in adopting the carefully worded resolution on Nuclear Arms Limitation. The Council must be very careful to avoid taking partisan or political stances, in order to avoid factionalization within the Society, and to be able to promote the advancement and diffusion of knowledge in physics in society-at-large with credibility and without suspicion of ulterior motives. It is, however, incumbent on the APS Council to speak in opposition to conditions which would make the advancement of physics difficult if not impossible, such as a nuclear war. I believe most physicists consider a nuclear war to be detrimental to physics. However, if a large enough contingent within the Society is upset with this resolution, I would urge them to take the democratic initiative of informing the Council of their opinion.

1. B. I do not believe it is possible for the APS Council to implement the resolution. The resolution recommends a set of actions which the Council felt was in the best interests of all humankind.

1. C. See answer to 1. A.

2. In my opinion, the single most useful thing for the APS Council to do to help increase the numbers of women and other minorities in physics is to provide additional support to the existing Committee on Women and Committee on Minorities. The physicists on these committees are dedicated people for whom this problem is a major concern, and they are the most likely to expend the energy to get results. As a member, and currently Chairman of the Committee on Minorities, I have helped in the Minority Scholarship Program, currently helping 23 excellent minority scholars through school. Our site visits to various institutions over the years have produced encouraging results.

3. **Forum** study groups are a very welcome addition. I am glad the members make the extra effort to form them and I often learn interesting information when I attend discussions resulting from such activities. I do **not** believe the APS should fund these study groups, however, nor endorse the findings. For instance, the particular topics mentioned could take enormous resources for proper study (the federal government is spending millions of dollars on each of these topics). These topics should properly remain within the context of the **Forum** as subjects on which a free exchange of ideas is encouraged. The **POPA** studies are funded from sources other than APS dues. The Society could not begin to afford to fund all of the interesting and timely subjects there are to study.

4. In my mind the technology transfer question is not a simple one. I firmly believe that science flourishes best in an evironment where information exchange is maximal. The development of physics requires exchange of ideas. I am strongly opposed to any form of censoring of pure physics research communications. Having some acquaintance with classified defense work, I can, however, understand the concerns of our defense establishment in having detailed applications revealed. The question then reduces to "what is applied?" I would draw that line as close to military "hardware" as possible. Additionally, the possible discovery of new concepts which could be sensitive to our defense can only be dealt with by the mature sensitivity of the individuals involved (as occurred with nuclear weapons).

5. Probably the most useful role the APS could take would be to encourage the exchange of ideas relating to teaching physics. Ways should be sought to strengthen our ties to the AAPT, **and to make more welcome** among us those whose primary interest is the teaching of physics.

Gerald T. Garvey: Candidate for Councillor at Large
Physics Division, Argonne National Lab, 9700 South Cass Ave., Argonne, IL 60439.

1. A. I have read the Council's resolution on Nuclear Arms Limitation and find no particular difficulty in endorsing it. As Marshack pointed out in his response to Keyworth's criticism, the resolution was a very measured statement. It is a call for direct, serious, unconditioned negotiation for mutual limitation and reduction of nuclear arms. As such, I support it. I understand why George Keyworth wishes that the Council of the APS refrain from taking a position on such a sensitive issue.

I was not party to the lengthy discussion in the Council previous to their going forward with the resolution, therefore, I don't know how I would have decided this issue. I am usually conservative on such matters but the resolution endorsed by the Council seems appropriate to me.

1. B. With regard to implementation I don't really have a good idea of what avenues are open to the Council. I assume that the resolution was widely distributed among policymakers in this country and abroad. The council should follow up and determine what specific actions are being taken in line with the resolution. A session at the '84 Washington Meeting could also be set up to see what progress is being made.

2. I have not thought much about what specificially the Council could do. I believe that much of the most useful effort has to be expended on effecting the aspirations of elementary school children. Given interest and aptitude, every reasonable step to nurture and support minority and women students should be taken by all institutions and individuals.

3. This question is too poorly posed to be addressed. What does it mean to fund an ad hoc study group? I don't believe that the APS should fund scientists (physicists) to do these studies. If the Council feels the study to be valuable I see no difficulty in providing incidental costs, consultants, secretarial and editorial help, etc.

4. At present I do not understand the position of those who wish to impose restrictions on the exchange of technical information on the general scientific community. The normal scientific and technological discourse between scientists engaged in basic research will not reveal much of military value. The burden of demonstrating that such exchange jeopardises national security rests with the government. We should strenuously object to limitations on valid scientific exchanges.

5. This is a very important question - a considerable effort should be made to mobilize all institutions which depend on the talents of physical scientists. Industry, national laboratories and universities all have a vested interest in motivating bright young people to careers in science. We can help by preparing better texts, lending or giving laboratory equipment, offering special instruction to interested teachers and students, opening up our facilities for well thought out tours. Sharing our enthusiasm for physics will directly support science teachers and motivate the students they work with.

Arthur Kerman: Candidate For Councillor
Physics Dept., MIT, Cambridge, MA 02139.

No reply available at press time.

COPS/Forum Session in San Francisco

The APS Committee on Opportunities in Physics (COPS) and the APS **Forum on Physics and Society** announce a Joint Symposium and Panel Discussion for the Fall APS meeting to be held in San Francisco, 20-23 Nov. 1983. The Symposium is entitled "University/Industry Partnership: Opportunities and Risks". It will be held in the Fairmont Hotel late Monday afternoon, November 21, from 4:30 p.m. to 6:30 p.m. so as not to conflict with technical sessions, while allowing the audience the freedom of the evening attractions of San Francisco.

The subject is one of wide interest, reaching both the daily press and the science-oriented media. At least three small, high level conferences were held in 1982 to examine the questions surrounding the topic (Pajaro Dunes, CA, Madison, WI, and Philadelphia, PA). While the greatest notoriety has been attached to arrangements and controversies involving biotechnology, interactions close to condensed matter (applied) science, as well as questions of broad academic impact make the topic one of importance to physicists in academia and in industry.

A distinguished group of speakers has agreed to participate in the Symposium. They are Dr. David S. Saxon, MIT/University of California; Dr. George E. Pake, Xerox Palo Alto Reserach Center; Dr. Nicholas A. Ashford, MIT; and Dr. Thomas H. Moss, Case-Western Reserve University. The Symposium and Panel Discussion will be under the chairmanship of Dr. Joseph Budnick, Head of the Physics Department at the University of Connecticut.

Dr. Saxon, who is Chairman of the Corporation of MIT and was recently President of the University of California, will address the topic of emerging opportunities for academic scientists and for budding entrepreneurs. Dr. Pake, Vice-President of Research for Xerox at Palo Alto, is a former President of APS, and has held major positions in academia. He will speak from the industry point of view. Dr. Ashford, who is Assoc. Prof. of Technology and Policy in the School of Engineering, and Director of the Center for Policy Alternatives at MIT, will discuss the relationships between industrial funding and academic freedom and integrity. Dr. Moss is Director of Research Administration and Adjunct Professor of Physics at CWRU, and was formerly in several Congressional staff positions (including a term as an APS Congressional Fellow). He will discuss ways by which the university system can pragmatically adapt to partnership with industry while preserving its own integrity.

Liberal Arts Course on Nuclear War by Alvin M. Saperstein, Physics Department and Center for Peace and Conflict Studies, Wayne State University, Detroit, Michigan 48233. (Presented at Session "Education and Nuclear War," on May 28, 1983 at the AAAS Annual Meeting Detroit, Michigan.)

Introduction

Very often the way to deal with major societal problems is to increase the knowledge and/or change the outlook of the members of that society. Societies turn to formal education when the required individual changes are beyond the capacity and/or will of the primary educational component--the family, when the new requirements transcend the "common sense" of the previous generation, or when the families may be embarrassed or hindered by peer pressures or intergenerational conflict. When the problems were universal, directly impacted upon all, and were presumed to be within the competence, interest, and eventual control of each individual--e.g., Civics, Consumer Economics, First Aid, Sex Education--the formal education was carried out in the high schools, our universal educational institution. As the last example shows, the problems and/or their solutions, could often be very controversial... We have now, belatedly, come to explicitly recognize that the nuclear aspects of the military component of national security policies are a major societal problem threatening the very survival of society itself.

Teaching the Public

To reach the general public with the pertinent "military and security knowledge" we must teach in the courses that they take. One possibility is to add material to the usual science courses such as the three levels of introductory physics: the descriptive physical science survey; the algebra based course; the calculus based course directed at science and engineering students. These courses usually include the basic physics of nuclei and rockets; lectures could be added on the military application of such physics as is done in Art Hobson's physical science course at the University of Arkansas (Journal of College Science Teaching, March/April, 1983, p. 332). Unfortunately, it is difficult to add much; the usual syllabus of such a course is overfull and seldom completed as is. At best, the purely technical aspects of the problem might be added; the students would have to form the necessary cohesive, pragmatic, overview of the problem on their own, melding its technical and non-technical aspects with little or no academic guidance.

Another possibility is to create a special course, earning regular science credits, which uses the problem of nuclear war to teach some of the principles and facts of science. The idea is to use the assumed in-

The objective of the **FORUM** is the advancement and diffusion of knowledge regarding the interrelation of physics, physicists and society.

The **FORUM** is charged with providing for all members of the Society an opportunity for discussion of and involvement with such matters,

The **FORUM** sponsors symposia at the general meetings of the Society, publishes a quarterly Newsletter, appoints committees or study groups to conduct studies, may support Topical Conferences and short courses on topics of interest.

WHY JOIN?

1) Membership is free to APS members.
2) Members receive the Newsletter.
3) Members may be appointed to committees, study groups, and may be elected officers.

FROM THE CHAIRPERSON OF THE FORUM

Dear Forum Member:

The last decade has seen a period of involvement of physicists with issues of science and society. The Forum has shared this concern and hopes to do more with your help. The Forum has been insturmental in the development of the CONGRESSIONAL FELLOWS PROGRAM, THE FORUM AWARDS, CONFERENCES ON PHYSICS EDUCATION AND EMPLOYMENT CONCERNS, Symposia at national meetings, and the establishment of the APS Panel on Public Affairs.

At present the Forum membership numbers approximately 3,603. For the next year, there are no Forum dues for current APS members. The Forum will, however, be given $2.00 per member to support the Newsletter and other Forum initiatives. As a member of the Forum, I would like you to recruit at least one (preferably more) of your colleagues to join The Forum. To do this, you (or your colleagues) should send this form with names and addresses to the Secretary of The Forum: Professor Dietrich Schroeer, Department of Physics and Astronomy, University of North Carolina, Chapel Hill, North Carolina 27514.

This form can be detached, folded and mailed. The reverse side is already addressed.

Very truly yours,
Willie Chinowsky, Chairperson
Forum on Physics and Society

Yes, I want to join the Forum on Physics and Society and I am a member of the APS.

NAME _____ **NAME** _____

ADDRESS _____ **ADDRESS** _____

_____ _____

_____ _____

NAME _____ **NAME** _____

ADDRESS _____ **ADDRESS** _____

_____ _____

_____ _____

DIETRICH SCHROEER
DEPT. OF PHYSICS AND ASTRONOMY 039A
UNIVERSITY OF NORTH CAROLINA
CHAPEL HILL, NC 27514

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The Last Four Years of the Forum - A Quick Look

The **Forum** has sponsored sessions at nearly every regular APS meeting; here is a rough tally; over the last 4 years:

Arms Control	7
Science/Technology	2
Education	3
Nuclear Power/Energy	8
Human Rights	1
Minorities	2
Contributed papers	2

The **Forum** has published **Nuclear Energy, Nuclear Weapons Proliferation and the Arms Race** ($2.50) and **Nuclear Weapons and Nuclear War** ($2.00), Both are available from Publications Dept., AAPT, Graduate Physics Bldg., SUNNY -Stony Brook, Stony Brook, NY 11794.

The **Forum** has sponsored two Short Courses on the Arms Race which were both huge successes. The last one will be published as one of the AIP Conference Proceedings (available from AIP in late Fall, 1983).

The **Forum** is currently sponsoring studies on Vulnerability, Verification, Proliferation, Electomagnetic Pulse, and Civil Defense.

The **Forum** has been active in promoting Women's and Minorities issues. To this end the **Forum** Newsletter, **Physics and Society** published an AAPT questionnaire on Women and distributed the newsletter to all AAPT members. Physics and Society has also publicized a roster for women physicists and gave wide distribution to Philip Schewe's Human Rights Kit.

Physics and Society goes to all **Forum** members. In April, 1980 there were 2613 **Forum** members,, in July, 1983 there were 3603. In addition the newsletter is delivered free to over 300 physics libraries. Newsletters go to 48 foreign countries. **Physics and Society** regularly publishes Letters to the Editor, the Forum Councillor's report, COPS reports, **Forum** questions to APS candidates (each October issue - to let **Forum** members know where APS Candidates stand on issues of interest to the **Forum**).

FORUM ELECTIONS

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FORUM ON PHYSICS AND SOCIETY 1983 ELECTION BALLOT

Please place and X in the box for the candidates of your choice.

For VICE-CHAIRPERSON (Vote for one)

- ☐ **Dave Hafemeister**
- ☐ **Roland H. Good, Jr.**

FORUM COUNCILLOR (Vote for one)

- ☐ **Ken Ford**
- ☐ **Paul Craig**

SECRETARY-TREASURER (Vote for one)

- ☐ **Pete Zimmerman**

EXECUTIVE COMMITTEE (Vote for two)

- ☐ **Forest Rouse**
- ☐ **Barb Levi**
- ☐ **Lawrence Krauss**
- ☐ **Henry Kelly**

Please fold and staple this ballot and return it to Dietrich Schroeer by 1 November 1983. The reverse side is already addressed.

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FORUM ELECTIONS

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DIETRICH SCHROEER
DEPT. OF PHYSICS AND ASTRONOMY 039A
UNIVERSITY OF NORTH CAROLINA
CHAPEL HILL, NC 27514

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terest of students in some problem area to teach the sciences which impinge upon that area. (In the past analogous courses such as "environmental physics," "environmental biology," "the physics of music," "nutrition--the chemistry of foods," etc., have been popular.) Ideally, one hopes to teach enough of the relevant sciences so that the students can actually do order-of-magnitude calculations pertinent to strategic and tactical issues while yet including enough of the history, politics, and other non-scientific aspects of the problem to understand the need for strategies and tactics. Such a course is taught by Avrom Blumberg to large classes at DePaul University (JCST, p. 337). At a somewhat higher level, Dietrich Schroeer teaches a similar course to small groups at the University of North Carolina (JCST, p. 310). Among the advantages of such courses are that, since they satisfy formal science distribution requirements, it is comparatively easy for them to attract students. Also, they are set up as regular courses, taught within the regular teaching loads of a single department and hence require little or no unusual bureaucratic maneuvers. Their disadvantages lie in the limited credibility to the students of a single teacher, credentialed in one discipline, attempting to cover the many disciplines required to understand the problem (attempting to "see" the entire elephant). also limiting enrollment is the requirement that students actually attempt calculations leading to quantitative answers--endeavors which liberal arts students evade like the draft these days.

A third possibility, with which I have been associated (JCST, p. 319), is the creation of a special, team-taught, interdisciplinary course. At Wayne State University students may register for the Nuclear War course in any one of the departments of physics, political science, history, or peace and conflict studies; the single lecture course--being "all things to all people" doesn't satisfy science distribution requirements. A similar course at Cornell (JCST, p. 344) has separate problem or discussion sections for the students registered in the departments of physics or political science in addition to the common lecture; in this way, formal science requirements can be met. Aside from increased credibility, a course taught by a team of diverse faculty is attractive to students because of the exposure to faculty which would normally require signing up for many, different, complete courses. Except for the course coordinator, the lecturers in such a course are usually all volunteers, lecturing above their regular teaching load; their rewards are the realization of the importance of the job. Though attractive, such team taught courses present problems to some students: they suffer from a lack of continuity and have difficulty handling the disagreements in substance and/or style, that often arise among the different lecturers. There are also administrative problems in addition to the obvious ones of setting up, publicizing, and registering for a course which has a home in several departments and consequently in none. We have had to obtain additional funding, from students special course fees (analogous to laboratory fees), because of the large number of films and slides we have felt it necessary to use. Dealing with the problem requires students to make major extrapolations from their experience, direct or vicarious. Many lacked the ability, common in good science students, of visualization of the abstract and of making predictions about events from theory. We relied therefore, on many cartoons, documentaries, and fiction films to enhance the reality of the concepts under discussion. The results, as judged by student evaluations, amply justify the course in spite of the extra bureaucratic hassles.

Conclusions

Students in a first course on nuclear war become disturbed and frightened--they want to be told what to do to relieve humanity of the nightmare. Many faculty will remain distinct and aloof for fear of becoming a "guru" to the students, of compromising their academic integrity. On the otherhand, once committed to giving such a course, we must respond to the students' needs, needs which we have raised. I can offer no easy, general way out of this dilemma except to point out that it must be faced with humanity and integrity.

Sessions such as this, showing that interest in a liberal arts approach to the problem of nuclear war is widespread, form an important support mechanism--we all need to know that we are not alone in going "out on a limb." Certainly, I have not found much of this kind of support from my local colleagues. They seed and reward recognition via narrow research grants or concrete papers in recognized journals. They may be suspicious of "pandering" to students or of attempting to create and profit from "fads." It may be that they are right--certainly, my early research training inclines me in that direction.

On the other hand, I have been given much support by administrators sensitive to broader requirements, to the need of a department to attract and maintain support from the rest of the university, from its students, and from the broader community. The community outside of the university seems to be much impressed by these kinds of teaching efforts. Explicit comments, made by many outside individuals, imply a general lack of respect for the relevancy of much of what normally goes on in a university. The respect accorded to "applied liberal arts," such as nuclear war courses, may imply that it is possible for us to regain respect by emphasizing relevance, without losing our academic virtues. Coupled with that regained respect is the possibility of preserving the society which accords it.

FORUM ELECTIONS Now is the time for all good **Forum** members to elect their officers. This year the offices of Vice-Chairperson, **Forum** Councillor (The **Forum's** representative to the APS Council), Secretary/Treasurer, and two Executive Committee Members are up for election. This issue of **Physics and Society** features a centerfold which contains a ballot for the **Forum** elections as well as an application for **Forum** membership (which you as a **Forum** member should give to your APS friends and encourage them to join). The ballot can be folded and is already addressed. Please return it to Dietrich Schroeer, Department of Physics and Astronomy 039A, University of North Carolina, Chapel Hill, NC 27514 before 1 November 1983. The **Forum** wishes to thank this year's nominating committee chaired by Mike Casper, and aided by Bob Cahn and Earl Callen.

DAVE HAFEMEISTER: VICE-CHAIRPERSON

Dave Hafemeister is Professor of Physics at the California Polytechnic State University, San Luis Obispo, CA 93407, and is currently Visiting Professor at MIT's Program in Science/Technology in International Security working on "The Technical Means of Verification of Arms Control Agreements." He was in Washington from 1975-1979 as an AAAS Science Congressional Fellow, Science Advisor in the U.S. Senate, and Special Assistant to an Undersecretary of State on nonproliferation of nuclear weapons (the Carter policy and the Nuclear Nonproliferation Act of 1978) and energy matters; Dept. of State delegate to the INFCE working group on nuclear fuel cycles. He did solid state and nuclear physics at Carnegie-Mellon, and the Universities of Groningen and Illinois. **Forum** activities include co-organizing (with D. Schroeer) the two "Short Courses on the Arms Race" (1983). He has chaired past **Forum** nominating and awards committees and was a member of the Penn State Graduate Education Committee. He has published Science/Society tests in the AJP on the arms race, energy, and environment; and was co-author of **Physics for Modern Architecture.**

Statement: Since science/technology are the primal cause for evolution of society, it is our responsibility to openly inform and debate the details of technologies that will effect our future society. In particular, as chairperson of the **Forum** I would:

--support and bolster the present menu of events (**Forum** sessions, awards, newsletter, etc.). I would attempt to increase the number of articles submitted to the **Physics and Society** Newsletter in order to strengthen its coverage;

--continue to work with the **Forum** Study on the Nuclear Arms Race so that we produce a publishable product and to consider the development of a "Gordon type" conference on the issue of the arms race.

--organize a "SHORT COURSE ON THE CONSERVATION/PRODUCTION OF ENERGY" and publish the proceedings in a fashion similar to what we did on the arms race.

I feel that my background with the **Forum** and in Washington would prepare me to carry out these objectives.

ROLAND H. GOOD: VICE-CHAIRPERSON

Roland Good is Professor of Physics at Penn State, where he was department head from 1972 until 1981. He taught also at Berkeley and Iowa State and has held visiting positions at U. of Colorado, Oak Ridge, Institute for Advanced Study, Matscience (India), SLAC, and Seoul Natl. Univ. (Korea). In the **Forum**, he served on the Executive Committee 1977-79 and was co-chairman (with Martin Perl) of the Penn State conferences on graduate education and employment. In other APS activities, he was a member of the Nominating Committee 1974-77, he was a member of the Executive Committee of the Division of Electron Physics 1956-58, and he is a member of the Committee on Opportunities in Physics 1982-84. He is author or coauthor of about 90 research publications in theoretical physics.

Statement: I am enthusiastically in favor of APS and **Forum** contributions to problems of society. For example, the recent statement on nuclear warfare (Bulletin of the APS **28**, 609) seems to me to be a departure from previous APS policies, and I hope it is the beginning of a series of statements from physicists about public policy. I understand and respect the opinions of those who think the society should confine its attention to professional questions. However, in my opinion there is an overriding consideration. Many modern problems are so complicated that there are plausible reasons for being on either side of a debate. Especially when there are technical aspects of a question, a nonscientist should know what the position of the physicists is and how they evaluate the issues. He should not have to make uniformed and unadvised decisions.

I think the **Forum** should be more of a forum for physicists to discuss problems of society, with the possibility in mind that the discussion may lead to a position-statement by the APS.

KENNETH FORD: FORUM COUNCILLOR

Kenneth Ford becomes President of Molecular Biophysics Technology Corporation on October 1. (Address is 3508 Market St., Philadephia, PA 19104.) He has been Executive Vice-President of University of Maryland and President of New Mexico Instutute of Mining and Technology. He was a Professor of Physics at Brandeis University and the University of California, Irvine, and conducted research in nuclear theory and field theory. He has written several text books and a book on elementary particles for the layperson. He co-authored and co-edited the **Forum**-sponsored booklet **Nuclear Weapons and Nuclear War** (1983). He was President of the AAPT in 1972 and Chairperson of the **Forum** in 1981.

Statement: There are vast human problems that embrace physics and physicists and will not soon be solved. These include weapons and war, energy production and use, human rights, freedom of information, degradation of the environment, and depletion of resources. It is the task of the **Forum** to keep these issues at the forefront of consciousness among physicists; further, to stimulate analysis of these problems and promote education about them. Links between the **Forum** and AAPT are valuable and should be preserved. Responsible advocacy within APS should be supplemented by outreach to a wider public. The sense of urgency that powered the early **Forum** should not be lost.

PAUL P. CRAIG: FORUM COUNCILLOR

Paul P. Craig is at the Department of Applied Science, University of California, Davis, CA 95616. He received his Ph.D. in Physics from CalTech in 1957; was a Staff Member at Los Alamos 1958-62; and Group Leader in Cryogenics Group at Brookhaven 1962-71. He was a Guggenheim Fellow 1965-66; National Science Foundation 1971-75; and is currently Professor in Applied Science at University of California - Davis. Current research is in energy conservation policy; long cycles in socio-economic systems; and the arms race. He served on the Board of Directors of the Environmental Defense Fund, the National Energy Committee of the Sierra Club, the Advisory Committee to the Biennial Report of the California Energy Commission, and as an Advisor to the White House OSTP, the Office of Technology Assessment, and the National Academy. While at the NSF he was Acting Director of the Energy Office (advisory to the President's Science Advisor). At Davis he introduced (with J. Jungerman) a course on the technology of the arms race (enrollment 170) for which they are now writing a text, and motivated a faculty resolution (to be voted on by faculty at all nine UC campuses this Fall) to the UC Regents calling for improvements in oversight by the University of LLL and LASL (UC holds both DoE contracts). He is a member of the Civil Defense subgroup of the Forum's Arms Race Project.

Statement: The nuclear arms race should be the primary focus of the **Forum.** The APS Council Resolution shows that the issue is winning a consensus in our parent body as well. The objections to the Resolution by the President's Science Advisor reinforce the importance of the **Forum's** maintaining a strong presence with the Board. We must also seek our own avenues for expression. The **Forum's** arms race study should be a primary focus of **Forum** activities. The Forum also has other important roles to play. It is the locus of expressions of social consciousness within the APS, and must be sensitive to all strongly felt views on social issues within the APS. As **Forum** representative to the Council I view my duties as:

--serving as a communicator of **Forum** views to the Council,

--being sensitive to Member concerns, and

--working actively on the **Forum's** arms race project.

PETER ZIMMERMAN: SECRETARY/TREASURER

Peter Zimmerman has been in the Department of Physics and Astronomy, Louisiana State University, Baton Rouge, LA 70803 since 1974. His research has been in intermediate energy physics. His Ph.D. is from Stanford in 1969. His **Forum**-related experience includes:

--Consultant to the Office of Technology Assessment's MX Missile Basing Study,

--Sabbatical leave in the Program of Science, Technology and Public Affairs at the University of California - San Diego, working on problems of "no-first-use" of nuclear weapons (1983),

--Studying substitution of conventional weapons for battlefield nuclear weapons, summer, 1983 at Center for Energy and Environmental Studies, Princeton University,

--Chair of the first committee to nominate APS Fellows from the **Forum** (1983), --organizing **Forum** topical study on vulnerability of land-based missiles,

--Author of invited chapter on physics of the neutron bomb for the forthcoming AIP book on the technology of the arms race.

Statement: The **Forum on Physics and Society** ought to be just that: the first place where physicists come to study and discuss professionally the problems in the broad areas where science, technology and societal issues intersect. The **Forum** has held successful short courses, sponsored, invited and contributed paper sessions at APS meetings, and published its newslet-

ter. All of these should be continued and the scope of the topics covered enlarged. But we should do more:

--The **Forum** has begun to sponsor professional studies of important issues in arms control; this kind of activity should be expanded, providing a route for **all** interested members to get involved and to gain professional experience.

--The **Forum** should sponsor topical conferences lasting several days on important questions such as nuclear arms or energy conservation.

--We have to develop a new generation of physicists skilled in relating physics to public affairs; the **Forum** can provide opportunities for interested people to begin projects in the field.

--Some new topics we might look at include technology transfer to other nations; openness in scientific communication, conserving known natural resources, and restoring the quality of science and mathematics education. The **Forum** should not just look at the arms race.

FOREST ROUSE: EXECUTIVE COMMITTEE

Forest Rouse is a graduate student at Lawrence Berkeley Lab (50 B 5029), 1 Cyclotron Road, Berkeley, CA 94720. He received his undergraduate degree from Stanford in 1977. His research interests are in high energy physics and he is working on the Time Project Chamber.

Statement: It was as an undergraduate at Stanford that my interests in arms control began. I was tired of reading in the newspaper that the military budget should be increased (in the interest of National Security).

While a graduate student at Berkeley, I have participated in a group at LBL, which sponsored a lecture series on disarmament and which gathered 600 employees signatures supporting a California nuclear weapons freeze initiative. Also, I am part of a group of physicists who will start a business aimed at countering the assertion that nuclear war is survivable.

Arms Control is not my sole political interest. As a black, I am interested in what can be done to expand the role of minorities in physics. I am beginning, as well, to work with a group consisting of Israelis, Palestinians, and Americans whose focus is on academic freedom of the West Bank.

I hope that by serving on the Executive Committee I can continue to work on these issues.

BARBARA GOSS LEVI: EXECUTIVE COMMITTEE

Barbara Goss Levi has just returned to a research position at Princeton University's Center for Energy and Environmental Studies, Princeton, NJ 08540, where she worked from 1981-82 on such problems as fallout patterns, residential energy consumption, and automobile fuel economy. (The past year was spent at Bell Labs.) In addition, she continues to work as a consulting editor for **PHYSICS TODAY**, which she has been associated with since 1969, and as a consultant to the Congressional Office of Technology Assessment, where, since 1969, she has helped out on studies of nuclear proliferation, energy from coal, and the future of nuclear power. She taught at Fairleigh Dickinson University (1969-76) and at Georgia Tech (1977-80). She earned her Ph.D. in high energy physics from Stanford University in 1971.

Statement: To my mind the **Forum** has three important functions: to foster participation by its members in public affairs, to inform them about the technical aspects of social issues, and to promote studies of technical questions that need further resolution. The **Forum** should not itself directly enter public debate. The wide range of **Forum** activities - newsletters, tutorials, special sessions, topical studies - very effectively help it fulfill its functions. I would be happy to contribute my efforts towards sustaining or even enlarging its scope.

The topics on which the **Forum** focuses are appropriately diverse, but I would like to see a stronger initiative, perhaps in conjunction with the AAPT or APS, to address the declining quality of math and science education in our public schools.

LAWRENCE KRAUSS: EXECUTIVE COMMITTEE

Lawrence Krauss obtained his B.Sc. Hons. in Mathematics and Physics from Carleton University in Ottawa, Canada, in 1977. He obtained his Ph.D. in Physics from M.I.T. in 1982. Since then he has been a Junior Fellow of the Harvard Society of Fellows and the Physics Department of Harvard University. He has been active in issues of Science and Society, focusing most recently on the issues of nuclear war. He was a local organizer of the Union of Concerned Scientists; **Convocation Against Nuclear War** in 1981. He also organized a letter sent by 20 prominent physicists to President Reagan in the same year, and has written a variety of popular pieces on the subject of nuclear war. Among the positions he has held are included: Board of Directors, Canadian Ass'n of Physicists, 1977; APS Forum Awards Committee, 1983; and regional coordinator for the new international petition of physicists on a nuclear weapons freeze, 1983.

Statement: I believe that the **Forum** must take a stronger position as the voice of the APS on issues of science and society, and also must make a more active effort to recruit and communicate to the younger generation of physicists who have recently completed their studies. Active liaison with other science and society groups which include physicists should be maintained and improved. I also believe that the **Forum** should go beyond the Annual APS meetings and consider organizing regional and/or summer meetings to help train physicists to lecture on issues such as nuclear war.

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HENRY C. KELLY: EXECUTIVE COMMITTEE

Henry C. Kelly is at the Office of Technology Assessment, Washington, DC. He received a BA from Cornell University in 1967 and a Ph.D. in Physics from Harvard University in 1971 with a thesis on quantum electrodynamics. He worked on the SALT support staff of the U.S. Arms Control and Disarmament Agency until 1975, leaving to accept a AAAS fellowship to work with the Congress. He directed a study of the consequences of "limited" nuclear war, and comprehensive analysis of small-scale solar energy devices in Congress' new Office of Technology Assessment. From 1979 to 1981 he was the Associate Director for Analysis and Applications at the Solar Energy Research Institute where he worked to show how energy efficiency and renewable energy technology could combine to vastly reduce demands on depletable energy resources without cumbersome or costly federal programs. Returning to OTA he is presently directing a program of analyses with the theme "Technology and the American Economic Transition."

Statement: Complex technical problems have insinuated themselves into virtually every major political issue the nation confronts. If the public is unable to make informed judgements about policies governing the promotion and restraint of technology, the democratic processes will have become irrelevant. The professionals in the **Forum** have a responsibility to ensure that honest analysis of technical policy issues is undertaken, and that the arguments are clearly explained. My priorities for activities in the **Forum** this year include:

--Analysis of proposals for freezing and reversing the expansion of nuclear arsenals with special emphasis on a comprehensive ban on nuclear testing.

--Analysis of opportunities for minimizing the financial and environmental costs of energy production and consumption that give special attention to important areas suffering from lack of support at the federal level: (a) the problems faced by low-income families, and (b) technologies for energy efficiency and renewable energy resources.

--Analysis of new proposals for a U.S. "Industrial Policy" concentrating on the assumption that the benefits of emerging "high-technologies" will "trickle down" to all groups of society.

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NOTEABLE QUOTES AND A SPECTATOR'S NOTES

THE NEW ARMS RACE OR NEW WAYS OF THINKING? (a week of education Novmeber 5 - 12, 1983.) This is the third annual 11 November Convocation which originated with the Union of Concerned Scientists in 1981. The Week of Education is being organized to encourage people around the country to explore means of arresting the new arms race before it takes permanent hold of society. The organizers want to develop more hopeful possibilities for the future before nuclear weapons become the preeminent feature of the world. For more information contact Sanford Gottlieb, UCAM, 1346 Connecticut Ave., NW, Washington, DC 20036, 202-223-6206, or Kathleen Gilroy UCS, 26 Church St., Cambridge, MA 02238, 617-547-5552.

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Anti-Satellite Weapons: Background Information is available free from UCS, 1346 Connecticut Ave. NW, Suite 1101, Washington, DC 20036. Their new document, Anti-Satellite Weapons: Arms Control or Arms Race? is also available for $3.

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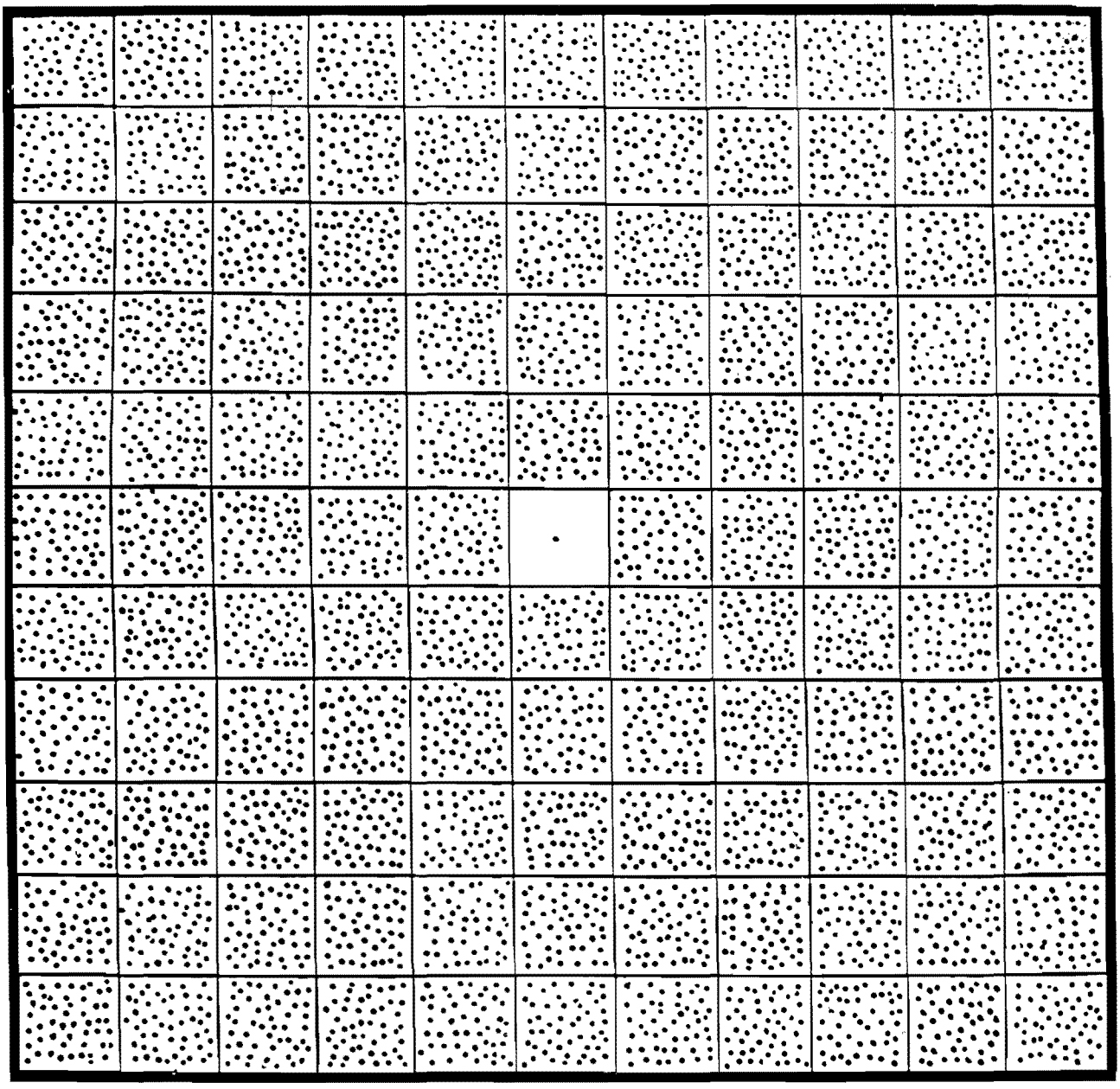
From Henry Kissinger's **Years of Upheaval** (Little, Brown, Boston, 1982) pg. 246, on the relative size of U.S. and Soviet missiles:

"Our preparations for SALT II suddenly took on a theological cast. For ten years we had deliberately designed a force structure quite asymmetrical with that of the Soviets. Our missiles were small and presumably versatile; theirs were heavy and powerful. The Soviets put most of their emphasis on land-based missiles with heavy payloads; we had diversified to include bombers and submarine-based missiles. The Soviets were ahead in numbers of land-based missiles and throwweight; we in multiple warheads. This was the force structure we had chosen. Throughout my period in office not a single request came forward from either the civilian or the military element of the Pentagon to change the mix of our forces. What they did ask for, when SALT II negotiations began, was that we demand in negotiations the perfect symmetry that their own unilateral decisions had never sought, and had indeed prevented, and that they never attempted to achieve even once the principle had been conceded."



EXPLOSIVE POWER NUCLEAR WEAPONS VS. WORLD WAR II

The dot in the center square above represents all of the firepower of World War II: three megatons. The other dots represent the number of World War II equivalents that now exist in nuclear weapons. This is 18,000 megatons or the firepower of 6,000 World War IIs. The United States and the Soviets share this firepower with approximately equal destructive capability. Just two squares on the chart (300 megatons) represent enough firepower to destroy all the large and medium size cities in the world.

Firebreaks: A War/Peace Game. Produced and distributed by Ground Zero, 806 15th St. NW, Suite 421, Washington, D.C. 20005 (202-638-7402). Assorted printed materials and posters, 1983. $10 for high school groups, $15 for all others. (Reviewed by John Dowling).

Ground Zero has developed an excellent role-playing game on the arms race called **Firebreaks: A War/Peace Game.** But Firebreaks is not only an excellent game, it is also a superb collection of visuals and background information on arms race. The game packet includes a summary of events; packets for orientation and for the game leader, four "move" packets, eight posters (see dot poster above)and two area maps (each 23x35 inches), pins, and a background booklet. The printed materials are color-coded, red for U.S.S.R. and blue for U.S. There are two complete sets of materials for two separate groups to play the game, but the players may have to share some of the materials. It is fun and informative, and at $15 it is really a best buy. I highly recommend it.