# Physics

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IN NO OTHER AREA OF SCIENCE is there such great potential for proper bibliographic control at the source as there is in the field of physics research. In no other field does the organizational structure exist whereby the publication of almost forty percent of the world's research literature is centrally edited, published and indexed.[1] Thanks to the foresight of the physics community itself and to the support and encouragement of the National Science Foundation, a physics information system was in the making as early as the 1930's. The American Institute of Physics, with its member societies (The American Physical Society, The Acoustical Society of America, The Optical Society of America, the American Association of Physics Teachers, the American Astronomical Society, and the American Crystallographic Association), has been the primary publisher of thirty percent of the world's physics research literature. Through its cover-to-cover translation program, it has published in translation the leading Soviet physics journals.

Since the end of World War II the American Institute of Physics has seen the need to participate in the bibliographic control of physics research in secondary publications, notably *Physics Abstracts* (Science Abstracts, Part A), and to plan for new services to physicists beyond the publication and journal indexes of its own publications.

In a recent article in *Physics Today*[2] Drs. Williams, Hutchisson, and Wolfe outlined the far-reaching plans for a modern information system which would be built on the firm foundations of the highly successful centralized publication system established at the American Institute of Physics:

> As a primary publisher, AIP seeks to maximize its contribution to the total documentary information system, which begins with a manu-

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script by a physicist and ends with an article in the hands of a physicist or other scientist or engineer who wants the information in it. We are now starting to explore a system in which the manuscript, after refereeing, editing, and *indexing,* will be fed into a computer either by key punching or by optical scanning. By appropriate programing, the computer should be able to produce the following outputs:

1. tape to operate a photocomposition system for primary journal production;
2. tape for merging with material from other sources in the preparation of a *current-awareness* journal;
3. tape for merging in preparation of an *abstract* journal;
4. tape for photocomposition of *subject and author indexes* of primary journals;
5. tape for merging in preparation of *indexes of an abstract journal;*
6. tape with *bibliographic and indexing information* for merging into the document storage and retrieval operations of *information centers and libraries.*[3] (Italics mine)

These plans are now well under way. Two journals will be published and prepared as outlined above in 1967. *Physics Abstracts* publishers are active participants in this research and development project so that a coordinated publication and information service will be developed in the United States and the United Kingdom. This development is being closely watched by the Abstracting Board of the International Congress of Scientific Unions (ICSU/AB). If it is successful in all respects, it will no doubt be adopted as a pattern of primary publisher-abstract journal publishers cooperation, not only exhibited in the various language editions of physics documentation literature, but in the other areas of science as well.

Such a centralized system of publication, indexing, and bibliographic control does not do the whole job for the working physicist or the librarian trying to serve individual groups of physicists in national laboratories, academic institutions, or in industry. Don Swanson [4] estimated that "possibly as much as 85 percent of useful scientific information is exchanged informally and verbally before the usual bibliographic tools are consulted to ascertain whether or not published information is available." We might argue that such information should not be under any "bibliographic control" since it is unpublished, but to argue in such a fashion is to hide our heads in the sand and pretend a bibliographic or retrieval problem does not exist.

A related problem, according to Swanson and others, is the need "to synthesize, review, and summarize" the literature. It is not enough to publish, index, and keep under bibliographic control the original research. It is essential to summarize and review such research and to provide easy access to the data reported.

These two problems pose several special problems of bibliographic control which are being discussed and studied, and some national plans in the physics community are being considered. Several issues of *Physics Today* in 1966 covered the preprint exchange issue, with pros and cons, plans and counter-plans being offered by those physicists most affected, the high energy theoretical physicists. With funds from the Atomic Energy Commission, the American Institute of Physics is currently studying the problem and intends to report the results shortly, with proposals for centralized bibliographic control of this literature.

The National Standard Reference Data System at the National Bureau of Standards, now almost four years old, has the task of welding together the bits and pieces of ongoing data compilation activities and developing an integrated nationwide complex of data centers and related activities. The areas covered include nuclear properties, atomic and molecular properties, thermodynamic and transport properties, solid state, chemical kinetics, colloid and surface properties, and mechanical properties. Here too the present co-ordination of bibliographic control of physical data is evident.

This rosy picture is completed by the fact that the most advanced bibliographic control tool yet designed has as its data base physics research literature. The experimental "utility" at Massachusetts Institute of Technology provides people with the tools for carrying on a "bibliographic dialogue" with a computer. T.I.P. (Technical Information Project), under the direction of M. M. Kessler, has a library of over 50,000 articles from the current literature of physics. Articles are recorded by journal, volume and page, title, author, institutional affiliation of the author, and citations (footnote references in the article). Location in *Physics Abstracts* and subject index information for the article are provided when available. The information is stored in permanent location on the computer memory disc. The user sits at an electric typewriter or teletype console and asks the computer his questions, based on key words in the title, bibliographic reference, bibliographic coupling of citations, author, location, or combinations of these. The response is printed back on the same console within sec-

onds. If he uses a console in Dr. Kessler's office, he can retrieve the full document from a microreader-printer immediately. This service is now available on an experimental basis through the hundred teletype consoles having access to Project MAC (Multiple Access Computer) system.

Obviously the physics community has seen the virtues of computers for bibliographic control, and they themselves are putting it to good use. Eventually the library profession will have to catch up.

A thorough review of the various bibliographic tools now extant which cover physics will not be reviewed here. Many have been covered in several articles in this issue. This overlap creates a problem for the working physicist who tries to keep up with the literature of interest to him. Where does physics leave off and chemistry (or mathematics or engineering) begin? Someone has said that chemistry is that part of physics which a chemist can understand. If this is the definition, how much of *The Physical Review* should appear in *Physics Abstracts* and how much in *Chemical Abstracts*? This question is not yet satisfactorily resolved. In fact it is only aggravated by certain government abstracting services which cross all discipline lines and cover the literature of interest to their mission, e.g., nuclear science or aerospace science and technology.

There is no easy answer to the question of coverage, overlap, and proper bibliographic control. Nor is there an easy answer to the proper development of bibliographic services for the physics community. It is only interesting to note that the most successful attempts are those that meet the stated needs of the community being served. This development can only come about with the advice and counsel of that community. Thus you have heard more in this article about what the physicists are doing to control their own literature problems than about what librarians or information specialists are doing. The physicists will see to it that something works for them. They cannot "stand on the shoulders of giants," as Newton said, unless they know who the giants are, and bibliographic tools are one way of finding out.

In years past, physicists have pointed out several serious weaknesses in the bibliographic control of their research literature:

lack of comprehensiveness
lack of selectivity and analysis
lack of adequate indexing
lack of promptness
lack of cumulations

It is obvious from the brief summary above that the matter is now in hand.

## *References*

1. Keenan, Stella, and Atherton, Pauline. *The Journal Literature of Physics.* New York, American Institute of Physics, 1964, p. 68. *See also:* "American Institute of Physics: Documentation Research Project; A Review of Work Completed and in Progress, 1961-1965." Pub. R-181 (AIP/DRP 65-3).

2. Williams, Van Zandt, *et al.* "Consideration of a Physics Information System," *Physics Today,* 19:45-52, Jan. 1966.

3. *Ibid.,* p. 52.

4. Swanson, Don R. "On Improving Communication Among Scientists," *Bulletin of the Atomic Scientists,* 22:9, Feb. 1966 (also in *Library Quarterly* 36:80, 1966).