SCIENCE 15 January 1971 Vol. 171, No. 3967

Vol. 171, No. 3967

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE





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COVER

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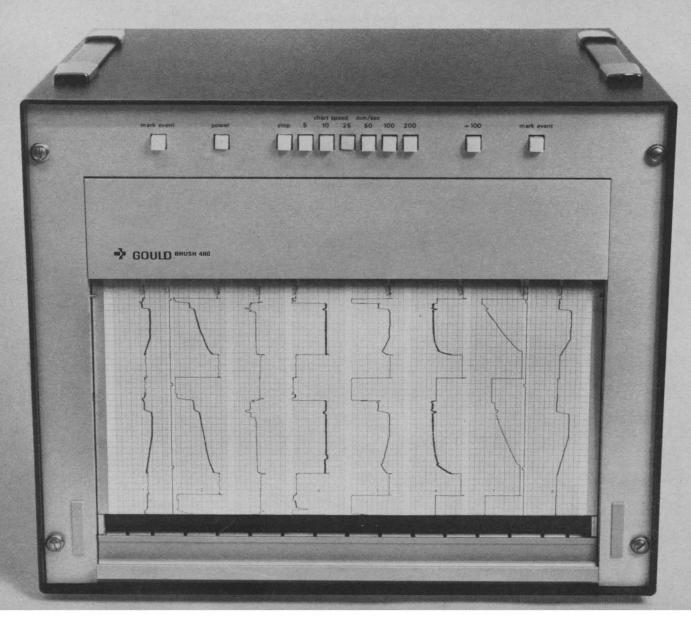
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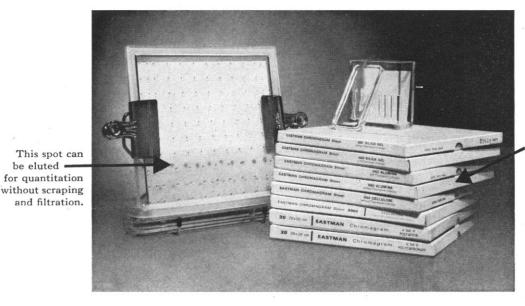






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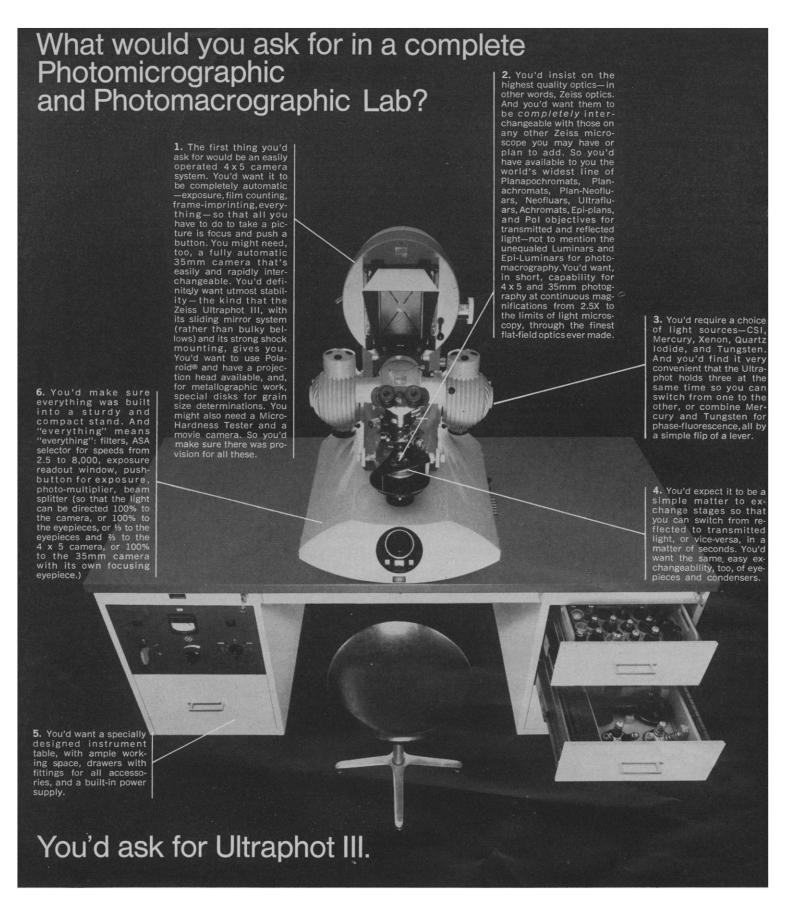
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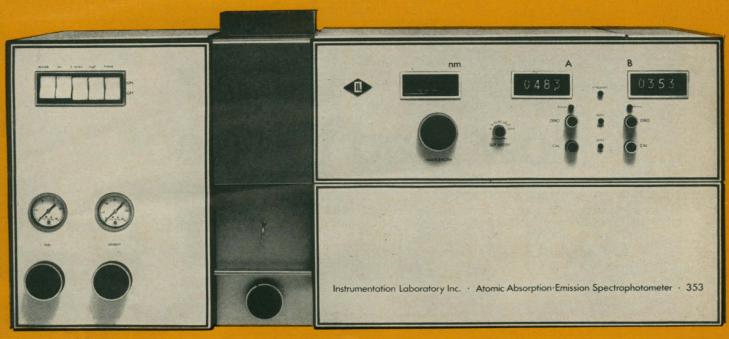
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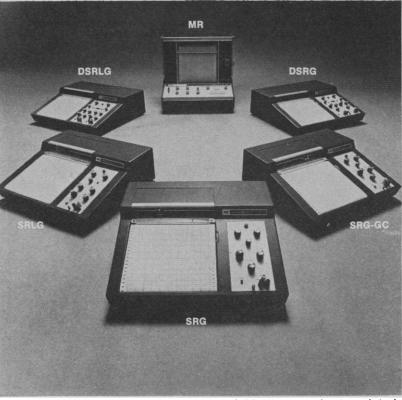
tometer - simultaneous recording of both transmittance and absorbance. Or linear/ log recording of any two time-synchronized variables. Basic price: \$2075.

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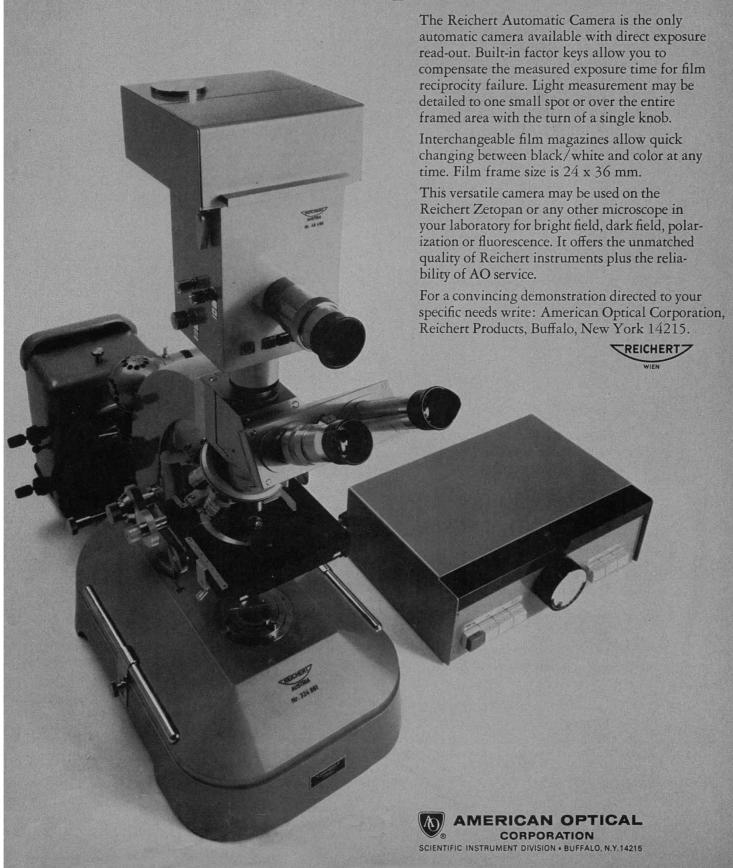
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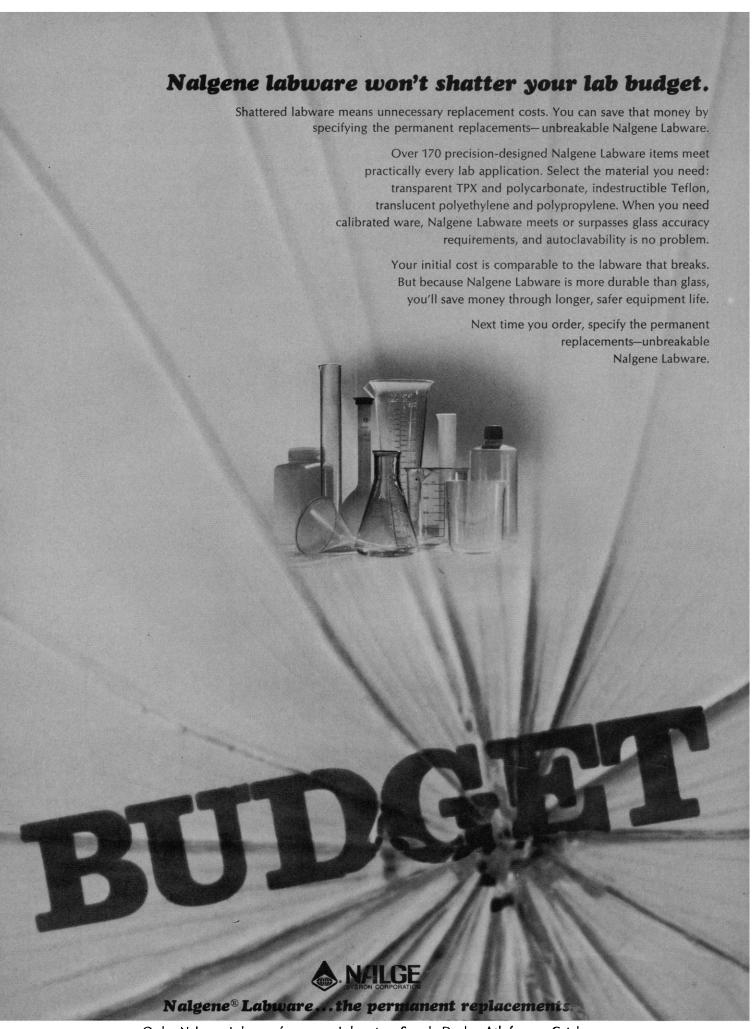
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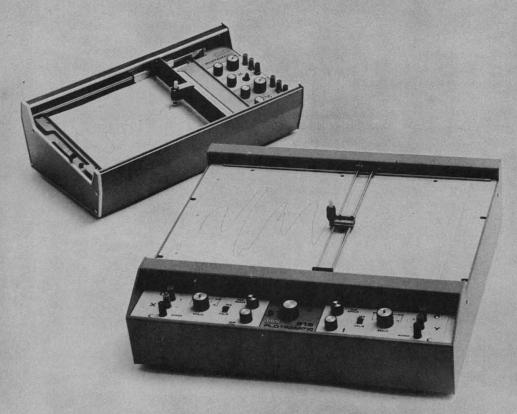
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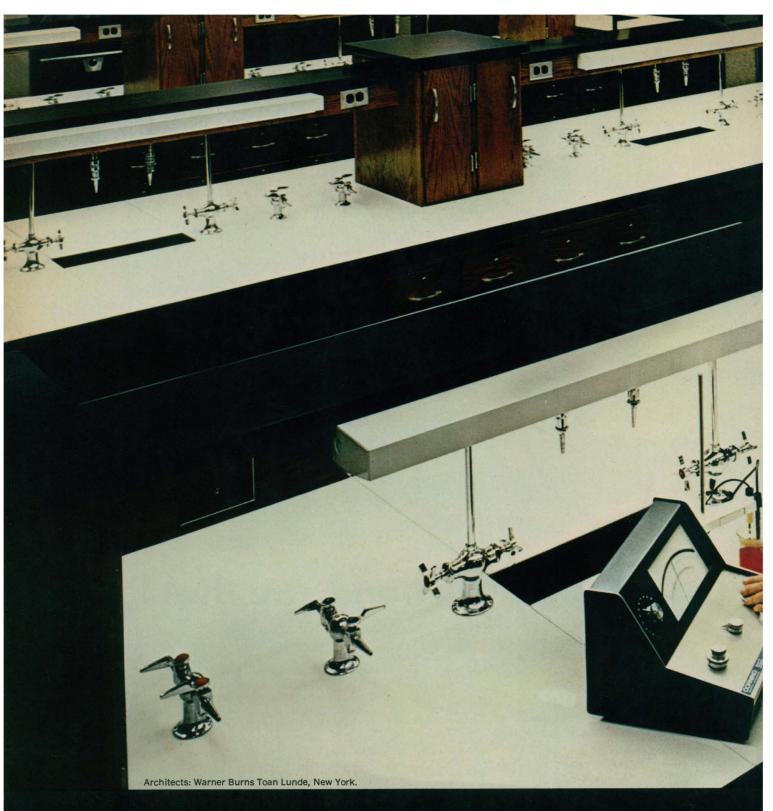
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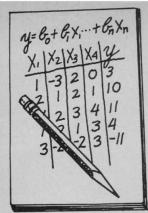
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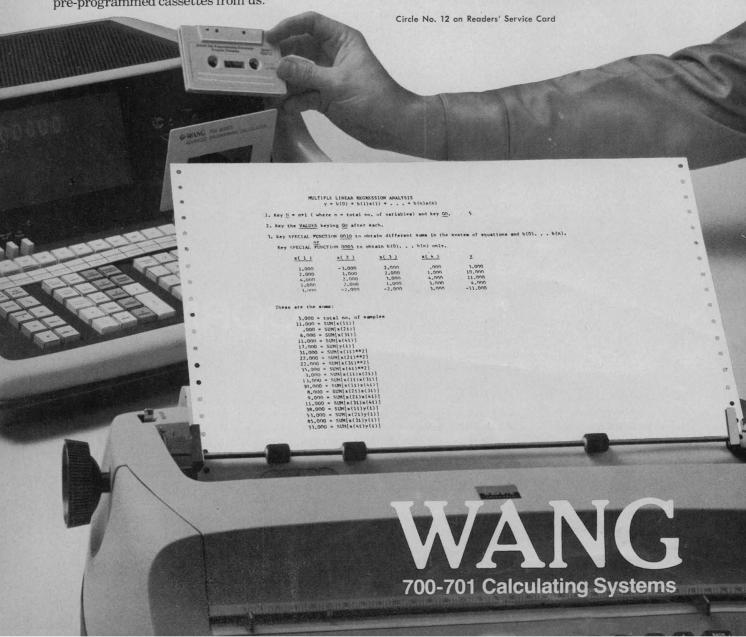
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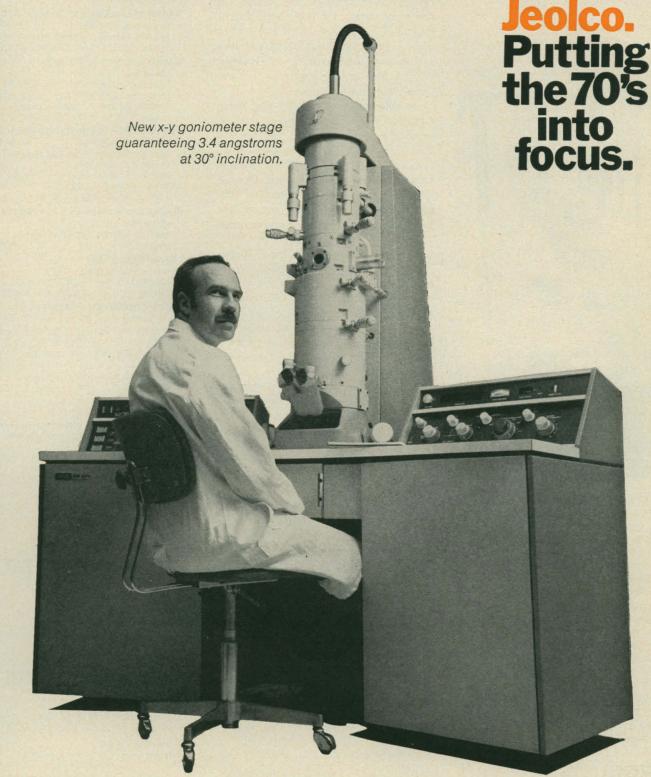
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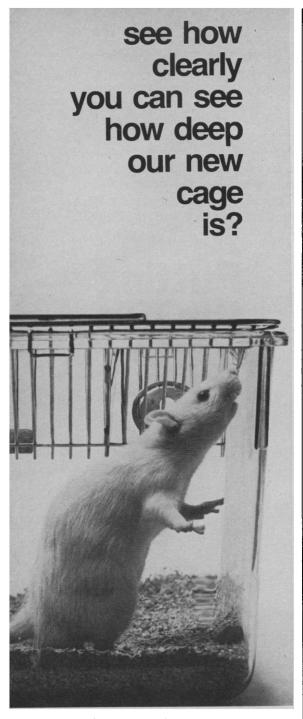
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which tourists can do, the introduction of pigs and goats by man has caused tremendous destruction. For example, in 1959 it took a full day to walk from the shore to the top of the cone on Abingdon Island. That year a fisherman introduced three goats on the island; today the goat population is estimated at 5000 and it is a brisk 2-hour walk to the top of the cone. Dr. De-Vries, director of the Darwin Station, now has an annual operating budget of \$20,000 which covers fuel for the generators, food, supplies, and salaries for the local help. He estimates that a budget of \$75,000 would enable him to place a ranger on each island and thus (i) protect wildlife from the tourists, and (ii) enable the rangers to hunt out the wild pigs and goats.

As illustrated so well by the Sierra Club and National Geographic publications, the flora and fauna on these islands are unique in the world. Unfortunately, Ecuador is not determined to preserve them as I learned from a United Nations official who had just attempted to persuade the government to apply for U.N. funds for conservation projects. He was told that the Galápagos were well provided for. Ecuador is understandably interested in its mainland problems.

Someone must try to preserve the Galápagos. Shouldn't the people who are alarmed about a desecrated U.S. environment do something to preserve one that is not yet destroyed before it is too late?

ROBERT FEINSTEIN Electrical Engineering Department, University of Michigan, Ann Arbor 48103

When Information **Becomes Knowledge**

The letter from Jean Sicé (30 Oct.) uses an article of mine to support a statement with which I do not agree. The statement was: "Most examinations, however, test only straight recall." What I wrote in the cited article on that point was this: ". . . most achievement tests . . . consist primarily of items testing specific elements of knowledge; facts, ideas, explanations, meanings, processes, procedures, relations, consequences, and so on" (1). While recall is surely involved in responding to such items, as it is in any other use of knowledge, straight recall would seldom provide a sufficient basis for response.

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Perhaps our misunderstanding on this point arises from different meanings we associate with the term knowledge. If knowledge is understood to be no more than information, then it is reasonable to believe that a test of knowledge would be no more than a test of recall of information. But what was meant by knowledge in the cited paper goes beyond information-to-be-recalled. The items I used to illustrate how one can test for command of knowledge were designed to test understanding as well as recall.

The distinction to be made between information and knowledge is the one Scheffler has made: ". . . it does not follow that the student will know these new facts simply because he has been informed . . . knowing requires that the student earn the right to his assurance of the truth of the information in question. New information, in short, can be intelligibly conveyed by statements, new knowledge cannot" (2).

Boulding supports the distinction in these words: "The growth of knowledge even in the individual is not a simple cumulative process by which information is pumped into the head and remains in a reservoir. Knowledge is a structure and its present form always limits its possibilities of growth" (3).

To test a student's knowledge in this sense of the term one must cause him to think as well as to remember. If we borrow phrases Sicé uses to describe the requirements for success in clinical medicine, our items ought to require him "to retrieve, to select, to organize, and to apply" his knowledge.

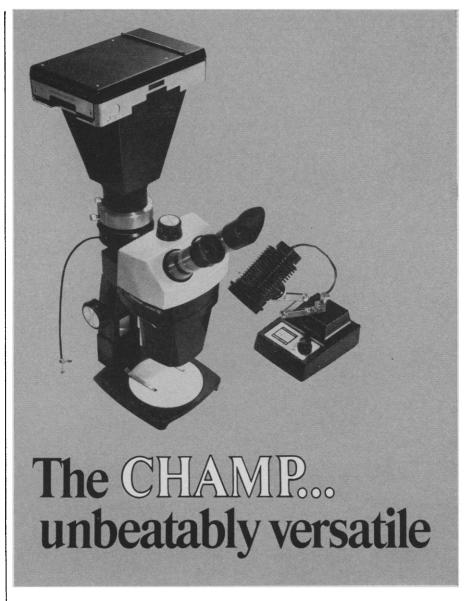
This is what most professors of my acquaintance try to do in writing objective test questions. Judging from copies of their tests I have seen, this is what most of them succeed at least passably in doing. Their tests may have serious faults, but excessive use of questions testing straight recall is seldom one of them, in my experience.

Hence the opinion attributed to me that most achievement examinations test only straight recall is not mine at all. In my opinion it is not true in general. Surely it need not be true. To the extent that it is, the item writer, not the item form, should be blamed.

ROBERT L. EBEL College of Education, Michigan State University, East Lansing 48823

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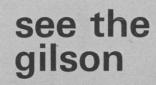
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The Need for Quality Filters in Information Systems

The American Psychological Association has just launched a new communications system which "distributes descriptions of problems, ideas, research findings and methods with minimal editorial processing. The responsibility for assessing the quality of the material rests primarily with the author." One of its main virtues is that it has a maximum delay of 65 days from input to circulation, whereas journals have a lag that runs to about a year. Its main weakness is that it compounds the information explosion by circulating more material, some of which might otherwise never have seen the light of day. Other professional associations also have provided their respective disciplines with information systems that ease the circulation and retrieval of material (usually only published material).

Typically, the systems have little or no quality control. Any paper that meets some very loosely defined criteria (for example, it is in psychology) is circulated, and the potential user is provided with no clues as to the relative merit of each item. It might seem that the user would be delighted at having all the material he wishes at his fingertips, but actually much of his time is being wasted as a high proportion of the material circulated and retrieved is without discernible value.

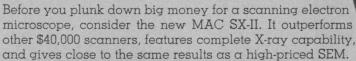
In the informal "system" the new devices seek to replace, users seek out, chiefly, material whose reputation has been communicated by word of mouth or by frequent references in the literature. This system may have caused occasional duplication of research and occasional failure by a researcher to take into account some previous relevant findings. But what is frequently overlooked is that this informal system of data retrieval is highly selective and hence very economical.

It seems a hopeless task to raise the standards of the tens of thousands of scientific and scholarly publications. But the information circulation and retrieval systems are very small in number, usually supported by public funds, and carefully controlled. It is here that quality control—or at least differentiation—can and should be introduced. If all papers must be circulated, some simple ranking should be introduced to allow the users to choose between a printout of all the papers on a given subject and those that meet only some specified criteria. For instance, papers may be differentiated according to whether they present limited or extensive data; the speculative studies may be separated into informally or mathematically conceptualized theories. Many other divisions may be constructed. For example, a self-editing computerized index, already at work in other systems, may be provided in order to reveal how often a paper has been requested by previous users or how often it has been referred to in published papers within a recent period of time.

This is not the place to spell out how the filters should be designed; such a task requires considerable study, consultation with potential users, and experimentation. The main point is that the filters are needed to save precious working years for the scientific community, which now faces the options of being flooded by unneeded information, devising its own ad hoc filters as the system spouts out its publications (or lists of references), arbitrary skimming of the endless pulp, or ignoring it altogether.—Amitai Etzioni, Chairman, Department of Sociology, Columbia University, and Director, Center for Policy Research

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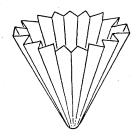
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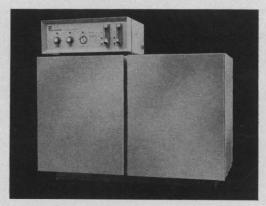
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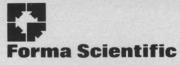
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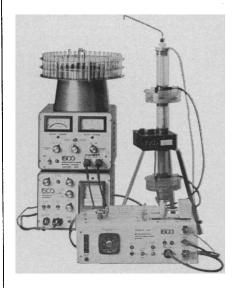
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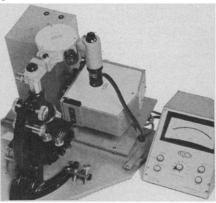
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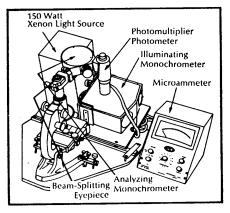
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