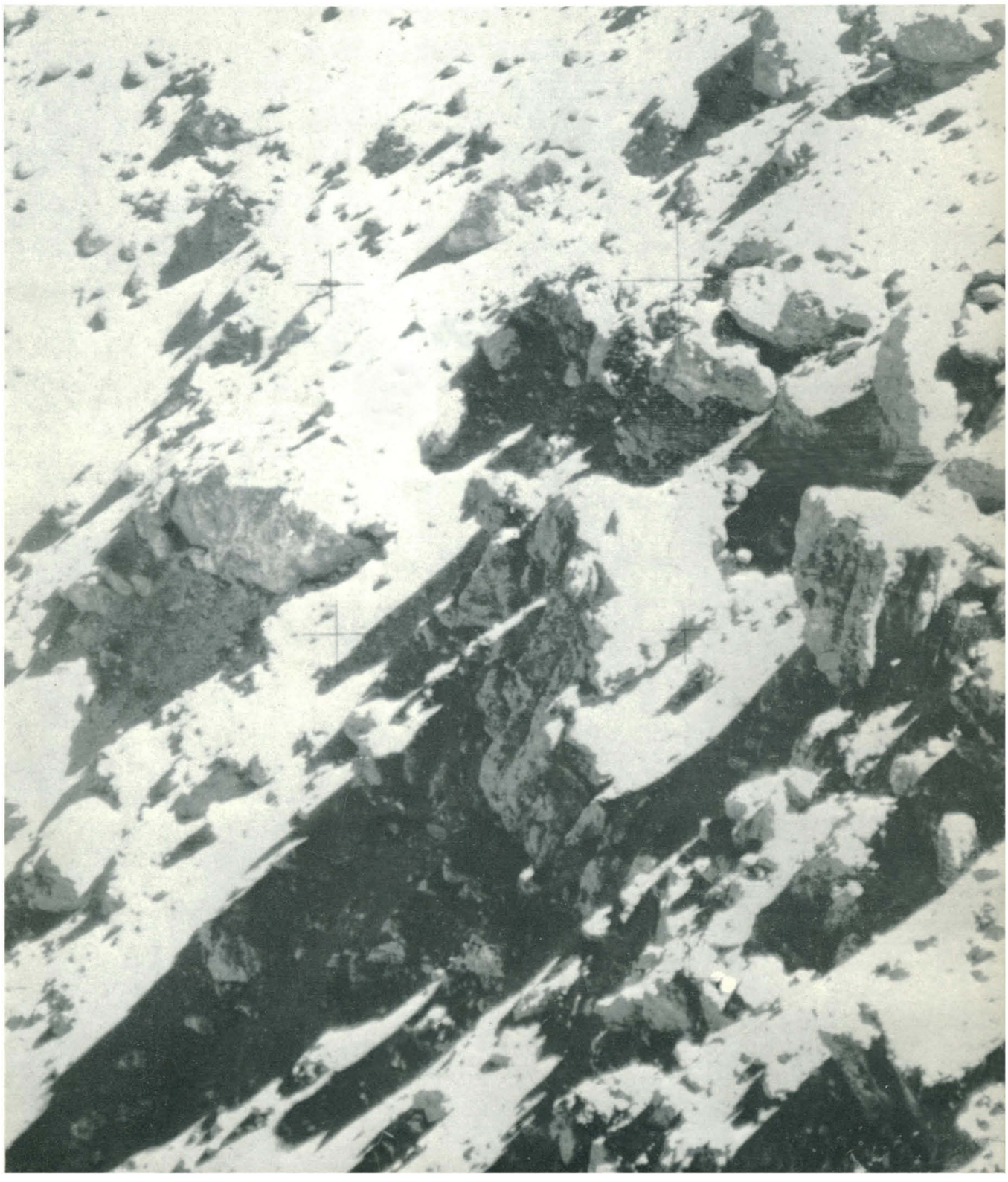
SCIENCE

5 January 1973

Vol. 179, No. 4068

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE



ON TARGET

The LKB Target Marker solves one of the most troublesome and time-consuming problems in ultramicrotomy—the pinpointing and accurate trimming of the areas of interest in a specimen.
The Target Marker is a valuable feature of the LKB Pyramitome histo-microtome. It projects a full-scale image of a stained survey-section on to the face of the specimen from which it has been cut. It is then a simple matter to trim around the areas of interest and form minute platforms, or "mesas", from which ultrathin sections can be cut for the electron microscope.

Write now for details of how this new facility makes the Pyramitome histo-microtome even more effective in ultrathin sectioning.

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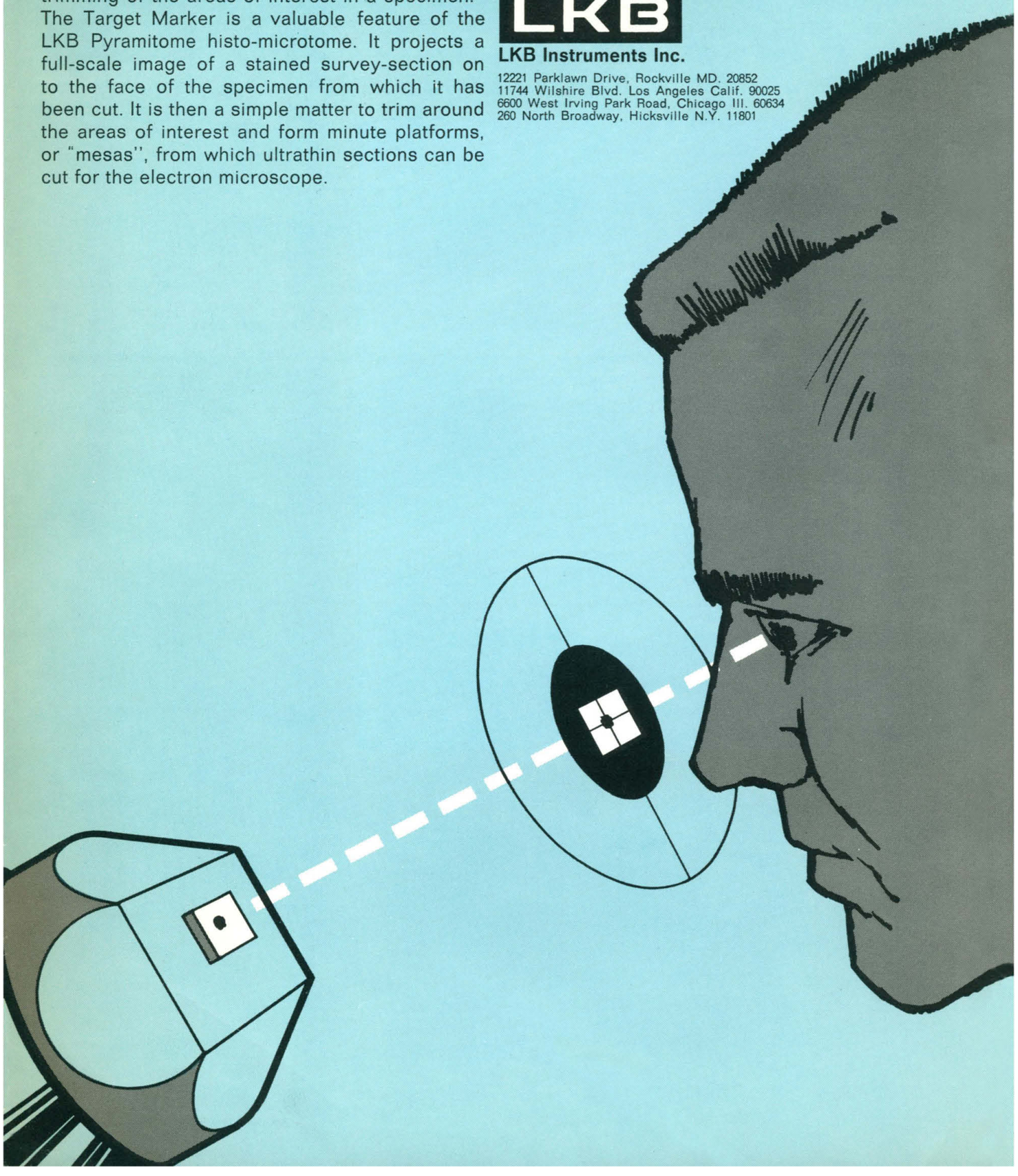


We want to be useful...and even interesting

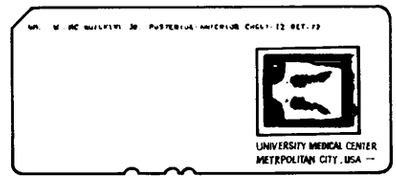
X-rays next year

What you see here is seldom seen. It is a widely distributed product of mass production: a 14 x 17 sheet of medical x-ray film.

Nobody buys this product simply to have it and enjoy it. All it does is capture and store information which radiologists interpret for other physicians. The radiologist's whole training and experience have been carefully tuned to its properties, but for storing information, which is the one and only product of diagnostic radiology, it is cumbersome and inefficient.

Current emphasis being what it is on efficiency in the delivery of medical care, Kodak intends about a year from now to market a group of devices and supplies which, where appropriate, would permit the large sheet of x-ray film to be discarded (for recovery of its rich store of scarce silver) the very same day it is exposed and processed.

One of the planned devices gets fed once a day a whole day's production of a radiology department's films. At the same rapid rate the device emits miniature film copies of the day's radiographs, each mounted in a window



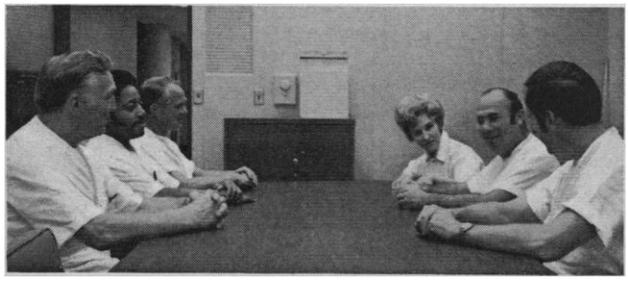
cut in a standard tab card. The device is loaded by insertion of a lighttight box of the cards with the raw film already mounted in them; the automatic processing to archival keeping standards takes place right on the card, which is rather clever. Each patient's card, perhaps notched for a simple manual retrieval method, goes into his individual packet. This remains in the file room always. Copy cards duplicated from the primary cards are displayed on a reader that has powers an ordinary microfilm reader doesn't need. The microfilm radiographs carry densities to nearly 4.0. A piece of film on which portions of the image pass only 1/10,000 of the incident light needs a rather efficient illumination system and some good ideas on flare and glare prevention.

All this implies that microfilmed radiographs can convey to the diagnostician's mind no less intelligence than originally captured by the big film. Not "can," but do. And not mere opinion that they do but mathematically sound proof to withstand scrutiny by competent but disinterested critics. A comparison has indeed been done for two years by double-blind methods in a reputable school of medicine and is continuing. Since Kodak scarcely qualifies as disinterested in how it turned out, we consider it inappropriate to summarize the findings here or even give a specific citation in an advertisement. The kind of buying decisions required don't get made from advertisements.

Health-care team, a step or two removed

We price our 14 x 17 x-ray film slightly *less* than we priced our 1906 product (though the 1906 user's education to use it didn't cost him what it costs today's radiologist to become one). This accomplishment by a profit-motivated organization reflects improvements in the productivity of human beings.

In our plant there are many people who spend year after year operating machinery that cuts x-ray film to size and scans it for defects. Meet six of them.



Instead of each holding a job, they share a single job. Only it's more than six times as big as a normal job. Several other similar teams function the same way. Before the day's work begins of cutting and scanning Kodak x-ray film, this group is meeting to decide a few things, like how they feel about posing for advertising that identifies them with new attitudes in this and other countries toward industrial employment. Why shouldn't they be consulted? They also discuss more pressing matters, like

"Sandy is taking a day of vacation tomorrow to try out his snowmobile. Can we operate effectively without him?"

"Are we ready to start selling management on those changes in the work-ticket procedure?"

"Let's prepare a priority list of annoying little machine problems so the engineers can get to work on them."

What is happening to the ask-the-boss principle in human behavior? So far what's happening in that particular department since the new approach was adopted: 1) training costs reduced 64%; 2) absenteeism reduced 16%; 3) productivity increased to help keep inflation at bay a little longer.

Kodak

Up with productivity

An equal-opportunity employer m/f

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SCIENCE

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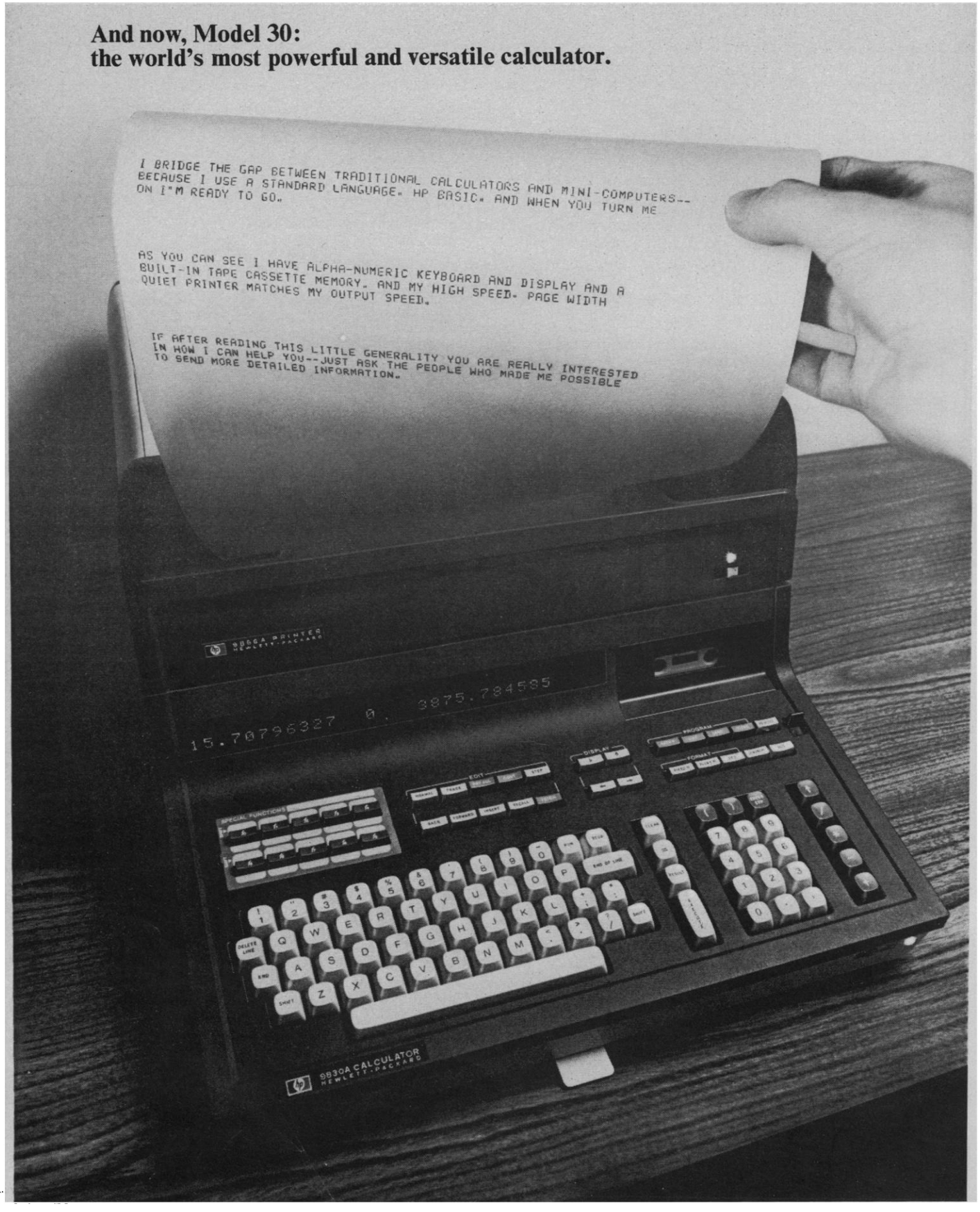
AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

COVER

Photograph of breccia boulders taken through telephoto lens by Apollo 16 astronaut Charles Duke. Blocks occur on north wall of North Ray crater. Photo is intentionally underexposed to illustrate details within shadowed areas. See page 62. [NASA photograph AS16-105-17172]

Some things are changing for the better.



Many people know us as an instrument manufacturer: we make more than 2,000 products for measurement, test and analysis. Others know us as a computer company: more than 10,000 own our calculators and computers. We prefer to think that our business is to serve your measurement and computation needs.

A way to manage airport noise.

Aircraft engine noise — from more and bigger planes taking off and landing more frequently — is now a bona fide environmental problem. As the volume of air traffic grows and our population expands to surround previously remote airport areas, the need for effective noise control is essential.

The ideal solution is to stop this noise at its source by designing quieter engines, or by retrofitting the world's current fleets with noise-suppressing engine nacelles, but this will take time to implement.

Until then, many airports are finding an interim solution by developing noise abatement techniques for landing and take-off operations. To help establish and validate these techniques, some major airports with acute noise problems are using HP Aircraft Noise Monitoring systems.

These systems operate automatically and around the clock. Special microphones monitor noise from different locations in the airport vicinity. This information is relayed to a central location where the data is continuously analyzed and reported so that airport operations can immediately advise pilots of noise irregularities and violations.

HP noise monitoring systems are now operating at international airports in Los Angeles, Sydney, Geneva, Zurich and Stuttgart (and soon, in London and Manchester).

If you have any relationship to this issue of airport noise, we'd be happy to send you information on our system. The noise won't go away, but our system will help make it more manageable.

A typical noise violation report generated by HP's noise monitoring system.

SINGLE EVENT NOISE VIOLATIONS

DATE	TIME	NMS	RANGE	SETNL	MNL	LIMIT	SENEL	COMMENT
1:23:72	0:13:25	4	60	85	102.5	105	114.7	*Flight KL 147*
1:23:72	0:13:54	7	80	85	104.8	105	113.2	
1:23:72	0:14: 8	10	60	85	97.7	100	104.3	
1:23:72	0:17:45	12	80	85	121.8	105	116.9	
*								
YC								
1:23:72	0:18: 0	1	80	90	84.9	110	96.3	CAL
1:23:72	0:18:12	14	60	85	99.6	100	107.0	
1:23:72	0:18:55	11	80	85	104.7	105	112.7	
1:23:72	0:19:25	2	80	90	85.3	110	96.8	CAL
1:23:72	0:20: 0	8	40	70	92.0	95	100.5	

NMS: microphone location by number.

RANGE: indicates the lowest value in dB of the dynamic range at microphone location.

SETNL: the threshold noise dB level. If a noise event occurs at or above this level, a report is generated.

MNL: the maximum dB which occurred during the noise event.

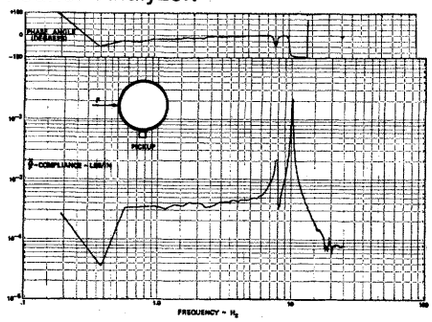
LIMIT: when this dB noise level is exceeded in a single event, audible and visual alarms are initiated.

SENEL: noise exposure level for the event: a time period/dB relationship.

You can detect the real cause and true effect of vibrations and noise.

A trained ear can pinpoint the pitch of a pure note within a few cycles per second. But, given a complex mixture of sounds or other types of signals — like an automobile vibration, or an underwater sound — it takes more than a trained ear to identify the basic frequencies that make up the mixture. Scientists and engineers find it highly useful, and sometimes essential, to trace or identify a low frequency signal through a mechanical structure. And they often need this information on the spot — in real-time as an event is taking place.

It is now possible to bring real-time signal analysis to the lower frequencies of vibration and sound with computers and the fast Fourier transform: HP's Fourier Analyzer.



Send a vibration through a pump with a known force (such as a hammer equipped with a load cell); obtain the output (from an accelerometer); display the transfer function on an HP Fourier Analyzer and you immediately learn the natural resonant frequencies of the pump, (see the above diagram). With this information, you can redesign to avoid resonance (vibrations) problems which might loosen connections or cause failure.

Here are a few practical examples of how it can be used.

- Testing mechanical components such as axles, differentials, and motors to assure their quality.
- Monitoring machines (power turbines, pumps, power tools) to determine when maintenance work should be done — before a breakdown.
- Analyzing structures, i.e., buildings, bridges, vehicle frames, airplane wings for improvement in design and resistance to failure.

If you think you have a problem that might yield to the HP Fourier Analyzer, ask for a free brochure.

For more information on the products described in these pages, fill out the coupon or write to: Hewlett-Packard, 1507 Page Mill Road, Palo Alto, California 94304.

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The Student Academic Freedom Forum presents:

How Much of Yesterday's Heresy
Is
Today's Science?

IMMANUEL VELIKOVSKY *Reconsidered*

Special Issue • Pensée Magazine • Stephen L. Talbott, Editor • First Printing: 35,000

During the 1950's Dr. Immanuel Velikovsky published his bestsellers, *Worlds in Collision* and *Earth in Upheaval*, in which he argued that the earth suffered a series of cosmic catastrophes during historical times. These upheavals, he claimed, sculpted our planet's face and changed the course of history, bringing an end to Egypt's Middle Kingdom, destroying civilizations around the world, and figuring in the Israelite Exodus. (This last receives detailed treatment in *Ages in Chaos.*) Initially castigated for his views by scientists, Velikovsky has now been vindicated by numerous space-age discoveries. This special issue of *Pensee* surveys the evidence.

The Scientific Mafia – *David Stove, senior lecturer, department of philosophy, University of Sydney, Australia*

How Stable is the Solar System? – *Dr. C. J. Ransom, plasma physicist, General Dynamics*

A Record of Success–*Thomas Ferte, department of humanities, Oregon College of Education*
37 documented confirmations of Velikovsky's scientific claims, most of which were considered unlikely or impossible when he first voiced them. For example, regarding the moon, Velikovsky deduced (before the Apollo landings) that (1) the lunar "rocks and lavas could conceivably be rich in remanent magnetism resulting from strong currents when in the embrace of exogenous magnetic fields"; (2) "Since the moon was heated and its surface became molten only a few thousand years ago, the temperature gradient under the surface crust will show, to some depth, a mounting curve"; and (3) "excessively strong radioactivity will be detected in localized areas" on the moon.

Lunar Rocks and Velikovsky's Claims – *Dr. Derek York, associate professor, geophysics division, University of Toronto*

When Was the Lunar Surface Last Molten? – *Immanuel Velikovsky*

Magnetic Remanence of Lunar Rocks/A Candid Look at Scientific Misbehavior – *Robert Treash, San Diego Evening College*
"One or more Apollo missions could have been spared were Velikovsky's books and memoranda considered."

On Decoding Hawkins' Stonehenge Decoded – *Immanuel Velikovsky*
A full-length analysis of Stonehenge and its meaning in the light of cosmic catastrophes during man's history.

The Censorship of Velikovsky's Interdisciplinary Synthesis – *Dr. Lynn Rose, professor, department of philosophy, State University of New York (Buffalo)*

The Center Holds – *Dr. William Mullen, departments of classics and comparative literature, and division of interdisciplinary and general studies, University of California (Berkeley)*

Shapley, Velikovsky and the Scientific Spirit – *Dr. Horace Kallen, co-founder and former dean of the graduate faculty, and research professor in social philosophy, New School for Social Research*
Einstein's reaction to the suppressive efforts against Velikovsky is revealed in a letter 30 days before his death.

Velikovsky at Harvard – *Stephen Talbott, editor, Pensee magazine*
The dramatic story of Velikovsky's lecture and seminar last February 17-18 to an enthusiastic crowd at Harvard.

Is Venus' Heat Decreasing? – *Immanuel Velikovsky*

Akhnaten, Aten and Venus Reconsidered – *Lewis Greenberg, assistant professor, department of art, Franklin and Marshall College*

Could Mars Have Been an Inner Planet? – *Dr. Lynn Rose, professor, department of philosophy, State University of New York (Buffalo)*

Venus' Circular Orbit – *Chris Sherrerd, electrical engineer*

Also:

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Dr. George Grinnell, assistant professor, department of history, McMaster University (Ontario)
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Below is a list of suggested titles of reprints. We can supply reprints of these or of any other articles which have appeared in Science during the past six years. Allow six weeks for delivery of reprints not marked with an asterisk. (Numbers in parentheses indicate number of pages for each reprint.)

BIOLOGY AND SOCIAL PROBLEMS

*1) D. Alpert and D. L. Bitzer, "Advances in Computer-Based Education," 20 March 1970 (12)
*2) R. C. Atkinson and H. A. Wilson, "Computer-Assisted Instruction," 4 Oct. 1968 (8)
3) J. H. U. Brown and J. F. Dickson III, "Instrumentation and the Delivery of Health Services," 17 Oct. 1969 (8)
*4) A. J. Coale, "Man and His Environment," 9 Oct. 1970 (8)
*5) A. Crancer, Jr., *et al.*, "Comparison of the Effects of Marihuana and Alcohol on Simulated Driving Performance," 16 May 1969 (4)
*6) B. D. Davis, "Prospects for Genetic Intervention in Man," 18 Dec. 1970 (8)
*7) B. D. Dinman, " 'Non-Concept' of 'No-Threshold': Chemicals in the Environment," 4 Feb. 1972 (4)
*8) N. I. Dishotsky *et al.*, "LSD and Genetic Damage," 30 April 1971 (2)
*9) L. L. Heston, "The Genetics of Schizophrenic and Schizoid Disease," 16 Jan. 1970 (8)
*10) C. Holden, "Community Health Centers: Growing Movement Seeks Identity, Storefront Therapy and More," 10 and 17 Dec. 1971 (8)
*11) L. E. Hollister, "Marihuana in Man: Three Years Later," 2 April 1971 (8)
*12) L. R. Kass, "The New Biology: What Price Relieving Man's Estate?," 19 Nov. 1971 (12)
*13) L. Lasagna, "The Pharmaceutical Revolution: Its Impact on Science and Society," 5 Dec. 1969 (8)
*14) W. McDermott *et al.*, "Health Care Experiment at Many Farms," 7 Jan. 1972 (12)
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*24) W. J. Staub and M. G. Blase, "Genetic Technology and Agricultural Development," 9 July 1971 (8)
*25) A. T. Weil *et al.*, "Clinical and Psychological Effects of Marihuana in Man," 13 Dec. 1968 (12)
*26) G. Zbinden, "Drug Safety: Experimental Programs," 9 May 1969 (4)

ENVIRONMENT

*27) A. J. Coale, "Man and His Environment," 9 Oct. 1970 (8)
*28) B. L. Crowe, "The Tragedy of the Commons Revisited," 28 Nov. 1969 (8)
*29) P. R. Ehrlich and J. P. Holdren, "Impact of Population Growth," 26 March 1971 (8)
*30) A. W. Eipper, "Pollution Problems, Resource Policy, and the Scientist," 3 July 1970 (8)
*31) M. Eisenbud, "Environmental Protection in the City of New York," 13 Nov. 1970 (8)
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*53) G. M. Woodwell, "Effects of Pollution on the Structure and Physiology of Ecosystems," 24 April 1970 (8)

POPULATION

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*76) J. Blake, "Abortion and Public Opinion: The 1960–1970 Decade," 12 Feb. 1971 (12)
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*84) L. W. Kangas, "Integrated Incentives for Fertility Control," 25 Sept. 1970 (8)
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*86) J. J. Spengler, "Population Problem: In Search of a Solution," 5 Dec. 1969 (8)

MAN AND TECHNOLOGY

*54) M. S. Baram, "Social Control of Science and Technology," 7 May 1971 (4)
*55) L. M. Branscomb, "Taming Technology," 12 March 1971 (8)
*56) J. Brooks, "Can Science Survive in the Modern Age?," 1 Oct. 1971 (12)
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LETTERS

Marine Transplantations

Recent interest in mariculture and an increasing interest in the biology of marine organisms have caused many to consider transplanting marine species. The feasibility of such transplants is enhanced by the availability of rapid long-range transportation and essentially nonexistent governmental regulations. Because of economic and population pressure man *will* introduce species to foreign shores. Considering our present knowledge it will be many years before we will be able to predict with any degree of certainty the effects an introduced species may have on an existing ecosystem.

Transplantations may cause considerable damage. For example, earlier in this century the Japanese oyster (*Crassostrea gigas*) was first introduced as spat to the northeast Pacific. This species is presently of considerable economic importance, and its introduction does not seem to have caused any direct harmful effects. However, two species of oyster drill (*Ocenebra japonica* and *Purpura clavigera*) were introduced with the spat and remain potential pests (*1*). Further, *Sargassum muticum*, a large, gregarious, brown seaweed, was accidentally introduced with the oyster spat. This weed has since become well established in sheltered low intertidal and shallow subtidal waters (*2*), a position normally occupied by eel grass (*Zostera marina*). If *Sargassum* is displacing eel grass, the results may be disastrous. Destruction of Atlantic eel grass beds by wasting disease demonstrated the importance of this plant as a nursery for many marine species. During the spring of 1972, Japanese oysters from British Columbia were introduced to French waters. I predict the establishment of *Sargassum muticum* in the eastern Atlantic as a result of this transplant.

Recent attempts have been made to establish the Atlantic lobster (*Homarus americanus*) in British Columbia, the British Columbian abalone (*Haliotis kamtschatkana*) in Japan, and Japanese species of the edible red alga *Porphyra* in the northeast Pacific. All of these introduced species are potential vectors of undesirable plants and animals. Once they have been introduced, control will be virtually impossible, particularly for those having pelagic stages.

At the Seventh International Seaweed Symposium held in Sapporo, Japan, from 8 to 12 August 1971, I sought the informal opinions of several biologists about the desirability of long-range transplantation. Without exception they considered it a mistake to undertake such action at that time. The question then arises as to how to regulate transplantation. The absence of international agencies with the ability to enforce regulations places the onus on individual nations to protect their shores. This solution is inadequate, as once species have been established, they could disperse along coasts without regard to international boundaries. One possible solution to this dilemma would be cooperation between countries with bordering shores. For example, Canada's newly formed Department of the Environment could collaborate in determining and enforcing regulations with a similar U.S. agency.

The scientific community must assist in formulating reasonable regulations which will apply to the introduction of exotic marine species for scientific or economic purposes. The formulation of these regulations may require a panel of scientists to evaluate the reasons for transplanting and possible dangers of such action. Further, inspection of the organisms to ensure that only the desired species would be introduced and a site inspection to assess the possibility of containment could be conducted.

Action is required now if we are to curb further disruption of the marine biosphere.

LOUIS D. DRUEHL
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Burnaby 2, British Columbia, Canada

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Meetings in Mexico

The question of whether foreign nationals are to be allowed into a country to attend scientific meetings is a continual problem. Last August, approximately 15 people from at least five countries (India, Taiwan, Lebanon, South Korea, and Egypt) were unable to obtain visas to attend the American

Phytopathological Society meeting in Mexico City. As several American scientific societies are planning to hold meetings in Mexico City in the near future, I submit the following letter, signed by 83 members of the American Phytopathological Society.

The American Phytopathological Society held its annual meeting in Mexico City on August 6 to August 10. Many foreign graduate students (including nationals of Taiwan, India, and Lebanon) who are presently studying in the United States, as well as a few faculty members of foreign nationality, were unable to obtain visas to attend the meeting. This occurred even though they were members of the society and in many cases were on the program to present research papers. While the Mexican government does not have an official policy which excludes the entry of these foreign nationals, the lack of communication between the central government and the various consulates in the United States prevented these people from obtaining the necessary visas required for entry. Whereas, we strongly disagree with any country whose policy prevents the entry of a foreign scientist to attend a scientific meeting, we specifically protest this action (in fact inaction) by the Mexican government.

In addition, we would strongly urge other American scientific societies who are planning to hold meetings in Mexico to reconsider unless all graduate students and faculty who are in the United States are allowed to attend the meeting.

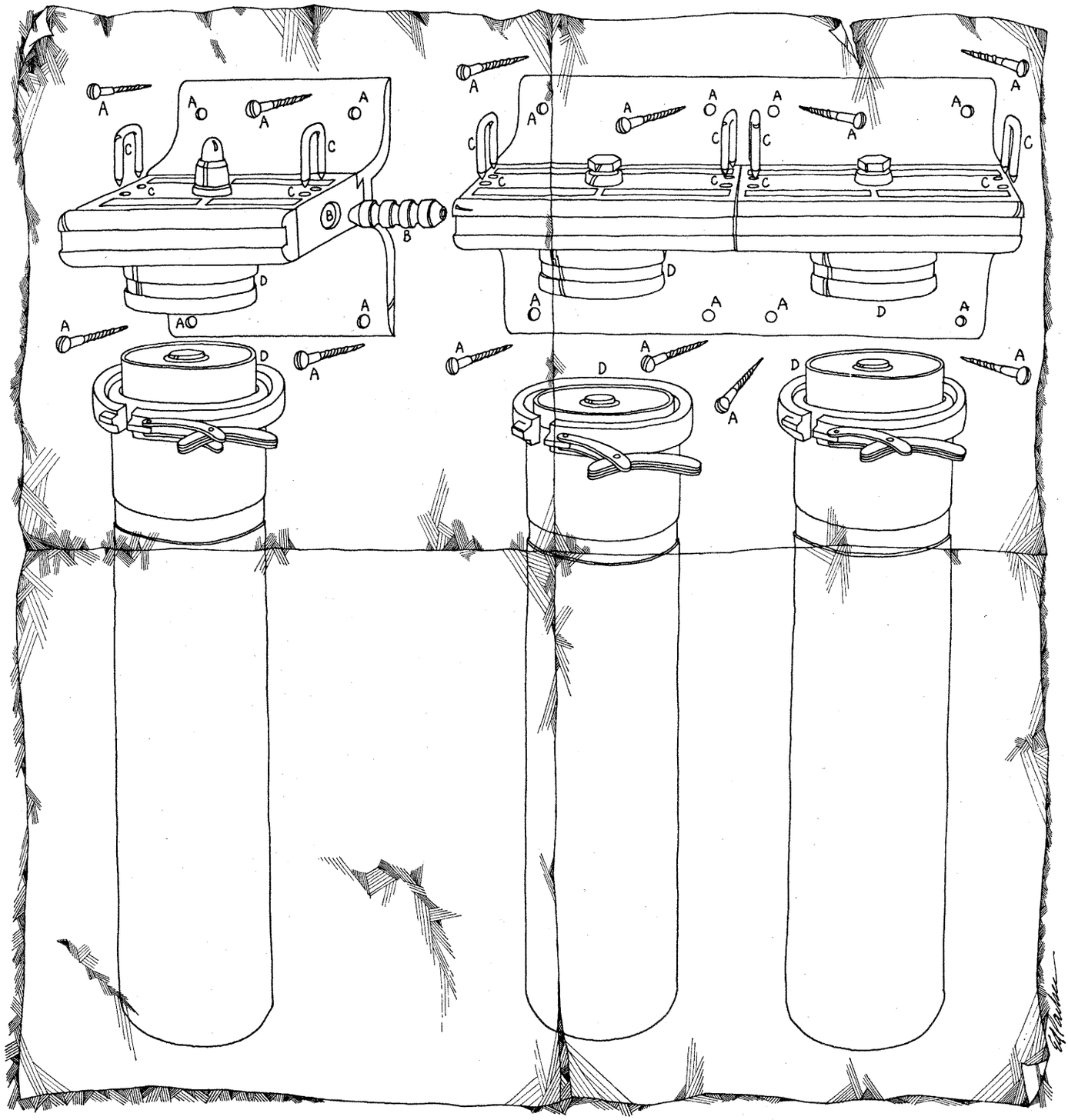
We hope that the Mexican government can pinpoint the specific problem and take the necessary steps to correct it.

JAMES L. VAN ETTEN
Department of Plant Pathology, University of Nebraska, Lincoln, 68503

The Hubble Variable?

It is difficult for professional scientists to keep abreast of advances in other professions. One method which politicians have discovered for making easy the solution of very difficult problems is the Semantic Method. With that in mind, my offering to relieve the distress of the astronomical fraternity with respect to the changes in the Hubble constant (see W. D. Metz, Research News, 10 Nov. 1972, p. 600) is this—why not call it the Hubble variable?

CHARLES W. PROCTOR, JR.
3784 Andrew Avenue, Cincinnati, Ohio 45209



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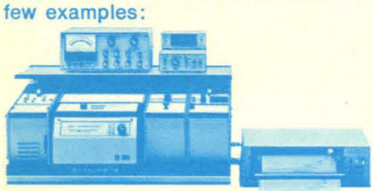

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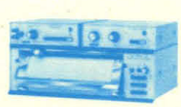

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SCIENCE

Consumer Product Safety

During the last two decades, there has been a great outpouring of new consumer goods. Many of these have involved novel materials with properties and behavior that the typical citizen is not well prepared to cope with. In some instances, manufacturers have not given sufficient consideration to the ways in which their products might be used or abused. While it is probable that most accidents involving consumer goods are caused by carelessness on the part of the users, a substantial number are caused by defects in the products. Over the years, dramatic incidents, especially those involving severe injury or death to children, have created a climate of public opinion necessitating governmental action.

As a first step, President Johnson in 1968 appointed a National Commission on Product Safety. This commission held extensive hearings, the record of which occupies some 8000 pages. Products used around the home and in recreation are involved in accidents that injure 20 million people each year. About 17 million of these require medical attention. Ten of the most important sources of injury are appliances (500,000), kitchen gadgets and serving utensils (500,000), cooking devices (150,000), home furnishings (500,000), home fixtures (2.5 million), heating devices (175,000), home workshop (125,000), home tools (750,000), yard and garden equipment (500,000), and recreational equipment and activities (8 million).

The findings of the commission led to a Consumer Product Safety Act that was recently signed into law. The new legislation covers an enormous range of products and has for its purposes:

1) to protect the public against unreasonable risks of injury associated with consumer products;
2) to assist consumers in evaluating the comparative safety of consumer products;
3) to develop uniform safety standards for consumer products and to minimize conflicting state and local regulations; and
4) to promote research and investigation into the causes and prevention of product-related deaths, illnesses, and injuries.

The new act provides machinery for regulating a host of products not previously subject to federal scrutiny. It is likely to have profound consequences on the economy. To administer the law, a Consumer Product Safety Commission, having considerable independence and authority, is to be appointed. Among other powers, the commission may ban products it deems unreasonably dangerous.

Even before the commission has been appointed, the Bureau of Product Safety has established a means for rapid identification of hazardous products. A National Electronic Injury Surveillance System (NEISS) monitors the emergency rooms of 119 hospitals to compile national injury estimates. The system reports on visits to emergency rooms resulting from accidents caused by consumer products. Data from a day's events are accumulated overnight in a computer in Washington and are available for all the kinds of analysis that a computer can quickly render.

We live in an increasingly complex world—one in which even highly educated citizens must feel a sense of helplessness in trying to make judgments about many of the consumer products and chemicals. No government can save its citizens from all the folly their fertile minds can invent. But government should make it possible for careful people to minimize the possibility of injury. The new Consumer Product Safety Act is a large step in that direction.—PHILIP H. ABELSON

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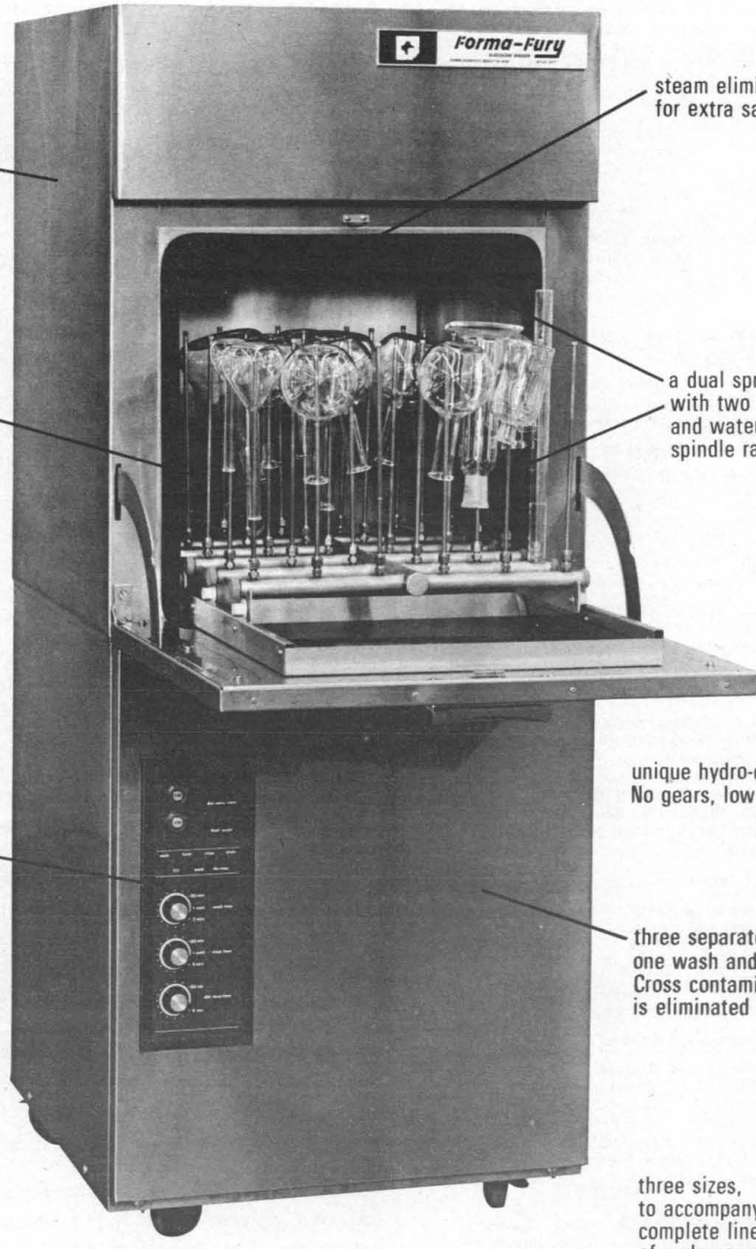

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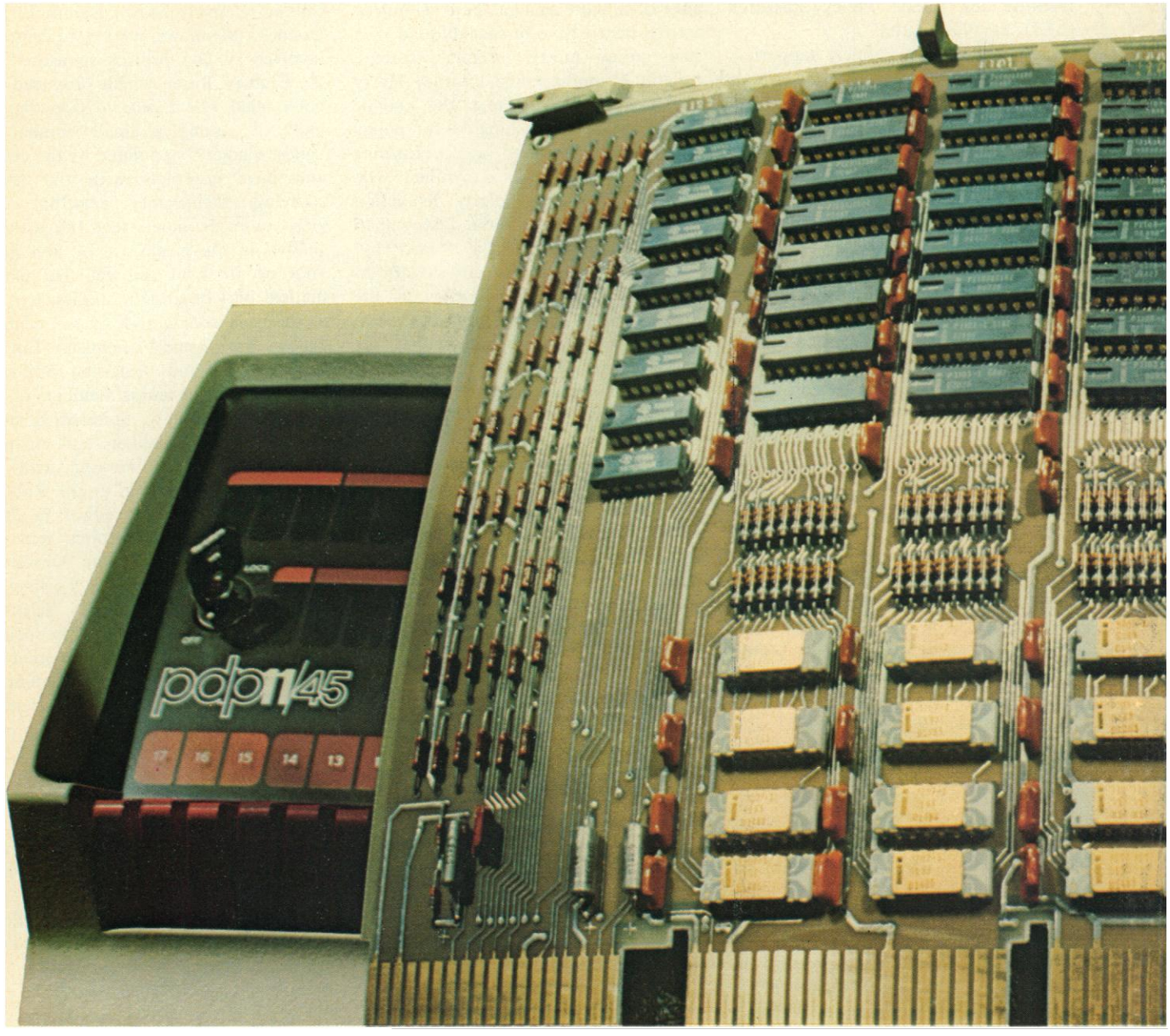

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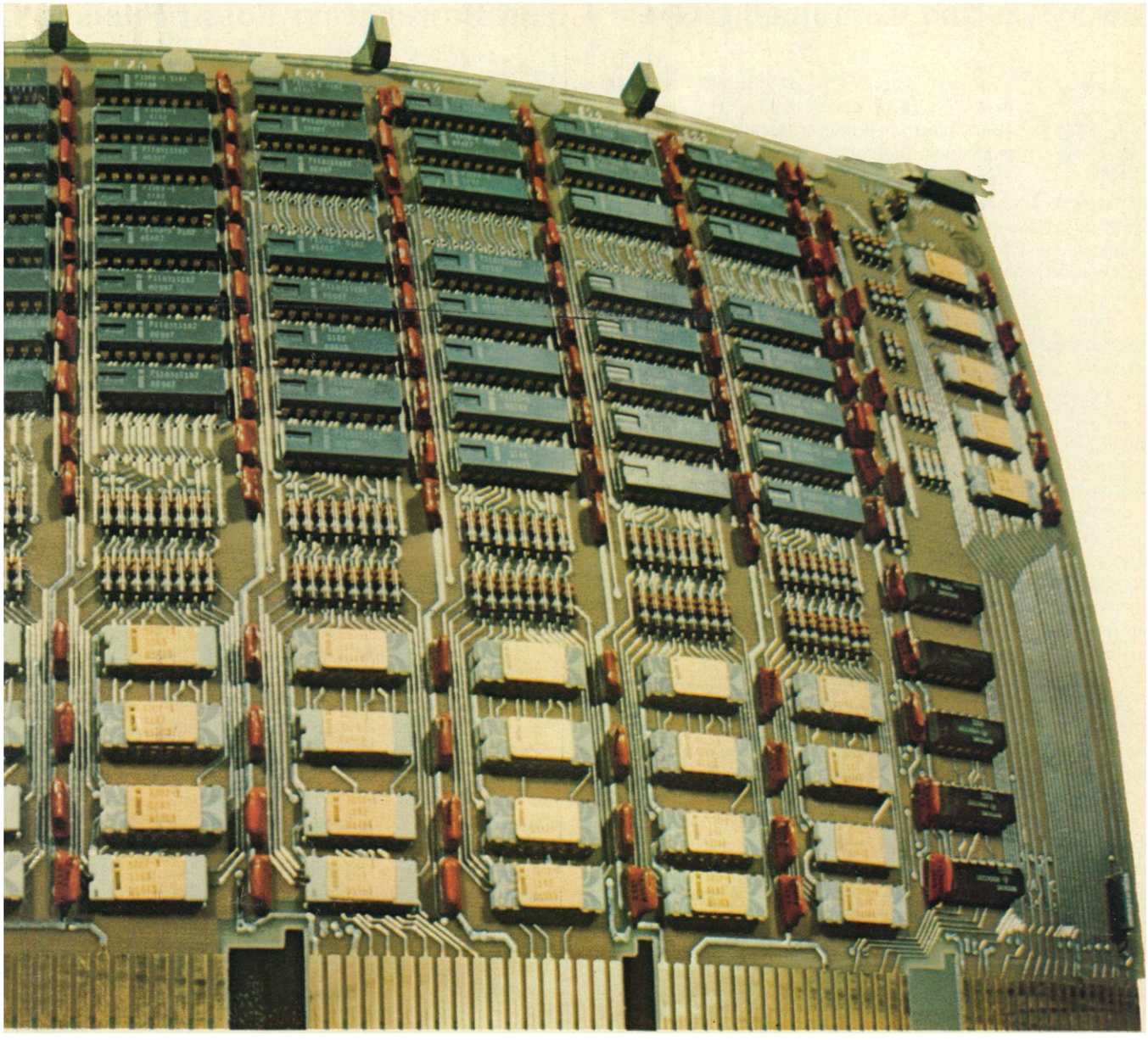

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