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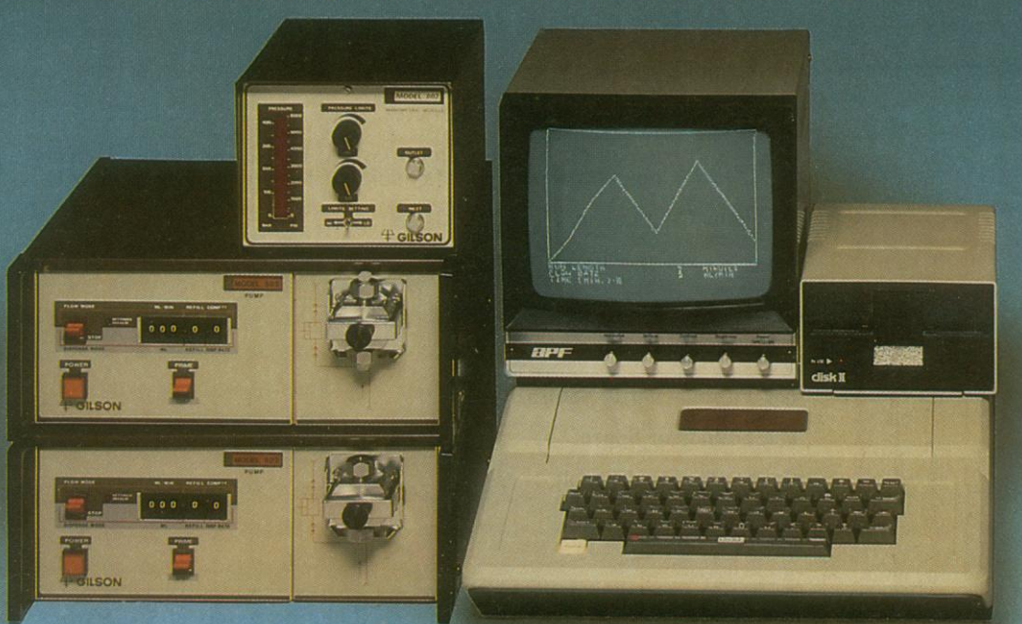

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COVER

View of U.S. Capitol from Hirshhorn Museum, Washington, D.C. See page 1353, AAAS Annual Meeting, 3–8 January 1982. [Stephen Shepherd, Gaithersburg, Maryland]

From DNA to RNA and beyond

These nine systems represent a major achievement in support of DNA/RNA research. They offer pretested, quality-assured sets of matched ingredients for analyzing genes and the products of their expression.

You could of course assemble the ingredients yourself, but here's what you'd likely be missing: Reliability, reproducibility, and hours of time better spent doing the research.

Call to discuss any questions you may have for our technical staff.

Nick Translation

Two exclusive systems for making consistently high specific activity probes using nick translation: dCTP, [^{32}P]- and dTTP, [^{3}H]-. Both systems include *E. coli* DNA Polymerase I prepared in our laboratories to ensure reproducibility. The DNase I, dNTP mixtures, stop buffer, and sterile deionized water are optimized for compatibility and stability.

Systems sufficient for either 20 or 10 reactions contain the following:

- dCTP, [α-^{32}P]-, or
- dTTP, [methyl, 1', 2'-^{3}H]-
- DNase I
- DNA Polymerase I
- Control Plasmid DNA (pBR322)
- Deoxynucleoside Triphosphate Mixture
- Nick Translation Buffer
- Nick Translation Stop Buffer
- Deionized Water

Each lot of systems is tested with the control supercoil pBR322 plasmid DNA to ensure efficient incorporation of dCMP or dTMP into DNA, and a copy of the curve is included with your system.

Ordering information:

- NEK-004 (dCTP, [α-^{32}P]) (20 reactions, tracer in ethanol)
- NEK-004A (10 reactions, tracer in ethanol)
- NEK-004B (20 reactions, tracer concentrated in aqueous solution)
- NEK-004C (10 reactions, tracer concentrated in aqueous solution)
- NEK-005 (dTTP, [^{3}H]) (20-reaction system)

3′ End Labeling

The system labels protruding (*Hae* II), flush (*Alu* I), and recessed (*Hin*f I) 3′ termini generated from pBR322 with 3′-dATP, [α-^{32}P]- (cordycepin 5′-triphosphate) in a simplified protocol similar to the procedures of Tu and Cohen.[1] The system utilizes terminal transferase to add a single 3′-dAMP, [α-^{32}P]-molecule to the 3′ end of a DNA chain. The resulting labeled DNA is suitable for sequencing by the Maxam and Gilbert[2] technique used in our new DNA Sequencing System (see next page).

The components include:

- 3′-dATP, [α-^{32}P]- (cordycepin 5′-triphosphate)
- Terminal Deoxynucleotidyl Transferase
- Terminal Transferase Reaction Buffer
- Cobalt Chloride
- Control Plasmid DNA Fragments
- Deionized Water

Prior to shipment, all system components are subjected to a complete 3′ end labeling procedure. The polyacrylamide gel used to separate the fragments is autoradiographed to assess labeling efficiency, and a copy of the autoradiogram is included with your system.

Ordering information:

- NEK-009 (10-reaction system)
- NEK-009A (5-reaction system)

[1]Tu, C.-P.D. and Cohen, S.N., *Gene*, **10:** 177, 1980

5′ End Labeling

Adapted from procedures described by Maxam and Gilbert,[2] an efficient, time-saving means of labeling nucleic acid fragments preparatory to DNA sequencing (see next column). The system includes ATP, [γ-^{32}P]- with polynucleotide kinase prepared in our own laboratories, and a carefully balanced complement of buffers, enzymes, and other reagents necessary for labeling the 5′ termini of DNA fragments.

Systems sufficient for either 10 or 5 reactions contain the following:

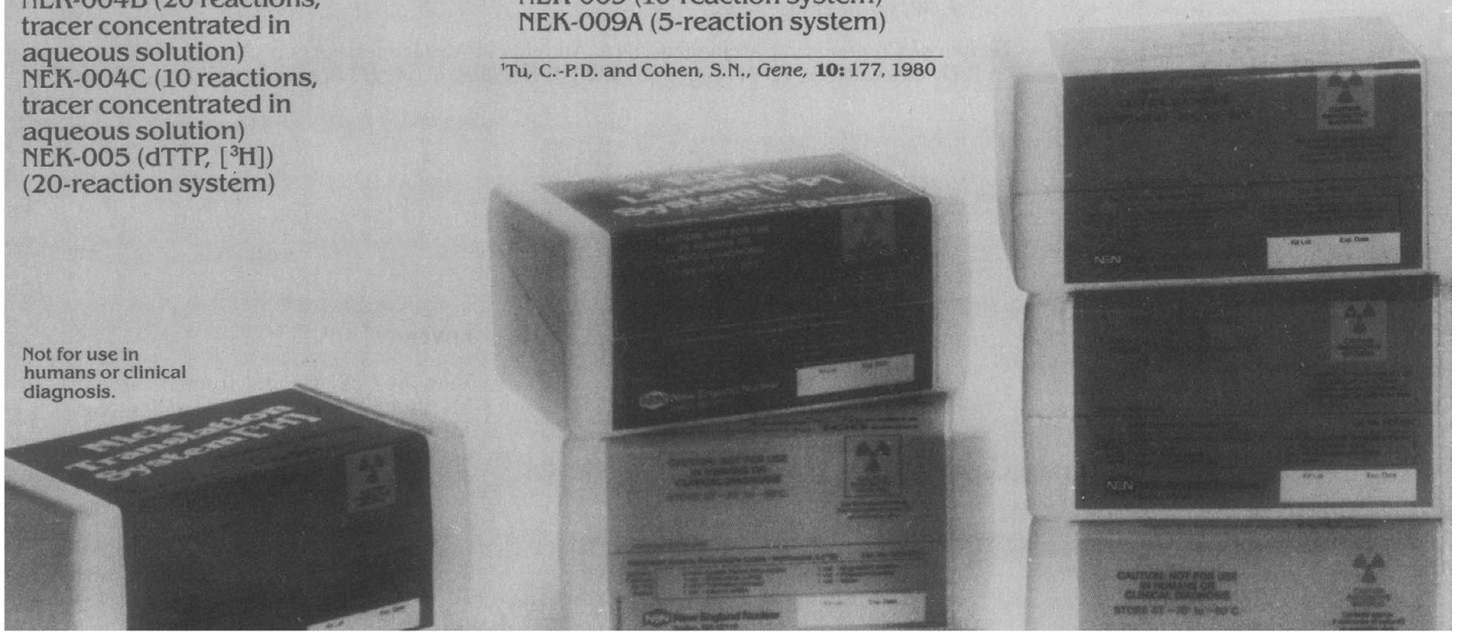
- ATP, [γ-^{32}P]-
- Alkaline Phosphatase
- Polynucleotide Kinase (purified to homogeneity)
- Phosphatase Buffer
- Direct Phosphorylation Buffer
- Exchange Phosphorylation Buffer
- *Hin*f I Digest of Plasmid DNA, pBR322 (control to check system)
- Deionized Water

The system is tested the day before shipment using the same lots of components you will receive, including fresh tracer. The resulting autoradiogram is included with your system.

Ordering information:

- NEK-006 (10-reaction system)
- NEK-006A (5 reaction system)

Not for use in humans or clinical diagnosis.



NEW

DNA Sequencing

This system follows the Maxam-Gilbert procedure as published in *Methods in Enzymology* and includes the entire text of the article.[2] It is suitable for sequencing DNA labeled with our 3′ or 5′ End Labeling Systems and includes all reagents necessary for the four base specific cleavage reactions. Sufficient material is provided for at least fifty of each reaction.

The following components are included:

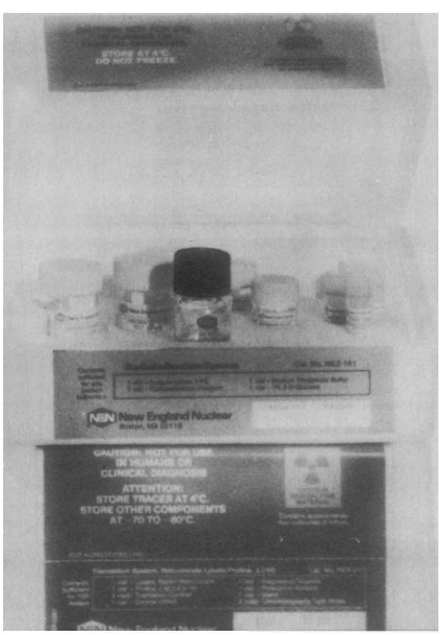
- Dimethyl Sulfate
- Hydrazine
- Piperidine
- Piperidine Formate
- Ferric Chloride
- Sodium Hydroxide
- Maxam-Gilbert Procedure Manual

Each new lot of components is tested before shipment in a sequence analysis of a DNA fragment. The purity of each component is monitored using chromatographic analysis and documented for inclusion with the system.

Ordering information:

NEK-010

[2]Maxam, A.M. and Gilbert, W., *Methods in Enzymology*, **65** (1980)



NEW

Transcription

This system provides all the components necessary to perform eukaryotic cell-free transcription. It contains a cell-free extract derived from HeLa cells which catalyzes the synthesis of mRNA precursors when provided with an exogenous DNA containing a promoter for recognition by the polymerase. This RNA polymerase II dependent reaction is highly sensitive to the presence of α-amanitin. The whole cell extract is prepared as described by Manley and coworkers.[3]

The system also includes UTP, [α-^{32}P]- for labeling specific mRNA precursors. A control DNA template, the cloned *Bal* I-E restriction fragment of Adenovirus-2, has been used to optimize the system and is included with it. This control should be used by the investigator to determine proper functioning of the system.

Components sufficient for performing 50 assays (25μl reaction volume) are listed below:

- UTP, [α-^{32}P]-
- HeLa Cell Extract
- Control DNA Template
- Transcription Cocktail
- Deionized Water

Ordering information:

NEK-014 (50-reaction system)

[3]Manley, J.L., Fire, A., Cano, A., Sharp, P.A., and Gefter, M.L., *PNAS* (U.S.A.), **77:** 3855 (1980)

Translation

Now Proline [^{3}H]

NEN's *in vitro* protein translation systems have made cell-free translations of eukaryotic mRNAs exceptionally reliable and reproducible. These systems are offered with either Methionine, L-[^{35}S]- or Leucine, L-[^{3}H]- or Proline, L-[^{3}H]- labeled tracers. All three utilize an extract of rabbit reticulocyte lysate that has been treated with micrococcal nuclease to remove endogenous mRNA. The lysate is prepared under strictly controlled conditions to ensure retention of high protein synthesis activity.

The components include:

- Rabbit Reticulocyte Lysate
- Methionine, L-[^{35}S]-, or
- Leucine, L-[3,4,5-^{3}H]-, or
- Proline, L-[2,3,4,5-^{3}H]-
- Translation Cocktail
- Control mRNA
- Magnesium Acetate
- Potassium Acetate
- Deionized Water

Each lot of systems is biologically tested with the control mRNA. A graph demonstrating Methionine, Leucine, or Proline incorporation is provided with your shipment.

Ordering information:

NEK-001 (Met [^{35}S]) (100 reactions)
NEK-001A (incl. extra ml lysate)
NEK-001B (tracer shipped as needed)

NEK-002 (Leu [^{3}H]) (100 reactions)
NEK-002A (incl. extra ml lysate)

NEK-013 (Pro [^{3}H]) (20 reactions)
NEK-013A (100 reactions)

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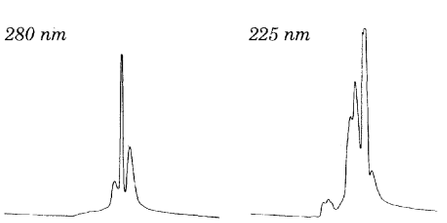
Are you getting results like this without knowing it?



Photographers call it underexposure. We call it absorbance inability. The first you get from too little light, the second from the wrong kind of light. But the result is the same; there are things there but chances are you don't see them.

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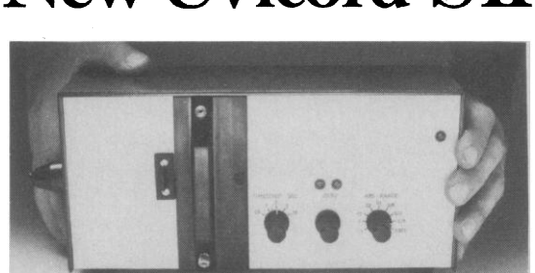
This new and improved version of one of the most widely used LKB products, (since 1958 we've sold a good twenty thousand Uvicord detectors) can monitor at 206, 225, 254, 280, 313, 365 or 405 nm. Just choose the wavelength that will give you the best result for your sample. If the 254 and 280 nm filters let you see nothing and 206 too much, the new 225 nm filter will be perfect. For peptides, for instance.

Uvicord SII also has a unique high intensity lamp (av. life 6,000 hrs.) which, combined with the short wavelength filters, can give you up to two hundred times greater sensitivity.

Get in touch with LKB for a demonstration. We think you'd be interested in a couple of other new Uvicord SII features like the variable time constant filter and it's indicator for baseline adjustment.

New Uvicord SII



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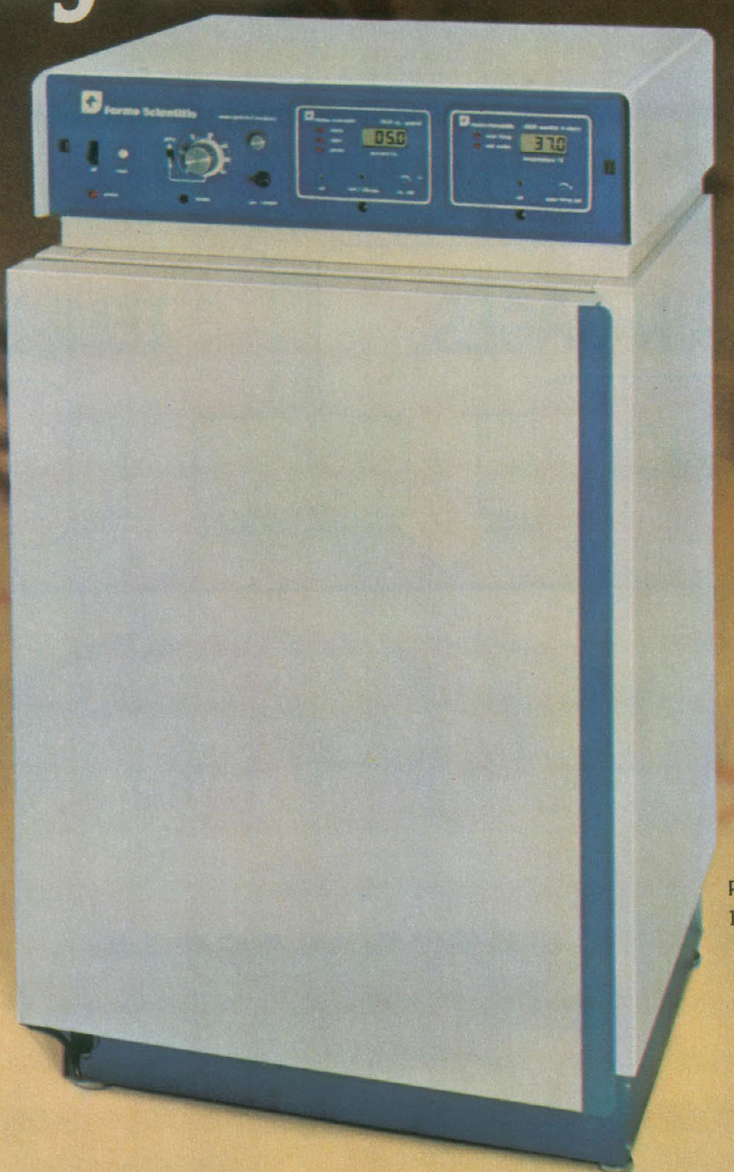
296

The performance you rely on.



Pseudomonas sp.
1000X magnification

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THE EASIEST WAY TO

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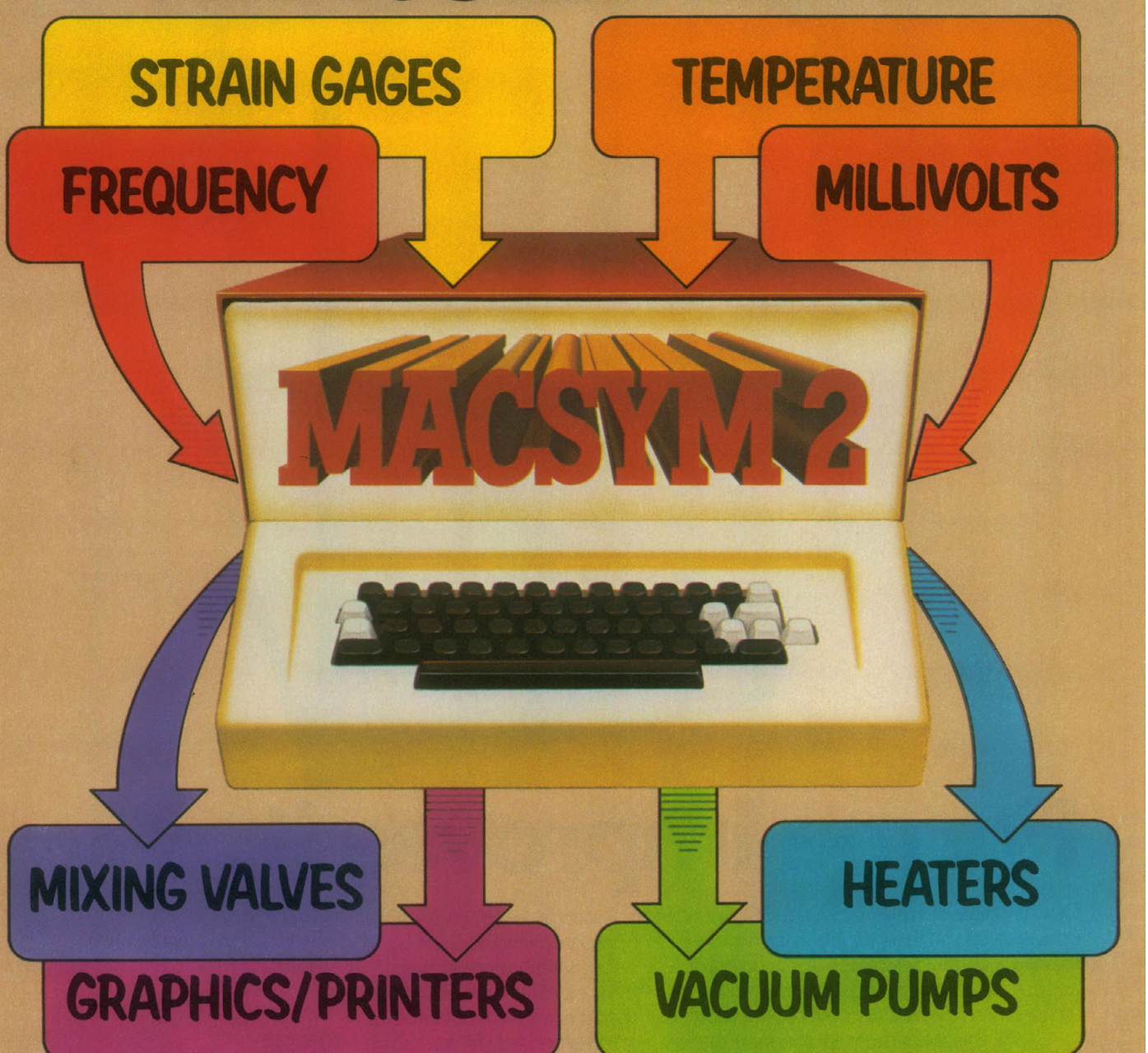

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```
60 X=AIN (8,0)
70 AOT (0,1)=0.5*SIN (X)
80 IF X>5 DOT (1,1)=1
90 IF X<5 DOT (1,1)=0
100 WAIT .5 GO TO 60
```

This program instructs MACSYM 2 to input analog data (AIN) from card slot 8 channel 0, set the analog output (AOT) of card slot 0 channel 1 to 0.5 times SIN (X). If X is greater than 5 volts, sound alarm on slot 1 channel 1; if less, turn off alarm. Wait ½ second, read again. It's that basic.

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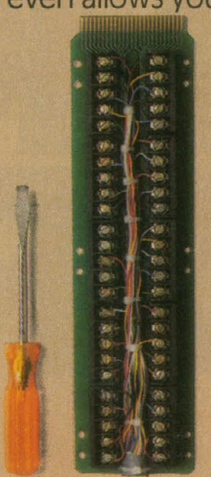

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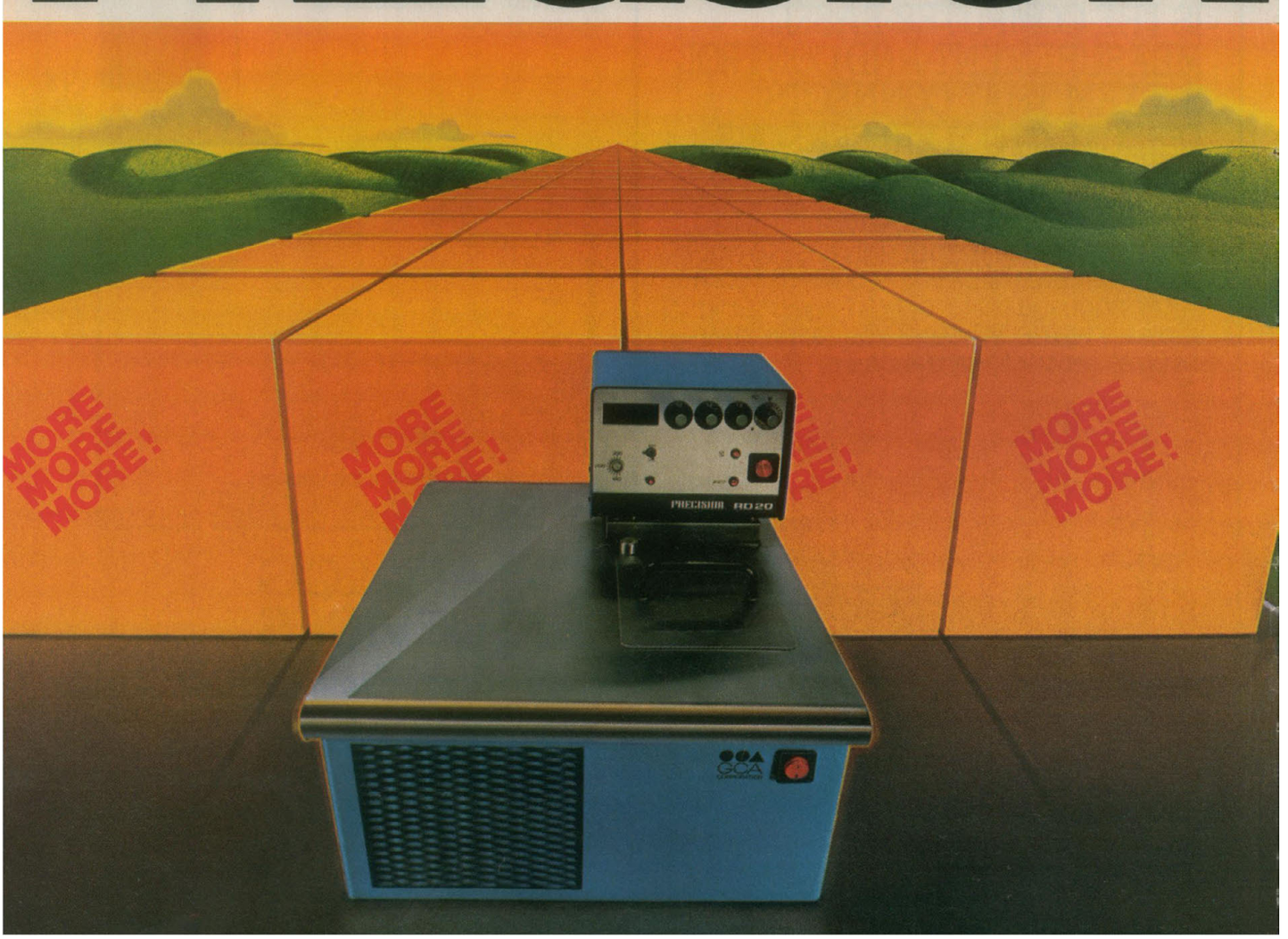

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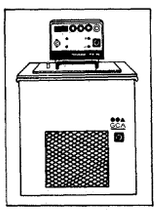

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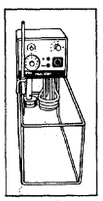

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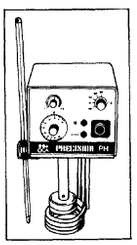

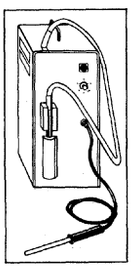

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LETTERS

Warburg Effect Revisited

Under the above title, an article was recently published in *Science* (17 July, p. 303) that I coauthored with Mark Spector, a graduate student in my laboratory. I feel compelled to withdraw some of the claims that we made in that article. On 24 July 1981, Volker Vogt, an assistant professor in our department with whom I have collaborated, discovered that the data obtained from an experiment involving immune precipitations from extracts of cells transformed with Moloney sarcoma virus were incompatible with the experimental protocol. This important discrepancy, and several others discovered with the generous help of other tumor virus laboratories, cast doubt on some of the published and unpublished claims we made. I state below which of the basic observations have been repeated by independent tests and which are doubtful.

1) I have confirmed the phosphorylation of the β subunit of the sodium, potassium–dependent adenosinetriphosphatase (Na^+,K^+-ATPase) by a protein kinase from Ehrlich ascites tumor cells prepared by Mark Spector. I have established that the phosphorylated amino acid on the β subunit is tyrosine.

2) We mentioned in our article a 6000-dalton polypeptide isolated in my laboratory by Spector that activated the phosphorylation of one of the enzymes of the protein kinase cascade (PK_S) by another (PK_L). I have performed these experiments several times with preparations of PK_S, PK_L, and activator, supplied to me by Spector, and observed at least a three- to fivefold stimulation of protein phosphorylation in the presence of the activator. Spector also gave to George Todaro, chief of the Laboratory of Viral Carcinogenesis at the National Cancer Institute, a preparation of the activator (now shown in Todaro's laboratory to be a mixture of several small polypeptides) which was found to be active in inducing phenotypic transformation of normal cells to cells that show anchorage-independence of growth. I have also tested a preparation of a transforming growth factor given to Spector by Todaro, and I have found it to be very active in the above described system of phosphorylation with PK_S and PK_L. It is obvious that these experiments will have to be repeated with enzyme preparations and an activator of known purity. On the other hand, I have been unable to verify the effectiveness of the different preparations of rabbit antiserum which supposedly neutralize and precipitate each of the four protein kinases. Since I know that some of these samples were shipped to other laboratories, I suggest that no further experiments be conducted with them.

I am also not certain of the correctness of some of the physical-chemical properties ascribed to the protein kinases, but I cannot state that they are wrong. We are now checking all published data, and it will take us many months before we know what is correct. We suspect that some of the data dealing with cells transformed by various tumor viruses are incorrect. We did not deal with these experiments in the *Science* article, but they were subjects of a paper in press which we are withdrawing. They were also presented by me and others in seminars, and I wish to withdraw these claims until we can verify them.

EFRAIM RACKER
Section of Biochemistry, Molecular and Cell Biology, Division of Biological Sciences, Cornell University, Ithaca, New York 14853

The Einstein Papers

I regret that only limited space is permitted to comment upon the long article "Waiting for the Einstein papers" (News and Comment, 17 July, p. 309). I shall, therefore, be able to mention only a few of the many misstatements and omissions in that article:

1) The article does not mention (as it is omitted in almost all statements, briefs, and publications by Princeton) that, when proposing a board of three coequal editors, the Einstein estate suggested that John Stachel be appointed one of the three, the one primarily responsible for Einstein's physics. Nor is it mentioned that the estate's suggestion resulted from the recommendation of the search committee which had nominated Stachel as an "alternate" for such a panel of editors. Finally, it is not mentioned that Herbert Bailey, the director of Princeton University Press, and arch-enemy of the estate's proposal, had himself made similar suggestions in 1974 and 1975.

2) In stating the credentials of the arbitrator, who found in favor of Princeton University Press, it is not mentioned that he is an alumnus of Princeton University, as he himself stated on the last day of the arbitration hearings.

3) John Wheeler's statement about the Soviet publication of Einstein's writings and the implications made by him are misleading. The Soviets only reproduced published papers by Einstein, all

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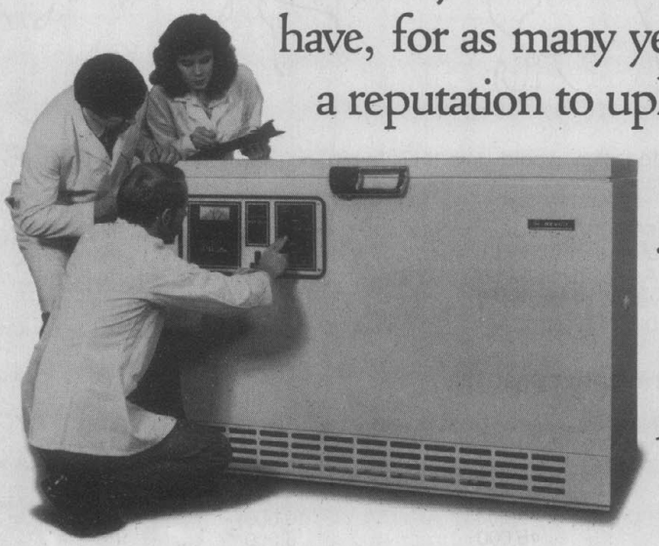

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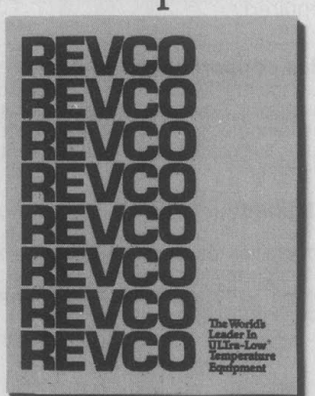

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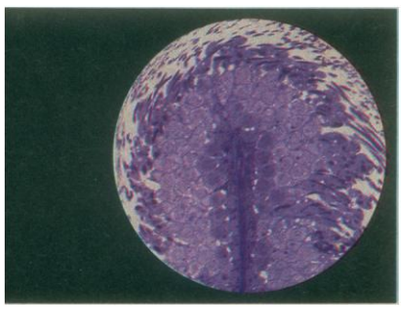

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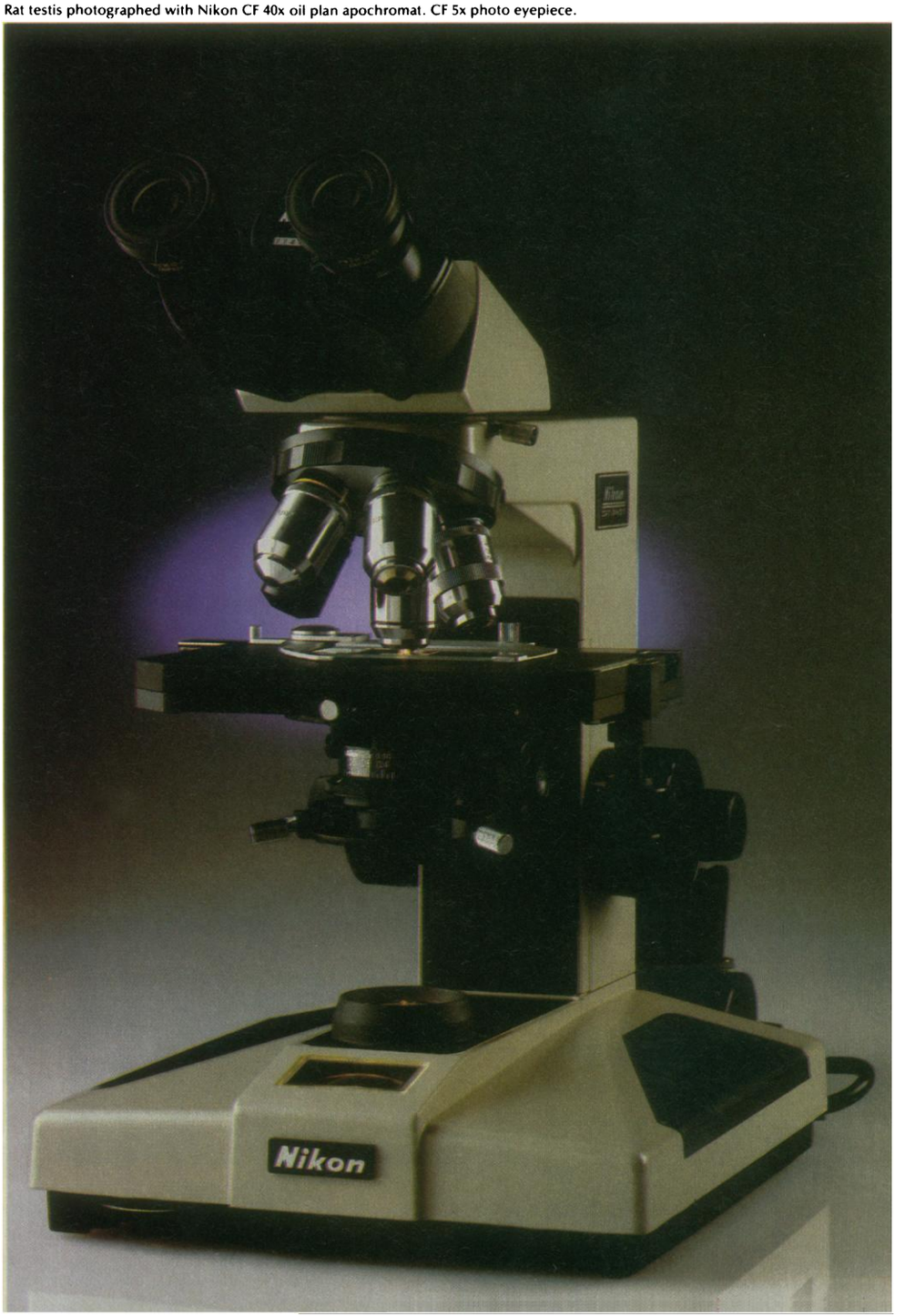

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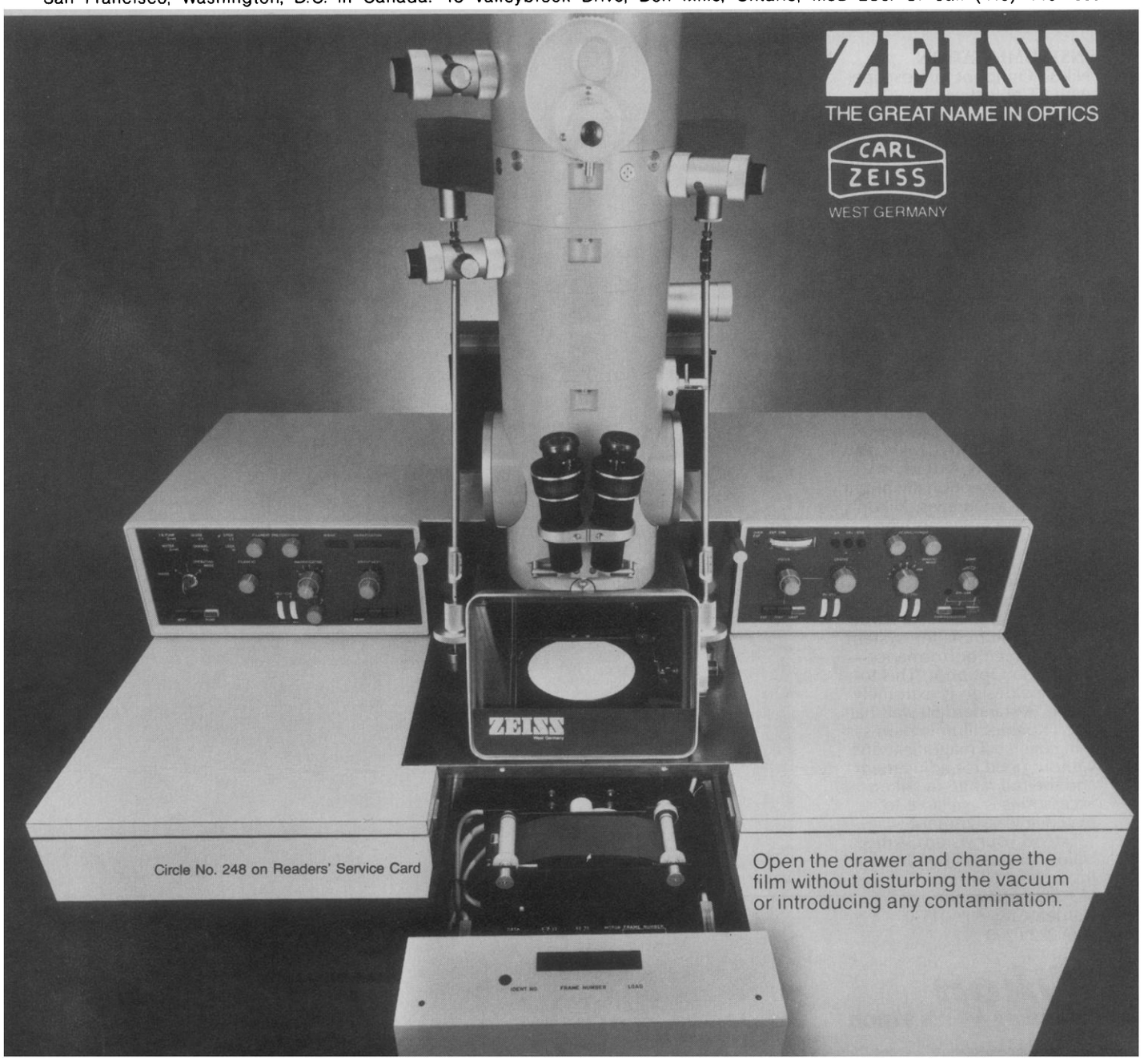

18 September 1981, Volume 213, Number 4514 **SCIENCE**

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United States and Technological Preeminence

When the Soviet Union successfully launched the first Sputnik in 1957, the U.S. response was immediate and effective. Today, U.S. technological leadership is again being challenged. In the past several decades Japan has gained world leadership in the production of steel, the manufacture of automobiles, and the development of many electronic devices. The failure of the United States to respond effectively to this challenge has serious long-term implications for its economic position and defense capability.

From a worldwide perspective, U.S. scientific research is generally in the forefront. However, the rate of technological progress in the United States has fallen behind that of foreign competitors. The restoration of U.S. technological preeminence is dependent on several factors. Of primary importance are research in engineering and the education of the engineering work force. Also essential are effective working relationships among the three major entities involved with technology: industrial companies, colleges of engineering, and federal agencies.

In the United States, engineering research is no one's specific responsibility. The federal government views it as primarily an industrial responsibility, although most industrial companies limit their research to relatively short-term objectives. The technical areas in which engineering schools carry on research are largely determined by the federal funding agencies. Technical areas coincident with the missions of major federal agencies are adequately funded, while other technical areas are relatively neglected. An important example of such an underfunded area is the field of robotics and factory automation.

In the past 10 years the approximately 280 U.S. engineering colleges have been stressed by a 100 percent increase in undergraduate enrollments and a decrease in U.S. graduate students. Although the baccalaureate degrees granted have increased by more than one-third in this period, the industrial demand for engineering baccalaureates has not been met. In electronic and computer engineering, a recent survey* indicated that the supply is less than half the demand for the current year and will be less than one-third the demand in 1985. A direct result of attractive industrial job offers has been a decrease in the number of candidates available for faculty appointments. The best current estimates are that more than 10 percent of the available faculty positions in engineering and computing are vacant. Thus, despite the availability of highly qualified applicants, most leading engineering schools are not continuing to increase their enrollments. The other major limitation is the obsolete status of much of the laboratory equipment available for instruction. The increased complexity of modern instrumentation plus the inflation in equipment costs have overextended college budgets available for equipment and facilities. Quality engineering education requires modern facilities.

The final factor is the lack of effective working relationships among the entities on which U.S. technological advance is most dependent. The relations between industrial companies and colleges of engineering are not as strong as those in West Germany. The relations between industry and government agencies are not as effective as those in Japan.

These barriers to increasing the rate of U.S. technological advance are not insurmountable. The first step is to recognize the serious nature of the challenge. Then the nation's scientific and technological resources should be mobilized, as they were after the first Sputnik.—F. KARL WILLENBROCK, *Cecil H. Green Professor of Engineering, Southern Methodist University, Dallas, Texas 75275*

**Technical Employment Projections, 1981–1983–1985* (American Electronics Association, Palo Alto, California, 1981).

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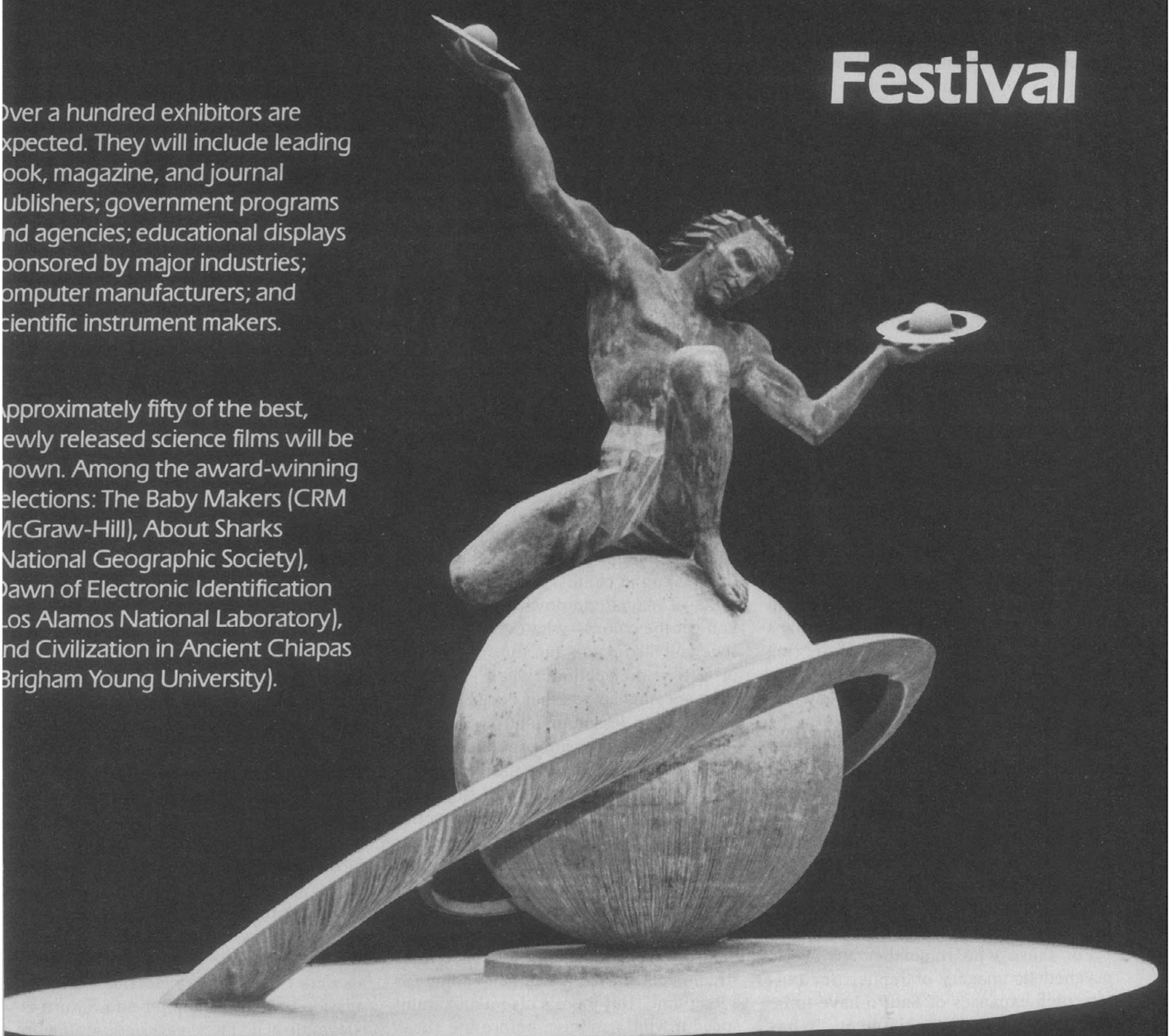

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15 ☐ Science policy
16 ☐ ..... (other)

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21 ☐ Teaching, education
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24 ☐ Research, development
25 ☐ Administration
26 ☐ ..... (other)

Institutional Affiliation Type
31 ☐ University, 4-year college
32 ☐ Other educational
33 ☐ Industrial, commercial
34 ☐ Other Private
35 ☐ Government
36 ☐ ..... (other)

Highest Educational Level
41 ☐ Doctoral Degree
42 ☐ Master's Degree
43 ☐ Other professional
44 ☐ Bachelor's Degree
45 ☐ ..... (other)

Age
51 ☐ Under 26 years
52 ☐ 26 to 35 years
53 ☐ 36 to 45 years
54 ☐ 46 to 55 years
55 ☐ 56 to 65 years
56 ☐ Over 65 years

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62 ☐ One
63 ☐ Two
64 ☐ Three
65 ☐ Four
66 ☐ Five or more

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Please indicate special housing needs due to a handicap: ☐ Wheelchair accessible room.

Other: _____

Arrival Date: _____ **Time:** _____ ☐ a.m. ☐ p.m.

Departure Date: _____ **Time:** _____ ☐ a.m. ☐ p.m.

Be sure to list definite arrival and departure date and time. Reservations will be held only until 6 p.m. unless accompanied by 1 night's deposit.

- All hotel reservations must be submitted to the AAAS Housing Bureau in writing **(use form above; type or print).**
- Reservations must be received by the Housing Bureau **not later than 14 December 1981;** reservations received after that date are conditional upon space availability at the hotels.
- Rooms are assigned on a first come, first served basis. If room rate requested is no longer available, the next available higher rate will be assigned.
- Confirmation will come directly from the hotel. All changes and cancellations must be made in writing (not by phone) through the AAAS Housing Bureau.

HOTEL RATES*

Hotel	Single	Double & Twin	Parlor + 1 Bedrm.	Parlor + 2 Bedrms.	Parking (rates subject to change)
Washington Hilton *Headquarters Hotel* 1919 Connecticut Ave., N.W. *(No. of rooms: 1,000)*	$51 68 81	$66 83 96	$175 and up	$271 and up	$5.00 per 24 hrs. with in & out privileges for registered guests only. Inquire for hourly rates.
Capital Hilton 16th and K Streets, N.W. *(No. of rooms: 500)*	$45 63 81	$65 83 96	$225 and up	$300 and up	$4.75 per 24 hrs. (no in & out privileges) at PMI Garage on L St. adjacent to hotel. Inquire for other rates.
Highland Hotel 1914 Connecticut Ave., N.W. *(No. of rooms: 75)*	$45	$55	$75	____	No parking on premises. Commercial parking in Universal Bldg. across street @ $4.50 per 24 hrs. (no in & out privileges).
Holiday Inn 1900 Connecticut Ave., N.W. *(No. of rooms: 100)*	$45	$55	____	____	Limited indoor parking (cars only) free of charge for registered guests only.

*Add 10% D.C. sales tax and 80¢ per night room occupancy tax.

Charges for roll-away beds: Washington Hilton and Capital Hilton, $15/night; Highland Hotel, $10/night; Holiday Inn, $8/night.

Children are accommodated free of charge in same room with parents if no extra beds are required. Age limits are as follows: Washington Hilton and Capital Hilton, no age limit; Highland Hotel, 14 and under; Holiday Inn, 19 and under.

Buy Your Airline Tickets Now!

Air fares, unlike aircraft, seem to be going in only one direction—up. The AAAS Annual Meeting starts on the last day of the New Year's weekend, when post-holiday travel is at its peak. Protect yourself by purchasing your airline tickets now. Thus, you will not only secure a seat on the flight of your choice, you will also save money by paying the currently applicable price. Be sure to inquire about discount fares such as "super saver" and others; these fares often require reservations or purchase of tickets well in advance and a minimum length of stay.