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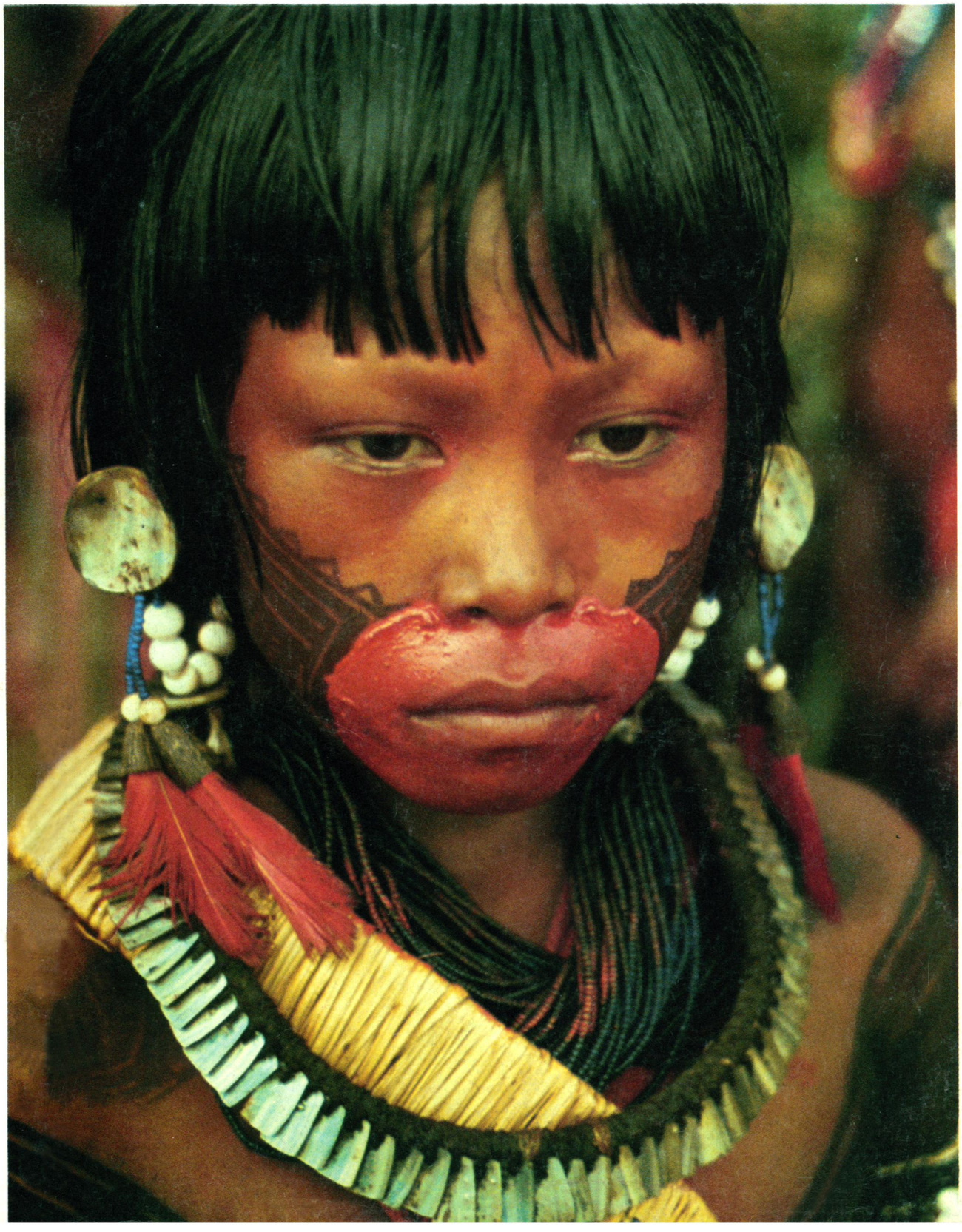
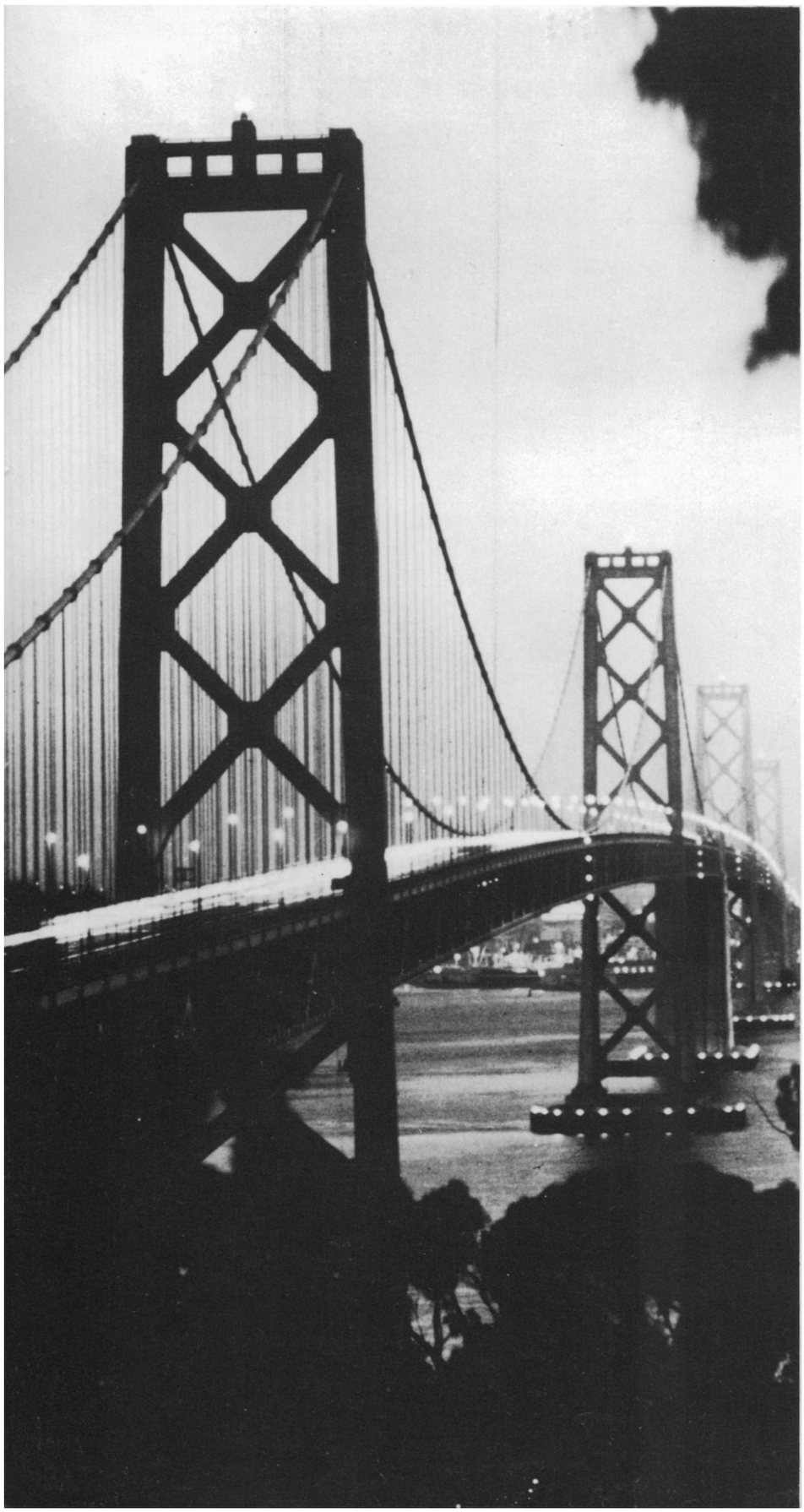
SCIENCE

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE



san francisco



Symposia

Exhibits

Science Film Festival

Tours

For details about the Meeting program, as well as housing and registration forms, see the Preconvention issue of Science, 16 November 1979

or write

AAAS Meetings Office—Suite 600
1776 Massachusetts Avenue, N.W.
Washington, D.C. 20036

Annual Meeting
San Francisco
3-8 January 1980

Would you pay twice as much for the family protection you need when you could get the same coverage at half the cost?

Not likely, if you realized you were eligible for low-cost individual life insurance from Teachers Insurance and Annuity Association! The brief cost comparison chart below illustrates why it pays to shop for life insurance, and the magnitude of your TIAA cost advantage. Check to see how much less owners of TIAA 5-Year Renewable Term policies pay than persons similarly insured by the country's biggest insurers—companies that sell one third of the policies purchased by Americans each year.

COMPARISON OF TIAA WITH THE 10 LARGEST U.S. INSURANCE COMPANIES
20 Year Average Annual Costs* for $50,000 5-Year Renewable Term Policies

	Policies Issued to Men			Policies Issued to Women		
	Aged 25	Aged 35	Aged 45	Aged 25	Aged 35	Aged 45
TIAA	**$ 91.00**	**$189.50**	**$445.00**	**$ 73.00**	**$126.00**	**$281.50**
Aetna Life	214.50	344.00	793.50	209.00	295.50	629.50
Conn. General	NOT ISSUED				NOT ISSUED	
Equitable	183.00	334.00	747.00	154.50	275.50	585.00
John Hancock	203.50	326.00	723.50	193.50	291.50	637.50
Mass. Mutual	182.50	310.50	732.50	171.50	286.50	697.00
Metropolitan	119.00	225.50	584.50	103.50	177.50	469.00
New York Life	171.50	290.00	624.00	156.00	236.50	465.00
Northwestern Mutual	154.00	277.00	628.50	137.00	242.50	545.00
Prudential	150.50	239.00	552.00	130.00	179.50	336.00
Travelers	198.50	352.50	801.00	181.50	275.50	589.50
Mean Cost, Largest Companies	**$175.22**	**$299.83**	**$687.39**	**$159.61**	**$251.17**	**$550.39**
% Greater than TIAA	93%	58%	54%	119%	99%	96%

*Based on published 1979 premium rates and dividend scales (dividends not guaranteed), adjusted for interest (5%) to recognize the time value of money. (Sources: Diamond Life Bulletins, Best's Flitcraft Compend)

The figures speak for themselves: For example, the mean cost for $50,000 5-Year Renewable Term policies issued by these insurers to men aged 35 is 58% higher than the same coverage with TIAA; and for 35 year old women it's 99% higher. Whether you choose 5-Year Renewable Term or some other plan, TIAA insurance is the best buy for you because you are a member of the academic and research community. To learn how you can give your family the most new protection for the least money just get in touch with TIAA!

Mail Coupon or Call Collect

For more information, just return the coupon at right or, for immediate assistance, call the TIAA Life Insurance Advisory Center—collect—(212) 490-9000. An insurance counselor will discuss your personal life insurance needs, help you select the plan and amount of coverage that's right for you and your family, and send details for you to study at home. TIAA employs no sales agents and no one will call upon you as a result of your inquiry.

Eligibility to apply for life insurance from Teachers Insurance and Annuity Association is limited to employees of colleges, universities, private schools and certain other nonprofit educational or research institutions. The employee's spouse is also eligible provided more than half of the combined earned income of husband and wife is from a qualifying institution.

TIAA Established as a nonprofit service organization by the Carnegie Foundation for the Advancement of Teaching

Life Insurance Advisory Center SP7911K3
Teachers Insurance and Annuity Association
730 Third Avenue, New York, NY 10017

Please mail me the TIAA Life Insurance Guide and personal illustrations for the policies indicated below. I understand that no one will call upon me as a result of my inquiry.

☐ Decreasing Term ☐ 5-Year Renewable Term ☐ Whole Life

(Please print)

Name

Job Title Birthdate

Home Address

City State Zip

Phone #s ( ) Home ( ) Office

Your nonprofit educational or scientific employer (college, university, private school, etc.)

If your spouse is also eligible according to the rules printed at left, please provide:

Spouse's name Birthdate

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Volume 206, No. 4422

SCIENCE

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COVER

Mekranoti-Kayapó Indian boy (northern Brazil) decorated with native dyes and jewelry for name bestowal. See page 1043. [Dennis Werner, City University of New York Graduate School]

VOICES

Our radiochemical catalogs and data sheets are informative. But a conversation can be much more enlightening. Sometimes talking to one of our technical staff can answer your question more handily than a literature search. Our staff is available to you without hesitation, because we know it's good business to share our 23 years of experience in tracer methodology.

This is not to underrate the first voice you hear when you call with an order. Our customer service people know the products, their schedules, method of shipment, delivery time, and—most important—the service needs of their individual accounts. They may well know your voice, your special requirements, and your license number, because we have assigned each person to a sales region.

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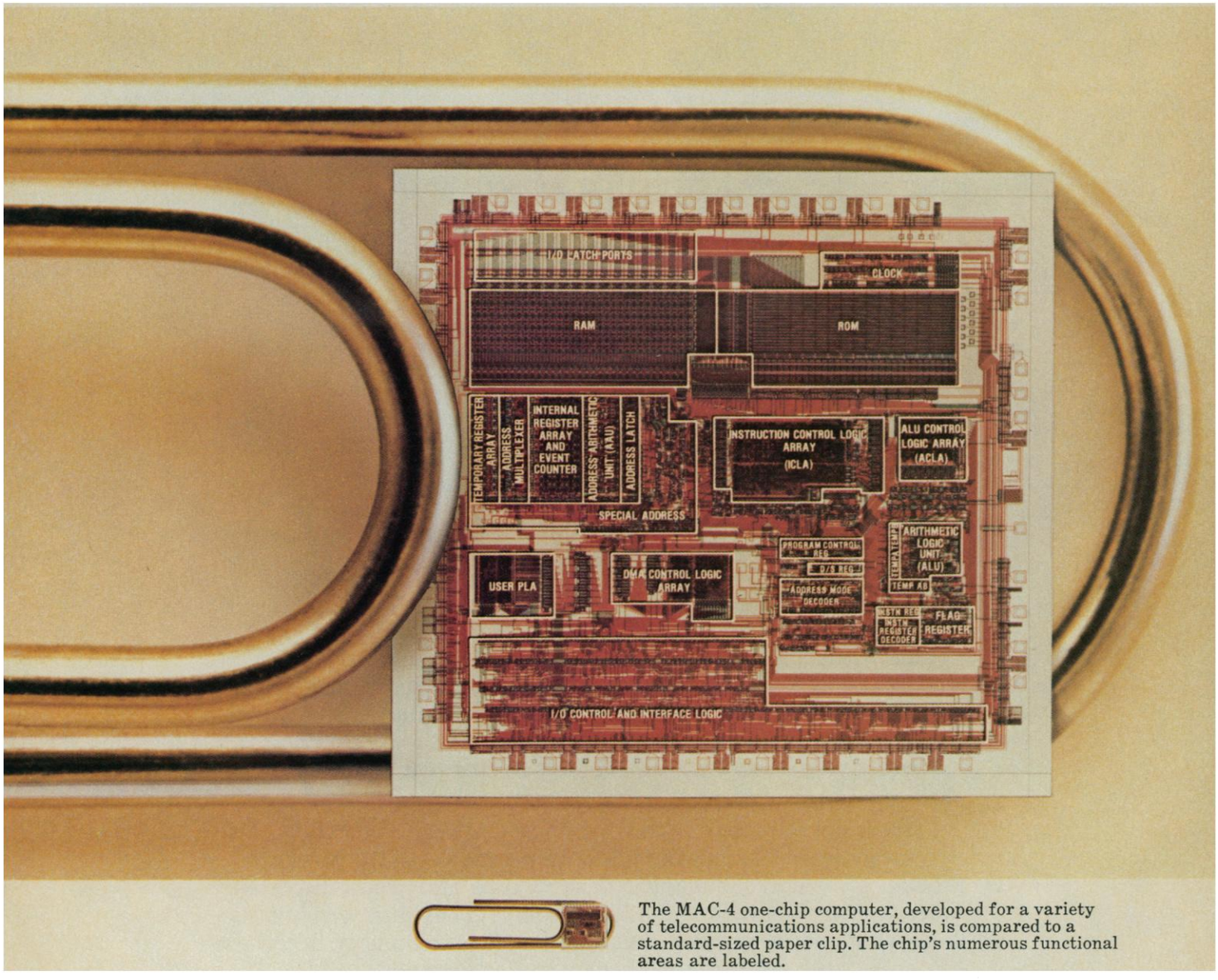
The one-chip computer: offspring of the transistor



The MAC-4 one-chip computer, developed for a variety of telecommunications applications, is compared to a standard-sized paper clip. The chip's numerous functional areas are labeled.

One of the transistor's latest descendants is the Bell System's 30,000-element MAC-4 "computer-on-a-chip." It's another in a long line of microelectronic developments that have come from Bell Laboratories.

The MAC-4 is so efficient that a program written on it takes 25 percent less storage space than that required by most other microcomputers. Its assembler language, C, also developed at Bell Labs, has features that make MAC-4 easier to program, debug and maintain. And the MAC-4 can handle anything from nibbles to bytes to words with its 4-, 8-, 12-, and 16-bit operations capacity.

Like other one-chip computers, the MAC-4 has sufficient memory to support its varied tasks—3000 nibbles of read-only memory and 200 nibbles of random access memory coupled to 34 input/output ports.

Fabricated with the latest CMOS technology, the MAC-4 needs little power. Thus it is well matched to a variety of telecommunications applications.

It started with the transistor

MAC-4 is just one current example of the many microelectronic devices to come from Bell Labs since we started the solid-state revolution with the invention of the transistor in 1947.

Over the past three decades, our advances in materials, processing, and devices have been vital to solid-state technology. These include:

- The Junction Transistor
- Crystal Pulling
- Zone Refining
- Field-Effect Transistor
- Diffusion
- Solar Cell
- Oxide Masking
- Thermocompression Bonding
- Photolithography
- Epitaxial Film Process
- Magnetic Bubble Memory
- Charge-Coupled Device
- Semiconductor Heterostructure Laser Used in Lightwave Communications
- Electron-Beam Exposure System

Today and tomorrow

Today, we continue to make important contributions to solid-state technology. For example, we've developed a rugged 65,536-bit RAM that can tolerate processing faults. Corrections can be made on the chip itself, so we can get more usable chips out of each manufacturing batch—and thus lower unit costs.

In materials processing, we've developed a technique for precisely controlling the growth of successive atomic layers of single crystal materials. This "molecular beam epitaxy" process is finding increasing use within Bell Labs and elsewhere in the electronics industry. We've used it to fabricate a device that permits us to double the speed of electrons by channeling them into crystal layers where they meet less resistance.

Other advances, in X-ray lithography and new resist materials, for example, promise to help place more elements on microelectronic devices and thus enhance their ability to perform important tasks.

As the solid-state revolution continues, these and other developments from Bell Labs will play an important part in it. What's important to us is the promise these advances offer for new telecommunications products and services. Like the transistor, MAC-4 and its solid-state relatives will find more and more applications in the nationwide telecommunications network.

For further information, or to inquire about employment opportunities, write: Bell Laboratories, Room 3C-303, 600 Mountain Avenue, Murray Hill, N.J. 07974.

From Science: Service

30 November 1979, Volume 206, Number 4422 **SCIENCE**

SALT II

The Senate debate on SALT II has turned from features of the treaty itself to U.S. strategic defense policy. Discussions of this kind can be useful if they transcend the fixation on numbers of weapons, delivery systems, and money, and focus instead on certain fundamental issues. I will mention two.

One is illustrated by nuclear war scenarios. Some proponents of SALT II believe that the use of any nuclear weapons will escalate to Armageddon and that it is not feasible to restrict a missile exchange to military targets. Some SALT II opponents believe that such a limited war could happen. If so, then the United States should be capable of both war against military targets, and all-out war including cities. What we in the West believe about this matter is less important than what the Russians believe, and they are in a position to act on their belief. Would they attack our Minuteman force, using the "heavy" MIRVed missiles allowed them under SALT II? Is the SALT II limitation on launchers, not missiles, a problem for us? We do know that the Soviets can launch some of their missiles in such a way that they could presumably reload the launchers with backup missiles. Such concerns do not matter under the Armageddon scenario, but they are vital under the military-war-only scenario.

A second critical issue arises from the necessity for assured command and control of strategic forces. There is a complex communication network that connects the President to the launch sites, submarines, and aircraft, so he can control their actions. If this network could be attacked and disrupted, the President could lose control—the forces might not be launched or might be launched by a lesser authority. Before acting, the President must have information on which to base his decision. What sources would he consider reliable enough to believe a nuclear attack had been launched against the United States—a telephone call from the Joint Chiefs, a teleprinter message from NORAD, or a presumed hot-line call from Moscow?

In thinking about this question, the implausibility of precipitate action by the President against a presumed attacker becomes evident. It has been said that the increasing vulnerability of our land-based missiles in the 1980's could be offset by launching them before they were hit by incoming weapons, requiring a faster than 30-minute decision. Such an action is better suited to a computer than a President under constitutional constraints and with the nation at risk. Yet high government officials give no assurance that such a measure might not be taken under pressure. We may be headed for a time in the 1980's when this hair-trigger situation will exist.

These issues are not the only ones raised by SALT II. Verification is another, and the treaty seems to be adequately verifiable. All these issues point to objectives for our defense policy. Not knowing how the Soviets view the Armageddon-versus-limited-war issue, we should avoid providing them with tempting strategic military targets. We should sustain a competitive strategic position to avoid Soviet hegemony in critical areas such as the Persian Gulf. Also required is a secure command and control system that provides current, accurate information for the President and avoids putting him in a position where precipitate action based on presumptive information is needed to prevent loss of a military force under attack.

SALT II does not limit us in these matters. Nor does it the Soviets, who can continue their buildup of strategic forces. In terms of true arms constraints, SALT II is at best a modest delaying action. The residual question is what effect the treaty might have on our resolve to accomplish our objectives. Would rejection increase the resolve of our decision-makers? Would acceptance be a palliative? To the logical mind that may seem improbable, but to the political mind it is plausible. The best course would be to sign SALT II *and* use our technology to keep our world interests viable. But in the current sour political climate, these may well be incompatible.—EDWARD E. DAVID, JR., *Chairman, Board of Directors, AAAS, and President, Exxon Research and Engineering Company, Florham Park, New Jersey*

Annual Meeting
San Francisco
3–8 January 1980

Tours

For the Annual Meeting Program please see the Preliminary Program in the 21 September issue of *Science*, pages 1243–1249. Tours are limited to Meeting Registrants only.

Tours

1. University of California, Davis: Friday, 4 January, 8:30 a.m.–4:00 p.m.

Tram tour of the campus, which specializes in agricultural and veterinary science with visit to Department of Enology followed by no-host luncheon.

2. Santa Clara Valley Industrial Technology, Tour A: Friday, 4 January, 8:30 a.m.–12:30 p.m.

Lecture and tour of Hewlett-Packard Integrated Circuit Processing Laboratory, focusing on multiple integrated circuits such as bipolar and MOS. Tour and demonstration of Fairchild Camera manufacturing techniques.

NOTE: Due to security regulations, Fairchild Camera requires the identification of the citizenship of all tour participants in advance.

3. Lawrence Berkeley Laboratory and the Lawrence Hall of Science: Friday, 4 January, 1:30 p.m.–5:30 p.m.

Multimedia presentation summarizing research efforts and tour of the Bevelac heavy-ion accelerator and the nuclear science and biomedical research areas at LBL. Exhibits and activities will be on display at Lawrence Hall.

4. University of California Medical Center, San Francisco: Friday, 4 January, 1:30 p.m.–4:30 p.m.

Lecture on the Center's DNA research and tour of some of the laboratories. Tour is limited to 15 participants.

5. Stanford Linear Accelerator Center: Saturday, 5 January, 9:00 a.m.-12:00 noon.

Includes tour of 2-mile-long linear electron accelerator, new facilities and high energy physics laboratories.

6. Exploratorium: Sunday, 6 January, 2:00 p.m.–5:00 p.m.

Museum utilizes unique methods for presenting science to the general public.

7. Long Marine Station, UC Santa Cruz and Año Nuevo State Reserve, Half Moon Bay: Monday, 7 January, 8:30 a.m.–5:30 p.m.

Includes drive through the Redwoods to Long Marine Station for no-host lunch. Guided tour of Año Nueva State Reserve over coastal bluffs, dunes, and beaches to observe elephant seals (3-mile walk; warm clothing necessary). Tour limited to 40 participants.

8. Santa Clara Valley Industrial Technology, Tour B: Monday, 7 January, 8:30 a.m.-12:30 p.m.

Lecture and tour of Hewlett-Packard Integrated Circuit Processing Laboratory, focusing on multiple integrated circuits such as bipolar and MOS. Tour and demonstration of an automated circuit system at Xerox Corporation and research prototype laboratories.

9. Santa Clara Valley Life Science Technology Tour: Monday, 7 January, 1:30 p.m.–5:00 p.m.

Introductory slide-show of Syntex Corporation and Laboratories and tour of pharmaceutical research labs and production and quality-control facilities. Visit to research facilities of Zoecon which manufactures numerous insecticides and pet care products.

10. The Geysers Power Plant, Sonoma County: Tuesday, 8 January, 8:00 a.m.–5:00 p.m.

Tour of Pacific Gas and Electric Company's geothermal power plant, hybrid solar home in Santa Rosa and (weather permitting) box-lunch picnic.

11. Lawrence Livermore Laboratory: Tuesday, 8 January, 8:30 a.m.–12:30 p.m.

Includes visits to laser facilities and magnetic fusion centers. Tour of SHIVA, a 20-beam laser system.

NOTE: Due to security regulations, L.L.L. requires the identification of the citizenship of all tour participants in advance.

12. NASA–Ames Research Center, Mountain View: Tuesday, 8 January, 1:00 p.m.–5:30 p.m.

Tour of construction sites of various aircraft and unique aeronautical research facilities including wind tunnels and motion simulators.

NOTE: Due to security regulations, NASA requires the identification of the citizenship of all tour participants in advance.

Commercial Tours

The following commercial tours are also available; reservations should be made in the lobby of the San Francisco Hilton Hotel:

A. City Tour	$ 7.75
B. Muir Woods and Sausalito	7.25
C. Napa Valley Wine Country	20.00
D. Boat Cruises	prices vary

Please be sure to make your tour reservations early—space is limited.

Following a long and honored tradition, the forthcoming AAAS Annual Meeting in San Francisco (3–8 January 1980) will feature an excellent selection of tours. Using the form on this page, please make advance reservations as soon as possible; space is limited and early commitment must be made to the host organizations. Reservations received after 14 December will be returned. Tickets will be held at the Ticket Desk in the Meeting Registration Area (East Lounge, San Francisco Hilton Hotel) and should be picked up 24 hours before the tour. A nominal charge will be made to defray transportation costs. Handicapped persons who need assistance for the tours (or any Meeting function) should consult the staff at the Resource Center for Disabled Attendants in the Teakwood B room (fourth floor, San Francisco Hilton). All tours depart from and return to the O'Farrell Street entrance of the San Francisco Hilton at the respective times listed for each tour.

Annual Meeting
San Francisco
3–8 January 1980

Reservation Form for Tours

AAAS Meeting registrants who wish to reserve tickets for any of the tours should complete the coupon below and return it to AAAS as soon as possible—space is limited. Reservations received after 14 December will be returned. Tickets should be picked up (and nominal bus fare paid) at the AAAS Ticket Desk in the Meeting Registration Area (East Lounge, San Francisco Hilton) during the Annual Meeting, approximately 24 hours in advance of the scheduled tour. *Do not send any remittance with this coupon*; it is a reservation form only. Please note that tours are limited to Meeting registrants only.

Tour	No. of Tickets
1. UC Davis [Fri., 4 Jan., 8:30 a.m.–4:00 p.m.]	_____
*2. Santa Clara Valley Industrial Tour A [Fri., 4 Jan., 8:30 a.m.–12:30 p.m.]	_____
3. Lawrence Berkeley Lab. [Fri., 4 Jan., 1:30 p.m.–5:30 p.m.]	_____
4. UC Medical Center [Fri., 4 Jan., 1:30 p.m.–4:30 p.m.]	_____
5. Stanford Linear Accelerator [Sat., 5 Jan., 9:00 a.m.–12 noon] **Waiting List Only.**	_____
6. Exploratorium [Sun., 6 Jan., 2:00 p.m.–5:00 p.m.]	_____
Total Number of Tickets Reserved	_____

Tour	No. of Tickets
7. UC Santa Cruz, Año Nuevo Reserve [Mon., 7 Jan., 8:30 a.m.–5:30 p.m.]	_____
8. Santa Clara Valley Industrial Tour B [Mon., 7 Jan., 8:30 a.m.–12:30 p.m.]	_____
9. Santa Clara Valley Life Science [Mon., 7 Jan., 1:30 p.m.–5:00 p.m.]	_____
10. Geysers Power Plant [Tues., 8 Jan., 8:00 a.m.–5:00 p.m.]	_____
*11. Lawrence Livermore Lab. [Tues., 8 Jan., 8:30 a.m.–12:30 p.m.]	_____
*12. NASA–Ames Research Ctr. [Tues., 8 Jan., 1:00 p.m.–5:30 p.m.]	_____

[*If you have selected tours 2, 11, or 12, please indicate citizenship _____]

Indicate any special requirements due to a handicap: _____

_____

Name _____

Address _____

City _____ State _____ Zip _____

Mail to: Tours
AAAS Meetings Office
1776 Massachusetts Avenue, NW
Washington, D.C. 20036