

A LOOK
INTO THE
FUTURE

NEXT

14336

**IF THE
INFLATION
RATE TOPS
25 PERCENT...**

**DESIGN THAT
SPEAKS FOR
THE 80s**

**FELLINI'S ONCE
AND FUTURE
WOMAN**



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ARE COMING**

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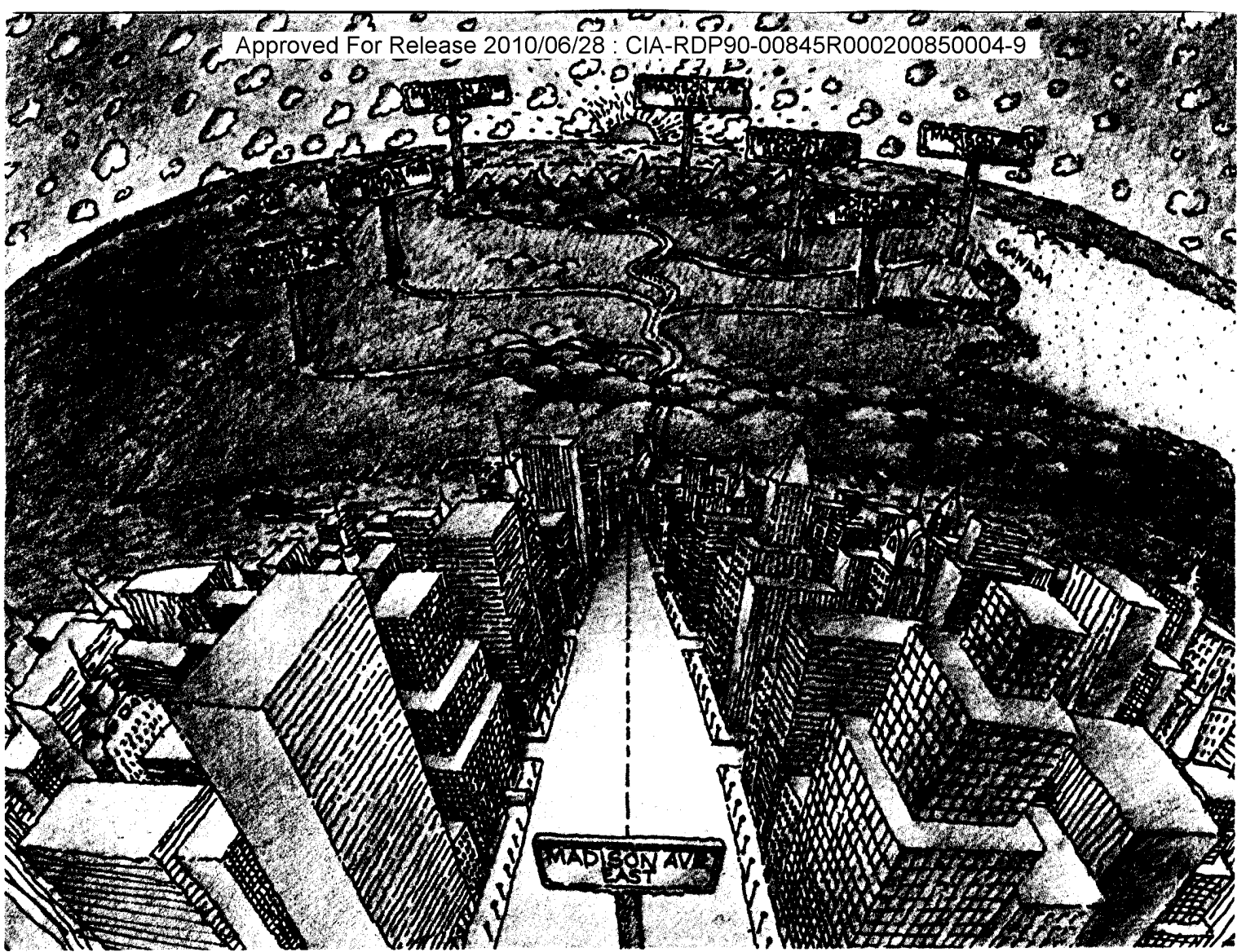


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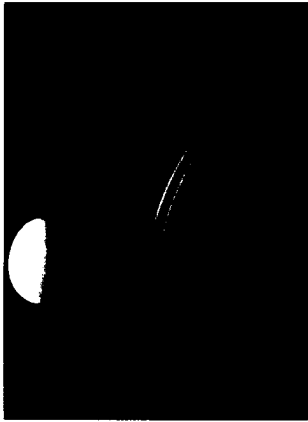
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To evoke the sophistication of today's robots, photographer Al Satterwhite posed this PUMA 500 with an egg in its gripper.

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NEXT

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BY FRED REED Funny little fellows out of *Star Wars* they're not, but these robots know what they're doing (some can even see) and, best of all, say their employers, they work three shifts without funny looks.

40 THERE IS AN ALTERNATIVE: HUMAN SCALE

BY KIRKPATRICK SALE For all things there is a proper size. Until we understand that, the author maintains, all our solutions will just create problems.

50 FELLINI'S ONCE AND FUTURE WOMAN

BY MELTON S. DAVIS To illustrate prospects for relations between the sexes, the noted Italian filmmaker puts his hero in a city populated and governed by women. It's an extravagant conceit, but men may not find it a pretty picture.

58 IF THE INFLATION RATE TOPS 25 PERCENT . . .

BY LAWRENCE FARBBER What was extremely unlikely only months ago now looms as a real—and chilling—possibility. What would your life be like in a superinflated economy? The answers may surprise you.

64 DESIGN THAT SPEAKS FOR THE 80s

BY VICTOR PAPANEK Twelve products that are not only the best of their kind, but also express the lifestyles and values of the new decade.

70 THIS MAN REALLY BELIEVES IN FREEDOM

BY DENNIS BAILEY He's the presidential candidate of the Libertarian Party, which, believe it or not, is now our third largest. If it's not the party of the future, at the least it should influence future party platforms.

76 BIG MING MEETS BIG MAC

BY RICHARD LINGEMAN A 1986 scenario of the Americanization of China: The new premier climbs to power on the success of Junk Food restaurants in Shanghai Harbor.

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Editor

A.J. Vogl

Publisher

Carroll V. Dowden

Executive Editor

Judson Gooding

Managing Editor

Molly McKaughan

Design Director

Steve Phillips

Staff Editors

Warren Boroson (special projects)

William H. Ryan (articles)

Karen L. Saks (assistant managing editor)

Art Director

Lester Goodman

Staff Writer

Richard Conniff

Researcher

Karen Braeder

Staff Assistant

Libby Botwick

Correspondents

Boston: John Sedgwick, 53 Joy Street,

Boston, MA 02114; Chicago: Civia

Tamarkin, 503 West Briar Place,

Chicago, IL 60657; Houston: David C.

Lee, 10138 Emnora, Houston, TX 77080;

Los Angeles: Jim Schefter, 24222 Park

Street, Torrance, CA 90505; San

Francisco: Charlotte K. Beyers, 330

Santa Rita Avenue, Palo Alto, CA

94301; Washington: Fred Reed, 1527 N.

17th St., Arlington, VA 22209; Paris:

Alexandre Dorozynski, Quartier du

Gres, 13210 St. Rémy de Provence,

France

Editorial Production

Joseph Coleman

Mary Meade Christensen

Dolores Baumann

Text Processing

Vincent Loccisano

Advertising Director

James B. Martise

Advertising Managers

William G. Battista (Detroit)

Jeffrey D. Diskin (Midwest)

Patricia B. Gornish (New England)

Jilda Manikas (West Coast)

Circulation Director

S.O.J. Spivy

Promotion Director

Elaine Stern

Administrative Assistants

Barbara L. Roman, Denise Schweffler,

Joanna Vitolo

Manufacturing

Leonard H. Habas

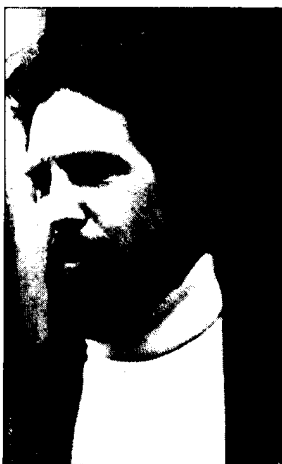
Ralph C. Peluso

Advertising Production

Herbert Linden

Aline P. Lodge

WHO'S NEXT



Kirkpatrick Sale



Victor Papanek



Richard Lingeman

Fred Reed, our Washington correspondent and Patents editor, need not worry that robots will ever put him out of work. The so-called "programmable manipulators" may eventually learn to type, but they'll have a hard time matching Reed's other journalistic skills, which include a broad knowledge of science (he was recently studying vertebrate anatomy and rereading Kittel's *Thermal Physics*), real enthusiasm (his first encounter with intelligent machinery, a school computer, was "love at first sight"), and the ability to write with a lucid, personal style. See his "The Robots Are Coming, The Robots Are Coming," page 30.

Reed started out in 1973 by persuading his local paper to let him pay his own way to Israel as a war correspondent. Since then, he's worked his way up to the op-ed page of the *Washington Post*. In his spare time, he's helping build a harpsichord for his wife. It's a chore, he says, that might cause a robot's brain to boggle.

Kirkpatrick Sale writes about problems that make human brains boggle. In addition to "There Is An Alternative: Human Scale," page 40 (adapted from his forthcoming book, *Human Scale*), he has boggled brains before with *Power Shift: The Rise of the Southern Rim and Its Challenge to the Eastern Establishment*, the book that thrust the Sunbelt into the national consciousness, and in *SDS*, a 1973 history of the Students for a Democratic Society. He also works for a number of social change organizations (all appropriately small scale), and is active as vice-president of the PEN American Center, which promotes international cooperation among writers.

While Sale gives us the political and philosophical side of human scale, **Victor Papanek** lets us see it and hold it in "Design That Speaks For the 80s," page

64. Papanek brings two disciplines, architecture and anthropology, to the subject, and they have served him well. His best-known book, *Design For the Real World*, has been translated into 23 languages and is the most widely read book on design in the world. He has lived, taught, and worked in 13 countries, and is now senior design consultant to the World Health Organization and to Volvo in Sweden. He also chairs the department of design at the Kansas City Art Institute.

Finally, we're privileged to be able to tell the truth about the secret life of **Richard Lingeman**, the author of "Big Ming Meets Big Mac," page 76. Better known as executive editor of *The Nation* and as a former editor and reviewer for the *New York Times Book Review*, Lingeman has for more than 15 years been a pseudonymous Sinologist. "I can now reveal for the first time," says Lingeman, "that I was co-author of a classic in the field entitled *The Red Chinese Air Force Sex Exercise and Diet Book*. Relying on "confidential CIA reports leaked to all the major dailies," Lingeman, Marvin Kitman, and Victor Navasky, then co-editors of a political satire magazine called *Monocle*, published the tract under the inscrutable cover identity of William Randolph Hirsch.

Noting the Supreme Court's recent decision to punish former CIA man Frank Snepp by confiscating royalties he earned writing about the agency, Lingeman emphasizes that none of the co-authors has ever been a member of the CIA. He says he's anxious that the children of the three "grow up knowing their fathers were clean. As for the royalties on the book, which totaled something like 35 cents, the CIA is welcome to them." Lingeman has a new book due soon from G.P. Putnam's called *Small Town America*. He says he'll keep those royalties for himself. ■



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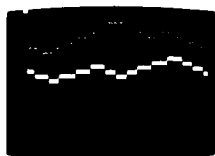
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Ned Levine

After looking through NEXT's Premiere Issue, some readers have asked me about our politics. Apparently the first issue left them a bit confused about where we stand and what we stand for. However, that didn't stop them from trying to label or pigeonhole us.

There were some who were convinced we were conservatives. For evidence they pointed to our piece on cars versus mass transportation, in which an economics professor challenged the conventional wisdom that mass transit is the wave of the future. As for his argument that giving every Los Angeles commuter a small car would be both cheaper and more energy-efficient than building a mass-transit system for the city—well, they said, the man's kidding, isn't he? No, although he didn't kid himself into thinking his proposal would be taken seriously. But however his views might be taken, there were readers who felt they were decidedly unenlightened, unrealistic, and (most damning of all) unliberal.

On the other hand, I got some letters regarding my conversation with Bill Moyers that accused Moyers (and me) of being too liberal—knee-jerk liberal, if that description still enjoys currency. That rather surprised me, because Moyers criticized Democrats (and President Carter) just as much as Republicans.

To make pigeonholing still more difficult, in this issue we have Kirkpatrick Sale ("There Is An Alternative: Human Scale") calling for an end to bigger-is-better government and the "technofix" solution to our

problems. But Joseph F. Coates, our guest columnist for Next & Last, argues that our problems with technology can't be solved without government help, even though the mess we're in has resulted from the government's ineptness in managing technology.

Then there's Karl Hess, who presents a real dilemma for pigeonholers. Hess, our book reviewer for the Premiere Issue, was once a speech writer for Barry Goldwater. (He's credited with Goldwater's infamous, "Extremism in the defense of liberty is no vice.") Hess has said good-bye to speech writing, has become a welder, and is now committed to making small communities work. He has also become loosely identified with the Libertarians, a third party that believes strongly (fanatically, I'm tempted to say) that the less government the better.

The reason I bother to explain this is that we have an article about Libertarians in this issue and Karl Hess is mentioned in it. As a result, I'm sure somebody out there is going to ask whether we've become the mouthpiece for the Libertarian Party. The long answer to that question lies in the article itself. The short answer is no.

The tracks of the future beckon. Some will lead to deadends. Others will take us closer to our goals—making tomorrow pertinent to your life today, suggesting alternatives, making you think about things to come. Traditional politics just aren't very relevant in deciding which tracks to follow.

Editor

EDITORS'S NOTE

LETTERS

Compliments

My first issue of NEXT just arrived. And I must take time off from my patients to tell you that out of all the magazines I have ever taken (and I currently subscribe to 40) this is the only issue which I read from cover to cover. It does indeed tell you what is coming next. I shall have to file every copy for future reference, instead of giving it to the local library or hospital.

Dr. G.E. Perry
Reedsburg, Wisconsin

The Premiere Issue of NEXT was great! Too great, in fact. There was so much interesting material packed between the covers that I got a bit overwhelmed. I feel like I just read Thanksgiving dinner.

Joy Imboden
Oakland, California

I'm sure Alvin Toffler would applaud your attempt to anticipate and understand the future. The net result for your readers should be an improved ability to cope with those changes which will directly affect our lives. As an employee of a bank, I have come to appreciate the fact that the future belongs to those who can best forecast and adjust to it.

Robert Schwarzberg
River Vale, New Jersey

Reindustrialization

Amitai Etzioni's column is right on target in predicting the reindustrialization of the U.S. in the 1980s. An upsurge in capital investment in the primary and secondary sectors is already under way, and substantial improvements in R & D spending are on the horizon. Let's hope that management faith in America will be matched by a corresponding effort among employees to restore our leadership in output and technology.

L. Clinton Hoch
South Orange, New Jersey

The premise Etzioni accepts is frightening in its implications. He assures us all, like a strong father, that austerity and self-discipline will lead us back to the days of a "strong economic infrastructure," which depends on "abundant cheap energy." But what he is really talking about is an economy of scale so

massive as to grind out the hope that a few of us will make it through the 20th century alive. I mention hope because it seems to be a word absent from his lexicon.

There are promising developments in the energy field that can and should be developed by private citizens. The technology is there. I can cite three examples: (1) a backyard solar-energy device that would allow denizens of the West and Southwest to unhook their utility lines for much of the year; (2) a revolutionary device that utilizes low-grade ground heat to run a generator and produce electricity; and (3) a device for producing ethanol (a gasoline substitute) that operates very much like an old backwoods still.

Leonard Hendrickx
Redondo Beach, California

Futuremakers

The true "seers" into the world's doubtful future are those who measure what we have remaining and who compute how long it will be before our resources are gone.

The self-appointed "futurists" interviewed in your first issue are mostly venting gas while our oil disappears. They talk in terms of "Karma yogi," "mobility and fluidity," "abundance," and "globalism." Hard-nosed, realistic thinkers such as Jacques Cousteau tell us that the Mediterranean Sea is dead and fishless, and that the Sargasso Sea in the Atlantic is a wasteland composed of blobs of petroleum glop. We must listen to such pragmatists as Barry Commoner, Frances Moore Lappe, and Cousteau in order to survive. Brave new worlds are for Huxley enthusiasts, not for parents of children.

David Binger
Mt. Kisco, New York

Hurrahs for Mass Transit

Ben Pesta's article "The Car: Is There Any Other Way To Go?" is shallow and nonsensical. Mr. Pesta flies in the face of every recognized authority in his assessment of future transportation trends, and sounds too much like a public relations "expert" for the auto, rubber, and oil industries to be taken seriously. Perpetuation of the past mistakes in city and suburban

planning would hardly seem to be the way of improving the lot of our cities, particularly in view of the increasing cost of oil, increasing pollution, and increasing congestion. Lengthy quotes from obscure academics and generalizations based on questionable statistics do not obscure the fact that highway costs are equal to if not greater than rail-transit-line building costs. In addition, Mr. Pesta never even considers where he would store all the hundreds of thousands of cars he would have Americans commute in. I hope future treatment of transportation in NEXT will be more rational.

Thomas Flanagan
Philadelphia, Pennsylvania

What funding has been doled out to mass transit has been fought over by intercity buses, Amtrak, and local transit services. Much of it has gone to isolated extravaganzas such as BART. Before we conclude that the gas guzzler is the only way to go, we must give mass transit the money it needs to demonstrate that it can and does work.

Chi Mo
New York, New York

Ben Pesta has the order of the "anti-car chorus" wrong. First there was Lewis Mumford, then Jane Jacobs. Next I came along, and much later came Ralph Nader with his book *Unsafe At Any Speed*, the title being a direct quote from my book *The Insolent Chariots*, although he failed to mention this fact.

John Keats
Syracuse, New York

The Diversion of Quibbling

Prediction—even in fun—requires both feeling and logic, along with an instinct for knowing which one to apply in any given situation. Paul Dickson's forecasts ("Diversions") seem a bit off to me. The average person doesn't give a damn about aesthetics in everyday objects. All he wants is practicality. You and I may tire of felt tips and long for the fountain pen, but the suburban housewife hates ink stains. And if city and suburban dwellers already find bicyclists eccentric, why should they take to tricycles? Hand ice-cream ♦

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LETTERS

makers may stage a nostalgic comeback, but they will be short-lived as soon as people find how much work they are. Ditto spritzer bottles with CO₂ cartridges.

Ed Rehmus
San Francisco, California

I Wish I Hadn't Said That

Both my accurate and inaccurate predictions were correctly cited, but the results of my forecasting during some 43 years are happily a great deal better than I am quoted as saying in your article. My box score in 1979 was 73 percent even though I predicted only an 8½ percent inflation rate. My most conservative estimate of the accuracy of my predictions, made every January before the Sales Executive Club of New York, is in the upper 70s, not "around 65 percent."

Leo Cherne
New York, New York

Nay to Nash

Because of the human factor (humans, after all, must program and control computers), nuclear technology is not now and can never be made safe, despite Roderick Nash ("Let's Save the Wilderness From Its Friends").

I lived near a supposedly safe mill-tailings pond during my two pregnancies and, as a result, my first child died and my second barely survived. He is now at a very high risk for developing leukemia. Tell me how "safe" that is. I just see red when I see "safe" mentioned in connection with any phase of nuclear technology. The two are like oil and water, and just don't mix.

Let's also look at some economic factors. Despite the low priority given it, solar technology is becoming easier to produce, more cost effective, and more efficient. At the same time, building nuclear facilities is skyrocketing in price, safety problems are becoming more apparent, and there's always the problem of what to do with the waste.

Let me tell you, we don't want it here in New Mexico.
Deborah Hallenbeck
Albuquerque, New Mexico

If we follow Nash's suggestion to investigate "safer" nuclear technologies (inevitably requiring many more Three Mile Islands), then we will certainly solve what he feels is the whole problem—large numbers of people.

Not only will the problem of our numbers be eliminated, so will the threat to our wilderness and wildlife.

How can plants and animals accommodate their niches to nuclear fallout? With soft technology, at least chances exist.

R. Dana Ono
Cambridge, Massachusetts

Being a mountaineer, Mr. Nash, you may have breathed too much thin, pure, beautiful, uncontaminated, unradiated air, lost your sense of direction, and stumbled into the world of big business. Too bad.

You envision a world covered with windmills, and rivers all stopped up with hydroelectric dams. You see the Sierras covered with the people of the Los Angeles-San Diego metropolis. So, you say, big cities are preferable, for then the true wilderness will be spared. But will it? No. The wilderness can't escape the cities' pollution. Because of acid rain, more than half of all the lakes in the Adirondacks are incapable of supporting life. I know, for that's where I live—30 miles from Lake Placid. I've seen lakes without fish and wondered how long it will be before every lake is lifeless.

Windmills, solar panels, hydro-systems, and the rest of the soft technologies really do matter to the safety of the environment. The air from a windmill comes out as clean as

it went in. The same can be said for a hydroelectric dam. You say the earth will have to be covered with windmills to support our needs. But there is no reason why a society that can cover its land with automobiles and parking lots (for the construction of which many wilderness areas have been destroyed) cannot use many more windmills.

Brian D. Bashaw
Au Sable Forks, New York

Nuclear power plants use uranium, which must first be mined and processed. Most uranium comes from strip mines that encompass many square miles. The tailings from these mines occupy many more miles.

The processing of uranium produces millions of gallons of radioactive fluids and tons of radioactive solids. These wastes are stored in acres of waste ponds. All of this occurs even before the uranium is used.

Mr. Nash's article also reveals he doesn't know much about alternate energy possibilities. Our future electric supply will come from solar satellites. As for fuel, alcohol can be made from any vegetable or wood waste.

Steven D. Nesko
Clarendon Hills, Illinois ■

THIS WAS NEXT



That's no gorilla, that's a college president. This cartoon, from a 1904 issue of *Life*, held that this pensive musclemán is what the average college president would look like after football controls our universities.

Heart Computer

Your heart can tell you three things that can help you live longer and stay healthier. The rest is up to you.

JS&A has never offered a pulse meter. And for good reason.

If you've ever used one, you'll quickly discover that your heart does not beat like a clock. It's irregular. It might beat at 40 beats per minute for one instant and at 120 the next. Since most pulse meters measure each beat as it occurs, you never feel confident that you're getting a very good reading.

We also considered size. Each pulse meter we examined was large or cumbersome and awkward to carry or store.

WE WAITED

We waited a few years. In the meantime, we discovered three ways your heart (through your pulse) helps you monitor your health.

Pulse Rate Your pulse rate can tell you if you are getting enough oxygen throughout your body. A high pulse rate indicates that your heart must pump faster to supply that oxygen and may indicate poor physical condition.

Target Zone Your pulse can tell you if your heart is beating fast enough during exercise. There's an area called the "Target Zone." Below this level, you're not exercising hard enough to do your heart or respiratory system any good. Above this level, you can be dangerously over-exercising yourself.

Cardiac Recovery Time The time it takes for your pulse rate to return to normal after you've exercised is the real measure of whether or not your exercise program is doing you any good. This time can be as healthy as one minute or as poor as several minutes.

The three things we learned convinced us that the ideal pulse meter must have the following features:

1. It must measure a series of heart beats and simultaneously compute the average to avoid the strange readings from irregular heart beats.
2. It must be small enough to use while exercising.
3. It should have a timing capability to determine the Cardiac Recovery Time.

It wasn't until a small Utah medical electronic instrument company created what we feel not only provides the capabilities listed above, but excels in other areas too.

FITS ON FINGER

The unit is called the Pulsetach, and it fits right over your finger. It weighs less than an ounce and can be worn easily during most exercise programs.

The large liquid crystal display can easily be seen in normal room lighting or in bright sunlight, and because liquid crystal displays consume very little power, the readily-available watch batteries will last for years. The Pulsetach automatically turns itself off in five minutes if you forget.

The heart of the system is a powerful micro-

computer CMOS semi-conductor integrated circuit that will take up to 4 pulse beats, compute an average pulse rate, and then flash that rate on the liquid crystal display.

FINGERTIP SCANNER

The sensor consists of a Gallium Arsenide infrared light-emitting diode which scans your fingertip hundreds of times a second to determine your pulse rate. This new system is one of the most accurate and is also used in sophisticated hospital systems.

The unit also contains a quartz-controlled timing circuit which will accurately time either your exercise period or your Cardiac Recovery Time. And you can switch back and forth between the pulse and chronograph mode while you are exercising.

We realize that the Pulsetach sounds like a very sophisticated unit. And it is. But as sophisticated as it is internally, it's an extremely easy unit to operate. There are just two buttons to press which operate the pulse reading and the chronograph timing circuit. A third button engages the audio circuit.



The Pulsetach system fits comfortably on your finger while it monitors your heart and determines your Cardiac Recovery Time.

HEAR YOUR PULSE

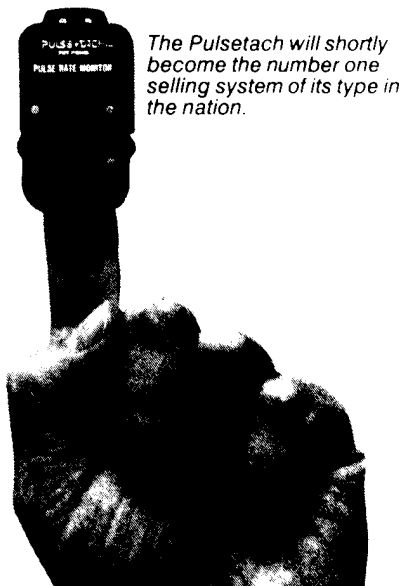
The audio circuit simply beeps every time your pulse beeps. This feature lets you monitor your pulse by hearing it as you run or exercise and it can be shut off by pressing the button a second time. The timing circuit is quartz-controlled and extremely accurate.

The Pulsetach not only has combined all of the most advanced technology in an extremely small size, but it costs less than many other systems lacking its advanced features.

The Pulsetach can be used for joggers, athletes, all forms of exercise and even cardiac recovery patients, as it operates quite effectively with pacemakers.

REAL WORKOUT

We suggest you order a Pulsetach for our 30-day no-obligation trial. When you receive your unit, give it a real workout. Notice how simple it is to operate and how easily you



The Pulsetach will shortly become the number one selling system of its type in the nation.

can read your pulse rate. Use it to stay in your Target Zone and to determine and then improve your Cardiac Recovery Time.

Monitor your Cardiac Recovery Time. Determine your Target Zone and see if you're really exercising in that area. Then use the Pulsetach to watch those important signs slowly improve thanks to the accuracy and information you get from the unit.

By knowing the important factors that help you monitor your health, you'll feel better, exercise more effectively, and many doctors feel you'll live longer.

TWO UNITS AVAILABLE

To order your Pulsetach pulse meter, send your check for **\$119.95** plus \$2.50 postage and handling (Illinois residents add 6% sales tax) to the address below. (Allow 20 days for personal checks to clear.) Credit card buyers may call our toll-free number below.

You can also order the more expensive hospital unit that averages 16 beats and has all the features including the small size of the previous unit. It costs **\$169.95**.

We'll send your Pulsetach pulse meter complete with 90-day limited warranty and instructions which include information on determining your Target Zone, Cardiac Recovery Time and other helpful information.

Then after your test, if you're not fully convinced that the Pulsetach is the best unit of its kind, the most convenient, and the greatest value, return it within 30 days for a prompt and courteous refund including the \$2.50 charge for postage and handling. You can't lose.

Your Pulsetach is totally solid-state so service should never be required, but if it is, the manufacturer has a national service-by-mail facility backing each unit. JS&A is America's largest single source of space-age products further assurance that your Pulsetach is backed by a substantial company.

We've waited an awful long time to jump into the pulse monitoring field. But what a great entry. Order your Pulsetach at no obligation today.

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**Latest Wave Of Smoker Research:
Smokers prefer MERIT 3 to 1 over high tar leaders
in tests comparing taste and tar levels:**

Merit Solid Winner!

**Smokers Report: MERIT
Taste Matches High Tar Cigarettes.**

New taste tests with thousands of smokers prove it.

Proof: A significant majority of smokers rate MERIT taste as good as—or better than—leading high tar brands. Even cigarettes having twice the tar!

Proof: Of the 95% stating a preference, 3 out of 4 smokers chose the MERIT low tar/good taste combination over high tar leaders when tar levels were revealed.

**MERIT: Proven Long Term
Alternative To High Tar Brands.**

New national smoker study results prove it.

Proof: The overwhelming majority

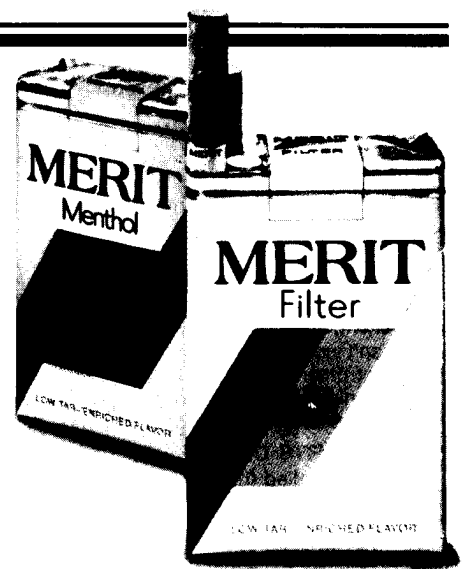
of MERIT smokers polled feel they didn't sacrifice taste in switching from high tar cigarettes.

Proof: 96% of MERIT smokers don't miss former high tar brands.

Proof: 9 out of 10 enjoy smoking as much since switching to MERIT, are glad they switched, and report MERIT is the best tasting low tar they've ever tried.

You've read the results. The conclusion is clearer than ever: MERIT delivers a winning combination of taste and low tar.

A combination that's attracting more and more smokers every day and—more importantly—satisfying them *long term*. © Philip Morris Inc. 1980



MERIT
Kings & 100's

Warning: The Surgeon General Has Determined
That Cigarette Smoking Is Dangerous to Your Health.

Kings: 8 mg "tar," 0.6 mg nicotine—
100's Reg: 10 mg "tar," 0.7 mg nicotine—
100's Men: 11 mg "tar," 0.8 mg nicotine
av. per cigarette, FTC Report Dec. 79

THE PERSONAL
SIDE OF
TOMORROW

YOUR MOVE

COSTLY NEW CREDIT CARD CRINKLES

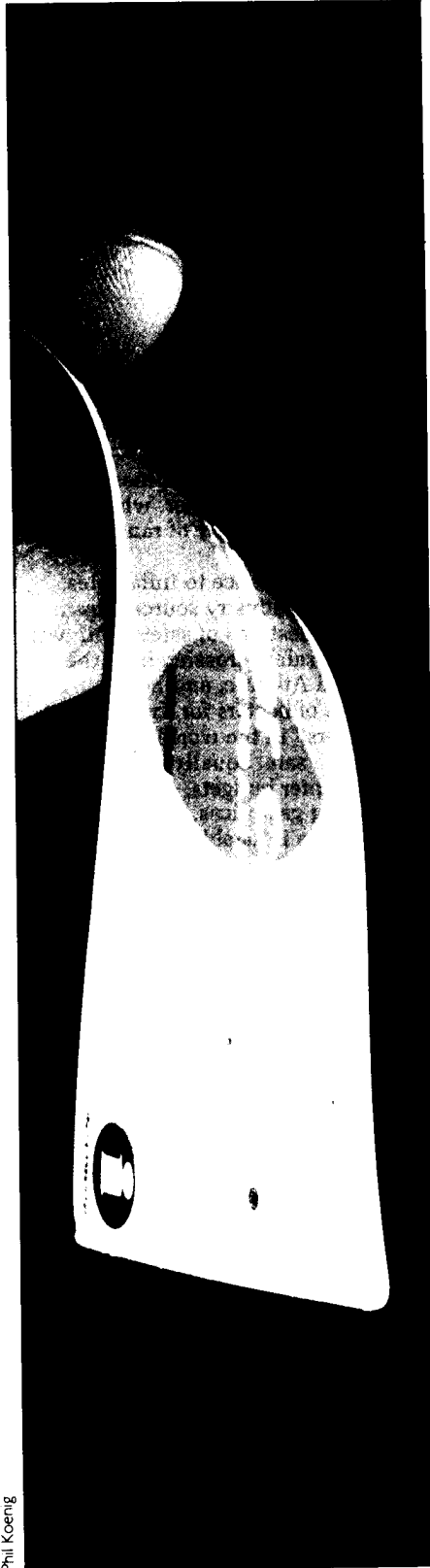
The major credit cards, having found their way into virtually all the nation's plusher wallets and purses, are about to lose many of the very cost advantages that made them so popular. A survey by Payment Systems, Inc., a subsidiary of American Express, predicts:

- the gradual erosion through 1985 of the 30-day no-interest grace period, which means you'll have to pay your 18 percent (or possibly a reduced rate) from the day of purchase;
- the imposition of \$6 to \$12 yearly fees, because bank card issuers say their credit card operations are just barely making money;
- increased emphasis on profits, even if that means raising standards for eligibility, limiting issuance of new cards, and tougher payment schedules such as those recently announced by Citibank.

In Rhode Island, Industrial National Bank has already slapped a \$10 annual fee on its credit-card accounts. But a spokesman for Interbank's MasterCard predicts most issuers will try to avoid annual fees as long as possible. "Nobody really wants to be the first on the block," he says.

Some harbingers: Union Planters National Bank in Memphis, Tennessee, recently told its cardholders they will have to cough up \$5 when they exceed their line of credit, \$5 for a late payment, and \$10 if their check bounces. And in New York, Citibank announced a 50 cent monthly fee on inactive credit-card accounts and on accounts paid in full one month with no new charges the following month. But it dropped the plan when cardholders protested.

Instead, in one of the more imaginative twists in the profitability game, Citibank is now considering paying cardholders interest on what it calls "credit balances." The catch is that you have to put up more in advance than you expect to owe. Citibank will then deduct your monthly payment. You earn interest—at a rate not yet determined—on the excess, turning the credit card into a sort of savings account. Such varied programs will make it increasingly worthwhile over the next



Phil Koeng

few years to shop around for the best credit-card deal.

Bankers seem sanguine about the prospect of losing some credit-card business. They hope the new "disincentives" will reduce inactive accounts (from 33 to 15 percent, PSI predicts) and discourage what they call "nonrevolvers"—cardholders who pay up late enough to take advantage of the grace period but too soon to incur interest charges.

If the grace period is eliminated and annual fees become the rule, "nonrevolvers" and others who now use credit cards mainly for convenience, rather than for installment credit, may want to switch to debit cards. (For a fuller discussion of how these work, see "If The Inflation Rate Tops 25 Percent..." on page 58.) What's the advantage? By having a purchase electronically deducted from your account before you leave the store, you'll avoid interest charges. Depending on how banks market the debit cards, you'll have a lower annual fee or no fee at all. —Richard Conniff

A BOAT UNDER THE BED

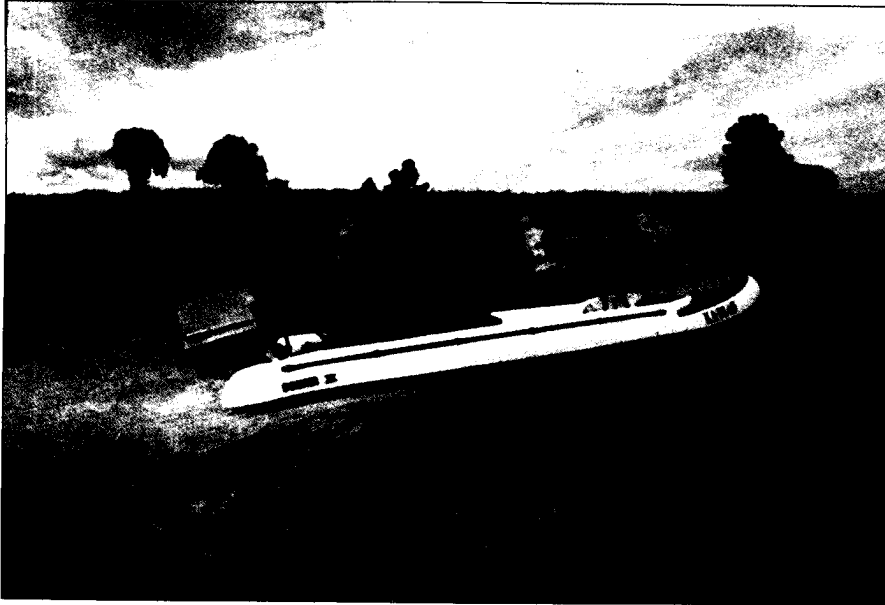
Small inflatable boats, long derided in the U.S. as "pool toys," are now coming into their own as Americans discover that the boats are ideally suited for this new, more stringent decade. Europeans, accustomed for years to crowded waters and to smaller homes and cars, have enjoyed inflatables ever since the Hindenburg disaster put many airship manufacturers into the boat business. In the 1980s, regular boats will cost more to buy, to store, to transport, and to fuel. It is the moment of truth for inflatables, which have had technological improvements grafted onto their traditional designs, and which offer reliability and convenience at reasonable prices.

Among the hull types are kayaks, which are best maneuvered with double paddles; all-purpose dinghies you can paddle, row, motorize or sail; and runabouts, the sports cars of the inflatable world, offering higher speeds as well as oar or sail options.

The two basic modes of construction are single layer (usually a tough PVC plastic) and sandwich types.

YOUR MOVE

Louis Bignami



Rocketing down the waterways at 20-plus knots, this jazzy Bonair III American-made inflatable shows what these blown-up boats can do—and it really will fit in your closet.

The former are about half the cost and weight of the latter, and are best used for casual boating on protected water—although PVC kayaks do meet the test of commercial runs such as those that rocket down Oregon's wild and scenic Rouge River.

"Sandwich" hulls—inner and outer coats on a reinforcing fabric or, increasingly, on a plastic web—allow the designer more latitude. Inner layers can be selected for air retention, and outer layers for sun and abrasion resistance. Neoprene, Du Pont Hypalon, PVC, Kevlar, rubber, and experimental boron and graphite fiber reinforcements layered for strength all reduce weight and improve durability.

But the inflatables primarily appeal to the market of the 1980s because of their portability and lower costs. Kayaks and small dinghies deflate to fit a carrying bag little larger than a suitcase. Runabouts usually come in two packages because most offer rigid floorboards to stiffen the boat for higher speeds. But any inflatable and its pump, paddles or oars, and the tiny motors that yield surprising performance will fit into the trunk of the smallest compact car, and will store in a closet, garage, cabinet, or even under a bed.

With the adoption of more regulations prohibiting gas motors to improve water quality, it's worth noting that small electric motors do an excellent job of quietly getting you out to the spot where the fish are biting. Those who stay with gas can buy 1.2 to 3 horsepower engines for inflatables at half the price and weight of motors needed for conventional

craft. And the smaller engines get 75 miles per gallon or better, which should provide plenty of range for fishermen.

Buyer resistance to inflatables, according to industry sources, seems related to questions of safety. But with inflatables safely crossing both the Pacific and Atlantic, and becoming the choice of boaters for the toughest "wild rivers" in the world, it's clear that they're safe. Equally clear, given today's tighter budgets, smaller cars, and soaring gas prices, is the growing appeal of the inflatables for the 1980s.

—Louis Bignami

A FOUR-LETTER WORD FOR A NINE-DIGIT ZIP

The bureaucrats who first brought you the zip code will be bombarding you with still more numbers next year. With the nine-digit zip code now a certainty, the U.S. Postal Service will not only change the look of your address but also facilitate the delivery of unsolicited mail to your home.

Why four more digits when you can't even recall your present zip code? Acknowledging that nine digits may cause "some confusion" for the public at the outset, the Postal Service nonetheless believes that if you can tolerate the long Social Security numbers, you can swallow added zip-code digits without undue vexation.

With the new system, the Postal Service claims, delivery will be faster and more dependable. Mail will be machine-sorted directly to pouches destined for small clusters of households or businesses in a single zip-

code area. But unfortunately mail carriers will not be the only ones with a more direct line to your letter slot.

Thanks to those four extra numerals, consumer-products marketers, advertisers, and promoters will be able to use the demographic charts of a section in a city block or a small group of suburban homes to evaluate the economic standing of an area. Direct mail and sampling programs will be targeted toward specific locations, with the result that more and more junk mail could come your way.

The lucky number that wins the "One-Time-Only! Mail Today! Chance-Of-A-Lifetime! Sweepstakes" will be easier to remember than your zip code. Grand Prize is a trip to Honolulu, Hawaii 968174235.

—David Michaelis

CAREFUL: WOOD STOVE WORKING

The national shift to heating homes with wood threatens to bring high hazards with its warmth. Government and private fire-prevention organization studies point to a sharp rise in fatalities linked to wood-burning stoves.

The stoves themselves are not to blame. A study by the National Bureau of Standards revealed that product failure was the cause in only 13 percent of wood stove-related fires. The rest were caused by improper installation, maintenance, or use.

"People are putting these things in themselves, any which way," says Paul Solomon, of the National Fire Protection Association's Boston office. "They're putting the stoves or the stovepipes too close to uninsulated walls and combustible surfaces. We even saw one or two cases where people installed stoves in their closets." Installation guidelines can be obtained from the National Bureau of Standards (Attn: Technical Information and Publications Division, Administration Building Rm. 617, Washington, D.C. 20234), but Solomon suggests getting a heating contractor to do the job. After installation, he recommends inviting a building inspector or fire marshal to examine your stove as soon as possible, notifying your insurance company, and getting a smoke detector. That done, you'll just have to worry about maintenance (creosote can build up in the chimney, especially if you make the mistake of using green or wet wood) and operation.

Is firing up a wood stove worth it? "A cord of good dry hardwood is equal in BTUs to about 130 gallons of

No. 2 fuel oil," says Forest Orr, a consultant to the Department of Energy. "If you're paying \$100 a cord, as opposed to, say 96¢ a gallon, obviously it's economical. Then too, from the national point of view, you're saving oil." And what about our forests? "As an old forester," Orr says, "I can tell you wood burning doesn't mean you have to destroy the forests. There's tons of what we call junk out there, interfering with the growth of the more desirable species. Now there's a growing market for it."

The Environmental Protection Agency is equally bullish on wood. They call for a trebling of consumption by the year 2000. The ashes are great for your garden, and if the smoke gets in your eyes—well, the EPA is working out ways of reducing the pollution, which even now is no worse than what oil and gas burners produce, and which smells better too.

—Evan Eisenberg

SMOKING STEWS AND FUMING PASSENGERS

If you've traveled on a commercial airline recently, you don't have to be told about the new discourtesy in the air. Stewardesses and stewards, once the smiling attendants of the skyways and among the airlines' best sales assets, have in many instances become churlish, sometimes even rude. Customary services such as handing out blankets and pillows have become rare if not nonexistent. Requests are ignored—or refused. Insults are traded. Tempers are short.

The lift-plus-thrust of future air travel equals stretch-plus-crunch. Diminishing profits (despite a record

39.6 percent fare hike in 1979) and reduced flight service to major cities have led the airlines to stretch seating capacity by mercilessly pinching elbow space and legroom. The conventional 36-inch fore-and-aft distance between seats has been cut by 4 inches. With the seat tracks crowded closer, rows are no longer aligned precisely to the aircraft's windows. The results? Ask for a window seat and you may find yourself staring at a wall. And if the seat in front of you is reclined, your chest may be flattened by the other fellow's headrest, while you hold your breath and wait for the auxiliary oxygen mask to drop.

But relax. Enjoy the slight. You're not alone in your vexation. The Airline Passengers Association (APA) receives several dozen complaints a day from victims of the new aerial discourtesy. "It has to be one of the dirtiest planes I've been on in months," wrote one outraged passenger about a Northwest Airlines flight. "Terrible crew! Terrible service from female cabin staff! Terrible disrespect! TWA won't have me as a transatlantic passenger ever again!" thundered another.

Up in first class, travelers fare no better: "On a 95-minute dinner flight there were no playing cards, no liquor, and the stewardesses sat and smoked for half an hour after take-off. I plan to avoid Western Air until first class becomes first class." Another deluxe passenger agreed: "The flight attendants were sarcastic. They gave me the feeling: Why did you have to come on this plane? Refused to get me a pillow. Said get it yourself. I should have gone economy."

Partial relief may be on the way. By 1982, the new fuel-efficient Boeing

767s will again provide seating aligned with the windows, and slightly increased legroom. For businessmen, the new "business class" ticket offering larger seats, which has been adopted by a few airlines, may catch on with others.

A few silver linings beckon, perhaps, but "the days of luxury flying, when friendly service and extras were commonplace, are gone for good," according to APA. "Air travel is now mass transportation. As airline fuel and labor climb to 72 percent of total operating costs, poor customer service will be the norm in the future."

—David Michaelis

NOW YOU CAN TAKE IT WITH YOU

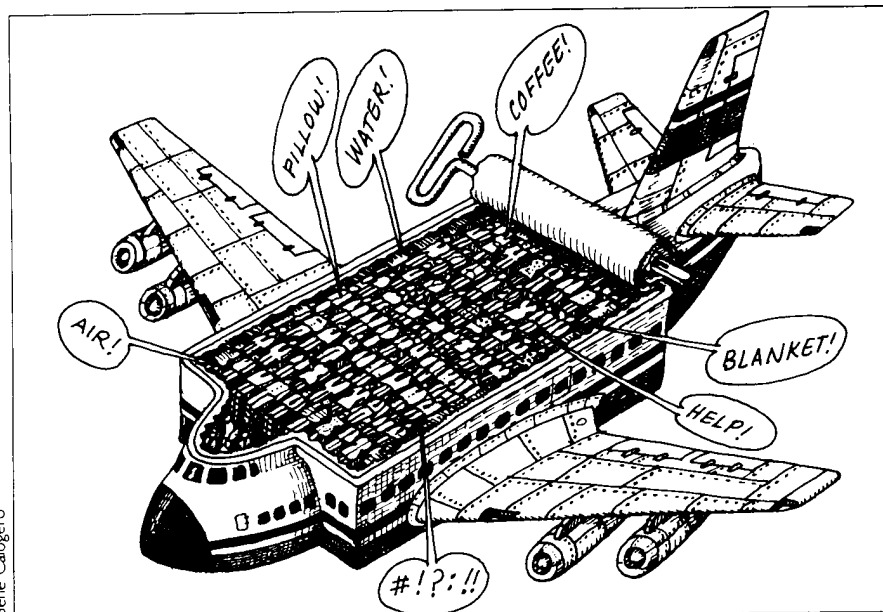
The fanciest new fringe benefit around is group life insurance that continues past a person's retirement. At his or her death, the cash proceeds—say, \$50,000—can pay off estate taxes or provide survivors with a monthly income. "Retired lives' reserve" (RLR), it's called, and one insurance expert, William Harmelin of New York City, considers it the hottest thing in insurance in years. Mutual of New York just began offering RLR, and in ten weeks it brought in \$10 million in premiums.

For the employee, RLR has all sorts of charms. With most group life insurance policies, when an employee retires, coverage either stops or declines drastically. And buying any kind of life insurance on your own, late in life, can require passing a physical exam, and in any case is fearfully expensive. But RLR costs employees nothing. And unlike stock options and other perquisites, it's usually not even taxable. CNA of Chicago, another large company offering RLR, lets employees from age 20 to age 75 sign on—and retire at ages 55-80.

For the employer, one giant benefit of RLR is that it's tax-deductible. Then, too, if an employee leaves before retirement age, the extra money the company has paid toward his or her RLR, beyond simple term insurance, reverts back to the company. All in all, RLR is an inexpensive way for the employer to keep executives happy—and to keep executives.

Some 36 insurance companies are providing RLR coverage, in just about every state. Typically, only high-level executives are covered, but eventually the benefit is expected to—so to speak—perk down. RLR is thus one more factor to consider the next time you evaluate a job offer.

—Warren Boroson ♦



YOUR MOVE



Mary Anne Shea

WHEN TWO CHIPS GET TOGETHER

For shy singles, the future promises a painless way of saying hello to the striking stranger at the far end of the bar. The new come-on goes like this: "Beep." The reply, if you're lucky, will be an electronic rhapsody: "Beep-Beep-Beep-Beep."

It's not exactly the smoothest line ever tried, but Carlisle Dickson, a Milwaukee inventor, says it works. His patented, trademark-registered Love Bug (probable price: \$40) uses two electronic chips, one programmed to describe the wearer's age, sex, and other less obvious characteristics (such as religion, income, or even astrological sign). The other describes the equivalent characteristics of the wearer's ideal mate.

At discos, beaches, special clubs, or anywhere else Love Bug wearers may assemble, the electronic device will identify with a beep any Love Bugger within 200 feet who seems tailored to your needs. If you measure up to someone else's program, their Love Bug will also beep. The closer you get, the more insistent the beeping becomes. If your opposite number lacks appeal, you can back out at a distance of 10 feet, by pushing the Love Bug's decoy button, which causes your signal to fade away.

Does all this sound like a pretty complicated way of saying hello? It could get much worse. Each computer chip in the Love Bug has 16,000 memory bits, which should just about cover all the elements in the human dating game.

Dickson expects to market the first Love Bug sometime next year. Oddly, the U.S. Law Enforcement Assistance Administration may help

get the project off the ground. The two-way homing device could help plainclothes detectives recognize each other. Dickson also sees potential for it as a locator for families at amusement parks or for firemen working in burning buildings. But having spent nine years as a bachelor before remarrying last year, he's most excited about putting an electronic beep in the game of love. —Michael O'Gara

THE COMPUTERIZED FENDER-UNBENDER

Technological razzmatazz surrounds us on all sides, but who would have thought it would penetrate the arcane field of automobile accident cost estimates? Audatex Services Division, of San Francisco, thought it could, and should, and is providing body shops with a system that generates speedy repair estimates for unfortunates with bent fenders, smashed grills and more extensive damage—of which there was \$11.6 billion worth from 18.3 million accidents in 1979.

The usual estimate process generally requires making an advance appointment, waiting at the estimator's for the expert to become available, then waiting some more while the damage is examined, and the cost of repair parts and labor is laboriously (and often erroneously) figured out. Then looms the possibility of a frustrating discussion with the insurance company adjuster, who may not choose to accept the estimate in all its details.

With the Audatex approach, the estimator marks code letters indicating damage on a blown-up diagram showing all the car parts. This takes about five minutes. The information is conveyed to a central computer via

teleprinter, and within four minutes the completed estimate is in hand, authoritative and precise, and rarely quibbled over by the adjuster. Audatex notes that in addition to saving valuable time, the system reduces friction between client, body shop and insurance company.

The body shop operator pays an initial fee of \$1500, then leases the system for \$100 per month, and customers pay \$5 or \$6 for an estimate. Developed in Switzerland ten years ago, the system is used for more than 70 percent of damage estimates in West Germany. Audatex now has 580 clients in the U.S. including insurance companies and adjusters, auto dealers and body shops, and the U.S. Department of Transportation.

ON THE HORIZON

- Vacations that earn you interest. Citibank and American Express are both considering paying interest—possibly at a 5 percent annual rate—on traveler's checks. They hope the move, to be made as early as this year, will give them a competitive edge.

- Taxicabs to tell you your fare and estimated travel time, in advance, as calculated by a computer back at the radio dispatcher's office. A Pittsburgh company is experimenting with the system in twenty cabs. The developers hope to make shared rides more popular by using the computer to calculate each rider's fare.

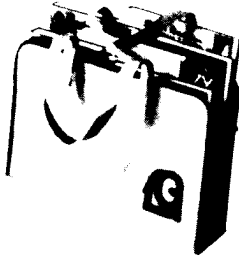
- An increase in liquor prices due to growing use of gasohol. Stretching petroleum supplies with alcohol will boost demand—hence prices—for corn and other grains, making this a good time to switch to rum.

- Electronic translators for rent this summer at selected Sheraton hotels in France, Germany, and Spain. PageAmerica Communications will also offer the device, at \$10 a day, to foreign visitors here. In addition, hotels here will be using electronic pagers that, instead of just beeping, read out an actual message. ■

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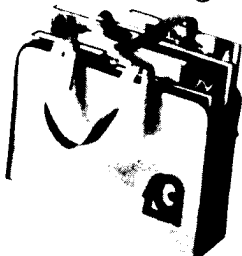
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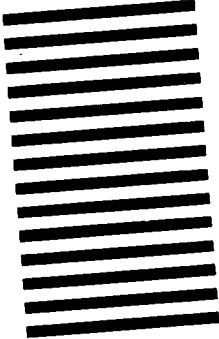
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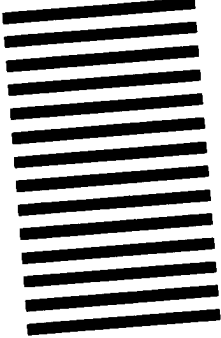
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FUTUREMAKERS

SIX WHOSE PASSION IS EARTHQUAKES

By Carl Proujan

What are the chances of seismologists predicting the next great California quake? When asked this question, Robert E. Wallace, chief scientist for the U.S. Geological Survey's Office of Earthquake Studies, bluntly responded, "It will depend on luck."

Wallace has reason to be gloomy. Of all the large-scale active geological processes, the shifting of the earth's crust is the most devastating and the most elusive of analysis. Every year, 30,000 people are killed by earthquakes; the loss of property amounts to billions of dollars. Soon it could happen in the U.S. where 70 million people live in high-probability quake areas.

Last year, a government study formulated a quake scenario about Los Angeles. A "great quake" of 8.0 or more on the Richter scale (each whole number represents a quake ten times more powerful than the next smaller number) hits along the fault underneath the city, killing 21,000 people, hospitalizing another 84,000, and leaving 183,000 homeless.

If seismologists could predict such a quake, the population could be warned and perhaps evacuated, nuclear power plants could be shut down, reservoir water levels could be lowered to reduce flooding. Indeed, some projects might never be undertaken if the site were deemed too hazardous to begin with.

The earthquake puzzle is formidable, but many of its pieces have been put into place within the last ten years. An understanding by scientists of the theory of plate tectonics has provided a standard working tool for measurement. The motion of the continents across the planet causes extreme stress to build up along the plate boundaries—the Pacific plate, for example, is believed to be crashing into the North

Carl Proujan specializes in the sciences and is the author of Secrets of the Sea.



Tom C. Ray; Inset: Nancy Riza Schiff

John Davies at work on the electronics of the seismic station on Unalaska Island in the Aleutians. Signals from the seismometer are transmitted to Dutch Harbor and recorded.

American plate, along the California coast—and when the stress grows too great, the land breaks at its weakest point, deep within a fault, and an earthquake wreaks its havoc.

Some seismologists still say the earth's gyrations will never be predictable. Yet others are tenacious in their search for clues to the secrets of the earth. The following six scientists are among those who are determined to make earthquake forecasting more than a matter of luck.

JOHN DAVIES STUDYING THE OMINOUS SILENCE OF A SEISMIC GAP

"It isn't easy to find out something new; there are so many scientific hoops to jump through," says John Davies, a 35-year-old seismologist who, along with his colleagues at Columbia University's Lamont-Doherty Geological Observatory, is responsible for locating what earthquake specialists believe to be one of "the most likely areas in the U.S. in which a quake will occur in the next ten years;" an area termed by Davies the Shumagin Gap.

Four of the most powerful earthquakes in recent history have occurred along parts of the Alaskan

coast's Aleutian Arc, a ribbon of islands sweeping westward from the mainland in a gentle curve toward Siberia. One segment of the arc's eastern end, the Shumagin Islands, however, has never been the site of a quake. After seven years of study, Davies became convinced that this area constitutes a seismic gap. A seismic gap is a place of ominous quiet around which earthquakes of a high magnitude have occurred within 30 years. Since this method was first postulated in 1965 by the Soviet seismologist S.A. Fedotov, 13 large quakes have successfully been forecast, in most cases within five years of the occurrence.

"The seismic potential of the Shumagin Islands seems to be great," Davies explains. "Quakes struck west of Kodiak Island in 1938; the strongest quake ever to shake North America hit near Anchorage in 1964; two others hit near Anchorage in '57 and '65, but the eastern section and the Shumagins were untouched."

Davies' belief in the Shumagin Gap was near to impossible to evaluate, he says, "without trying to extend the historic record of the area." Only a few months ago, his hypothesis gained respectability when he finally



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Other Xernus distinctions? Mirrored face plating; a highly difficult technique that's just now beginning to

frame the displays on only the most costly digitals. A tightly meshed, smoothly polished bracelet that doesn't pull at skin or hair. Recessed function buttons that stay out of your way.

This unusual timekeeper is available to you in two different models: all Stainless or Gold (with a rich 5 microns worth over stainless). Incidentally, that's real gold, not "goldtone".

Xernus comes with full instructions, service-by-mail, if needed, a one-year manufacturer's guarantee against defects, and its battery in place. (Sensitive to sunlight or even dim roomlight, Xernus solar cells will keep this micro-thin battery working for up to 2 years. Replacements are available at most jewelers.)

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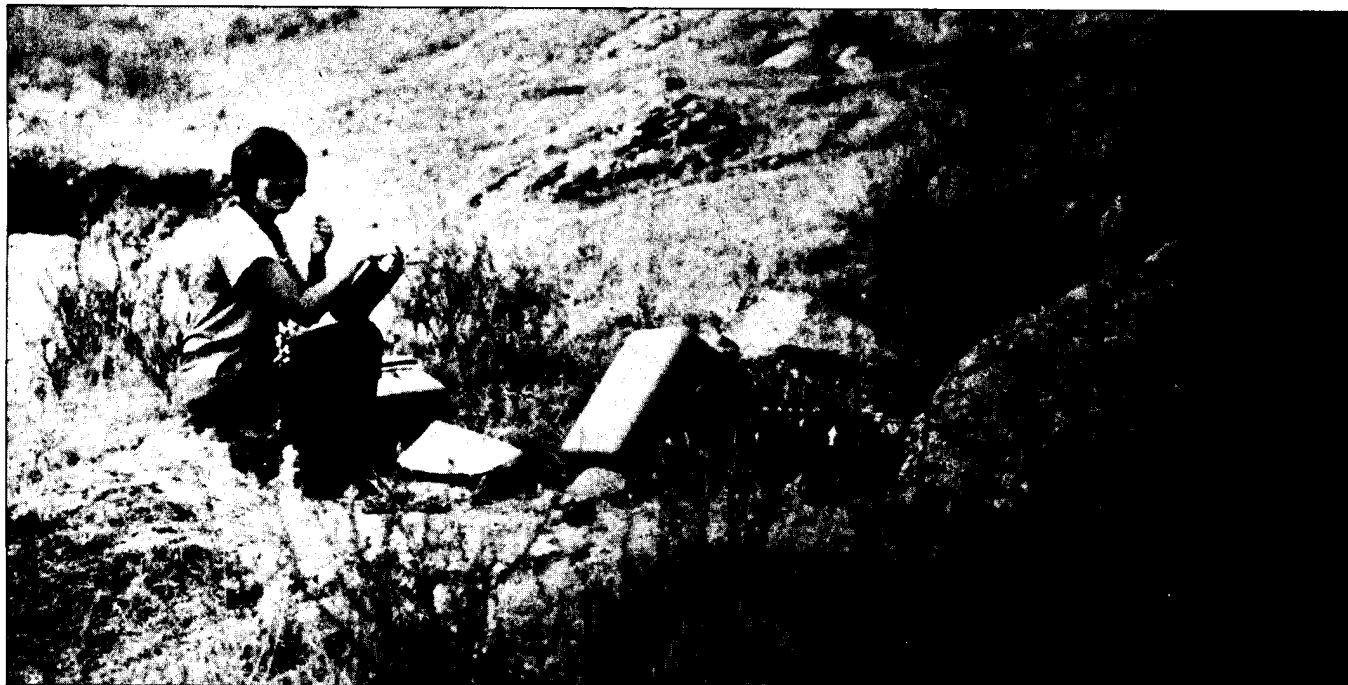
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FUTUREMAKERS



Lucile Jones spent August 1976 near Farkhar, Afghanistan, monitoring seismic activity with a network of seven field stations similar to the one shown above. Since that time she has come close to identifying a foreshock pattern that may make earthquake prediction possible.

found and had translated Russian earthquake records dating from 1780 to 1848. The U.S.G.S. is now impressed enough to agree to resurvey the geodetic lines, retriangulate the old survey marks, and physically monitor the strains in the faults.

What makes this finding so unique is that, if a great quake does occur, the seismological precursors used to identify the area will take on new meaning. Most importantly, Davies hopes a large data base will be set up so he can continue to maintain his seismic network, and that his discovery might lead to funding of more complete monitoring "of possible precursors, of sea level, or radon in ground water, of strain ground measurements. If we had adequate records of all types of activity in the Aleutians," says Davies, "we'd be better able to understand the relationship between, say, volcanic activity and the occurrence of large shocks—and then we might be able to predict time, not just forecast space."

LUCILE JONES SIMULATING QUAKES IN THE LABORATORY

Lucile Jones, a doctoral candidate in earth sciences at MIT, is trying to discover what happens to rocks when they are crushed by the forces that lead to a quake. Earthquake specialists believe that fault gouge, the rock and

sand trapped in a fault, must undergo a metamorphosis that is known as "strain weakening" before an earthquake can occur. Strain weakening, Jones explains, does trigger a quake, but this depends on many factors, such as the kind of rock in the fault, the presence or absence of clay, and the amount of water in the earth. Fault gouge in earthquake zones is buried under at least five miles of earth, and no one has yet dug up a sample of it to study.

The U.S.G.S. has plans to do so, but in the meantime Jones attempts to simulate fault conditions. She takes samples of rock thought to be present in faults and places them in a pressure-generating machine. Within 48 hours the rock is deformed, shortened, or pulverized. Jones then removes it from the machine, impregnates it with epoxy to ensure that it holds its new shape, slices it into layers, and examines it under a microscope. Preliminary results of Jones' analysis reveal that the strain weakening of fault gouge might indeed be a precursor to a quake. "This one," she says, pointing to a cylinder of what was once solid rock and now looks like fine sand, "formed a fault plane"—a miniature fault, which to seismologists is indicative of weakening. "The strain weakening in rocks results in a decreased resistance to movement," Jones explains. "Sand, for example, moves more easily than pebbles." When samples of real fault

gouge are examined for strain weakening, Lucile Jones' work, performed under the guidance of an expert in the field, MIT's William Brace, might provide the means for accurately estimating the probability of an earthquake occurring.

In addition to the fault gouge project, Jones is probing the meaning of foreshocks. "Foreshocks precede a major earthquake. There were more than 500 before the 1975 Haicheng earthquake in China," Jones says, "but they are defined as foreshocks in hindsight."

Jones visited China the summer of 1979. She learned there that both miniquakes and foreshocks occur in China with great frequency. (She also scored one of her already numerous seismological firsts. After examining the data recorded by the Chinese, she was able to determine the location of the epicenter of the 1975 quake with computers which the Chinese could not figure out.) "The miniquakes sometimes occur in large swarms, but the swarms don't always lead to a big quake. We have to learn how to differentiate between harmless swarms and precursory foreshocks."

Lucile Jones believes she is close to identifying a foreshock pattern. "The ratio of mini-earthquakes to larger foreshocks seems greater before a big quake than before a false alarm. It will take further analysis and more trips to China to support her hunch. ♦

The Ultimate Tax Shelter



by
TED NICHOLAS

Tax experts are now referring to a small, privately owned corporation as "The Ultimate Tax Shelter." This is especially true with the passage of the recent Revenue Act. This law makes most former tax shelters either obsolete, or of little advantage. Investments affected include real estate, oil and gas drilling, cattle feeding, movies, etc. These former tax shelters have lost their attractiveness. Aside from that, these tax shelters required a large investment. Only a small segment of the population could benefit from them.

I've written a book showing how you can form your own corporation. I've taken all the mystery out of it. Thousands of people have already used the system for incorporation described in the book. I'll describe how you may obtain it without risk and with a valuable free bonus.

A corporation can be formed by anyone at surprisingly low cost. And the government encourages people to incorporate, which is a little known fact. The government has recognized the important role of small business in our country. Through favorable legislation incorporating a small business, hobby, or sideline is perfectly legal and ethical. There are numerous tax laws favorable to corporate owners. Some of them are remarkable in this age of ever-increasing taxation. Everyone of us needs all the tax shelter we can get!

Here are just a few of the advantages of having my book on incorporating. You can limit your personal liability. All that is at stake is the money you have invested. This amount can be zero to a few hundred or even a few thousand dollars. Your home, furniture, car, savings, or other possessions are not at risk. You can raise capital and still keep control of your business. You can put aside up to 25% of your income tax free. If you desire, you may wish to set up a non-profit corporation or operate a corporation anonymously. You will save from \$300 to \$1,000 simply by using the handy tear-out forms included in the book. All the things you need: certificate of incorporation, minutes, by-laws, etc., including complete instructions.

There are still other advantages. Your own corporation enables you to more easily maintain continuity and facilitate transfer of ownership. Tax free fringe benefits can be arranged. You can set up your health and life insurance and other programs for you and your family wherein they are tax deductible. Another very important option available to you through incorporation is a medical reim-

bursement plan (MRP). Under an MRP, all medical, dental, pharmaceutical expenses for you and your family can become tax deductible to the corporation. An unincorporated person must exclude the first 3% of family's medical expenses from a personal tax return. For an individual earning \$20,000 the first \$600 are not deductible.

Retirement plans, and pension and profit-sharing arrangements can be set up for you with far greater benefits than those available to self-employed individuals.

A word of caution. Incorporating may not be for you right now. However, my book will help you decide whether or not a corporation is for you now or in the future. I review all the advantages and disadvantages in depth. This choice is yours after learning all the options. If you do decide to incorporate, it can be done by mail quickly and within 48 hours. You never have to leave the privacy of your home.

I'll also reveal to you some startling facts. Why lawyers often charge substantial fees for incorporating when often they prefer not to, and why two-thirds of the New York and American Stock Exchange companies incorporate in Delaware.

You may wonder how others have successfully used the book. Not only a small unincorporated business, but enjoyable hobbies, part time businesses, and even existing jobs have been set up as full-fledged corporations. You don't have to have a big business going to benefit. In fact, not many people realize some very important facts. There are 30,000 new businesses formed in the U.S. each and every month. 98% of them are small businesses; often just one individual working from home.

To gain all the advantages of incorporating, it doesn't matter where you live, your age, race or sex. All that counts is your ideas. If you are looking for some new ideas, I believe my book will stimulate you in that area. I do know many small businessmen, housewives, hobbyists, engineers, and lawyers who have acted on the suggestions in my book. A woman who was my former secretary is incorporated. She is now grossing over \$30,000 working from her home by providing a secretarial service to me and other local businesses. She works her own hours and has all the corporate advantages.

I briefly mentioned that you can start with no capital whatsoever. I know it can be done, since I have formed 18 companies of my own, and I began each

one of them with nothing. Beginning at age 22, I incorporated my first company which was a candy manufacturing concern. Without credit or experience, I raised \$96,000. From that starting point grew a chain of 30 stores. I'm proud of the fact that at age 29 I was selected by a group of businessmen as one of the outstanding businessmen in the nation. As a result of this award, I received an invitation to personally meet with the President of the United States.

I wrote my book, *How To Form Your Own Corporation Without A Lawyer for Under \$50* because I felt that many more people than otherwise would could become the President of their own corporations. As it has turned out, a very high proportion of all the corporations formed in America each month, at the present time are using my book to incorporate.

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FUTUREMAKERS



Dr. William Kautz (left) and Dr. Leon Otis (right) of SRI International began Project Earthquake Watch in 1978.

WILLIAM KAUTZ AND LEON OTIS MONITORING THE BEASTS OF THE FIELD

In mid-December 1974, snakes in northeast China's Liaoning Province came out of hibernation and were found frozen to death. Officials coordinating that country's unique citizen earthquake watch received thousands of reports of other bizarre animal behavior throughout January 1975. On February 4, within a few hours of the now infamous Haicheng quake (magnitude 7.3), which leveled the industrial city, 100,000 residents were efficiently evacuated. The Chinese were less surprised than the rest of the world that the accuracy of their prediction was based in part on studying animal behavior. Can the natural phenomena preceding an earthquake go undetected by humans, and yet influence animals to such a marked degree? U.S. scientists, though skeptical, are investigating the phenomenon.

William Kautz, a mathematician and electrical engineer at SRI International in Menlo Park, California, convinced Leon Otis, director of SRI's psychology and physiology lab, to establish Project Earthquake Watch in 1978. It currently enlists more than 1,000 Californians, some living on or near the state's most active faults, who report regularly on animal behavior.

In all, 200 species of domestic and wild creatures are being observed, including insects, crustaceans, fish, reptiles, amphibians, birds, and mammals. Volunteers are asked to call a toll-free "hot-line" at least once a week or whenever strange animal behavior is observed. Only calls

received *before* the occurrence of a quake are included in the analysis.

"We know that the events months, weeks, days, even hours before an earthquake include changes in magnetic activity, electrical resistivity of rocks, ionization of the air, emission of gases, and noises from the ground. Some of these we know can be picked up by animals," Leon Otis says. A few mammals are sensitive to low frequency sound; pigeons are highly sensitive to odors; catfish to electrical field changes; rats, dogs, and cats to high frequency sound. "But we also know," adds Otis, "that the phenomenon of earthquakes prompting anomalous behavior in animals, if true, is not obvious."

The Chinese have also had to learn this lesson the hard way. Using the same methods, they failed to predict a quake in Tangshan that killed 650,000 people in July 1976.

M. NAFI TOKSOZ MODELING EARTHQUAKE MIGRATION

"First you hear the sound, then you feel the earthquake," explains professor M. Nafi Toksöz, a leading investigator of earthquake phenomena. He was telling of an experience he had had in 1975 in a remote region of his native country, Turkey. For the last 20 years, Toksöz, now 46 and a U.S. citizen, has been making annual visits to his homeland to study the very active North Anatolian fault system, which slices across northern

Turkey eastward almost 900 miles to the Iranian frontier. Toksöz believes that disasters caused by this extremely restless fracture have special meaning for Californians and he is trying to develop a model which will apply to the San Andreas and North Anatolian faults, which are both the strike-slip type.

Because the Anatolian fault has a greater number of intermediate earthquakes, it is a better place to collect large amounts of data, to find out if the phenomena that precede an earthquake in one fault zone are similar to those in another fault zone. Records showed that in 1939 a major quake broke a part of the North Anatolian fault; five more large shocks occurred in the succeeding eight years. Toksöz gradually realized that the geographical sequence wasn't random, the earthquakes had migrated east to west. "I believe one occurs and the next one seems to be triggered by it. It might not occur immediately. It might occur a few years later, another still a few years after that. Sometimes the process is not continuous and there is a jump and a quake occurs still further on."

Toksöz hopes his study of migration will enable scientists "to estimate what is a reasonable time period for the stress of one earthquake to diffuse to an adjacent zone, and when we are likely to get the next earthquake in that zone."

Toksöz has not been content merely to study the earth's quakes



M. Nafi Toksöz with his seismograph. During the last ten years he has noticed that earthquakes migrate east to west along the North Anatolian fault in his native Turkey.

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Ionosphere's electronics are both superb and unique. It is the only ionizer that uses "passive multi-stage" circuitry for its noiseless and noninterfering output (many units are known to affect radio reception). Most other units use a "vibration" mechanism, which causes clicks, pops or an annoying high-pitched whine.

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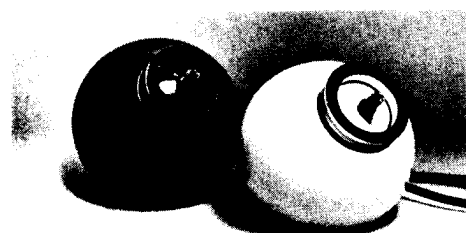
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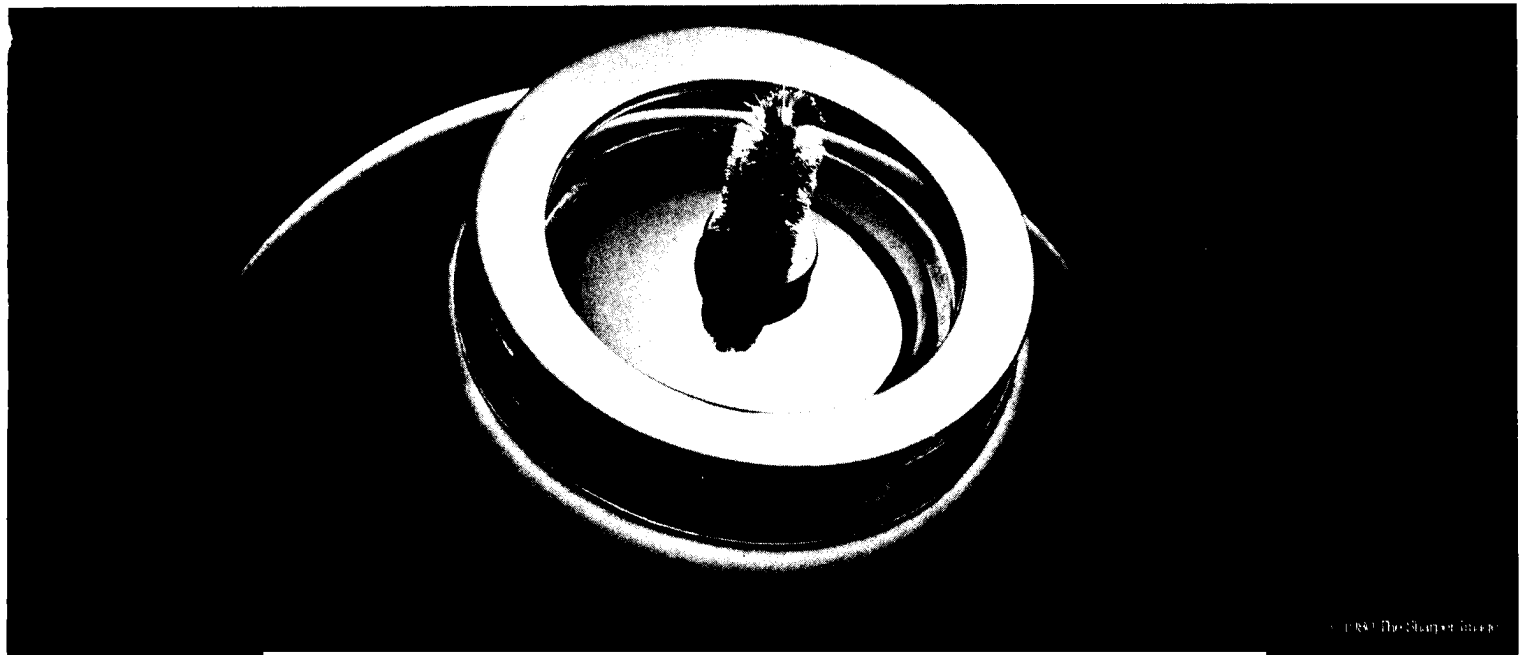
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in hopes of understanding their patterns. Several years ago he helped design the seismometers brought aboard the Apollo and Viking space missions to detect possible quake activity on the moon. According to Toksöz' calculations, the data revealed that the moonquakes correlated with tides caused by the earth's gravitational attraction. Toksöz wondered if the gravitational pull of the moon on the earth might cause some quakes on earth. We all know that waters of the ocean are pulled in one direction and then the other by the moon. But, so is land. The difference, of course, is magnitude. While the sea may rise many feet at maximum high tide, the earth will lift little more than a foot. Toksöz thought it was possible that this slight increase in stress applied to a very delicate fault might be just enough to jar it into motion.

"The Santa Barbara earthquake in 1979 and recent quakes in the North Anatolian fault coincided with periods of greatest tidal stress," Toksöz says. "If there has been a long-term prediction about an earthquake in a particular area, advance tidal data could be important."

Although much remains to be learned about the anatomy and physiology of earthquakes and many danger zones must be heavily instrumented to monitor changes taking place. Dr. Toksöz expresses confidence in the future of earthquake prediction. "We are going to predict earthquakes," he states softly but emphatically. "There will be a number of false alarms. But if the public bears with us and accepts our early mistakes as part of the experimental stage, we will be able to predict earthquakes, especially the large ones, with a significant degree of accuracy by the turn of the century."

WILLIAM McCANN MAPMAKER OF THE UNDERGROUND

William McCann is both a field hand and a desk man. As a theoretician, he has developed a unique map for earthquake forecasting; and as a hands-on scientist, he has outrun Caribbean hurricanes in order to drop ocean-bottom seismometers off remote islands. Along with John Davies and others at New York's Lamont-Doherty Observatory, McCann is beginning to unravel the mysteries of the earth's explosive nature.

McCann has been able to refine the theory of plate tectonics into a map of the earthquake belt which



Nancy Rice Schiff

William McCann in his office at Columbia University's Lamont-Doherty Observatory. His six-level probability map of the earthquake belt presents a formidable array of data.

girds the world. He has forecast where the first quakes are most likely to occur along this "rim of fire."

His multicolored map consists of a segmented band that snakes around the Pacific, into the Caribbean and the East Indies. The array of data presented is formidable; the key to it is the significance of each different segment. The band outlines the area of large-scale geological movement—active volcanoes, quake occurrences, colliding plate boundaries—and each color signifies a different set of geological, historical, and quake-frequency data. According to the Lamont-Doherty findings, areas most susceptible to a "great" quake in the near future are those where major quakes have occurred—but not within the last 100 years. The color for these areas is red, and it overlays southern California and parts of the Caribbean. McCann has concluded that these areas are the most ripe for a giant shock because of long-existing unrelieved stresses. Yellow, indicating the next most dangerous potential sites, overlays the San Francisco Bay area and a section of the Alaskan peninsula, areas that have not been shaken by a great quake for 30 to 100 years. Quake activity is due, but the

stresses in the yellow areas will probably not exceed the tolerance of the faults for 20 or more years. Gold, gray and blue areas follow; and lastly green segments, indicating the lowest probability areas—those in which a "great" quake has struck within the last 30 years.

McCann's six-level probability map and analysis of the earthquake belt ringing the Pacific Ocean pull together bits and pieces of seismic theory into a unified, more practical and understandable tool for earthquake forecasting. Forecasting, explains McCann, should not be confused with prediction. He is eager to determine the likelihood of a quake in a specific area within a time span of perhaps 20 years. Prediction, as seismologists define the term, would reduce the time to months, weeks, days, even hours, as well as pinpoint the precise site and magnitude of the quake. McCann thinks this kind of accuracy is impossible in the foreseeable future. As for planning ahead, he and his colleagues are returning to the Caribbean this summer to the quake-detecting instruments he set up five years ago, determined to uncover another clue. ■

How To Achieve Total Financial Freedom.

A MUTUAL CONCERN— We've never met and probably never will, but I think we share a common interest. That interest is to achieve total financial freedom.

In just 48 months my net worth reached the *magic million dollar mark*.

That might not impress you, but if you had seen me just a few years before; you might wonder how I did it. I lived in Denver then, in a cramped, tumbled down house at 2545 South High Street. My wife was expecting our second child and we were so broke we had to borrow \$150.00 from a relative just to buy food and pay the rent.

SUPERIOR INTELLECT—I barely got through Ames High School (Ames, Iowa) with a C average. I did a little better later on but I soon realized that a salaried job was not the way to become financially free. If you'll stop and think, you'll realize that millionaires do not work 10, 20, or 50 times harder or longer than you.

FINANCIAL FREEDOM—It seems that most people who are charging for financial advice have studies on how to "do it" but have never actually "done it" themselves. You will find as you read my formulas, that since I have actually achieved total financial freedom myself, you will receive from me more than just the motivation to achieve your own financial independence, but a workable step-by-step plan to actually do it.

STEP-BY-STEP—Contained in the work entitled **How To Wake Up The Financial Genius Inside You** are the various formulas which will show you exactly how to do each of the following:

- buy income properties for as little as \$100 down.
- begin without any cash.
- put \$10,000 cash and more in your pocket each time you buy (without selling property.)
- compound your assets at 100% yearly.
- legally avoid paying federal or state income taxes.
- buy bargains at one-half the market value.

MORE LEISURE—If you apply these formulas and methods you will find in a very short time, you will be able to do almost anything you care to do. I think, at that time, you will find out as I have, that spending several weeks on the beaches of Hawaii, or on the ski slopes of Colorado, or sightseeing in Europe, is what *real freedom* is all about.

Most people think that it would be impossible to do some of the things

"...more than 500,000 people have discovered that my formulas will provide the road map that can lead to total financial freedom..."



listed above. For example, to buy a property, and at the same time put \$10,000 (or more) cash in your pocket without selling the property, or to buy a property with little or no cash down. Believe me, it is possible and fairly simple. This is exactly how most wealthy people actually do make 10, 20, or 50 times more money than you do.

YOUR MONEY'S WORTH—While I was struggling on making my first million, I often thought how nice it would be to have personal advice and counsel

from someone like Howard Hughes or J. Paul Getty.

What would I have been willing to pay for this service? I can tell you one thing for sure, it would have been a lot more than the \$10.00 that I'm going to ask you to invest in your financial future.

FOR YOUR FUTURE—What will this \$10.00 actually do for you? It will give you a complete step-by-step plan that you can follow to become totally and completely financially independent.

Please try to understand my situation. I am not a New York advertising agency with all their professional skill and manpower to write a powerful and persuasive ad to convince you that I can make you financially independent. I am just somebody who has actually 'done it', and can really show you how to 'do it'. I hope by my simple direct approach I can convince you to try my formulas.

COSTLY INDECISION—It seems the majority of the people in our rich country lose, not because they lack intelligence, or even willpower, but because of procrastination, or lack of action—please don't be like the masses. Make a decision while you have this paper in your hands. Make a decision now to either act now and send for my material or immediately round file this paper. If your decision is to order, do it now, not later. Otherwise you may lose, just by default.

"FINANCIAL FREEDOM"—To order, simply take any size paper, write the words "Financial Freedom," your name and address, and send it along with a check for \$10.00 to Mark O. Haroldsen, Inc., 2612 So. 1030 West, Dept. AJ031, Salt Lake City, Utah 84119.

If you send for my materials now, I will also send you documents that will show you precisely how you can borrow from \$20,000 to \$200,000 at 2% above the prime rate using just your signature as collateral.

IT'S GUARANTEED—If you are still somewhat skeptical, and believe me, when I started out I certainly was, because of the many people in the world trying to deceive others, I would encourage you to postdate your check by 30 days, and I promise and guarantee that it will not be deposited for at least those 30 days, and if for any reason you do not think that what I have sent you lives up, in every aspect to what I told you in this letter, send the material back, and I will quickly, without question, refund your money and send back your own uncashed check or money order.

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IN FUTURE

THE LAST AMERICAN FAMILY

By Amitai Etzioni

When I first pointed out in the April 1977 issue of *Science* that if we continue to dismember the American family at the present accelerating rate, we shall run out of families before we run out of oil, some eyebrows were raised. Since then, the pace at which American families have been undone has accelerated further.

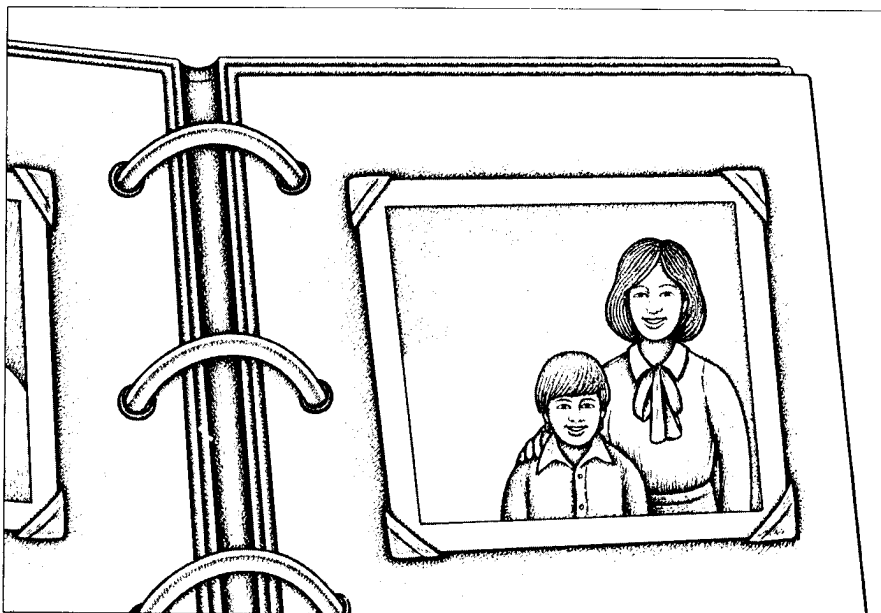
Back in 1975, the Census Bureau published a series of four different projections about the future of the family. According to the most pessimistic of the four projections, the number of American husband-and-wife families would be 59 million by 1990, accounting for 61 percent of the total households. Yet in just the past few years this projection has turned out to be too optimistic. The most recent data we have are for 1978. The most pessimistic 1975 projection called for 50.1 million families in 1978 (66 percent of the total households). The actual number was 47.4 million (or only 62 percent).

Looking at it another way, if the number of married couples decreases at the accelerating rate it has over the past few years, the result will be no husband-wife families by the year 2008.

Personally I do not believe that America will be without married couples, and I use this projection chiefly to call attention to the direction in which we are headed. But one must note that American society has been set on this course of undoing the family for half a generation. And the forces that might arrest, let alone reverse, the trend are not quite in sight.

Indeed, all the major forces that pull the family down are still rushing hell-bent along their accelerating trajectory. The percentage of women who are gainfully employed (and hence not dependent on marriage for their livelihoods) continues to rise, with women composing 51 percent of the total labor force in 1979, as

Etzioni is professor of sociology at Columbia University and director of the Center for Policy Research.



Chuck Albano

compared with 43 percent in 1970. Public alienation from established institutions continues to rise. From 1966 to 1979, the percentage of Americans expressing a great deal of confidence in major institutions dropped from 59 percent to 25 percent.

Divorce continues to be stigmatized. More than half the states have introduced no-fault divorce laws, and virtually all now have easier and expedited procedures.

There are quite a few social scientists, and freethinkers in general, who say: no matter. God has not decreed that a family must be composed of two permanently related adults; the very notion was concocted in days when the average life expectancy was 23 years or less. Back then, no one wound up staying married for 40 or 50 or more years. Above all, the functions of the nuclear family are now handled quite well elsewhere. Education has long ago been taken from the family and invested in the schools; work, in factories and offices; religion, in churches; and sex, all over the place. Even the upbringing of children, which social scientists once considered the family duty, is being downgraded by an increase in the number of people who decide not to have children at all, or who decide they do not need a traditional family to bring up their children.

Broken Is Better

Perhaps the most sophisticated argument against the notion that husband-wife families are needed to bring up children grows out of studies of children from broken homes. Many casual observers assume that broken homes breed juvenile delinquents, truants, runaways, drug addicts, and—most recently—teenage and preteen alcoholics. And, indeed, statistical correlations are frequently uncovered.

Recently, however, the new thinkers challenged the interpretation of such results with the argument that broken homes occur much more frequently among the poor and minorities than among the middle class. Or, put differently, lower-class families produce more delinquent kids, whether those families are broken or not.

And it actually is true that if families of the same class are compared, most of the difference in delinquency rates between children from broken versus unbroken homes disappears. Those familiar with these findings conclude that having an intact family is not vital to character formation.

Looking at the same data, I suggest that economic conditions, housing, and employment may well be more important for the upbringing of a child than a lasting positive relation between the parents and between the parents and a child. At

the same time, I am not convinced it has been shown that family stability is irrelevant; it may just be less important than social class. "Less important" is not the same as "unimportant."

Moreover, Urie Bronfenbrenner of Cornell University suggests that poverty produces more delinquent kids because it produces more broken homes.

In short, there are worse things for a child than a broken home, but a broken home is no blessing in disguise.

Granny Yes, Pop No

Of late it has become intellectually chic to celebrate the idea of an extended family. What does this have to do with the survival of the nuclear family? Ostensibly, by easing the burden on parents to be constantly responsive to each other and to their children, the extended family makes a breakup less likely.

Our typical middle-class, suburban nuclear family, it is said, is emotionally unwholesome. It provides the child with only two warm, caring adults—both increasingly absent or harried—instead of the abundance offered by grandparents, uncles, aunts, nieces, and nephews of the extended family. Some theorists of the extended family favor a revival of these older family forms. Others favor the formation of "extended families of choice"—communes.

There are several rubs. Just because extended families might be useful does not mean that most middle-class couples could be induced to start them. The forces that undermined the extended family originally, from the need to be mobile (for economic success) to the desire for individualism and privacy, are difficult to reverse. However attractive and desirable they may be, there is no way known to social scientists (or others) to mass-produce or invent extended families.

All this said, there is no question that the nuclear family is coming apart. While there is no definitive evidence that a single parent cannot do as well, there are some signs to this effect. The idealization of the extended family is largely an idle dream, a substitute that is not widely available.

What we must do next is find out more about the effects of divorce and single parenthood to determine if marriage remains the vital unit of our society—and if the destruction of the family may do more to harm society than its running out of its favorite source of energy. ■

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THE ROBOTS ARE COMING, THE ROBOTS ARE COMING



**But the invasion
won't be what
you've been led to
expect**

By Fred Reed

On a factory floor in Danbury, Connecticut, in the spaceship atmosphere of high-technology industry—pale fluorescents, green flicker of oscilloscopes, clean, shiny machinery, mounds of green and red wire tangled everywhere like Christmas spaghetti, a smell of insulation, computer screens advising that RTAG 4F7D = KLOAD—a pair of dismembered black arms writhe and reach and grope from their pedestals for things that aren't there, spin and stretch and twirl. Robots. Hour after hour they go through their mechanical calisthenics unattended, hardly noticed by hurrying technicians in worn jeans. The black arms are, after all, just robots.

Specifically they are PUMA 500s, the most advanced robot made by Unimation Inc., the nation's leader in robotics. PUMA (an acronym for Programmable Universal Machine for Assembly) is a little robot, weighing 120 pounds and having a reach, with its arm extended, of about 3 feet. Muhammad Ali would not be impressed. PUMA 250, a smaller brother still in development, will be a cute little thing weighing 15

Photograph by Al Satterwhite

Everyone in the field is sure what a robot isn't. A robot is not a clanking semi-human giswich that dusts furniture and runs errands

pounds. Huge robots, medium robots, tiny little robots—these days, we got 'em all.

Small or not, PUMAs are a shock to the uninitiated. You come through the door and find them waving like anemones in tidal surge, moving with disturbing smoothness. The uncanny feeling comes that they are ... well, looking for something. They aren't. They also aren't what you expect robots to be. Industrial robots are just arms mounted on boxes, in PUMA's case a cylindrical column like a fireplug. Its brains reside in a nearby box contain-

ing 75 pounds of electronics.

Five electric motors in the arm drive the five joints (a sixth joint is optional), each joint making a noise right out of a comic book. The fireplug spins half a turn, *squooooonk*, the shoulder bends up, the forearm dips, *screeee*, and the hand suddenly begins spinning, *ssssss*. This is unsettling because you have come to think of robots as real. And arms and wrists aren't supposed to spin.

While robotics specialists—"roboticist" seems to be the word—are sure that robots are the next advance in

automation, they are not sure what a robot is. Joseph Engleberger is president of Unimation (a wholly owned subsidiary of the Condec Corporation), and, by his willingness to talk to reporters, the de facto Voice of Robotics: "I can't define a robot, but I know one when I see one." The line between ordinary automation and robots is not clear. The estimated number of robots in the world varies wildly depending on what one regards as a robot. The Japanese have an automatic tree-climber, designed to saw off offending limbs, and they consider it a robot. Americans say it's merely special-purpose automation. One roboticist suggests half-seriously that an automatic washing machine is a sort of robot. Engleberger's best try at a definition is "a programmable manipulator with a number of articulations," which would include people, trained monkeys, and perhaps, lobsters.

Everyone in the field is sure what a robot isn't. A robot is not a clanking semi-human giswich that dusts furniture and runs errands. Right-minded kids know that a robot ought to be a lurching scrap pile that floated in from a doomed civilization in Andromeda, with laser eyes and the voice of a man gargling ball bearings. Unfortunately, real robots are much less interesting, though not from lack of effort by roboticists.

"The standard from the beginning was the human," says Engleberger. "The closer the robot comes to having human flexibility, the more robotic it is." The catch is that robots, though useful, do not come at all close to humans. The friendly robot butler is not around the corner or staggering around in the distance. He is, with foreseeable technology, impossible.

Advanced robots of today have two distinguishing features. First, all are jointed metal arms controlled by a computer. They may have two joints or six, which may not work like human joints—PUMA's spinning wrist, for example. Second, and this is the key feature, robots are versatile. An automatic lathe is not a robot, no matter how sophisticated it is, how many switches and knobs and computers it

Fred Reed, who covers new technologies for NEXT, also contributes regularly to the Washington Post.

ROBOTS NOW: THREE SHIFTS AND NO COFFEE BREAK

Over the last six years, U.S. productivity has grown by a pitiable .01 percent annually (in Germany, by comparison, the figure was 4.4 percent for 1979 alone). Not even the most fervent roboticist believes robots are going to turn that situation around.

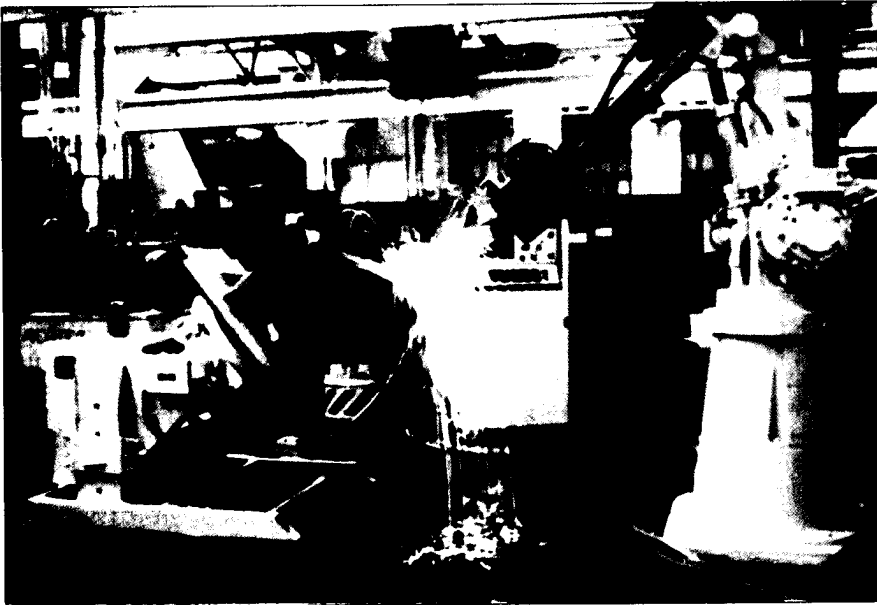
Still, there are signs that robots can help. Depending on the robot's intricacy, the sticker price runs between \$10,000 and \$130,000. But operating costs are only about \$4 an hour, and the machines can work three shifts daily, without holidays or coffee breaks. Automation specialists estimate that roboticizing an assembly line might eventually cut production costs to one-tenth of that of a nonautomated line.

According to various projections, that potential should cause the robot industry to grow from its \$60 million in sales last year to between \$700 million and \$2.2 billion in 1990. American industry now has 3,000 robots at work, more than twice the number in use just seven years ago (but still far short of Japan's present total of 7,000). In the forefront are such companies as General Electric, where a spokesman says robots have in some instances increased productivity by 50 percent, Westinghouse, which is developing a robot assembly line to put together five different types of electric motors, and General Motors, Ford, and

Chrysler, where robots do much of the welding and painting. A survey by the Society of Manufacturing Engineers predicts that by 1995, 50 percent of automobile assembly will be done by automated machines (including robots).

Robots aren't perfect, of course. One nonauto manufacturer who has used them for 15 years notes that repairs can be a problem because service centers are located only around Detroit (to accommodate the automakers) and in the plants where the robots are manufactured. "If you're not near either of those areas, someone packs a little black bag and hops on a plane to get to you. Meanwhile, your robot is down and you're not producing." But at GE and at Texas Instruments, another major user, spokesmen say their robots are up 98 percent of the time, on three shifts. Indeed, a more formidable problem may be that the machines with which the robots work can't always match that performance.

To minimize such obstacles, optimists urge the updating of machinery to suit the robots. They compare robotics to microchip technology, and see prices plummeting in a few years. But while robots will grow in number and learn to do things they can't now, skeptics hold that we're still a long way from the point where robots will take over the workplace. —Ed.



The computer-controlled T³ (made by Cincinnati Milacron) is one of the most versatile robots. It's been used for welding (as shown), painting, and assembly-line work.

has, because it can do nothing but lathing. A robot can weld today, spray-paint tomorrow, and load boxes the day after. You simply reprogram it and put a new tool on the end of its arms. There are many of these tools (which engineers for mysterious reasons call "end effectors"): welding guns, paint sprayers, riveters, claws, scoops.

Ease of programing is crucial. If a manufacturer has to fly in a team of programers from the Massachusetts Institute of Technology every time he wants the robot to turn a bolt instead of a screw, he won't buy many robots. Robot makers, keenly attuned to the profit principle, have made advanced robots very simple to program. PUMA can be programmed in several ways, but the easiest is to lead it by hand; an engineer puts PUMA's gripper over the object to be picked up and pushes a button on its "teach box"—a thing like a calculator attached to the robot by a wire. The button says in effect, "Remember this place." The engineer then closes the grippers on the widget to be picked up and pushes the "Remember to do this" button. Then he moves the gripper over the widget receptacle, tells it to remember that place, too, and so on. When he pushes the "Go" button, PUMA will shift widgets to the widget receptacle as long as

it is plugged in—provided the widgets are always exactly where the robot expects to find them.

Which brings up the two greatest defects of robots. They are blind, and lack a sense of touch. Today's robots are precision blind-grabbers, reaching mindlessly where a part should be. For example, PUMA can screw a bulb into the front panel of a stereo with impressive finesse—if the bulb and panel are precisely where they are supposed to be. If the bulb is upside down in its tray, PUMA will contentedly try to screw it into the panel upside down. If the panel is a quarter inch out of position on the conveyor belt, the robot will jam the bulb into blank metal and twist, trying to screw it in. If the bulb isn't there, PUMA will close its grippers on empty space and try to screw it into the panel. None of this is particularly useful.

For today's robots, consequently, a lot of effort goes into getting the parts to be assembled exactly where they ought to be, exactly when they ought to be there. Otherwise a robot is quite capable of breaking things. If it picks up a radio by a transistor instead of by the metal frame, the result is likely to be a crushed transistor.

"Factories today really aren't suited to robots," Engleberger says. "Clas-

sically, you have a lathe department, a dye casting department, and so on. When each gets through with its process, it dumps the parts in a box and sends them to the next process, and later they dump them in a box, too. If you want to use robots, either you arrange things so you don't dump parts in boxes, or you give the robot vision so it can take the parts out of the box.

"Assembly turns out to be much more difficult than people thought it would be. The reason isn't so much that the robot arm has trouble in doing the assembly. It's that orienting parts for the robot is extremely difficult. In an assembly operation, a human being usually has a whole bunch of pieces in front of him. He picks them up and puts them together. The robot can't. If someone has to pick the piece up and orient it so the robot can find it, he might as well go ahead and assemble it—your economics go to hell very fast.

"When we get robots with vision and tactile feedback—and lots of people are working on it—then things will blossom. We won't need to worry so much about precise positioning."

Giving a robot vision is not something that one does casually before breakfast. Merely getting a picture is easy. A small TV camera does nicely. Getting the robot to understand what it is seeing is not easy. Because computers can handle nothing but numbers, the picture must be converted to numbers ("digitized" in the jargon). To do this, the camera breaks the picture into dots as in a newspaper photograph. In the simplest form of vision, all the dots are either black or white, without grey tones. If "0" is used to represent a white dot, and "1" to represent a black dot, the picture becomes an array of zeros and ones.

Even a digitized picture is a problem for a robot. Computers handle numerical calculations with elegance, but, not being suited to what engineers call "visual processing," they interpret digitized pictures by methodical, awkward methods. Suppose the robot is trying to locate a black square—say, a cigar box—on a white conveyor belt. In a typical approach, the computer scans across the digitized picture, dot by dot, until it finds a black dot. It then knows it has found the box.

To pick the box up, the robot must also know where the edges of

With its "eye," this robot can search for and retrieve randomly placed objects. It was developed at the National Bureau of Standards.

the box are. To find out, it examines the dots that surround the first black dot it encounters. If a black dot has white dots on one side of it, and black dots on the other, then it must be part of the edge. Continued computation of this kind allows the robot to find the other edges and thus the orientation of the box. A good engineer can devise all manner of short cuts, but methodical examination of dots is unavoidable.

Calculation takes time, which in commercial applications translates into money. A sharper picture requires smaller dots, and consequently more of them per picture, which means more calculation. Greater definition requires grey tones, which greatly complicate the calculation, and thus increases the time needed to do it. Vision in three dimensions necessitates complex trigonometric computations. Odd problems arise, such as the possibility that the robot will mistake a shadow for part of an object and try to pick it up. More calculation can avoid this, but takes more time. In many applications, by the time a computer decides what it is looking at, the object will already have passed on the conveyor.

Computers exist that are fast enough, but they cost too much. Manufacturers will not buy a \$200,000 computer to do a minimum-wage job. Fortunately, the price of electronics is falling rapidly, thanks to microcomputers. Already vision machines are fast and cheap enough for many uses. Within a year, PUMA will have vision, with a camera mounted off the robot.

Visual wizardry bubbles along in laboratories. Chesebrough-Pond's, Inc., in Clinton, Connecticut, has a computerized grey-tone camera destined for the factory floor and perhaps, further down the road, for use by robots. Among other things, the camera has a "differencing" function. At the press of the button, it takes a picture of a shelf of general engineering clutter on the opposite wall of a lab. A technician removes a small oilcan from the shelf, and takes another picture. The computer subtracts the second picture from the first—literally subtracts each dot of one picture from the corresponding dot of the other. On the screen appears the difference between the two pictures—the oilcan, hanging in an otherwise empty screen, with its shadow behind

it. Robots of the near future will be able to store a picture of, say, the top of a carburetor and, by comparing it with a picture taken of a carburetor on a conveyor belt, determine whether this new carburetor is in the correct position to have a screw inserted.

The sense of touch poses different but equally exasperating problems. In many applications a robot needs to know how hard its gripper is squeezing. If it doesn't squeeze hard enough, it doesn't pick up the widget; if it squeezes too hard, it produces a flat widget. The robot also has to know exactly when it touches the widget, or it may keep on reaching for it and knock it off the conveyor. And the robot should feel when a screw is tight enough, or it may nonchalantly twist the head off.

Plato's Robot

There are many other improvements in store for robots, all likely to exist by 1990: hand-to-hand coordination to make possible robots with two (or twenty) arms; and a "universal gripper," meaning a replica of the human hand. ("A good idea," says Engleberger, "but it happens that the hand is extremely hard to imitate.") Robots that understand simple spoken commands are in the works, although sight and touch remain the crucial goals.

"Labs are doing a lot of work on these problems," says Engleberger. "How long will it be until we have solved them? The question doesn't mean much unless you ask how much sophistication you want. If I want to do a scene analysis with a black object against a white background, I can do it right now. When objects are on top of each other, I'm dead. In tactile sensing, it's easy to put a limit switch between the robot's grippers and, if they close past the object, the switch trips and the robot says, 'Hey, I missed it.' That is a crude form of tactile feedback. To reach inside a bin and feel something and tell what it is, that's much more difficult. It's going to take a while."

Robots have been banging around industry since about 1960 (the engineers call early models "classical" robots, as if Plato had one), but until recently they have been crude. Most are big brutes designed to do jobs that humans don't like—spot-welding of cars, pulling ingots from furnaces, op-

erating great booming machines that can take off an arm or leg. The rapidly falling cost and miniaturization of computers have ended this primitiveness, for the sophistication of robots lies more in their electronics than in their mechanics. Some of the newer monsters are remarkably sophisticated.

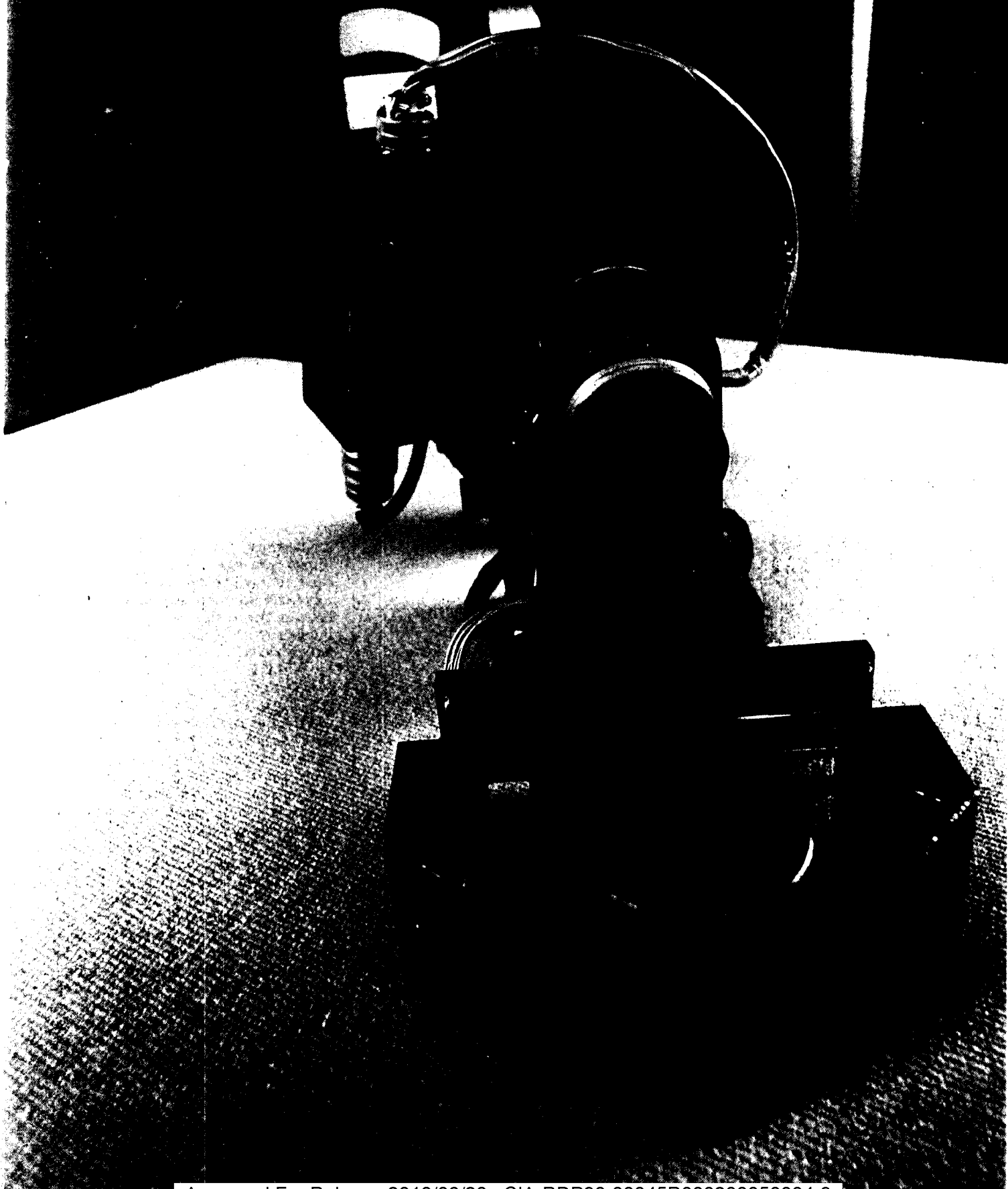
The trend is toward small, sophisticated robots for assembly work. PUMA, just reaching the market, is the most advanced of this new breed. PUMA handles a maximum load of five pounds (big robots throw around hundreds of pounds) with a surgeon's touch. Its positioning is accurate to four-thousandths of an inch. Since 90 percent of the parts of a car weigh less than 5 pounds, PUMA is not handicapped by its small payload. Because it is small and fairly quiet, it shouldn't intimidate workers. It occupies roughly the space of a man, an important marketing consideration because it can replace a worker without necessitating the redesign of the production line.

PUMA's mechanical parts—the arm—have been kept relatively simple to keep prices down, but its precision and elaborate programming make it attractive for jobs hitherto closed to robots. For example, a PUMA being tested by General Motors screws light bulbs into dashboard assemblies.

As often happens with new technologies, robots are becoming attractive candidates for jobs that were never in the forefront of roboticists' minds. Engleberger tells of getting a call from some Australians who figured a robot would be just the thing for shearing sheep. He politely told them they were crazy. Later they showed up in Danbury and explained that Australia, which has 14 million people, has over 130 million sheep, almost all of which require annual barbering. Sheep-shearers, it seemed, cost lots of money, making a cheaper method desirable. The Australians figured that, theoretically, they could use 130,000 robots; Engleberger, who makes 50 robots a month, suddenly saw the underlying wisdom of the idea. The Australians are now working on sensors to keep the robot from skinning the sheep.

Social stargazers with a fondness for interesting disasters predict that robots will swarm from the laboratories, whirring and clicking, and take over everyone's job. They won't, not for

Photograph by Joe Matera



“Robots increase productivity, and productivity is always good. You can’t sit on a curbstone in Cairo with flies all over you and hope to improve things”

a long time at any rate. For one thing, they aren’t good enough and won’t be soon. For another, robots are not always the best way to do a job. Many jobs can be automated better by other means. For example, Chesebrough-Pond’s once had a worker checking labels on Vaseline bottles, hour after hour, as they passed on a conveyor belt. Such jobs are not overwhelmingly rewarding to the spirit, or even conducive to continued sanity, and thus offer scope for automation.

In principle a robot with vision might inspect the Vaseline bottles and maybe knock the mislabeled ones into a bin (although it would take a very fast robot). Instead, the company uses a computerized camera that takes a picture of each passing label and compares it with a picture of a perfect label stored in memory. If the label is wrong, a small plunger knocks the bottle off the belt. A robot to do this would cost at least \$30,000. The plunger works per-

fectly and costs little. It doesn’t qualify as a robot because it cannot be reprogrammed to do different jobs.

Such “hard” automation—special purpose machinery—is usually cheaper than a robot if a factory makes the same product year in and year out. For example, beer cases are always the same size and shape. A brewery can afford to buy a special machine to pack the cans into cases with no fear that it may become obsolete.

Robots become extremely attractive when, as in the cosmetics industry, the product changes frequently. A machine that efficiently loads tall thin bottles of Dawn Fog complexion tenderizer will not load short, squat bottles of new, improved Whoopee-Goop hair conditioner. The machine must be scrapped or modified, which costs lots of money and takes time. Robots like PUMA can be reprogrammed in a few minutes.

In the automobile and aircraft in-

dustries, the cost of retooling is a substantial fraction of the cost of the product. A factory may make only a hundred of a certain aircraft before changing to another kind of plane. Whereas a riveting machine would require expensive modification, a robot can simply be programmed to put rivets in new places.

Despite their seeming attractiveness for small-lot manufacturing, robots won’t descend on the workplace like Huns in a hurry. Says James S. Albus, a roboticist-philosopher at the National Bureau of Standards, “True, a high proportion of manufacturing jobs are in assembly. But assembly has turned out to be much more difficult than we expected. It’s going to be at least five years, maybe ten, maybe more, before robots can do much assembly. Remember, it’s not enough for a robot to be able to do something. It has to be able to do it faster and cheaper than a human being can. And human assemblers are very good.”

“Nobody needs a robot,” says Engleberger. “If you want to lathe things, you have to have a lathe. You can’t do it with a pen knife. Anything a robot can do, a human can do. Robots have an awful time going as fast as a human. It boils down to economics, and robots are pretty expensive.

“In this country, the extreme conservatism of manufacturers has been a real barrier to robots. It’s different in some industries like electronics, where new ideas are welcome. When somebody comes out with a new chip, everybody starts producing it even before they are sure what it does. But manufacturers are resistant to new ideas. People are surprised when I tell them that labor is more receptive to robots than management is. All we get from unions is ‘No massive layoffs, and give us some of the goodies that come from increased productivity.’”

Unions do in fact seem comparatively serene about robots. Robots are concentrated in the automobile industry; yet the United Auto Workers, while keeping an eye on the machines, expresses no particular concern. On the other hand, some manufacturers are skittish about having their robots publicized for fear of alarming their work forces.

Engleberger says, “Personally, I think social and economic forces will

THE ULTIMATE ROBOT: SELF-REPRODUCING

Four score and seven years from now we can enjoy equal or greater productivity in a much more humane work place according to one expert in robotics, James S. Albus, an electronics engineer with the Institute for Computer Science and Technology at the National Bureau of Standards.

In his new book, *People’s Capitalism: The Economics of the Robot Revolution*, Albus offers an unusual proposal. He argues that it will one day be technically feasible to build factories that operate largely unattended and make, among other things, replacements for their own worn-out parts—indeed, robots that can reproduce themselves. The idea is not nearly so farfetched as it may seem. Any computer-controlled robot that assembles computer-controlled robots is reproducing itself. Such robotic factories would eventually make manufactured goods that cost little more than the raw materials required to make them. With goods pouring from these

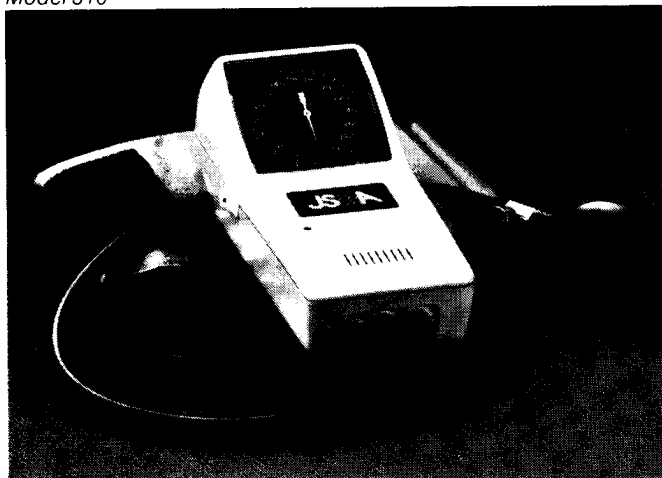
automatic assembly lines, the problem would be how to distribute the wealth being created.

Albus suggests that today’s distribution of wealth by means of wages is unsatisfactory on several counts. The first is that it keeps people dependent on having jobs while automation makes their labor less important to productivity. The time is coming, he says, when robots may help us change this situation. Imagine, if you will, robotic factories owned by everybody. These goods would be sold and the income would be distributed equally among the entire population, in the manner of stock dividends. The entire population would thus become financially secure. They would have a basic income produced by robots. The remainder of the economy would continue under the free enterprise system; anyone who wanted more income than his share of the profits from the robotic factories could go to work and earn it. —F.R.

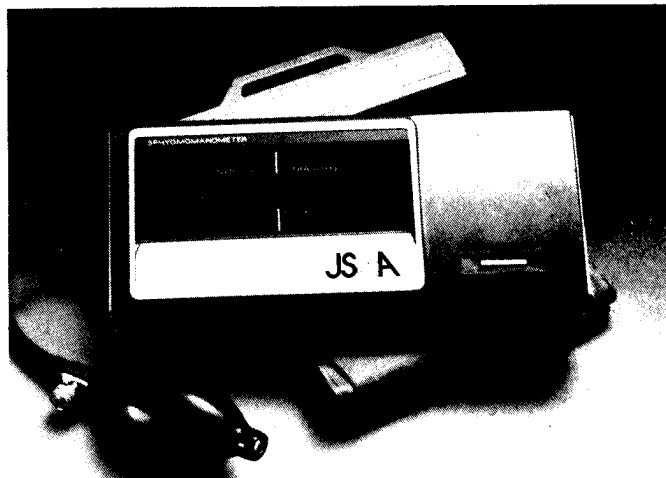
Extended Lifespan

JS&A was destined for failure when we introduced our first electronic blood pressure unit. But then a miracle happened.

Model 310



Model 410



Advertisements were starting to appear everywhere. JS&A had just introduced the world's first home electronic blood pressure unit in a massive national advertising campaign.

But something was strange. JS&A often tests its products in its catalog first before they are nationally advertised. If they sell well, we then start a national magazine advertising campaign. The blood pressure unit sold well in our catalog, but for some strange reason, it wasn't selling well in magazines.

SHOCKING DISCOVERY

And then we found the answer. A few months earlier after our blood pressure unit appeared in our catalog, our computer manager (let us call him Ralph to protect his identity) handed us a computer printout of the catalog sales results.

Scanning the results, we discovered that the blood pressure unit was the best-selling product in our catalog—far exceeding every other product by five times.

The results were so positive that we immediately placed hundreds of thousands of dollars in an advertising campaign launched in early 1978.

Just as the advertisements were starting to appear, Ralph walked into our president's office with some startling news. "There's been a mistake," Ralph said. "The computer printout was wrong. The blood pressure unit is actually our worst selling product but a computer error gave us the wrong information."

And so our president sat back and watched JS&A advertisements appearing everywhere, knowing full well that the campaign would cost his company almost the price of a new computer.

Then came the miracle. As if by plan, the American Medical Association came out with

an advertising campaign urging consumers to take their blood pressure regularly to combat hypertension or high blood pressure. Ads appeared everywhere.

The campaign revealed that there may be as many as 25 million Americans who have high blood pressure and don't know it. Simply by taking their own blood pressure and discovering hypertension early enough, Americans could be saving their lives and reducing the chances of heart attacks. Suddenly our campaign started to sell blood pressure units by the thousands.

AWARD RECEIVED

This year JS&A's president received the Extended Lifespan award for "pioneering in the distribution of home health electronic devices" by the Committee for an Extended Lifespan. In accepting the award, our president made it very clear that the award was earned as a result of a computer error and not as a result of his brilliance.

This story is painfully true. And although it may be a slight embarrassment to us, there is one aspect that is not. JS&A was indeed the company that pioneered the electronic blood pressure units and has always selected the very best units available to offer at the very lowest prices possible.

NEWEST UNIT

Our newest unit shown above is another example. The model 310 sells for only \$69.95 plus \$2.50 for postage and handling (Illinois residents, please add 6% sales tax.) You simply wrap the velcro cuff around your arm (you can even keep your shirt on) and inflate the cuff. Both an audible tone and a visible red light will indicate your systolic and diastolic readings. The system is extremely accurate, comes with a self-bleeding air valve and can be stored in a convenient carrying case that

comes with each unit.

The deluxe model 410 functions similar to the first system except that the readings are displayed in digits, and the unit also displays your pulse reading. It sells for \$139.95 plus \$2.50 per unit for postage, insurance and handling. If for any reason you are not completely satisfied with either unit, you may return it within 30 days for a prompt and courteous refund including your \$2.50 postage and handling. To order either unit, credit card buyers may call our toll-free number, or you may send your check or money order to the address below.

Both units use solid-state components, come complete with instructions and a one-year limited warranty, and should give you years of trouble-free service. If service should be required, we maintain a service-by-mail center as close as your mailbox. JS&A is America's largest single source of space-age products—further assurance that your modest investment is well protected.

If you are concerned about your blood pressure or know somebody who is concerned about monitoring his or hers, we recommend JS&A's latest units.

Incidentally, Ralph left JS&A on his own accord and bought a farm in another state. There were no hard feelings when he left. How could there be? Order your blood pressure unit at no obligation, today.

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THAT THINK

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Northbrook, Ill. 60062 (312) 564-7000
Call TOLL-FREE 800 323-6400
In Illinois Call (312) 564-7000

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prevent the disastrous displacement of workers. We've been automating for years and never had the unemployment that people keep expecting. The capital-formation barrier will keep anything from happening fast. We've got 80 million workers in Europe and America doing the kinds of jobs that robots might do. If you replaced 5 percent of them over 40 years, assuming a cost of \$30,000 per robot, that is \$3 billion a year worth of robots that somebody has to pay for."

In the next century, some writers say, the prospect could change. They suggest that as machines do more and more of the necessary work, society can respond in two ways. It can fire workers; or it can distribute unemployment over a wider population where it will not necessarily cause harm.

These writers maintain that distributed unemployment is the course the United States has always followed, more as a result of political pressures than conscious policy. Child labor laws removed children from the work force. The 40-hour week cut the work done per man by a third or more. Compulsory education took adolescents from the labor pool, colleges took millions more. A standing army keeps two million people on what, from a purely economic point of view, is a form of welfare. Welfare itself keeps others in paid unemployment. Early retirement has long been pushed to unemploy older workers. In theory, then, as robots and their relatives do more work, the country could distribute the employment by going to a shorter work week.

Other thinkers believe that worrying about robot-induced unemployment is premature and unfounded. They believe that technology, by its very nature, creates new jobs, although workers may be temporarily displaced and need retraining. According to this view, machines such as robots will free workers to do more jobs requiring real brain work. By increasing productivity, these thinkers argue, robotics will cause the economy to grow and thus create new jobs.

Not surprisingly, roboticists are optimistic. Engleberger says, "Robots increase productivity. My argument is that productivity is always good. You can't sit on a curbstone in Cairo with flies all over you and hope to improve things.

ROBOTS OF OUR DREAMS

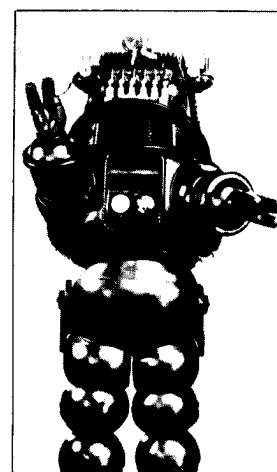


The Bettmann Archive

The "Roboter," a British model of 1932.



NBC's Twiki and Tina, 25th century lovers.



Movie Star News

Hollywood's Robby the Robot.

Robots as assembly-line drones—the only kind of robots we're likely to see for a long time—have seldom interested writers or moviemakers. Instead, they've given us robots who (yes, who) can love, hate, fear, or play marbles; insomniac robots counting electric sheep; demoniacal robots; robots as substitute children; robots who suffer segregation (but not sexism—so far); robots as cuddly little hunks of metal; robots as the hope of mankind; even, once, a robot as Pope.

The robots of science fiction are, in short, chrome-plated people. That notion is so appealing that it overrides the reality of the robot as industrial equipment. Thus the Merriam-Webster dictionary gives as its first definition of robot: "a machine that looks like a human being and performs various complex

acts (as walking or talking) of a human being." The word "robot" itself is far more to the point; it comes from the Czech "robota" (work) and "robotnik" (worker). But even Karel Capek, the Czech writer who introduced the word in his 1921 play *R.U.R.*, made his robots indistinguishable from people.

That wished-for resemblance is exactly why robots appear in science fiction at all. As Isaac Asimov has put it, a little grandly, the purpose is not so much to study the machines as to consider "the nature of man in its deepest aspects." Hence such titles as "A Logic Named Joe," and such weighty tracts as "What's Become of Screwloose?" "Pink Plastic Gods," and "The Tinplate Teleologist." Alas, the humdrum robot of reality is, by comparison, a mere giswich. —Ed.

"What you do with the productivity may not be so good. The need is not to limit productivity but to use it intelligently. You can use it in several ways. You can keep the same level of material wealth but work only 20 hours a week. Leisure is, after all, another form of wealth. Or you can keep people working 40 hours a week, and produce great material wealth for everybody. Or you can use the extra productivity to clean

the air and water. Quality of life may be what you want."

But these are human considerations, of no interest to robots. On the factory floor in Danbury, PUMA bends and stretches and twirls—screeee—in the high-tech snake dance, a docile slave, the Compleat Drudge, writhing amid the oscilloscopes, and wire spaghetti and the flickering cryptic message: ZDEX IOUT to SQRK. ■

NEW INVENTION



Miracle Fuzz

A new space-age invention and the same effect as lightning combine to create the world's first home oxygen regeneration system.

The new Energair ionized oxygen generator will make a handsome addition to any desk.

You need oxygen to live. You can live without food for 60 days, without water for seven days, but without oxygen, you won't make it past two minutes.

That small piece of fuzz located on top of the cylinder shown above emits negatively-charged electrons which attach themselves to molecules of oxygen, thus creating ionized oxygen.

You are already familiar with ionized oxygen if you've smelled the air after a thunderstorm. You feel great, revitalized, and alert. The lightning from the storm adds a small negatively-charged electron to each oxygen molecule in a process called ionization.

SCIENTISTS DISCOVER

Scientists discovered that air quality can actually affect your moods, your feelings and your sense of well being. Air that is positively charged caused people to be depressed, moody and tired. Negatively-charged air made people feel good. We have all experienced air that is positively charged in air-conditioned buildings or in a polluted environment.

Scientists looking for a way to turn positively charged air into negatively charged air developed the negative ion generator—a product that produces negatively charged particles that attach themselves to air molecules and thus create the same fresh feeling you get after a thunderstorm.

The new space-age product shown above is an ionized oxygen generator called the Energair air purifier. The copper mesh fuzz on top of the unit is one of the secrets of the system.

Although it has no moving parts, you can actually feel a wind of ionized oxygen produced from the fuzz which spreads to fill an average-sized room in one minute.

CIGARETTE SMOKE TEST

To show the dramatic effect of ionized oxygen, you can take the Energair, blow cigarette smoke into a clear bowl, and hold the bowl inverted over the system. The smoke will vanish. The charged oxygen particles appear to dissolve the smoke particles, precipitating them from the air.

In a room, the Energair air purifier surrounds you with these oxygen ions and cleans and purifies the air so that even in a smoke-filled room, you will be breathing cleaner, country-fresh air all day long.

WALL TEST

Take our unit and place it next to a wall. Also

put a large piece of paper on the wall. Within a few days notice how black the paper gets. That black film is finite carbon particulate matter—the same pollutants you would normally breathe and that would pass through most air filters. By placing the unit in the center of a room or away from a wall, that same matter falls to the ground as dust.

A trip into the mountains exposes you to nature's freshly ionized oxygen. The Energair produces this same effect. It will clean your room of odor-causing bacteria and stale, musty, or smoky air.

Ionized oxygen should not be confused with ozone. Ozone has a molecular formula of O_3 , whereas the molecular formula for ionized oxygen is O_2 with a negatively-charged ion.

DON'T BE CONFUSED

After we announced the Energair last year, many companies came out with their own ion generators. We purchased a unit from each company and tested them at an independent laboratory. The results are shown below:

Name	*Ions	Price
Energair	438,000	\$79.95
Omega 700	63,000	245.00
AirCare	72,000	149.95
Modulion	75,000	79.95

*Measurements indicate total number of ions per cubic centimeter per second at one meter. These figures may vary by plus or minus 10%.

Note: One unit not mentioned above produced no ions and actually produced ozone or several times the maximum ozone concentration allowed by federal government standards.

USED IN HOSPITALS

Many hospitals are now using ionized oxygen systems in their operating rooms and burn centers. Their units not only purify the air, but they also eliminate pollen and other irritants.

Working in a clean air environment, you think clearer, are more alert, and you function better. The Energair is actually a miniature lightning machine. The minute you plug it in, energy is converted into ionized oxygen. This efficient system uses one watt of power or less than a penny per day to operate, so you leave it plugged in continuously.

We are so impressed with the pleasant effect of Energair that we urge you to personally test it yourself in your home or office. Order one at no obligation. Put it by your desk, or in any room where you spend a great deal of time. See if it doesn't rid your room of odor-causing bacteria and stale, musty or smoky air. Try the smoke and paper tests mentioned in this advertisement.

SLEEP FASTER

At home, use the Energair by your bed and see how country-fresh air allows you to sleep easier, deeper, and more relaxed.

You should notice the difference within one day—especially in a work environment. But use the Energair for a full month. Then, if you do not feel totally convinced of the positive effects of ionized oxygen, return your unit for a prompt and courteous refund.

The Energair is manufactured by the Ion Foundation, a leading ion research and development company.

Service should never be required, but if it is, there's a prompt service-by-mail center as close as your mailbox. JS&A is America's largest single source of space-age products—further assurance that your modest investment is well protected. The Energair measures 9" high by 3" in diameter and weighs 24 ounces.

To order your Energair ionized oxygen generator, send **\$79.95** plus \$3.00 for postage and handling (Illinois residents, please add 5% sales tax) to the address shown below or credit card buyers may call our toll-free number below. We will send your Energair ion generator complete with 90-day limited warranty on the electronics, a five-year warranty on the fuzz, and complete instructions.

Let space-age technology revitalize your life with the world's first home ionized oxygen generator. Order one at no obligation today.

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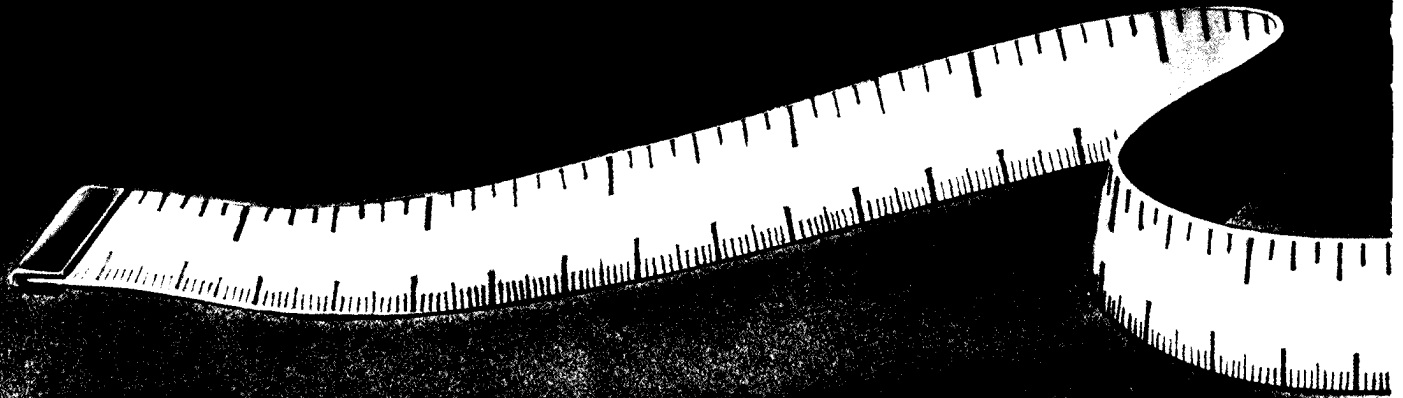
THERE IS AN ALTERNATIVE: HUMAN SCALE

Our society's faults lie not in the stars but in our size
By Kirkpatrick Sale

Here's what I see when I glance down my bookshelf: *Mankind at the Turning Point*, *The Domesday Book*, *The Limits of Growth*, *The Coming Dark Age*, *The Promise of the Coming Dark Age*, *The Twilight of Capitalism*, *The Environmental Crisis*, *The Transformation*, *The Biological Time-Bomb*, *Awakening from the American Dream*, *The Poverty of Power*, *The Stalled Society*, *Our Synthetic Environment*, *Future Shock*, *Blueprint for Survival*, *Nightmare*, *The Myth of the Machine*, *The End of the American Future*, *The End of the American Era*. I think they're trying to tell us something.

It is true that dire predictions of universal crises have been made during all ages, at least since the Sumerians and Egyptians first settled into urban societies 5,000 years ago. And I do not mean to seem foolishly pessimistic or a professional Chicken Little in directing attention once again to the accumulating crises of contemporary America, as if I thought the ingenuity of the human species had reached its limits or the cockroaches were about to inherit the earth. Nor am I overlooking the fact that every age has its crises, and that—so far—the ingenuity of the human brain, often the scientific brain, has been capable of solving or appearing to solve them all.

Nonetheless there is enough evidence around us and affirmations from enough different people in enough different disciplines to prove that our current predicament is not only serious, but unique. For the fact is that our current crises proceed like the growth of our systems, *exponentially*. The present differs from the past because our problems are so large we can't solve one problem or try to without creating some other problem, or a score of problems, usually unanticipated, and then we are suddenly faced with the task of coming up with a new solution without enough time to figure out its consequences. And when we hastily put that solution into effect, it goes on and



©1990 Stanislaw Lem



Illustration by Stanislaw F.

“The most interesting and powerful force in our time is that people are getting more and more interested in regional and local affairs”

creates another set of problems.

That is the double bind.

“During the last two centuries,” in the words of Dr. M. King Hubbert, a geophysicist from the U.S. Geological Survey with a worldwide reputation for vision and acumen, “we have known nothing but exponential growth, and we have evolved what amounts to an exponential-growth culture, a culture so heavily dependent upon the continuance of exponential growth for its stability that it is incapable of reckoning with problems of nongrowth.”

What that means is best expressed in the ancient fable of the Arab potentate who offered to give one of his subjects any gift he desired, in return for some well-received favor. The humble subject asked only for some grains of wheat on a chessboard, one grain on the first square, two on the second, four on the third, eight on the fourth, and so on, doubling each time until all the squares were filled. Naturally the potentate was willing to comply with this modest request, and the granary managers were called forth to begin distribution. Much to everyone’s amazement, there wasn’t enough wheat in the entire country to fulfill the gift. Before they reached the thirty-third square, he was owed 8,000 bushels of wheat, by the fiftieth square 1 billion bushels (equal to the modern annual output of the U.S.), and by the sixty-fourth square some 7.4 trillion bushels (2,000 times as much as the annual production of the entire modern world).

That’s exponential growth.

In the Land of the Double Bind

Let’s say America wants to alleviate the crisis of domestic hunger, not simply for humanitarian reasons but because feeding 20 million underfed citizens turns them into better workers, better consumers, and better taxpayers, and prevents them from turning to social unrest. But given the nature of corporate agriculture, a decision to

grow more food means a far greater use of energy for farm equipment, fertilizers, pesticides, and transportation to markets, thus adding to the energy crisis, driving up energy prices, and making the cost of growing and distributing food even more expensive—ultimately putting food out of the price range of the needy. It means increased use of pesticides, some of which in the air, soil, or food will cause additional disease and debilitation, especially among the poor, who would thus be put out of work and have less money to spend on food. It means increased use of chemical fertilizers, the mining of which adds radioactivity to the air and can cause further sickness; and the fertilizers will eventually leach even more into surrounding water systems, damaging the marine life, curtailing the supply of fish for food. It means the expansion of larger farms with greater capital, thus driving out the owners of small and marginal farms who will be forced into the cities to either join the ranks of the underfed or get on the welfare rolls, adding to governmental spending and thus to inflation, driving up food prices. With increased inflation and abundant agricultural supplies, farmers will be getting less money for their crops, so they will have to either get subsidies from the federal treasury (increasing inflation still further, particularly for the poor) or cut back on production (forcing prices up, thus making less food available for the underfed).

Whichever way you look at it: double bind.

Or let’s say it is decided, as many politicians and criminologists have urged, that the country solve its problem of soaring crime rates by beefing up state and local police forces, expanding and computerizing federal agencies, increasing the number of prosecutors and judges at all levels, building more courts and jails, and expanding budgets for prisons and rehabilitation services. This, of course, places an enormous extra burden on already stretched government budgets, and particularly those of the larger cities where crime is greatest. The cities must then draw funds away from other services, including schools, hospitals, welfare, community development, transit, housing, and job training, which inevitably leads to increased

unemployment, poverty, urban deterioration, addiction, and prostitution. This, of course, means more crime.

Double bind.

But we don’t have to be quite so futuristic about it. Double binds are all around us.

People living in cities, where natural forms of exercise have been pretty much eliminated, have taken to jogging and cycling to build up heart muscles and ward off coronary diseases. But when people jog and cycle in cities, they expose their lungs to about ten times as much air pollution as they would otherwise, and the activity itself leads to hyperventilation and the inhalation of even greater quantities of pollutants, many of which are known causes of heart disease. So if you do not exercise, you risk coronary illness in one way, and, if you do, you risk it in another.

Double bind.

Or take the Aswan Dam. Egypt had it built with much fanfare and vast expense in order to improve the general standard of living by providing electricity for its people, increasing agricultural production through controlled irrigation, and increasing fish production by providing a new lake. But the dam has blocked off the Nile waters so that the millions of tons of natural fertilizers end up in the lake behind it and never reach the farmlands downstream (severely harming agricultural production) or the marine life of the delta (severely curtailing fish production). The government planners were then forced to use much of the electricity from the dam not for home or industry but for production of artificial fertilizers for the farmers and, they hope, artificial chemicals for the delta fishermen, thus using electricity to solve the problem created by the dam that was built to solve the problem of electricity. But since the artificial fertilizers don’t work as well as the natural ones, and since the delta waters, stagnant now for much of the year, have bred a variety of diseases, the overall standard of living has been lowered.

Double bind.

I hope the point is clear: The crises of the present are of such magnitude and synergy that they cannot be solved by any of the conventional solutions we have applied; indeed, the solutions themselves turn out to be problems

Kirkpatrick Sale is the author of Power Shift: The Rise of the Southern Rim and Its Challenge to the Eastern Establishment. This article is adapted from his forthcoming book, Human Scale, to be published in June by Coward, McCann & Geoghan.

more often than not. In virtually all our systems, all our conventions, all our institutions, we are caught in a double bind, and we apply our solutions, one after another, in vain.

The Promise of A Technofix World

The basic question is how can we alleviate these crises, and soon, before they place us in even greater jeopardy?

We could proceed to an age of more spectacular bigness, continuing certain obvious trends of the present toward large-scale institutions, multinational corporations, centralized governments, high-technology machinery, large cities, high-rise buildings, and all that is implied in the American ethic of unimpeded growth: the expansion of the present corporate/government structure, leading to a fully mixed system of state and private capitalism. That would seem to entail government regulation of scarce resources and some greater degree of social regulation, increased corporate conglomeration, further consolidation of political power within the Executive Branch, and more business and governmental support of the arts. Allowing, as always, for a few pockets of discontent, big would be better; progress is our most important product.

Essential to this future is a belief that our present crises can be solved, or at least meliorated, by the application of modern technology and its attendant concentrations of science, government, and newly generated capital—what I would call *technofix*.

"We must pursue the idea that it is more science, better science, more wisely applied that is going to free us from [our] predicament," said Glenn T. Seaborg, former Atomic Energy Commission chairman and chancellor of the University of California-Berkeley. "[This will] set the underlying philosophy for a rationale for the future handling of our technological and social development."

A shortage of oil? The technofix solution is to develop and perfect the processes for liquefaction of coal, and, if that fuel ends up costing more money, the unimpeded workings of corporations in the marketplace will simply develop more efficient cars and furnaces that will require less fuel.

More food? All we have to do is

THE BEANSTALK PRINCIPLE



It occurred to me one day, looking at the drawings in a book of fairy tales I was reading to one of my children, that the giant in "Jack and the Beanstalk" looked somehow more *fragile* than menacing, as if he weren't put together quite right. I sat down and made a few calculations. If the giant was, as he looked in the picture, about five times as big as Jack—five times taller, five times wider, five times thicker—then he would have to weigh not just five times as much but five to the *third power* times as much; just as the volume of a box 5' × 5' × 5' is not just five times bigger than a box 1' × 1' × 1', but five to the third power as big, or 125 cubic feet.

So if Jack weighed 50 pounds, the giant would have to weigh 50 lbs. × 50 lbs. × 50 lbs., or 125,000 pounds—more than 60 tons. Naturally, lugging around all that weight would be something of a problem, an immensely greater problem than the human form has been developed for. Particularly so because the giant's leg bones, though indeed they were 125 times as big as Jack's in all, were only 25

times as big in the dimensions where it counts in carrying weight, that is, in a cross section through the bone, which takes in only width and length.

Thus, the giant would have been trying to support 125 times Jack's weight on bones only 25 times as strong, and he would have cracked his legs in two and fallen flat on his face if he were to stand up, much less try to chase Jack. No wonder he didn't seem very menacing.

The point can be amplified a hundred ways—we have only to look around. A big mansion is not simply a bungalow with more rooms; a big party is not simply an intimate dinner with more people; a big metropolitan hospital is not simply a clinic with more beds and more doctors; a big corporation is not simply a family firm with more employees and more products; a big government is not simply a town council with more branches.

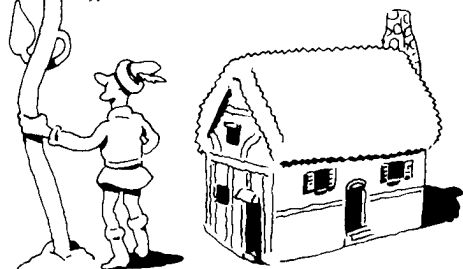
The simple conclusion is that size matters—in human institutions as well as human forms—and it has its limits. We may formulate this more precisely as a principle—let's call it the Beanstalk Principle in honor of the medium that, after all, brought Jack and the giant to the point of comparison. It holds:

For every animal, object, institution, or system, there is an optimal limit beyond which it ought not to grow.

To which might be added the Beanstalk Corollary:

Beyond this optimal size, all other elements of an animal, object, institution, or system will be affected adversely.

—K.S.



Even buildings such as the Parthenon and Peking's Temple of Heaven were built on human measures and in proportions that took account of the human body

run seawater into the Sahara—which could be done with large, nuclear power and desalination plants along the Mediterranean and Atlantic coasts—and develop a few new kinds of hearty crops such as a single-cell protein that could be made into an all-purpose super-cereal.

Civil unrest? It has been seriously proposed that enormous geodesic domes be built over large American cities that have populations likely to riot or rebel, especially in the summertime, so that there would be no "long hot summers." The air could be controlled; certain oxygen mixes could be created to induce lethargy when needed.

Of course a serious commitment to the technofix future will require far greater concentrations of capital than at present, larger scientific and technological centers, bigger corporations to raise capital and sponsor research, and expanded national bureaucracies to coordinate the varied activities, particularly those on an international scale. If I should live to the next century, it would not surprise me to find that this, in fact, is the future we have chosen—or rather, that we have been given. Still, it is not such a comforting future, considering that these larger forces have brought us to the critical pass in which we now find ourselves.

There are some among us, and not a radical fringe either, who do not have much confidence in technofixability. Not everything can always be solved by technology. The cost of all the elaborate techniques used to try to control air pollution in this country now comes to more than \$95 million a day—yet in most places the air is not getting appreciably better, and in some places it's getting steadily and gravely worse. Nor can we always be sure of the effects technology will have: The technofix in the 1940s and 1950s for acne, tonsillitis, adenoids, and ringworm among children was high-dosage X-ray treatment. But now the National Cancer Institute says that X-rays may have given thyroid cancer to as many as 4 million people, one-third of those who were exposed.

The other possible way out of our double-bind present, one antithetical to the technofix future, lies in exactly the opposite direction: toward the decentralization of institutions and the

devolution of power, with the slow dismantling of all the large-scale systems that have created or perpetuated the current crises, and their replacement by smaller, more controllable, more efficient people-sized units, rooted in local circumstances and guided by local citizens.

In short, the *human-scale* alternative.

Retrograde Revolution

In the search for the proper order of things and societies, a search that has inspired humankind since its earliest sentient days, we have found no better guide than the human form, no better measure than the human scale. *Man the measure*. Has that not been the standard or at least the goal for the greater part of human societies since they first began gathering collectively some 15,000 years ago? Was that not the explicitly stated principle of Pericles, of Leonardo, of Jefferson, of Corbusier, and of hundreds more of our most capable planners and thinkers? In any search for a desirable future—for the ways in which tools, buildings, communities, cities, shops, offices, factories, meeting places, forums, and legislatures should be constructed—I see no reason to go beyond this simple rule: All should be built to human scale.

"Human scale" is originally an architectural term used to describe the components of a building in relation to the people who use it. In every society the measurements most convenient and most constant were those of the finger, the hand, the arm, the stride, and the height of the builder—a tradition we honor today in the English system, in which an inch is based on the length of the first joint of the thumb, the foot on the length of the forearm, and the yard on the length of a normal pace or an extended arm from fingertip to nose.¹ Even buildings intended to evoke awe and inspiration, such as the Parthenon or Peking's Temple of Heaven, were, when successful, built on these human measures and in proportions that took account of the human body.

¹This tradition is being threatened by current attempts to get the U.S. to adopt the metric system, based not on anything human at all, but on a measure that the French Convention, in 1793, chose quite arbitrarily by taking 1/40,000,000 of the meridian of the Earth.

But the idea of human scale can also be used to govern the design of communities and towns, indeed of whole cities. It means buildings that can be taken in easily by the human eye, in harmonious relations that do not engulf or dwarf the individual; streets that can be comfortably walked, parks and arenas for casual human contact, places for work and play and sleep within close distance of each other; the natural world brought into daily life, with grass and trees and flowers in every part, open spaces to experience scenery by day and the stars by night. And all of this of such a size as can be comprehended by a single individual, known at least by acquaintance to all others, living in an area where the problems of life are kept to manageable proportions, and where security is the natural outcome of association. Cities, too, with their overlays of urbanity, with interlocking networks and cross-neighborhood relationships of all kinds, can arise from an amalgam of such communities, if only the cities themselves do not lose the human scale, either in their buildings or their total size, and do not smother their separate parts.

Surely it is not so difficult to imagine all other aspects of human life, by extension, governed by the same principle of human scale. Social arrangements, economic conditions, and political structures, even educational and leisure facilities could be designed so that individuals could take in their experience whole and coherently, relate with other people freely and honestly, comprehend all that goes on in their working and civic lives, share in the decisions that make everything function, and not feel intimidated or rendered impotent by large, hidden forces beyond their control or reckoning.

The same sense of security and self-worth that a person inevitably feels within an effective community, the family member can feel within the home, the worker on the job, the citizen at the town meeting, and all for precisely parallel reasons. What it takes is a scale at which one can feel a degree of control over the processes of life, at which individuals become neighbors and lovers instead of just acquaintances and ciphers, makers and creators instead of just users and consumers, participants and protagonists instead

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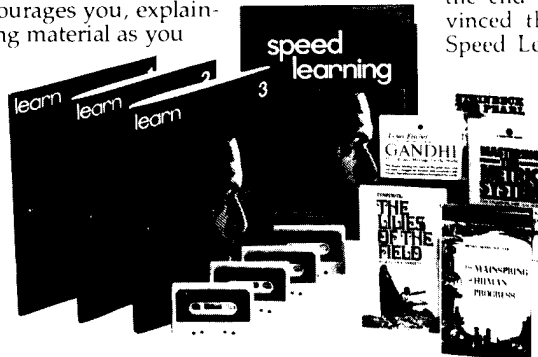
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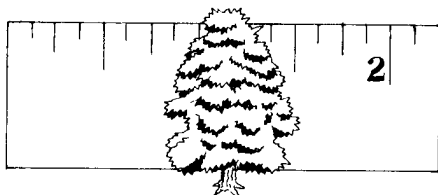
That scale is the human scale.

This alternative kind of new age would certainly not be without its problems, some considerable, and would likely face crises of its own in the course of its development—a development that, even in the best of circumstances, would take place over several decades. At a minimum it does suggest something in the way of obvious relief from the imperilment brought on by our present large-scale institutions. It would survive without the military/industrial complex, the agribusiness giants, the real-estate speculators. It would eliminate the convoluted systems whereby, at present, the citizens of New York City are governed by 1,487 different governments, agencies, and boards, and the citizens of California pay an accumulation of 454 taxes on a single loaf of bread.

This alternative future is somewhat less likely than the technofix one, I should think, since it calls for somewhat broader changes over time and for the dislocation of forces that despite being caught in recurrent double binds, retain considerable momentum. But it is by no means a utopian pipe dream, and there are many reasons to imagine its coming about.

The Societal Pendulum Takes Five

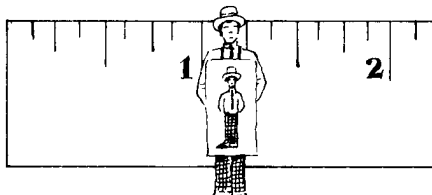
I believe even now we can see indications of a well-spread and growing movement toward some kind of a human-scale future that I'll isolate here, at the risk of presumption and certainly of oversimplification:



Naturalism

There is new concern for the natural world. This unprecedented concern for everything from renewable resources to endangered species may be a very deep biological reaction to the damage we are inflicting on our environment, a primordial human impulse toward self-preservation. But, whatever the roots, it is an extraordinary phenomenon, manifest-

ing itself right now among all segments of society, in every Western nation. In the U.S. naturalism has found its most dramatic expression in the emergence and the clout of the environmental movement, which, for now, as *New York Times* columnist William Shannon noted, "is one of the few big popular movements that continues to enlist volunteers, excite idealism, and evoke steadfast and unselfish commitment . . . in every region and virtually every community." Along with it has come the swift development of the alternate technology crusade and, in almost every state of the union, the closely allied drive against nuclear power plants. Today the spirit of naturalism is seen in everything from the boom in health foods to the development of a \$200 million-a-year house-plant business. Hard to believe? The latter is so big it inspired a plant-napping profession in the Sunbelt states, where most of the greenery is grown. The mania for backyard gardening involves 33 million U.S. households—some \$136 billion worth of produce.

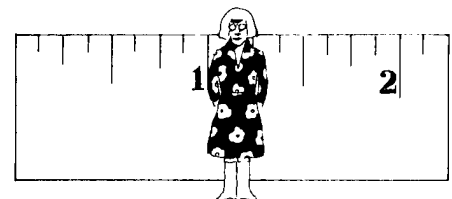


Individualism

Probably as a result of the proven inadequacy of so many governmental, corporate, and academic remedies, and possibly in biological response to the increasing pressures of depersonalization and homogenization in our society, Americans are asserting a new kind of individualism, a claim for self-identity and self-worth. And when this concern is not taken to the point of abrasive selfishness ("meism"), it becomes, for me, a positive societal current.

It can be seen in the fashions of our times, the physical-fitness boom, personalized gifts and clothing, "self-assertiveness" training for women, do-it-yourselfers, individualistic styles of dancing and dress, at-home "gourmet" cooking, the search for "roots" and family trees, the demands of women to control their own bodies, even the demands of cancer victims for Laetrile. It

is there in the new religious movements, which, in the words of San Francisco State University sociologist Jacob Needleman, "can no longer be taken as a transitory cultural aberration but rather as a central feature of the profound change through which the American civilization is now passing." This is true however dubiously we may regard religion's louder hucksters. And it is the wellspring of the contemporary currents toward "flextime," workplace democracy, self-management, worker participation in decision making, employee ownership plans, and the like—currents that are gradually changing the nature of many offices and factories in the industrialized world.



Feminism

In the broad view of history, at no time since the Romantic Age at the turn of the 19th century have the values associated with feminism in the largest sense been so triumphant. I don't mean simply the rise of the women's movement and its quick political and economic consequences all across this country, important though those have been; nor just the changing ideas in many sectors about women's roles, child-rearing, the patriarchal family, sexual stereotypes, and all that sexism now means, radical though those have been. I mean the ascendance of what have been regarded, in our culture, as the womanly virtues: spontaneity, permissiveness, sexuality, emotion, softness, cooperation, lovingness, participation—as against, say, analysis, authoritarianism, denial, reason, hardness, competition, sternness, elitism, what might be called the manly virtues.

Obviously both of these sets of elements play a part in our current society, as in all societies. But who could look at the current revolt against and distrust of authority, the free expression of sex in all ages and quarters of the population, the rise of communal and communitarian arrangements, the growing permissiveness in homes, schools, offices, even boot camps, the

Illustrations by Steven Guarnaccia

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The present widespread interest in ecological and environmental matters suggests that we may be experiencing a profound feminist alteration of our culture

upsurge in the nurturing skills of gardening and husbandry, the relative status of the scholar as against the soldier, the growing acceptance of homosexuality, the rise of pacifist, antiwar, and antinuclear sentiments, the revival of fundamentalist and transcendental religions—who could look at these alone and deny the ascendancy over the last decades of the feminine virtues? Indeed, if masculine cultures are associated with sky-gods (as in ancient Egypt, Judaism, Christianity) and feminine cultures with earth-gods (Phoenecia, Greece, Phrygia), the present widespread interest in ecological and environmental matters suggests that we may be experiencing a profound feminist alteration in our culture.



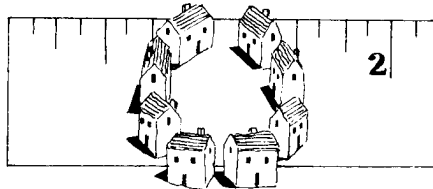
Populism

It is safe to say that not since the late 19th century have the goals and ideas broadly associated with populism been so pervasive as they are today. The current mood of disillusionment with big government, big business, and big labor to which the polls continually attest is reminiscent of nothing so much as the classical populist response of the 19th century. We see it in the rise of alternative institutions, the growth of citizen protest, and the emergence of mainstream political activity aimed at reducing government interference rather than applying government remedies. The list of alternative organizations and networks that have grown up over the past 15 years is almost limitless, but for a start there are free schools, free clinics, storefront law offices, food co-ops and group suppliers, community newspapers, counterculture magazines, alternative publishing houses, "underground" churches, independent credit unions, community day-care centers, communal houses, garage and tag sales, and health-food restaurants, and all are common now in every large city, in most college towns, coast to coast.

A similar people-oriented opposi-

tion to the established systems just in the last decade or so has produced a remarkable number of citizen-action groups organized around consumer protection, utility regulation, taxation, the environment, and other political issues. Taken altogether, these alternative groups have at least twice as many contributors as the two major parties combined (about 1.4 million to 520,000), and they get even more money in donations and dues (\$16.6 million to \$13.6 million in 1976, a presidential election year), which gives a good idea of their relative importance in the eyes of the populace.

To veteran Washington observer and correspondent Tris Coffin all this signals that "the U.S. is turning left to neo-populism"; to the conservative academic Daniel Bell it means that "the populist revolt . . . has already begun at the very outset of the postindustrial society."



Localism

Part of the disintegration of national loyalties in the West—witness the sharp decline in patriotism in the U.S. (the current jingoism notwithstanding) and the rise of separatist and regional movements among American Indians, blacks, Inuits, Quebecois, Scots, Welsh, Basques—has to do with a resurgence of local interests and local allegiances that has probably not been so intense for more than a century. René Dubos, the eminent biologist who has been studying the human animal for some 50 years has asserted, "The most interesting and powerful force in our time is that people are getting more and more interested in regional and local affairs," and he went on to note a remarkable fact: The American people's great mobility has produced an "extraordinary social trend—for the first time in human history a large and increasing number of people can *select* their place of residence" rather than simply take it as a matter of birth. This undoubtedly accounts for the great population migrations to the exurbs and the Sunbelt,

and for the fierce passions that people exhibit toward the places they have selected to live. Hence the spontaneous growth of block associations and neighborhood associations over the last few years, of community organizations and communes and intentional communities. Dubos, again, makes the point that localism can only increase in the future, first because of continuing mobility; second because of the drying up of shippable fuel sources (such as oil and gas) and the turn to unshippable ones (solar, wind, wave); third because of the need for societies, buildings, and technology to adapt to local conditions to harness local energy and preserve local ecosystems; and fourth because of the need to avoid overdependence on foreign resources and to supply food for growing populations.

These five characteristics of our era—naturalism, individualism, feminism, populism, and localism—may well shape a human-scale future, if not within years at least within decades. They are all durable, indeed all have existed in one form or another through most of history, now waxing, now on the wane, but never really extinguished, as if they described at least one set of priorities and passions basic to the human psyche. They are all connected, all part of some complicated reticular pattern—so the nurturing of feminism relates directly to the rootedness of localism, and both to the ecological harmony of naturalism—that expresses similar concerns in different but reinforcing ways. And they have all become resurgent in a fairly short span of time, roughly in the years since 1960, despite the obvious array of static and traditional styles which oppose them. This suggests to me that the trend they reflect is a real and powerful one, and it is in their direction that the entire societal pendulum may perhaps be swinging.

All this gives me some hard-nosed optimism about the potential—though by no means inevitable—emergence of a human-scale world.

It is said his contemporaries laughed with scorn when Sophocles, as a young man, predicted that Athens, which at the time was engaged in a running war with the powerful Persian Empire, was about to enter into a Golden Age. ■

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In what may be his most controversial film, the celebrated Italian director conveys a bleak vision of coming relationships between the sexes By Melton S. Davis

Federico Fellini describes it as "the most difficult film I've ever undertaken." Which is understandable since the subject of *The City of Women* is nothing less than the future relations between the sexes.

The film tells of a man (Marcello Mastroianni) who finds himself in a city populated and governed by women. His story reflects Fellini's views on feminism and man's role in a world dominated by women, a world that may already be starting to appear.

In *The City of Women*, which will premiere at the Cannes Film Festival this month, Fellini has created what may be his best work. A high achievement indeed because, although he's completed only 13 films, they have won four Oscars as well as the top awards at the Venice and Cannes festivals. *Time* magazine has hailed him as "the cinema's greatest satirist." And, after seeing a Fellini film, Swedish director Ingmar Bergman described the experience as "... a decisive turning point. I will have to review my way of directing."

Even as his films analyze contemporary society, they tell us about tomorrow. In *La Dolce Vita* (1960), for instance, Fellini anticipated our present-day consumer society, bent on amusement and increasingly bored by too easy living. That movie was a milestone not only of



Photographs by Deborah Beer Syma

The master himself directing some of the thousands of women who inhabit *The City of Women*. In this scene, they sit in bleachers to watch Fellini's Everyman (who else but Marcello Mastroianni) demonstrate his prowess

“. . . it's the end of the world. Man and woman no longer have fantasies they can project on each other”



Fellini on the set. He claims to have questioned hundreds of women to get their ideas of what emerging female identity is all about. "The new woman will be particularly dangerous to men," he says, "because she's different from all we know of women."

motion pictures but for modern society, as well.

In his most recent picture, *Orchestra Rehearsal*, Fellini took an angry look at what could be ahead for us politically: chaos, brought about by excessive pursuit of self-interest. The movie begins prosaically with a television interview with musicians at a rehearsal. But the conductor steadily loses his authority. The tension and quarreling mount. The players yell revolutionary phrases and spray-paint slogans of protest, attacking the conductor. Chairs, tables, and music stands are broken. Suddenly a huge demolition ball crashes through the building, covering everything and everyone with plaster and dust. The finale is the shocker. The conductor again assumes charge, this time with an authoritarian voice—Hitler's.

"The orchestra can represent Italy, but also whatever world in which we find ourselves living together," Fellini explained to me. "I wanted to suggest the total rethinking that must take place in the individual sphere, a look at where each of us is headed."

Fellini's growing pessimism about the future is again manifest in *The City*

Melton S. Davis, who is based in Rome, writes regularly about the Italian cultural scene.

of Women, where he forecasts what may happen when the male ego is submerged by aggressive femininity. Here the man-woman relationship described in his film *8½* is overturned, which is a measure of how much Fellini—and the times—have changed. In *8½* he retold the ancestral dream of a man gathering around him all his women to subject them to his wishes and pleasures. Man was depicted as a caliph, catered to by the women in his personal harem. Now, 17 years later, in *The City of Women*, the protagonist is lost among his women, surprised and overwhelmed by what has taken place in the meantime. Now, it's man who is forced to submit to the will of woman.

The film is about a professor of Greek mythology, Marcello Snaporaz. Explains Fellini, "He discovers that the women around him no longer correspond to the archetypes of Venus, Diana, Juno, the goddesses of his studies and of his dreams—or maybe they're my dreams. I should emphasize that, in this movie, my protagonist is divided in two: There's the professor and there's his alter ego, Cazzone [played by Ettore Manni]. Where Marcello is a romantic, an idealist, Cazzone is a man who lives only to take women to bed, an insolent and uninhibited erotomaniac. In short, it's Jekyll and Hyde.

"The professor, pursuing a woman he's seen on a train, arrives in a city inhabited by all the women he's known and loved, or wanted to love. But none of the women accepts the roles he wants to assign to them, and the same thing happens to Cazzone, who finds that the role he has always offered women is now being refused. To both men, it's the end of the world: Man and woman no longer have fantasies they can project on each other."

The quality of the city is fable-like, too, yet Fellini always makes it credible. His fantastic sets are futuristic; at the same time they seem derived from Hieronymus Bosch. One of Fellini's most unusual constructions is a luminous toboggan chute, a half-mile long. After a dizzying ride down the chute, the professor lands in a large cage that clangs shut behind him. Then he's put on trial, after which he must meet a representative woman in combat. To reach the ring, which is like a sacrificial altar, he climbs a strange tower, the outside of which is covered with pictures and medallions of famous women—the Byzantine Empress Theodora, Georges Sand, Catherine of Russia, and the Emperor Claudius' wife, Messalina—who fought the domination of men.

The City of Women is obviously not going to bolster the male ego. But Fellini believes that much of what he shows will happen soon—or is already happening outside Italy. In his native country, statistics underscore the radical social change affecting women and that unique institution, the Italian family. The number of marriages is decreasing; the divorce rate is rising; families are becoming smaller, and some are disintegrating. Sociologist Giampaolo Fabris believes the gap between the sexes will widen, and predicts, "If men don't awaken from their lethargy in the 1980s, conflict will dominate the lives of couples." It will be a conflict, some say, that men will lose. In fact, males might even be an evolutionary dead end that will be abandoned.

This is reflected in the movie. Marcello, hidden behind a column listen-

The faces in Fellini films are always haunting, and no less so in his latest. Marcello Mastroianni, the principal male of *The City of Women*, comes upon these two beauties at a feminist convention where women live out their fantasies of independence.



A fat woman shouts: "Cellulite no longer exists. It's a male invention"



Fellini's hero finds himself in the villa of an aging Don Juan, who is holding a party to welcome his 10,000th mistress. The festivities are disrupted by the "women's police," who bear an unmistakable resemblance to East German border guards.

ing to a meeting of women, hears a female chorus, almost Brechtian, which becomes stronger and stronger in vituperative challenge. The final cry of the chorus is, "Without a woman, what bloody use is a man!" Nothing illustrates better the director's ability to extrapolate from today's events than his shot of a fat woman who shouts, "Cellulite no longer exists. It's a male invention." Or the sign that reads, "All women are beautiful!"

A combination of visionary and narcissist, Fellini, now 60, is a tireless painter of himself and of his dreams. In his first picture, *The White Sheik*, he has one of his characters say, "Reality exists only in dreams." It is here that Fellini creates his mysterious universe. "I'm no soothsayer," he says, "but if anything, I see the future in my dreams." He is influenced by Swiss psychologist Carl Jung and believes his dreams stem from what Jung called the collective unconscious. The director frequently says, "I had a dream; no, it was more like a vision."

Fellini claims his dreams even tell him what is coming next in his own life. "Before starting *The City of Women*," he says, "I had a dream in which I saw in a flashing image all that was going to happen. I was in the midst of a storm, up to my knees in a vast expanse of water on a small sinking boat sur-

rounded by sharks. I could only think that a helicopter would appear as in a James Bond film, or that the sharks would change into a mysterious bird I could grab on to and get away. At the end, I escaped as a deep-sea diver."

The director chuckles. When telling a story he acts out all the parts: the sea, the sharks, the mysterious bird, the helicopter, the deep-sea diver. Since he is over 6 feet tall, weighs around 200 pounds, and looks like a friendly bear, his performance is a memorable sight.

"My own interpretation," he goes on, "is that the attempt to explore the depths of the feminine psyche forced me to transform myself into a deep-sea diver. It was clear I was facing the *femme revoltée*, the feminine universe in revolt. I was at the same time the turbulent ocean and the diver."

As he was about to finish shooting, he had another dream, which he views as an answer to the first. "I am in Venice: below me a canal, to my left a bridge, and in front of me my director of photography, Giuseppe Rotunno. He wants to come to me; but, instead of using the bridge, he jumps. As he's about to fall in the water, a submarine emerges and brings him to me. I had thought of a helicopter, but it was a submarine. The meaning? For me cinema is light, the image cannot be ex-

pressed without light. So Rotunno, who directs the lighting, represents the safety of the film. It didn't sink. He didn't drown because it was a rational event. So instead of a deep-sea diver, I became a submarine captain."

For Fellini, the completion of the film has come as a great relief. On top of protests, strikes, court cases, and the death of Nino Rota (the gifted composer of the music for all of Fellini's films), Italian actor Ettore Manni, who had the role of Cazzone, accidentally shot and killed himself. By then 70 hours of film had been shot. After weeks of doubts and discussions, Fellini decided to rewrite the ending of the film and to use a stand-in, filmed from behind, for the scenes in which Manni was to have appeared. Fellini had little choice: He sees the character of Cazzone as a necessary counterpoint to the professor—besides possibly being another part of Fellini himself. "He is the modern-day reincarnation of Don Giovanni, of Casanova," says the director. "He is a child who's only apparently grown up, a kind of guru of eros, a decadent phallicrat who thinks only of fornication. His home is a veritable mausoleum of sex, full of mirrors, erotic paintings, fetishist symbols, and art deco rubbish. It's here that the professor discovers the woman from the train—in Cazzone's bed!"

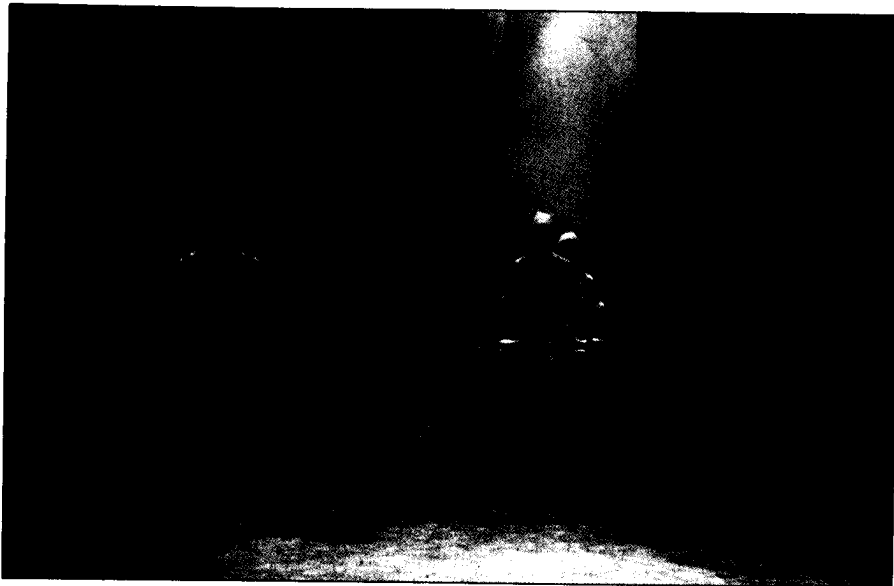
Who else is in the film? "Women, naturally," answers Fellini. "They are as kind as fairies or disturbing as witches, tender and perverse, old and young, crazy kids and fanatical sexpots. Anna Prucnal, the French singer, is the wife-mother. The stranger for whom the professor has always been waiting and whom he meets on the train is English actress Bernice Stegers. Italian actress Donatella Damiani is the fairy god-mother, the embodiment of femininity, who leads him away from the feminist congress and saves him from the many pitfalls of life."

This last characterization of femininity has led some women to accuse Fellini of making sexist films. "Quite the contrary," he says. "In *La Strada*,

After a dizzying toboggan-like ride, Marcello Mastroianni lands in a large cage, then is put on trial. The movie describes Fellini's vision of what may happen when the male ego is submerged by aggressive femininity.



“I have to take my hat off to him. . . . Do we expect a man like Fellini to make a film about women and take their side?”



Fellini's evocation of gladiatorial battle. Under the watchful eyes of a female guard, nurses carry out a wounded combatant. In the background stands an iron maiden.

the heroine is treated by the man as a puppet, an object, an animal. But when she dies, he goes mad. In *Juliet of the Spirits*, more or less the opposite happens, but the meaning is the same. Incidentally, *Juliet* was one of the first movies in which a marriage breakup marked the rebirth of a woman.

“Those films were made more than twenty years ago, and both were feminist films, although only a few realized it then. Now in *The City of Women*, the professor finally realizes that women are throwing back his conception of them.

“Many of the fantasies we’ve projected upon women have been absurd, artificial, monstrous deformations. We’ve given each of our women a role: angel of the hearth, or beautiful but perverse, or chaste, or lusty Amazon, or whore. Women have accepted this, even if the roles often didn’t fit. But there was a remedy: A woman could find another man who’d see her in a different way and give her a character in antithesis to the one before. Think of Madame Bovary. She often acted two or three or five parts with different men.”

I reminded Fellini that French author Georges Simenon confided to him in 1977 that he’d had 10,000 women, while Casanova hadn’t passed the 200 mark. “It depends on a person’s temperament,” the director answers. “For

some men, having various affairs is like exploring different planets.” Does he think such pluralism is the wave of the future? “It depends on what kind of commitment we’ll be willing to make, whether that of a cricket or something more. There are one-woman men who live for just a single affair. In a *Don Giovanni*, a *Don Juan*, a *Cazzone*, there’s a splintering that coalesces into a mosaic-like unity that gives them a temporary, tortured balance.”

And the man of the future? “Everywhere,” says Fellini, “women—and men, too—are redesigning their lives. New sexual rules are emerging almost constantly. *The City of Women* says that the sexual balance of power is changing. And the new woman will be particularly dangerous to men because she’s different from all we know of women.”

Is this threatening to him? “For me, woman is still that fascinating and unknown being on whom we keep projecting uncertainty, obscurity, ignorance. Personally, I continue to be comforted by a type of woman who is protective, serene, nurturing—that is, a feminine woman and not the asexual creature stamped by current style. I think it’s pathetic that young women accept a style that mortifies femininity and annuls them as individuals.

“On the other hand, I sympathize

with the pleasing woman—sensual, maternal, docile—who has been so humiliated that she’s justified in rejecting both her model and the sometime hysterical battles fought in her name by the women’s liberation movement.

“I find it comprehensible, even if a little absurd, that today’s women prefer to show themselves nude rather than dress sexily. Exhibiting the female body nude under sunlight, to deprive man of his erotic fantasies, seems to me a subtle anti-male act.”

As the movie neared completion, the attacks by belligerent feminists diminished. Originally, they were certain that Fellini was making a movie which would denigrate them and their ideas. They were appeased upon learning that two well-known feminists worked on the screenplay and that members of women’s organizations were in the cast. One of the latter, actress Michele Caruso, says her views have changed: “As far as I know or was able to understand, the film tries to give a picture of women today, how they are, what they think, and what they would like to become.” Another, Ippolita Avalli, takes a more cynical view. “What’s paradoxical and amusing at the same time,” she says, “is that Fellini makes use of feminist women and dialogue to turn everybody and everything in an antifeminist direction. But I have to take my hat off to him. After all, it’s more honest. Do we expect a man like Fellini to make a film about women and take their side?”

Fellini refuses this left-handed tribute. “Feminists have nothing to worry about,” he says. “Here, like the musicians in *Orchestra Rehearsal*, they’re metaphors, the allegoric terms used in a film essay on what social change is doing to human coexistence. What I have made is a fantasy epic about the changing image of women and the effect this will have on men. In reality, I’m proposing an armistice.

“It may be that *The City of Women* won’t please the more militant feminists. Few of my preceding pictures have. But I hope it will be an occasion for a reconciliation between the sexes, to suggest to woman a more affectionate consideration of man, giving her comradeship back to him. Both must be liberated from their prior conditioning. In other words, an invitation to take the road together in friendship.” ■

Too Busy Earning a Living To Make Any Money?

You think you've got problems?

Well, I remember when a bank turned me down for a \$200 loan. Now I lend money to the bank — Certificates of Deposit at \$100,000 a crack.

I remember the day a car dealer got a little nervous because I was a couple of months behind in my payments — and repossessed my car. Now I own a Rolls Royce. I paid \$43,000 for it — cash.

I remember the day my wife phoned me, crying, because the landlord had shown up at the house, demanding his rent — and we didn't have the money to pay it.

Now we own five homes. Two are on the oceanfront in California (I use one as my office). One is a lakelakefront "cabin" in Washington, (that's where we spend the whole summer — loafing, fishing, swimming, and sailing.) One is a condominium on a sunny beach in Mexico. And one is snuggled right on the best beach of the best island in Hawaii — Maui.

Right now I could sell all this property, pay off the mortgages, — and — without touching any of my other investments — walk away with over \$750,000 in cash. But I don't want to sell, because I don't think of my homes as "investments." I've got other real estate — and stocks, bonds, and cash in the bank — for that.

I remember when I lost my job. Because I was head over heels in debt, my lawyer told me the only thing I could do was declare bankruptcy. He was wrong. I paid off every dime.

Now, I have a million dollar line of credit; but I still don't have a job. Instead, I get up every weekday morning and decide whether I want to go to work or not. Sometimes I do — for 5 or 6 hours. But about half the time, I decide to read, go for a walk, sail my boat, swim, or ride my bike.

I know what it's like to be broke. And I know what it's like to have everything you want. And I know that you — like me — can *decide* which one it's going to be. It's really as easy as that. That's why I call it "The Lazy Man's Way to Riches."

So I'm going to ask you to send me something I don't need: money. Ten dollars to be exact. Why? Because I want you to pay attention. And I figure

that if you've got \$10 invested, you'll look over what I send you and decide whether to send it back... or keep it. And I don't *want* you to keep it unless you agree that it's worth at least a hundred times what you invested.

Is the material "worth" \$10? No — if you think of it as paper and ink. But that's not what I'm selling. What I am selling is information. *More* information than I give when I'm paid \$1000 as a guest speaker. *More* information than I give in a one-hour consultation for \$300.

But you're really not risking *anything*. Because I won't cash your check or money order for 31 days *after* I've sent you my material. That's the deal. Return it in 31 days — and I'll send back your check or money order — uncashed.

How do you know I'll do it? Well, if you really want to be on the safe side, post-date your check for a month from today — *plus 2 additional weeks*. That'll give you plenty of time to receive it, look it over, try it out.

I know what you're thinking: "He got rich telling people how to get rich." The truth is — and this is very important — the year before I shared "The Lazy Man's Way to Riches," my net income was \$216,646. And what I'll send you tells just how I made that kind of money... working a few hours a day... about 8 months out of the year.

It doesn't require "education." I'm a high school graduate.

It doesn't require "capital." Remember I was up to my neck in debt when I started.

It doesn't require "luck." I've had more than my share. But I'm not promising you that you'll make as much money as I have. And you may do better. I personally know one man who used these principles, worked hard, and made 11 million dollars in 8 years. But money isn't everything.

It doesn't require "talent." Just enough brains to know what to look for. And I'll tell you that.

It doesn't require "youth." One woman I worked with is over 70. She's travelled the world over, making all the money she needs, doing only what I taught her.

It doesn't require "experience." A widow in Chicago has been averaging \$25,000 a year for the past 5 years, using my methods.

What does it require? Belief. Enough to take a chance. Enough to absorb what I'll send you. Enough to put the principles into *action*. If you do just that — nothing more, nothing less — the results will be hard to believe. Remember — I guarantee it.

You don't have to give up your job. But you may soon be making so much money that you'll be able to. Once again — I guarantee it.

I know you're skeptical. Well, here are some comments from other people. (Initials have been used to protect the writer's privacy. The originals are in my files.) I'm sure that, like you, these people didn't believe me either when they clipped the coupon. Guess they figured that, since I wasn't going to deposit their check for at least 31 days, they had nothing to lose.

They were right.

And here's what they gained:

'Wow, it does work!'

"Oddly enough, I purchased Lazy Man's Way to Riches some six months ago, or so, read it, and really did nothing about it. Then, about three weeks ago, when I was really getting desperate about my financial situation, I remembered it, re-read it, studied it, and this time, put it to work and WOW, it does work! Doesn't take much time, either... I guess some of us just have to be at a severe point of desperation before we overcome the ultimate laziness, procrastination."
Mr. J.K., Anaheim, CA

'Made \$50,000 just fooling around'

"In February 1974 you sent me (for ten bucks) your Lazy Man's Way to Riches. Since then I have made approximately 50 grand (\$50,000) just fooling around on the basis of your advice. You see, I really

am lazy — otherwise I could have made 50 million! Thank you!"
Mr. R. McK., Atlanta, GA

'\$24,000 in 45 days'

"... received \$24,000.00 in the mail the last 45 days."
"Thanks again."
Mr. F.G.N., Matewan, W.VA

Made \$70,000

"A \$70,000 (thanks to you for writing The Lazy Man's Way to Riches. That's how much I've made..."

"I use this extra income for all of the good things in life, exotic vacations, classic automobiles, etc. Soon I hope to make enough to quit my regular job and devote full time to making money the easy way."
Mr. D.R., Newport Beach, CA

\$260,000 in eleven months

"Two years ago, I mailed you ten dollars in sheer desperation for a better life. One year ago, just out of the blue sky, a man called and offered me a partnership... I grossed over \$260,000 cash business in eleven months. You are a God sent miracle to me."
B.L., Pascagoula, Miss.

'There's no stopping me'

"Since I've got your (Lazy Man's Way to Riches) in July, I've started 4 companies — there's no stopping me and I'm so high I need chains to keep me on the ground."
M.I., Portland, OR

What I'm saying is probably contrary to what you've heard from your friends, your family, your teachers, and maybe everyone else you know.

I can only ask you one question.

How many of them are millionaires?

So it's up to you.

A month from today, you can be nothing more than 30 days older — or you can be on your way to getting rich. You decide.

The wisest man I ever knew told me something I never forgot: "Most people are too busy earning a living to make any money."

Don't take as long as I did to find out he was right.

I'll prove it to you, if you'll send in the coupon now. I'm not asking you to "believe" me. Just try it. If I'm wrong, all you've lost is a couple of minutes and a postage stamp. But what if I'm right?

Joe Karbo 1979, 17105 South Pacific, Sunset Beach, Calif. 90742

Sworn Statement:

"On the basis of my professional relationship as his accountant, I certify that Mr. Karbo's net worth is more than one million dollars."
Stuart A. Cogan

Bank Reference:

Home Bank
17010 Magnolia Avenue
Fountain Valley,
CA 92708

Joe Karbo
17105 South Pacific, Dept. 782-A
Sunset Beach, California 90742

Joe, you may be full of beans, but what have I got to lose? Send me the Lazy Man's Way to Riches. *But don't deposit my check or money order for at least 31 days after it's in the mail.*

If I return your material — for any reason within that time, return my *uncashed* check or money order to me. On that basis, here's my ten dollars.

Name _____
(Please Print Clearly)

Address _____

City _____

State _____ Zip _____
SORRY NO COD'S

PROOF!

Don't take my word for it. These are excerpts from articles in newspapers and magazines:

Time:

"He only works half the year in his stunning office on California's Sunset Beach, and even when he's there he puts in short hours... In other words, Joe Karbo, 48, is the prototype for "The Lazy Man's Way to Riches."

Seattle Times:

"Is it all honest? A man who has done business with him says Karbo's reputation is excellent, and that he has managed to conduct mutually beneficial deals with him with nothing but a handshake and an oral agreement... Want to be rich? Take my advice and follow his."

Boston Herald-American:

The book has drawn hundreds of letters from persons who have profited by it.

Los Angeles Herald-Examiner:

An unpretentious millionaire, Joe Karbo of Huntington Harbor is a vibrant, living testimonial to his intellectual, pragmatic conviction.

Forbes:

After bouncing around show biz, advertising, and real estate, he made his fortune... Last year (1972) he made \$250,000.

Money Making Opportunities:

Maybe Joe Karbo has the secret. Don't you think you owe it to yourself to find out what it is all about?... I just finished it — and I'm off on a vacation myself. Get the idea?

The Boston Globe:

Jay Haws of Chico, Cal. said the pep talk... in "The Lazy Man's Way to Riches" has "changed my life," and upped his freelance graphic designer income from \$2000 to \$30,000 annually.

"I'm not rich yet," said Haws, "but I see the light at the end of the tunnel... It gave me the swift kick in the pants that I needed."

Long Beach Independent:

He's programmed the path to riches for the lazy man.

Bad as inflation is in the United States, it could be much worse. In Argentina and Israel, among other countries, the rate now runs five to ten times as high as ours, year after year. And in Weimar Germany during the early 1920s, the mark's worth fell to one-billionth of what it had been—all in only five years.

Could our inflation rate even come close to the extreme of an Argentina or an Israel? And if it did, what would our lives be like?

No one has ever precisely defined superinflation, but most economists seem to have in mind an inflation rate that is over 25 percent and growing by leaps and bounds. (Hyperinflation is the most extreme superinflation. If the latter is Frankenstein, the former is Godzilla.) The United States, with its complex economy, would obviously suffer through superinflation in a less disruptive way than countries with simpler economies, like Argentina. At the same time, if we did have superinflation, we would certainly not go the way of Weimar Germany; that country's appalling plight was due not just to inflation but also to the social and political problems of a nation humiliated in war and in peace.

That's why, if you ask the average banker, economist, or businessman whether superinflation could happen here, he may give you a comforting answer. "We look for inflation to ease down over the next five years to an average of, at worst, 9 percent," says Robert T. Perry, chief economist of Security Pacific National Bank in California. Chimes in Hank Koehn, the bank's vice-president for futures research, "Superinflation is an unthinkable alternative future." Says Kenneth Goldstein, an associate economist with the Conference Board in New York, "Sure it could happen here—just as the sky could fall on Henny Penny. And it's just as unlikely, too." There is nothing on the horizon, he says, that might bring about a 25 percent rate.

But not everyone is equally convinced. "In the field of economics, 'never' is a dangerous word," observes Nake Kamrany, professor of economics at the University of

Southern California. "Who'd have thought, ten years ago, that we would have a yearly inflation rate over 15 percent today? Sure, we can reverse the trend if the monetary authorities keep a tight rein on credit and on the money supply, if the government holds down spending, if labor doesn't insist on raises in excess of productivity gains, and if business is content with reasonable profits. But if everybody focuses only on his bottom line, superinflation could be the result."

There are two danger signals that superinflation is on the way. The first, ironically, is the growing reliance on a supposedly painless method of coping with ordinary inflation: indexing, which ties income to cost-of-living increases or decreases. The familiar example is providing cost-of-living adjustments—COLAs—to workers' salaries. Similarly, escalator clauses can be inserted into leases and other contracts, allowing the amount of payment to vary with the inflation rate.

In theory, indexing should not contribute to inflation, since indexed wages and other payments would go down if the cost of living declined. Unfortunately, in practice this does not happen often; what does happen often is that cost increases—and hence price increases—are carried over automatically from one period to the next. This prompts people to take inflation for granted. They are dissuaded from saving; they are persuaded to buy and buy.

In Argentina, not only are wages indexed. The government also regularly boosts pension payments; it indexes income taxes, so COLAs don't push anyone into a higher bracket; it indexes rents, which go up every three months, and business taxes, so a company's inventory isn't taxed just because its value has risen on account of inflation.

"You should send people down here to study what we do," a Buenos Aires business consultant told an American recently. "You're heading in the same direction." Let us hope not. The inflation rate in Argentina went from 18 percent in 1972 to 150 percent today. "Indexation is self-defeating," Santiago Murray, the Argentine minister in

If the Inflation Rate Tops 25 Percent...

**Should you stockpile food?
Buy stocks? Increase your
use of credit cards? The
answers may surprise you**

By Lawrence Farber



While you might buy two pairs of shoes at a time if they fit well and are priced right, you're not likely to buy six pairs at a time

charge of economic and commercial affairs in the United States, told NEXT. "It keeps inflation going."

We may not have all that much to learn from gaucho economics, because we have already adopted a degree of indexing. Although only 10 percent of the U.S. labor force is covered by COLAs, the figure is 60 percent in basic industries like steel. Social Security benefits are now indexed to the cost of living. And five states—California, Arizona, Colorado, Minnesota, and Iowa—are now indexing state income-tax returns; next year, Wisconsin joins the list.

Once indexing permeates a society, stopping the inflationary spiral becomes as difficult as getting an alcoholic to switch from whiskey to water. In Israel, indexing is about as comprehensive as in Argentina. Last year, the government finally tried to stop the spiral by limiting COLAs to only seven-tenths of the inflation rate (then around 80 percent). The public outcry forced the government to raise COLAs back to the full inflation rate. As a result, inflation climbed to over 100 percent.

Another signal that superinflation is on the way is that the housing market becomes superheated, and nothing can cool it off.

During ordinary inflation, housing prices tend to go up. Things you buy with borrowed money cost you less because you repay the loan with dollars that are sure to be worth less tomorrow. And the simplest way for most Americans to obtain large loans, of course, is to keep buying houses with bigger and bigger mortgages.

But there's a stopping-point. When interest rates start going up, housing sales taper off, and prices decline. Buyers figure that mortgage rates will come down eventually, so why get stuck with a long-term 13 or 14 percent mortgage?

In an era of superinflation, however, the first commandment is *Thou shalt borrow to the hilt*. The public is convinced that inflation is no transient visitor but a permanent resident, that interest rates won't retreat for a long time to come. If droves of people continue buying houses despite high mort-

gage rates, it means that the public has accepted long-term inflation—which in turn means that superinflation is a giant step nearer.

Recently mortgage rates went up to over 15 percent, and housing sales did slacken. It remains to be seen whether the public will eventually start swallowing such high rates, and the housing market continue its upward climb.

Bookkeepers 'Good With Zeros'

Now, if there is one story about the Weimar Republic that everyone is familiar with, it is of people lugging wheelbarrows full of money to stores. This is one of the more vexing problems of superinflation—the need for enormous quantities of currency. At the height of the German inflation in 1923, the Reichsbank kept 30 paper mills and over 100 printing firms going full blast to produce banknotes. On top of that, more than 2,000 kinds of auxiliary currency were in circulation. Though notes were eventually denominated in billion-mark units, it still took a sheaf of 1,200 to buy a dozen eggs and a loaf of bread. The sheer volume of currency required banks to hire 50 percent more office workers in 1923 than in pre-inflation years. They regularly advertised for bookkeepers "good with zeros."

That won't happen here. One reason is the credit card. Even during superinflation, such cards won't become relics. As economics professor Samuel A. Morley of Vanderbilt University points out, Brazilians continue to use credit cards despite their inflation rate of above 60 percent. And cardholders pay interest on all outstanding balances from the date of any purchase—just as we may be doing in this country soon.

Yet credit cards might become less popular if their interest rate is ever tied to inflation. The finance charge, with compounding, could become exorbitant. In that case, credit cards might lose their popularity to debit cards.

When you shop at, say, a department store, instead of using a credit card you will present your debit card. The clerk will insert it into a computer terminal and—presto!—the charge will be subtracted from your bank balance and added to the store's. In a few states, banks are already offering debit cards,

as are the major credit-card companies.

Besides credit cards or debit cards, another reason we won't be burdened with having to carry around vast quantities of money is the greater use of tokens for money—tokens whose value will vary with inflation. Those "instant money" machines now available to credit-card holders at many banks and airports could be modified to spew out plastic tokens you may need to pay bus fares and buy newspapers. Like the no-denomination stamps issued by the post office not long ago, the tokens needn't bear a fixed face value. A bank's computers can determine what you will pay when you pick up your tokens every morning, and your account will be debited accordingly.

Another problem created by the ever-changing value of money during superinflation is the ever-changing cost of anything you buy. But here, too, we have modern solutions.

In the Weimar Republic, shopkeepers closed their doors for several hours at midday. This gave them time to have a quick lunch, check the latest mark-to-dollar exchange rate at the nearest bank, and—if necessary—correct the price tags on their merchandise before opening up for business. But eventually they hit upon an ingenious alternative.

Instead of correcting the tag on each item, the shopkeeper merely posted a sign in the window showing the day's "multiplier." If a tag showed 1,000 marks and the multiplier was 1.1, the customer knew to pay 1,100 marks.

Yet even if America enters an era of superinflation, we probably won't have to bother about multipliers. The reason is the Universal Product Code, those little parallel lines on cans and packages that allow an electronic scanner at the checkout counter to identify each individual product and to price it according to a computerized schedule. (Supermarkets in almost all states have such scanners.) Raising prices across the board by any desired percentage would be just a matter of pressing a few keys on the central control panel. Customers could check terminals throughout the store to learn the new prices before buying anything.

How Argentini-ans Save

One casualty of superinflation might be the savings account. Suppose

Farber is a writer specializing in economic subjects. He is based in southern California, which has the highest inflation rate in the nation.

COULD IT HAPPEN HERE? FIVE ECONOMISTS SAY YES

Five out of six noted economists whom NEXT questioned agree that superinflation is possible in this country. The one exception simply chose not to speculate on such an alarming subject.

"Yes, I believe that superinflation is possible in the United States," said Herbert Stein, former chairman of the president's Council of Economic Advisers. "The political result may be the end of democratic processes and the coming to power of a dictator who promises to end the terrible anxieties of superinflation by establishing a police state."

Fortunately, Stein went on, it's more likely that "we will just continue on this wave of inflation, up to the 25 percent range."

A rather optimistic slant was taken by Robert L. Heilbroner of the New School in New York City. First, he doesn't think that Latin American superinflation—which might be the next step for this country—would be so bad. "It's not runaway inflation," he says. "It's something between current American-European inflation and hyperinflation. The rate is 50-150 percent a year, and quite stable." Second, Heilbroner thinks that while inflation will accelerate, "Before it goes too far, it will be met by more effective measures than have been used up to now: price controls."

Edward Greenberg, professor of economics at Washington University in St. Louis, agrees that superinflation is possible, but thinks that controls would not be effective for long.

"In some ways," Greenberg continues, "the United States would not experience the effects of superinflation that other countries have. I visited Israel recently, and there superinflation has prompted an exodus of people with marketable skills. Incomes are higher in other parts of the world with less inflation.

"But such emigration from the United States is less likely. With our prominence in the market, superin-

flation would be hard to contain. There would be no countries to escape to. Besides, this still would be a prosperous country. And Americans don't speak many foreign languages."

To Robert Theobald, an economist who's also a futurist, "There is only one certainty in the economic field: The standard forecasts will be wrong." And he considers superinflation "a significant possibility." Those who argue otherwise "have not looked at the possibility of a credit explosion that would devalue the currencies of all nations in a very brief period of time." Still, Theobald thinks that it's more likely that we will experience a depression before superinflation.

In the view of Dennis Meadows, director of the Resource Policy Center at Dartmouth College, the depletion of natural resources is the cause of spiraling inflation. "Were the United States self-sufficient, superinflation would be unlikely," he says. "But our dependence on foreign resources creates a positive-feedback loop of cause-and-effect relationships, a vicious circle, in which the costs of our goods go up because of rising resource costs."

Wassily Leontief, winner of the Nobel Prize for Economic Science in 1973, declined to comment directly on the possibility of superinflation, but argued that a root cause of rising inflation is "a deep-seated social problem: the lack of day-to-day cooperation between labor and management." If they cooperated—labor easing its demands, management holding the price line—inflation might be contained, as it is in West Germany and Austria. "I have no doubt," Leontief concluded, "that, without such cooperation, all attempts to contain inflationary pressures will fail in the long run."

Which suggests that the six economists are actually unanimous in thinking that superinflation could happen here.

—Ed.

last year you put \$1000 into an account paying 5.5 percent; with inflation at 13 percent, the money would have shrunk to \$920 in a year. If you think that's bad, consider your Argentine counterpart. He gets 7 percent interest on his savings account, despite an inflation rate of 150 percent. Not surprisingly, the overwhelming majority of savings in Argentina go into higher-paying certificates of deposit. What's more, those C.D.s run for only 30 days, so the Argentine saver can shop around for higher interest every month. (Recently the monthly rate was lagging at 5.5 percent—only 63 percent a year.) An American saver who currently wants top bank rates has to tie up his money for at least six months, and even then his interest is likely to fall short of the inflation rate.

Unless steps are taken to encourage savings during superinflationary times, says professor Morley, our present banking system is in danger of being wiped out. To continue to attract funds, banks must pay realistic interest on their deposits; that, in turn, means they must charge their borrowers accordingly. As it is, more and more business loans are being tied to the daily prime rate (the interest rate a bank charges its favorite customers). If the prime rate goes up, the interest on loans already made goes up. A number of states are also amending or repealing their usury laws, so that higher rates can be charged on consumer loans.

There are also moves afoot in Congress to make it easier for people to get higher returns on their savings. The lid on passbook interest may gradually be lifted to allow competition among banks. Like Israeli investors, you may soon be able to buy notes and bonds that pay interest indexed to inflation. Even now, you can put your spare cash into money-market funds, Treasury bills, or commercial paper, all of which offer a considerable edge over bank savings accounts.

If fixed-income savings are no hedge against superinflation, what about common stocks? Offhand, one might think that the stocks of manufacturing companies, especially, would be appealing. Manufacturers can pass all cost increases onto their customers.

This is—and isn't—a good case for investing in manufacturing companies. The *Wall Street Journal* reports that the

“Superinflation could become a more effective contraceptive than the pill”

stock of one Argentine manufacturer tripled in a single day last May. Another stock leaped 1,000 percent in six months. But even superinflation cannot sustain leaps like that for long. During the three-year German superinflation, the stock market went up and down like a yo-yo. During 1922, the stock prices of German companies rose 1,200 percent. But the value of the mark fell three times as much.

A Cellar's Market

If stocks, along with fixed-income investments, become unattractive during superinflation, another form of savings becomes far more popular: hoarding, even though it's not all that effective. True, you could fill your cellar full of canned goods in anticipation of price increases. But clothing will also be getting more costly, and so will refrigerators, theater tickets, college tuition, etc. How far in advance could you possibly afford to pay all of your family's living expenses?

While piling up goods isn't a satisfactory response to superinflation, it's the one most people adopt. Like most Americans, you're undoubtedly buying some things sooner than you would if you didn't expect prices to rise. But you do this selectively. You're probably aware, for instance, that many major appliances cost no more today than they did before double-digit inflation; some items, like pocket calculators, are actually cheaper. And you can still count on occasional price declines and seasonal sales. While you might buy, say, two pairs of shoes at a time if they fit well and are priced right, you're not likely to buy six pairs.

As superinflation continues, however, the number of items that don't rise in price steadily dwindles, and price cuts become a rarity. At the same time, the conviction sinks in that if you hold money back, the decrease in its purchasing power will be lost forever. That's when you begin to buy goods even if you don't need them and even if you're not worried about future shortages. In the economists' jargon, tangibles replace money as a repository of value. In Israel, for instance, imported color TV sets are snapped up the moment they appear in the stores. The \$3000 price doesn't faze consumers, and neither does the fact that Israeli telecasts are all in black and white.

Workers' Paradise?

If superinflation has any benefit at all, it is high employment. Because people spend and hoard instead of saving and investing, manufacturers keep busy and unemployment sinks to the vanishing point. The jobless rate in Buenos Aires is less than 2 percent, the government reports, and that 2 percent consists mainly of unemployables. Workers are in such demand that job-hopping is the order of the day; employers are forced to pay premium wages to attract emergency replacements. Israel, too, is enjoying, or suffering from, full employment—“overemployment” is what Arnon Gafny, the governor of the Bank of Israel, calls it. In a turn of history's wheel, Egyptian workers may soon be flocking to the promised land to relieve the labor shortage.

Salaried workers, wage-earners, and the self-employed would be affected differently by superinflation. The salaried, being paid less often, are constantly giving their employers credit—especially unwise during superinflation. If someone is paid \$2000 once a month, he gives his employer an average monthly credit of \$1000. When inflation is 25 percent a year, he loses \$21 each month. When inflation is 60 percent, he loses \$50 each month.

Blue-collar workers are generally hurt less than white-collar workers, since they are paid more frequently. They are also more likely to be shielded by COLAs, thanks to strong unions.

For the self-employed, especially in the service field, the situation is more complicated. A doctor can quickly raise his fees. But if he accepts health-insurance assignments from his patients, he may wait six weeks to three months for payment, the value of which will have sunk drastically in the interim. If he refuses health-insurance payments, patients may stay away in droves or take a long time to pay. And were this country to experience superinflation at the same time that a national health-insurance program were instituted, doctors could find their incomes in need of emergency transfusions.

In some countries where this combination exists, the inflation-adjusted income of physicians dropped, proportionately, more than that of almost any other group.

The answer for doctors and their

patients may be prepaid medical care. For some years now, the federal government has fostered the development of “health maintenance organizations” (HMOs), whose participants make monthly payments and receive treatment at no charge (or a slight charge) whenever needed. The HMOs have a permanent staff of salaried physicians. In a superinflationary time, these physicians wouldn't need to worry about a general falloff of income because of patients who pay late, patients who don't pay, or patients who stop visiting doctors until they are at death's door. And their patients get the benefit of paying in advance for services they may use later on—a degree of protection against price increases.

Lawyers can also expect trouble. Their clients would be more reluctant to embark on protracted litigation, because superinflation would shrink the value of a future award. A not unwelcome result may be that disputes will increasingly go to arbitration for settlement. Arbitration costs less and takes less time. Another result might be that prepaid legal plans would get a boost.

Crime Marches On

The people most vulnerable to superinflation will include the elderly on fixed-income pensions; part-time workers, who won't enjoy job benefits and certainly will not get swift wage raises (which is why employers will try to hire more and more part-timers); and, especially, the unemployed. In a society where people are frantically searching for new ways to keep above water, little thought will be given to those who are sinking.

We can probably expect an increase in crime as a result. In the Weimar Republic thieves kept stealing so many public statues in Berlin, for the metal, that those remaining were removed. The prisons were jammed. Historian Alex de Jonge writes, “Criminals given short sentences were released and told to reapply for admission in due course.” Business crimes increased, too. In Hamburg, there were riots when the public learned that the local canning factory was using cats and rats in its preserved meats. In just 1922, the overall crime rate in the Weimar Republic increased 25 percent.

We can also expect a deterioration in the national morale. Superinflation, says

UPPER-CLASS FAMILIES WILL FEEL "MASSIVE STRESS"

If spiraling inflation causes our spending power to dwindle even further, the Americans who will experience the worst psychological wounds will be upper-class college-educated white Protestants and Jews. That's the opinion of psychologist Robert C. Weigl, director of services for the Mount Vernon Center for Community Mental Health in Alexandria, Virginia, who has been studying the link between money and psychology in both the rich and the poor.

Any loss of spending power, says Weigl, wounds the self-esteem of well-to-do Americans in particular, since they have come to take special pride in their possessions and their ability to obtain them. "Their sense of well-being rests on a bedrock of buying power," he says. "Even symbolic losses—a foregone vacation, the lowering of the heat in one's house—can provoke high anxiety and even contribute to family problems."

Blue-collar families may respond differently to drastic losses in their purchasing power, according to Weigl. Some may project their anger outward—"toward a monolith of some sort," like a big corporation. That might help spark a political witchhunt. Other low-income families—Greeks and Italians, among them—are likely to have extended families and close friends to help them absorb the shock of lower standards of living. (In absolute terms, of course, those people bereft

of the necessities would suffer the most.)

When upper-class families begin to lose the purchasing power that helps prop up their self-esteem, they may have nowhere to turn. Typically they don't have extended families and a wide circle of friends to fall back on. They generally live in houses they cannot afford, separated physically and socially from their suburban neighbors. "Their wealth has allowed their isolation," Weigl says.

Again unlike blue-collar families, the well-to-do may blame themselves or other family members for their misery. Says Weigl, "In Jewish and Protestant families especially, there may be an ethic that holds a person responsible for his material success or failure. So you see far more of a tendency for them to blame themselves, rather than to blame forces in the outside world." Of course, many Catholics would be included, too.

While the psychologist foresees "massive stress" among the elite in the short run if their purchasing power declines, he thinks there may be a silver lining. In the long run, people may turn again to other people for help: "They may have no other choice but to make cooperative arrangements with other families—like food co-ops, the sharing of baby sitting, family communes. There may be a return to the extended family, a linking together to share common strains." —Ed.

means more women will postpone, or forego, having children. In fact, futurist Hank Koehn remarks, superinflation could become a more effective contraceptive than the pill.

Some other trends we can expect:

More and more homeowners begin taking in lodgers, for the extra income. There's a return to the barter system. (In Weimar Germany, theaters advertised that the cheapest seats would cost two eggs.) And a deep sense of anger and frustration develops—the kind that made the German people ready to accept any sort of self-proclaimed savior.

In the nearly unanimous view of economists and financial experts, it's unthinkable—to use Hank Koehn's word—that America is destined to go down that same road. But was it much less unthinkable that Germany would, back in the 1920s?

One day in 1922, according to a contemporary account, a Berliner named Rudolf Havenstein visited his favorite tailor shop to order a suit, the kind he used to buy for 100 marks before the war. Told the tab would be 5,000 marks, he decided to wait for the price to come down. A year later, the suit cost 500,000 marks. What makes Herr Havenstein's decision a significant footnote to history is that, at the time, he happened to be the president of the Reichsbank, and, as such, the man in charge of Germany's monetary policy.

The disturbing truth is that we don't understand inflation much better now than we did then. "After years of intensive study," observes economic historian and social critic Robert L. Heilbroner, "we still do not know whether an increase in the supply of money is the cause of inflation or merely its passive accompaniment. We do not know whether wage increases lead inflation or follow it. We do not know if falling productivity is the source of rising prices or a quite unconnected factor. We do not know whether inflations are cumulative, pressing insidiously toward a runaway hyperinflation, such as that of Weimar Germany, or whether inflation may have self-limiting properties."

What's certain is that the scenario of superinflation has had its out-of-town tryout. The final act still needs work, and maybe the show won't make Broadway. But the stage has been set. ■

Argentine minister Santiago Murray, "is the worst thing that can happen to a country. It's demoralizing. Everyone becomes so involved in this race to keep up—they waste so much energy. People are anxious, worried. A few years ago, it was the only thing talked about in Buenos Aires. No one knew what anything was worth. A shirt might cost half the price of an entire suit, and no one knew why. And if you stepped into a taxi, you found the driver knew all about interest rates, the value of the U.S. dollar

and the Deutschmark. There were more amateur economists in Argentina than anywhere else."

During a time of superinflation, some current social trends should also intensify. More wives will join the work force to give the family a better chance of keeping up. There are already more than 43 million working women in this country, an increase of over 20 percent since 1970. Rampant inflation could spur a greater exodus from the home in the next decade, even if that

DESIGN THAT SPEAKS FOR THE 80s

Not glitter, but substance. A leading designer picks 12 of the best

By Victor Papanek

Many people think that design, if it is to express the next ten years, must be as new as the decade. That's not so. Advanced design does not have to be new; it *does* have to respond to the way we'll live in the years to come.

The 70s saw a revolution in lifestyles, and good design in the 80s will support and reinforce that revolution. Essentially, there's been a return to simpler pleasures. We enjoy preparing food ourselves, spending time outdoors, working with our hands. We find satisfaction beating the system in minor ways: pedaling a bicycle for inner-city transportation, or using a lamp that consumes less electricity than another but provides as much light.

When we look around for products to support this lifestyle, our choices seem unlimited—mind-blindingly so. But closer examination reveals the relatively small number of well-designed products. To say a product has lasting value, we should be able to answer yes to five questions:

- Does it perform its function better than other products now available?
- Is it easy to use, a breeze to understand and maintain?
- Is it safe?
- Is its design simple and clean, without the kind of trendy decoration that will unavoidably date the design?
- Is it made to last without built-in obsolescence?

These questions are basic enough.

Author of Design for the Real World, Victor Papanek is currently chairman of design at the Kansas City Art Institute in Missouri.

but few products pass the test. Most electronic gadgets are outdated by the time they reach mass-production; most cars are neither energy-efficient nor really designed to get us through the next decade; stereo equipment, cameras, appliances, and much furniture are merely "more of the same"—extensions of objects we already own, tarded up to look chic.

But not all. We are beginning to see a new concern for durability, safety, and quality—on the part of American designers. This is significant because, recently, we've had to look overseas for such excellence.

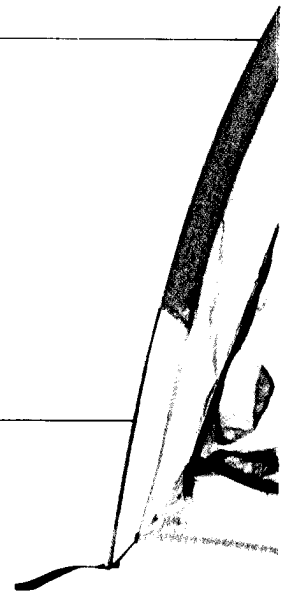
Does this sound like hyperbole? Consider the things in the life of an upper-middle-class American family interested in good design. Rick Chambers owns an insurance company, and his wife, Helen, teaches retarded children. They are in their middle-forties and have three children. Rick, an amateur photographer, uses two West German cameras, a Swedish Hasselblad, and a Leitz slide projector, also from Germany. Their stereo system was made by Bang and Olufsen of Copenhagen; their cassette tape unit in Sweden by Sonab. Rick's office typewriters and adding machine were made by Olivetti in Italy; his Sinclair pocket calculator in Great Britain; his ballpoint pen, fountain pen and pencil set by Lamy in West Germany. His spectacles sit in frames from Holland, his wife's are from Sweden. They drive a Mercedes. Helen's sewing machine is by Yamaha, the same Japanese firm that made their piano and their oldest son's Moog synthesizer. Her hair dryer was made in Italy, the bathroom scale in the Irish Republic. In the kitchen there's a French-made Cuisinart food processor, and a German coffeemaker and a coffee grinder by Braun, the company that also made Rick's electric razor. They have clay stewing pots from Greece; pans from France, Finland, and Germany; an orange-juice squeezer from Sweden; British dishes, Finnish glasses, a Swedish dish rack, and a Miele electric dishwasher from Germany.

In the 80s, I think we'll find that this dominance of foreign products was a temporary aberration. With good reason. Americans have an enviable record of innovative product design: The invention of the Franklin stove changed heating concepts around the world; the Winchester carbine is still the preferred hunting gun with Eski-

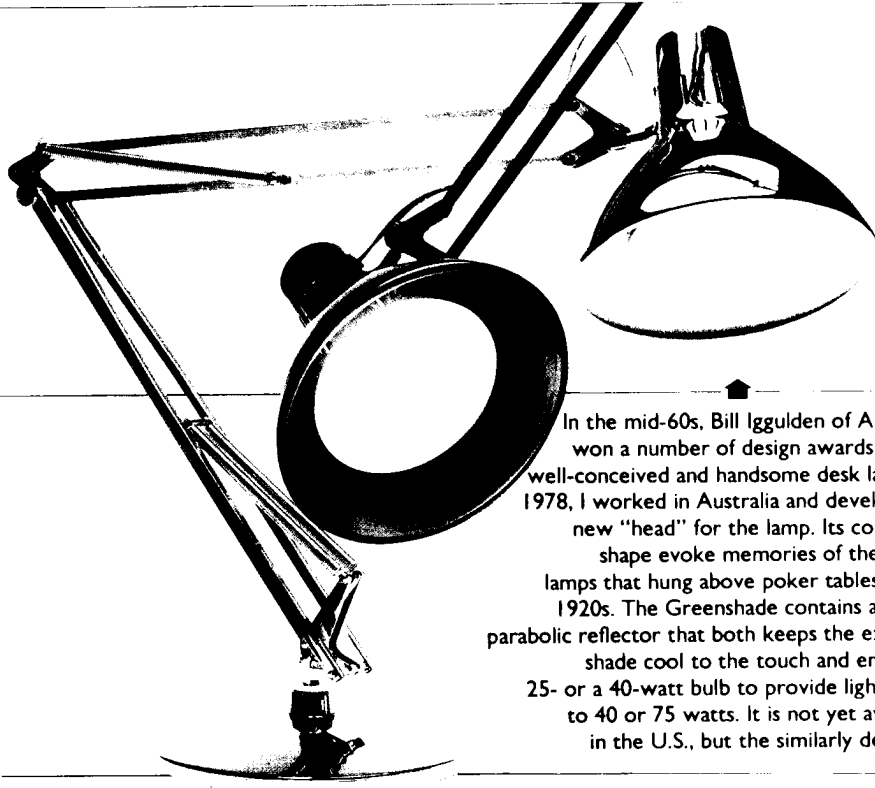
mos in Canada and Alaska, 114 years after it was produced; and George Eastman's Kodak Box Brownie camera set a world standard for almost 50 years, only to be superseded by Edwin H. Land's Polaroid cameras.

Americans are not only rediscovering the origins of good design. They are also redefining what selling is all about. Gourmet food shops, organic- or health-food stores are ready to assist you with recipes, diet plans, and cooking guidance. Florist shops, once primarily known for funeral wreaths and prom corsages, are giving way to shops that will lease plants to you for a year and to "botanical clinics" willing to gently nurse your failing *Monstera deliciosa* back to health. Bicycle shops, especially in such university towns as Madison, Cambridge, or Berkeley, have become community centers. Of course, they sell bicycles and related equipment, and provide information on local rallies. But now they also serve as bases for political action in the interest of cyclists. High-fidelity shops and stores specializing in model building, hang-gliding, spelunking, and other activity-centered avocations have become more like clubs than retail shops.

This "participatory," commonsensical lifestyle is reflected in the design pictured on these pages. In several instances, the products are new; in others, the designer has reached back to an earlier way of doing things. (Also notice that 7 are "American Originals.") I expect every one of the 12 to become leading examples for the rest of the world to copy and follow in the 80s.



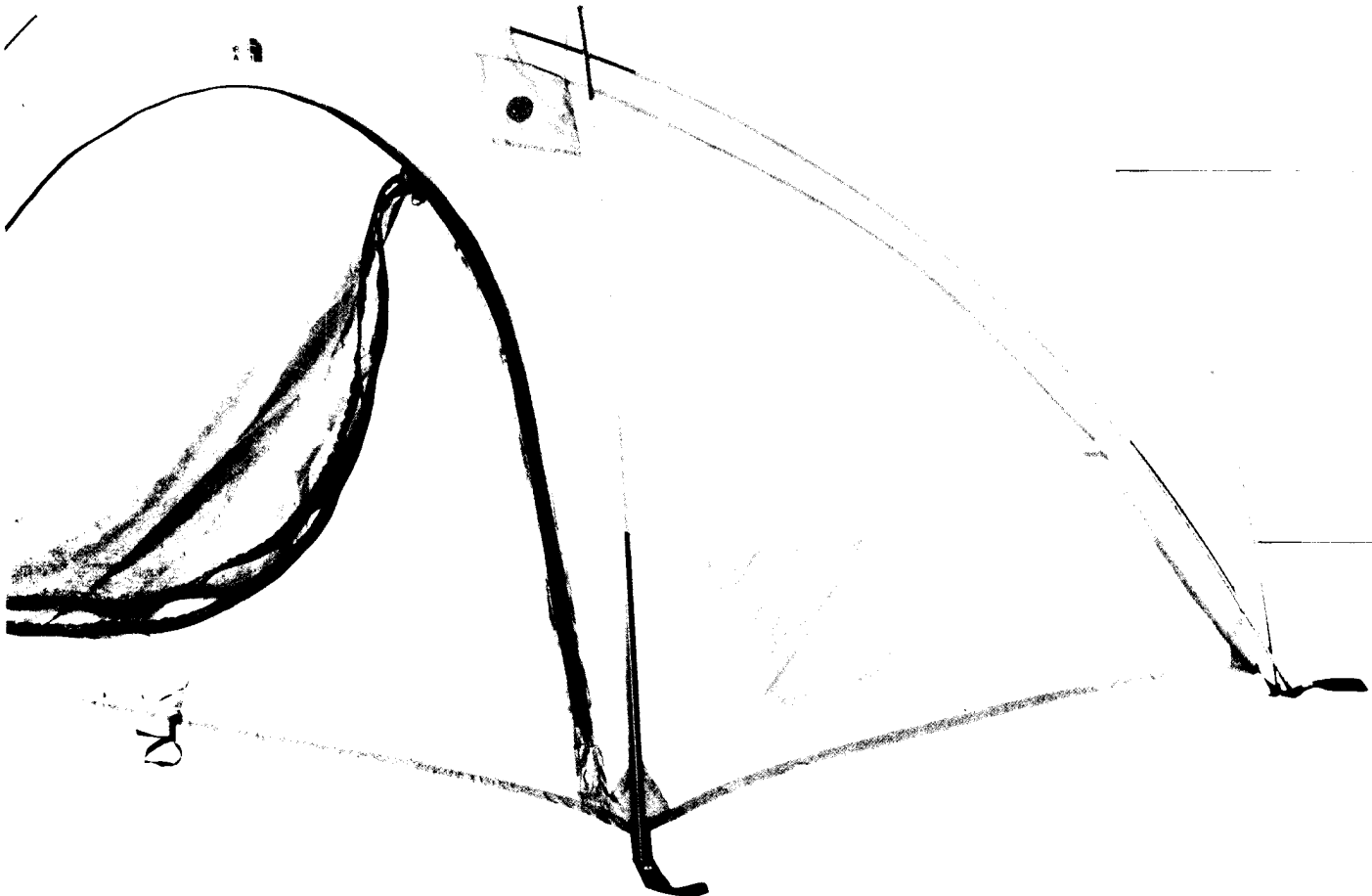
The eight-man army tents of World War I and the pup tents of the Boy Scouts are still with us for backyard pajama parties. Contemporary backpacking, however, demands rugged yet light material that can pack completely and provide good insulation. The North Face company, a pioneer in the development of equipment for expedition work in the Himalayas, Alaska, and the upper reaches of the Rockies has produced a mountaineering tent based on Buckminster Fuller's geodesic dome. The Oval Intention (below) can sleep



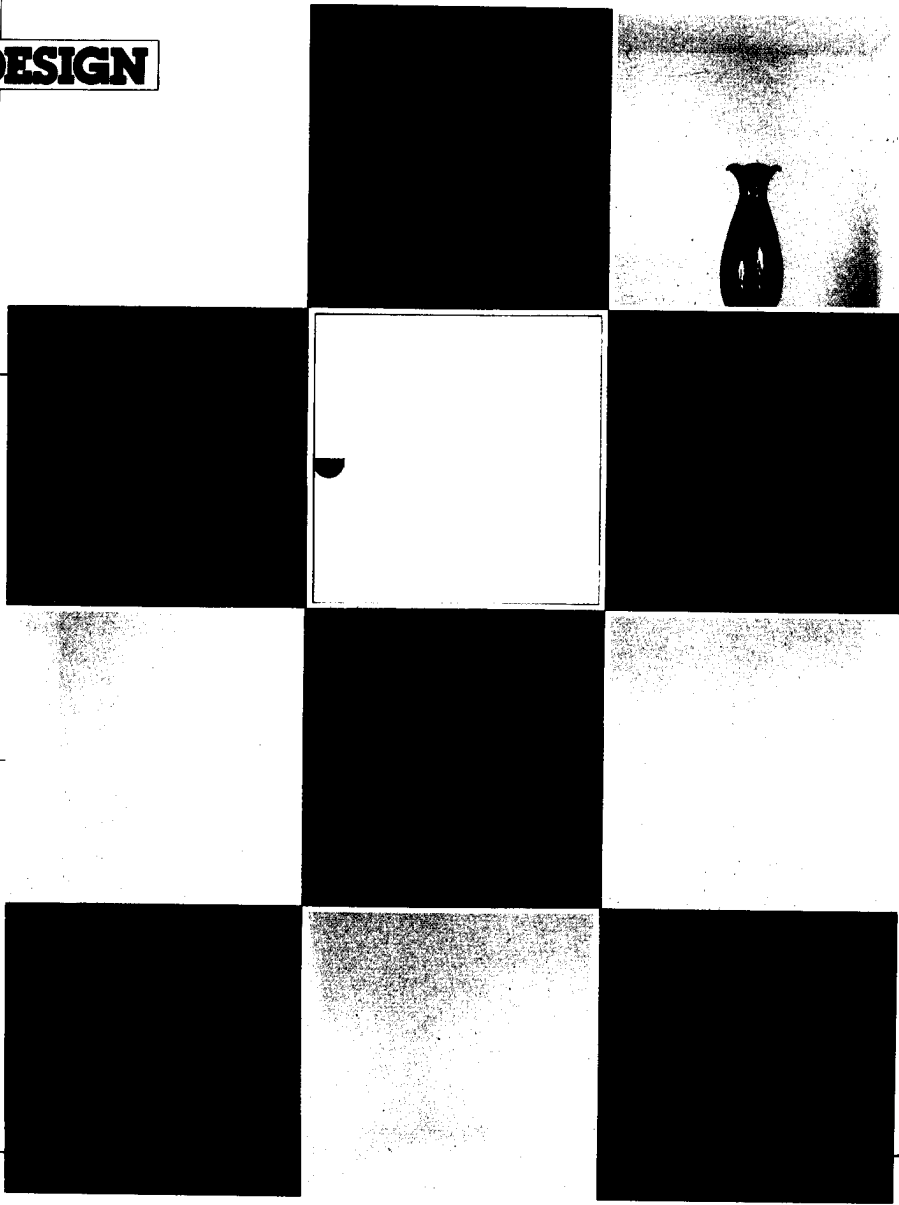
three people, with gear, and awesomely resists heavy snow-loads and high winds. In spite of its spaciousness, it weighs only 9 pounds, 14 ounces. (I've put one up in a high wind in fewer than four minutes.) The design worked so well that the company created two smaller versions, the VE-23 (for two people) and the VE-24 (intended for high alpine snow conditions). All three are superb examples of American ingenuity and are available from The North Face, 234 Fifth St., Berkeley, CA 94710 at a cost of \$385, \$235, and \$300, respectively.

In the mid-60s, Bill Iggulden of Australia won a number of design awards for his well-conceived and handsome desk lamp. In 1978, I worked in Australia and developed a new "head" for the lamp. Its color and shape evoke memories of the green lamps that hung above poker tables in the 1920s. The Greenshade contains a clip-in parabolic reflector that both keeps the exterior shade cool to the touch and enables a 25- or a 40-watt bulb to provide light equal to 40 or 75 watts. It is not yet available in the U.S., but the similarly designed

Luxo lamp is (above, left). The American-made Luxo uses a double-wall shade with an interior reflecting surface, much like the Greenshade. The models range in size and material, costing from \$50 to \$185.

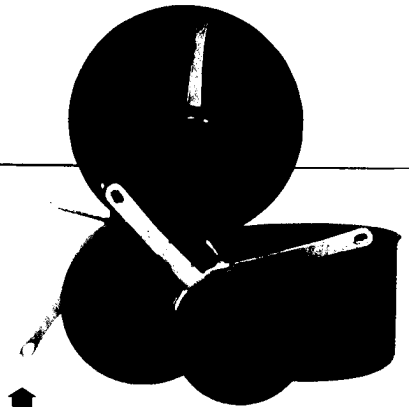


DESIGN



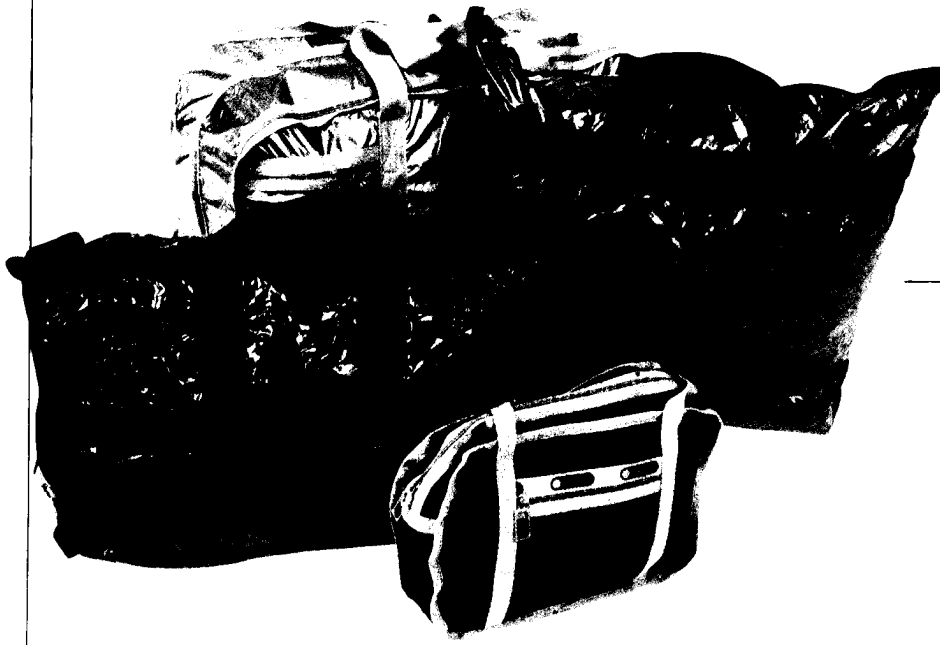
◆ We can expect furniture in the 80s to be easier to move, foldable or knock-down, and—above all—comfortable and well made. The prototypical folding chair (you know it as the director's chair) was first developed during the Civil War, and still sells well all over America.

Yet Americans have never given the design of "casegoods" (drawer units, wardrobes, bookcases, and other modular and stackable furniture pieces) as much attention as they have chairs. Ristomatti Ratia's "Palaset" storage system, developed in Finland five years ago, has set a world standard for versatility and adjustability. Although available everywhere, it is fairly expensive (pictured at left are 10 standard units, at a cost of \$26 a piece, and one unit, far left, with 6 drawers, for \$69)—a good reason for U.S. designers to develop a less costly but equally versatile, elegant, and simple system.

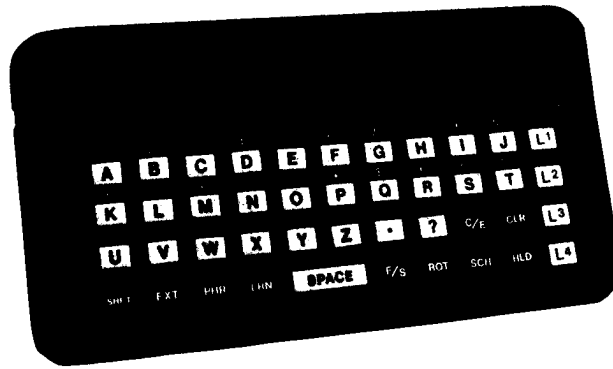


◆ Domestic production of another household basic, namely pots and pans, has offered us "starter sets" of thin-wall construction, plastic handles, easily cracked lid knobs, and baked-on enamel finishes.

Our only choice was to invest in extraordinarily expensive imports. That is—until now. Ohio's Commercial Aluminum Cookware offers a range of Calphalon cooking vessels constructed of a tough aluminum alloy in an extra-heavy gauge. Originally produced for restaurateurs, the pots are nonoxidizing and abrasion-resistant. The price tag of \$116 for a complete set (above) is more expensive than Brides Register gimcracks, but worth it. The motto of the firm—"built to be the last cookware you'll ever buy"—is well supported.



◆ Most designers of luggage seem to think we're still riding the Orient Express, complete with careful porters and ample baggage cars. But the makers of Le Sportsac, a new line of travel pieces (set at left costs \$140) know otherwise. Their sturdy, light products use polyurethane-coated parachute material and fold down to virtually nothing. When unfolded, they can carry a wardrobe for a ten-day trip. Le Sportsac was conceived and manufactured in America, but its name bears a continental flair to appeal to those still old-fashioned enough to believe that imports are better.



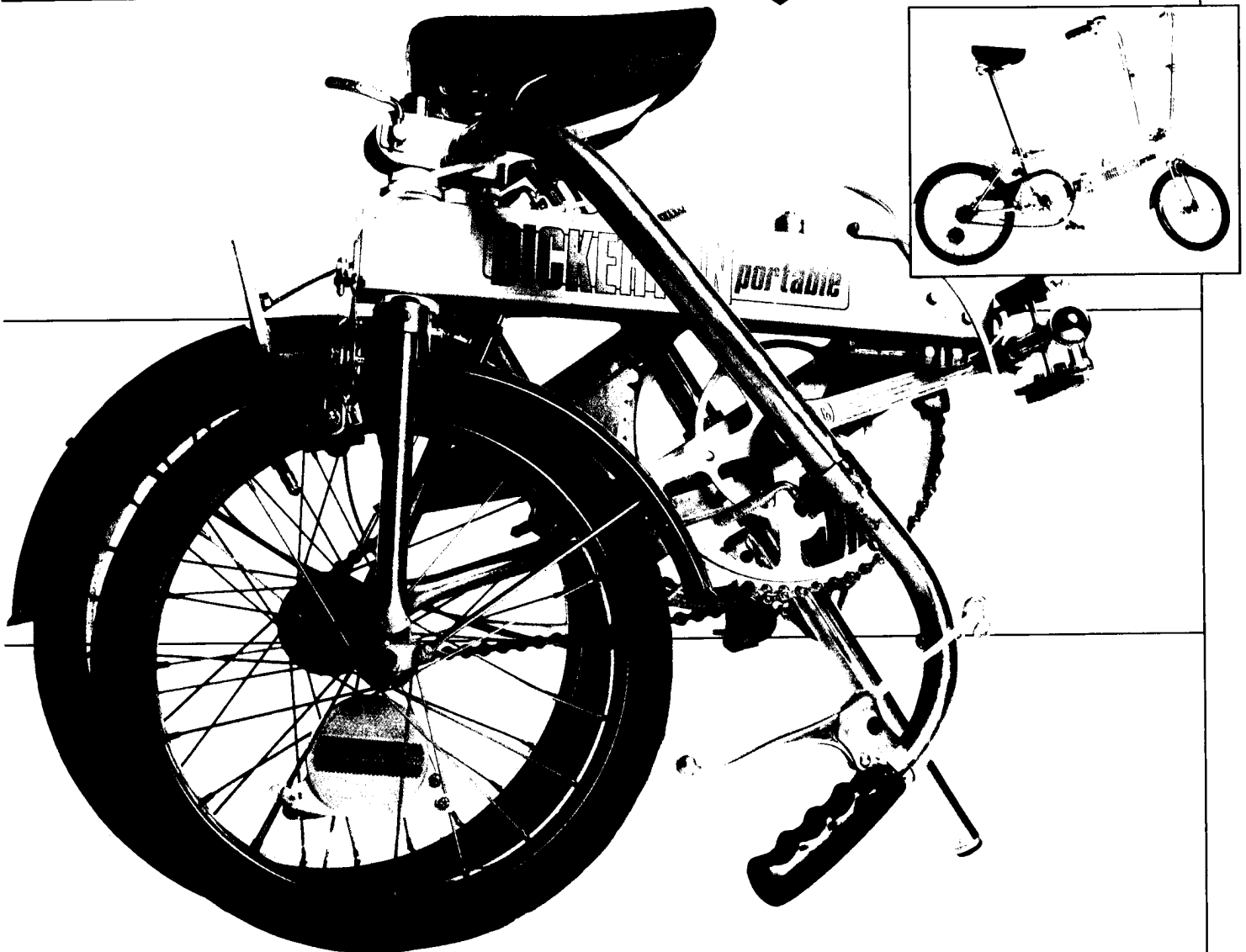
◆ The best direction for high-technology to follow in the 80s is provided by those hand-held computers initially sold as electronic language translators for tourists. They consist of a calculator-size scanning and display unit that accepts a series of miniaturized memory capsules. German, French, Italian, Portuguese, Russian, Greek, Japanese, Swedish, Dutch, and Arabic memory capsules are available. Recent additions include capsules on dieting, first aid, astrology, and, of course, several that play games.

In terms of weight/speed trade-off, a bicycle is far more efficient than either a racing car or a 747. But bikes are highly vulnerable to theft and vandalism, and they are much too heavy to be easily carried.

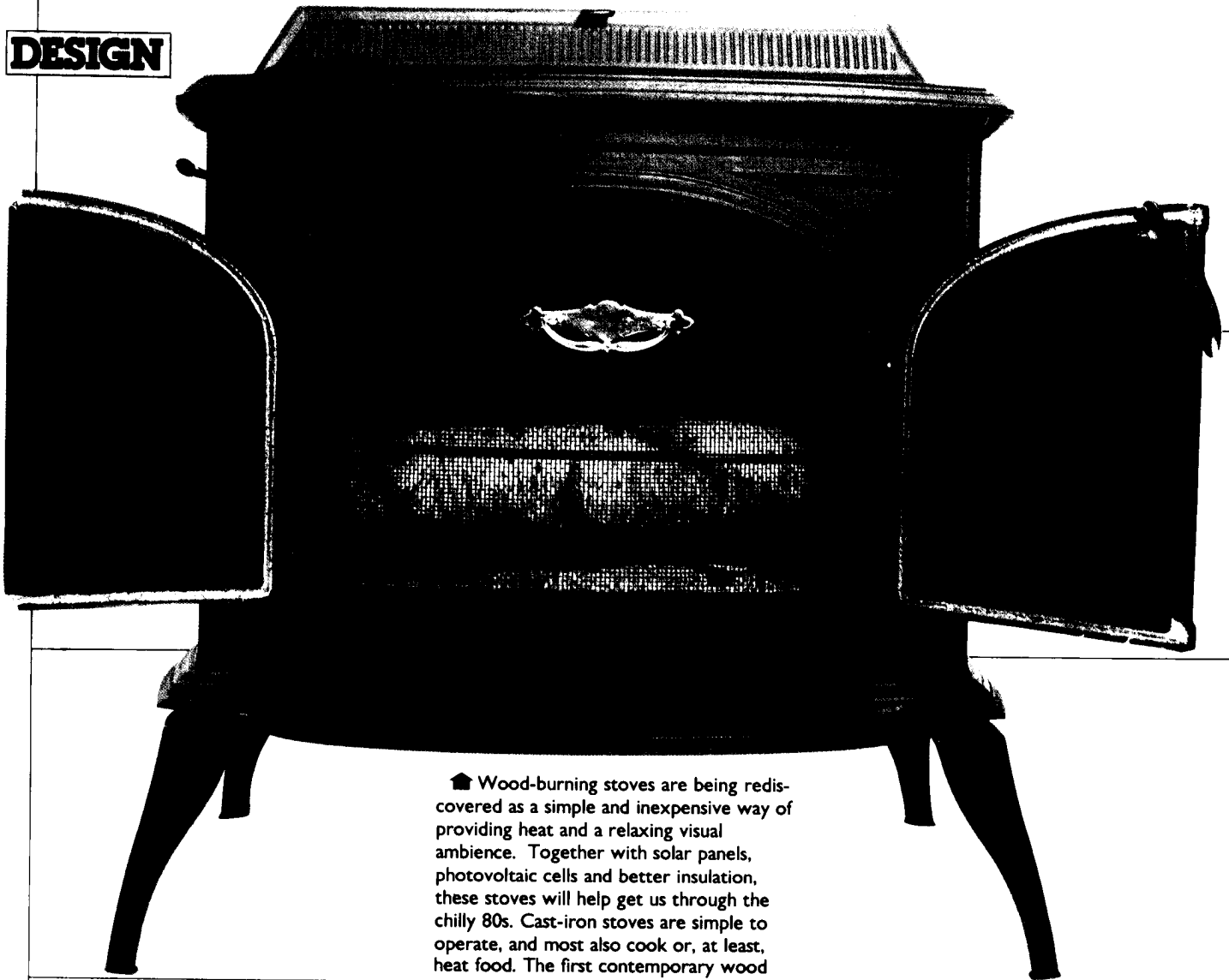
Over the last few years, Harry Bickerton, a former design engineer for Rolls-Royce and the aircraft industry, has developed what seems to be the ultimate in a lightweight folding bicycle. With aluminum and magnesium alloys, Bickerton's bike

weighs in at 18 pounds, 9 ounces, or, with a Sturmey-Archer three-speed gear shift, at 23 pounds (below). The Bickerton folding mechanism has been simplified so that folding or unfolding can take fewer than 60 seconds. Also it folds down to a smaller package than any other folding bike, and can fit into a standard two-suitcase. Its U.S. distributor is Norm Thompson, P.O. Box 3999, Portland, OR 97208; it costs over \$400.

The Craig M100 (above, left) is my favorite. It's the only one that will accept three memory capsules at the same time, thus making possible simultaneous cross-translation among three different languages. (The Craig costs about \$170, and the capsules between \$24 and \$60.) Within the next two or three years, hundreds, possibly thousands of capsules will appear on the market. The concept of entire plug-in memory libraries is design that truly speaks for the next decade.



DESIGN

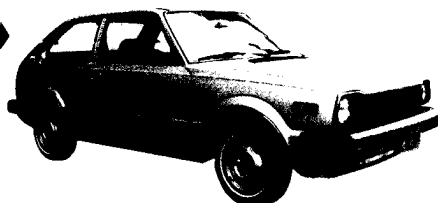


▲ Wood-burning stoves are being rediscovered as a simple and inexpensive way of providing heat and a relaxing visual ambience. Together with solar panels, photovoltaic cells and better insulation, these stoves will help get us through the chilly 80s. Cast-iron stoves are simple to operate, and most also cook or, at least, heat food. The first contemporary wood

stoves, based on Benjamin Franklin's original 1742 design, were revived by Jøtul of Denmark and Norway. New models are being manufactured in a modest, decentralized way by dozens of companies, particularly in New England. Two of the best: the Defiant (at a cost of \$610) and the Vigilant (above, for \$500). Both are available from Vermont Castings, Inc., 2091 Prince St., Randolph, VT 05060.

Since designers are professionally involved in futurism, one question I'm frequently asked is: "What will automobiles look like in the late 80s?" My usual answer is that I am driving the prototype car of the late 1980s—a 1977 Honda Civic CVCC.

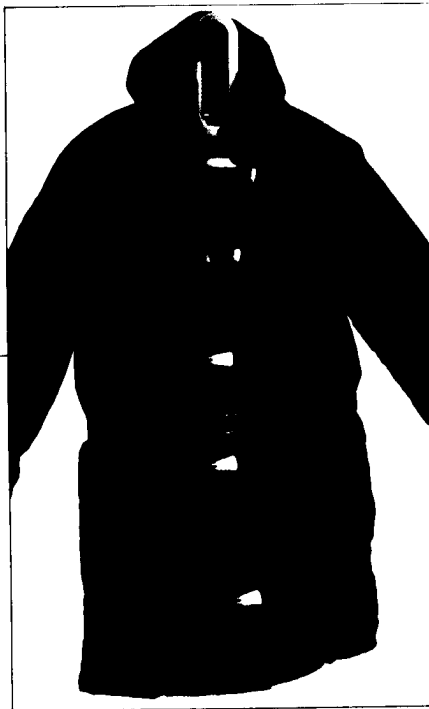
The CVCC is small, light, and inexpensive to operate. My model needs no catalytic converter to meet emission standards; neither does the 1300 or 1350. But Honda has recently introduced a larger-sized engine, the 1500 model, pictured



above, which does need a catalytic converter. The Honda CVCC's small size makes for great maneuverability, easy parking, and tight cornering, but don't be fooled—I've stuffed twice as much luggage

in my car as in a Lincoln Continental, and seated four tall adults comfortably (five in a pinch). Sitting low enough to the ground to avoid excessive wind-sway, the car gets, on the average, over 40 miles per gallon. The car is a pleasing statement of sophisticated and highly refined urban transportation. Perhaps for this reason (and because it's not named after some aggressive beast of prey), the Honda has become a status car here and abroad. The CVCC is available at \$3699-\$4949 from Honda dealers.

The energy crunch and the "back-to-the-land" movements are two reasons why urban fashion is taking cues from the backwoods. Down, that wonderfully warm material first utilized by the Chinese, is no longer confined to mountaineering outerwear. Nearly all down parkas and vests are made in the U.S. and most are waist-length to provide outdoors-people with maximum freedom of movement. Recently, though, an especially practical take-off was produced with city dwellers in mind. The Eastern Slope Coat (right), distributed by Eastern



Fashion writers concern themselves with the length of hemlines, the width of neckties and lapels, and the heel height of women's shoes. But a less superficial look at what people are wearing yields more insight into the lifestyles of the next decade. Back-carriers have mushroomed out from hiking trips and campuses into everyday life. Walk down any street in a major city and you'll see young people carrying what their

Mountain Sports, is 6-14 inches longer than the other "activity coats" and has a hood that becomes part of its collar. As a walking coat, a car coat, a stadium coat, it's an intelligent alternative to existing outerwear, and a potential trendsetter for the next decade. It's available at all 18 EMS stores for about \$100, or you can write to Eastern Mountain Sports, One Vose Farm Road, Peterborough, NH 03458.

grandparents called "haversacks," musette bags, or rucksacks. An enormous range is available, from the Fanny Pack—a belt pack for skiers, photographers, hikers, and others—to special packs for books, tennis rackets, and cross-country skis. A dozen or so U.S. manufacturers produce the majority of these packs; one of the most interesting and novel is the Ruth Sac (below, at a cost of \$85), conceived by The North Face. A large zipper extends clear around the pack top and sides so that you have full access without unpacking. I have found this a



distinct advantage in customs offices when crossing borders or when trying to reach one elusive item. ■

Too much material and energy still go into packaging a large majority of U.S. goods, but a less wasteful approach is surfacing.

Sanka coffee is one of several products that now comes in a can designed to be reused as an attractive, somewhat nostalgic-looking canister.

Supermarket house-brands forgo aggressive labeling to state, in plain black type and without illustrations, just what the package contains (above). As design, these house-brand labels are aesthetically prefer-

able to the multicolored, cartoon-strip-enriched mishmash on most grocery-store shelves. And this trend toward the depackaging of America will become even more widespread—another manifestation of something that many of us have known all along. It makes more sense to buy luncheon meats and cheese by the piece rather than in little plastic strongboxes, and to buy real bread that is unsliced (to keep it fresh) and without a krypton shroud.



THIS MAN REALLY BELIEVES IN FREEDOM

—the freedom to own guns, have abortions, and smoke grass. He is also a candidate for president of the United States
By Dennis Bailey

They are not neo-conservatives. Or old conservatives. Nor are they the New Left, the New Right, or anything in between. The truth is they don't easily fit into any traditional mold. Avoiding labels may be trendy right now—à la Jerry "I move left and right at the same time" Brown—but, with this bunch, labels are downright impossible.

What do you call a political party that advocates a completely free and open economic market, including the legal sale of everything from sex to heroin; demands an end to all taxes, the draft, and practically—no, make that absolutely—all federal agencies now operating in Washington; favors a return to the gold standard; calls for the repeal of compulsory-education laws, the abolition of the post office, and the closing of all mental institutions?

They've been called anarchists, radicals, extremists, even kooks, weirdos, and mental midgets (you can call them anything you like—they don't believe in libel laws, either). But they call themselves Libertarians with a capital L, a name that conjures up images of the Boston Tea Party, the American Revolution, the Freedom Fighters, and the spirit of liberty and justice for all.

It's also a name that occasionally conjures up laughter, especially from those new to the party's radically sweeping and seemingly conflicting smorgasbord of ideas. It can't be taken seriously, right?

Wrong. The Libertarian Party is armed and ready to take aim at America's venerable two-party system. Only eight years old, it is already the country's third largest party, with active chapters in every state. Almost unnoticed, the party has managed to gather a cadre of savvy young intellectuals, writers, and semi-celebrities who are fervently pushing the party line. Although the Libertarian Party candidate received less than 200,000 votes in the most recent presidential election, he still outpolled all other third parties, including such quadrennial also-rans as the Communists, the Socialists, and Lester Maddox's American Independent Party. (Eugene McCarthy was the real third-place winner in 1976, but he wasn't a member of a party.)

Even more significant was the party's surprisingly strong showing in 1978, a nonpresidential year. Over 200 Libertarians ran for office in 32 states and garnered a combined total of 1.3 million votes. One candidate, Richard L. Randolph, actually captured a seat in the Alaska legislature, while Edward E. Clark, an oil-company lawyer from Los Angeles, received over 5 percent of the vote in a three-way race for governor of California, which surprised even him.

As it heads for the 1980 election with Clark as its presidential candidate in at least 48 states, the Libertarian Party expects to get around 2 million votes, which would be the largest third-

party showing since George Wallace's race in 1968. If the party continues its exponential growth, it could wind up with 5 million votes by 1984, enough to throw a monkey wrench into the outcome. And beyond that? Maybe permanent status as this country's "other" party, a realization of its slogan, "Toward a Three-Party System."

The odds are that the Libertarians won't make it that far, but if the party hangs on, it's a sure bet it will begin to alter traditional politics. The Socialists, after all, never managed to get more than 8 percent of the vote, yet they take credit for pushing politicians to the left in such areas as unemployment compensation, which was first suggested by Socialists in the 30s and quickly condemned as a Marxist dole. Now it's right up there with most inalienable rights. "Pretty soon," says a top Libertarian, "a lot of politicians are going to start sounding like us."

Why, after all this time, is there a new political force that may give the two parties a real run for their federally matching money? "Because truth is on our side," says writer-theorist Murray Rothbard, dubbed "Mr. Libertarian" by his followers for his preeminently libertarian ideas. "In the long run, we're going to win," Rothbard says, "because statism, big government, doesn't work."

California attorney Edward E. Clark is the Libertarian who would be president.

Photographs by Roe Di Bona



Clark holds no benevolence in his heart for Uncle Sam and is so dedicated to liberty that to him the 1980 census represents an invasion of privacy

The anti-statism mood is here and rising fast. Nobody really trusts politicians anymore, and it's exactly the way the American revolutionaries regarded the British and all other governments in the 18th century."

A Mysterious Group

The Holiday Inn in downtown Jersey City, New Jersey, stands at the mouth of the Holland Tunnel and provides an excellent view of the Manhattan skyscrapers. This is where I caught up with the Libertarian Party. The state chapter had planned a weekend convention called "Libertropolis 80," featuring speakers, films, and Ed Clark. Having heard about the Libertarian Party's unique ability to draw members from both the extreme right and the extreme left, I didn't quite know what to expect. I was not alone. "They're a mysterious group," the desk clerk said on my way in.

It would be hard to believe that the desk clerk was any more enlightened when the weekend was over. Anyone unfamiliar with the central theme of libertarianism—that you and you alone should have complete control over your own life and the government and everyone else should butt out—might have had a hard time figuring out what these people stood for from simply observing them over the course of a weekend. The convention had its share of conservatively dressed, 1950s businessman types, many of whom said they were attracted by the party's unwavering support of free enterprise and government decontrol, and a smattering of bearded, long-haired 1960s refugees, who like the Libertarian Party's strong civil rights platform, which gives the nod "to any and all styles of life so long as they are voluntary and nonaggressive in nature." With the possible exception of the Mafia, there's a place in this party for everyone.

Its capacious political umbrella has given more than one of its members nightmares of seeing its conventions overrun by hordes of gun nuts, gays, and cancer patients demanding the availability of Laetrile (Libertarians think all drugs should be legal). A Libertarian group in Maine once had its

meeting invaded by six members of a motorcycle gang dressed in leather and looking as if they had just come from a stomping. But the only unpleasantness was culture shock. The bikers were there because they had heard about the party's pledge to fight state helmet laws. They were ready to sign up.

So here they were, the Libertarians, gathered in a state where one of their more controversial positions—in favor of legalized gambling—is already a fact of life. As soon as they arrived, they turned the downstairs lobby into a midway of the free-enterprise system, selling libertarian paraphernalia, pamphlets, and posters at generally anti-inflationary prices. There were Robert Ringer's *Restoring the American Dream*, a seething indictment of big government and a plea for libertarian principles, and Milton Friedman's semi-libertarian *Free to Choose*, both of which have made the best-seller lists. There were buttons that said, "Laissez-Faire" and "There is no government like no government." One pamphlet advertised a book by Walter Block entitled *Defending the Undefendable: The Pimp, Prostitute, Scab, Slumlord, Libeler, Moneylender, and other Scapegoats in the Rogues' Gallery of American Society*. They even tape-recorded their own lectures over the weekend and ran them off on a high-speed duplicator. Within a half-hour after a presentation, it was on a cassette and up for sale at \$5. There were films on inflation and monetary policies, the evils of nuclear power, and the joys of marijuana.

And there was talk. Libertarians love to talk. The cocktail chatter ranged from sophisticated discussions of political theory—led in some instances by former Goldwater speech writer turned individualist, Karl Hess (a sometime-libertarian)—to sublime applications of Libertarian principles. One group debated whether a mother has an obligation to feed her newborn child.

One Voice

Because Libertarians hold clearly delineated principles (spelled out in a six-page party platform), talking to one adherent is pretty much the same as talking to any other. The only differences are over matters of degree—whether to dismantle the government gradually or all at once. Aside from

those arguments, Libertarians are in agreement on solutions to today's issues and seem to lack the wishy-washiness found in traditional politicians. The solution to inflation? "Reduce the money supply." Unemployment? "Repeal minimum-wage laws, end welfare, and eliminate all licensing restrictions." Energy? "Decontrol prices and end all government subsidies to oil companies."

Once you accept the basic Libertarian premise (it's your life to live as you see fit), their platform takes on a simple but certain logic. It's very hard to argue with a Libertarian who finds it contradictory for arch-conservatives to want trade restrictions lifted on everything—except, of course, triple-X-rated movies—or for liberals to say it's fine to smoke dope but not to own guns.

"You know, the Me Decade has really gotten a bad rap," says Edward H. Crane, a 35-year-old former financial consultant who has been with the party since its beginning and whose organizational skills are probably chiefly responsible for getting the party to where it is today. "What's so wrong about letting people live the way they want to live, which is really what this party is all about?"

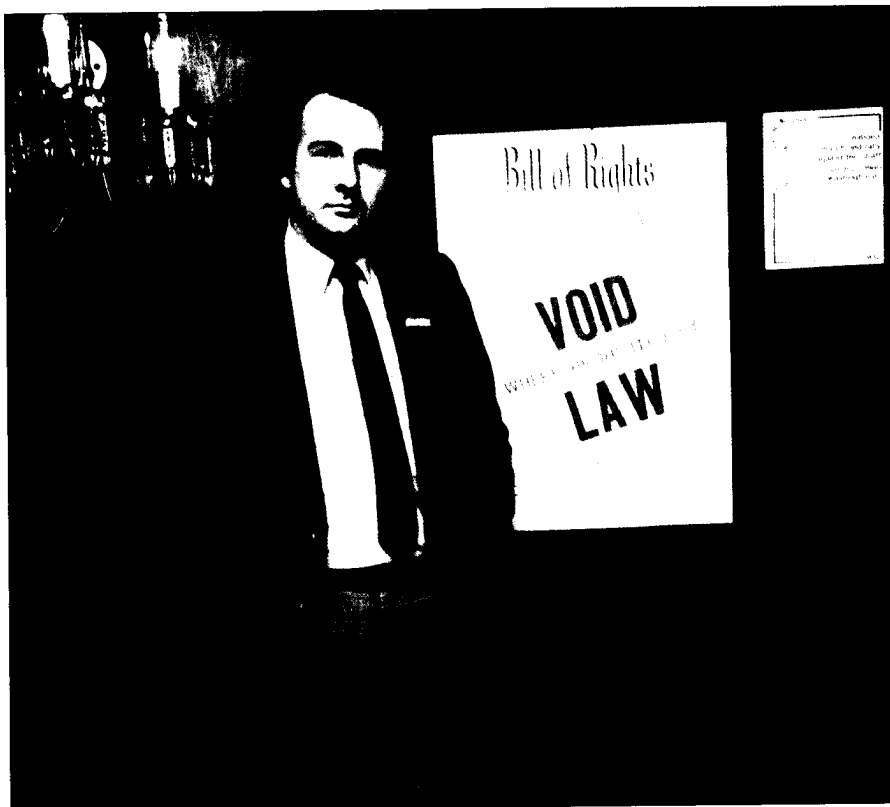
In Gold We Trust

If the Libertarians ever take over and start minting gold coins, they'll probably bear the images of Friedrich A. Hayek and Ludwig Von Mises, two Austrian free-market economists who inspired the modern Libertarian movement. At the height of the New Deal 40s, Hayek and Von Mises pioneered largely untried and ignored laissez-faire solutions to economic problems and were quickly embraced by the conservative intellectual movement. To the two Austrians, a controlled economy was a threat to basic liberties.

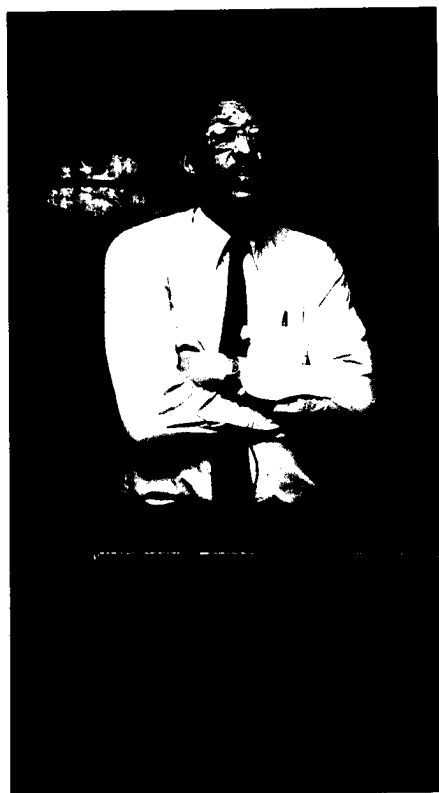
Typically, such radical views appealed to young conservatives, especially college students, and by the 60s libertarians had formed organizations on several major campuses. There was even a libertarian caucus within the Young Americans for Freedom, those Nixon-Haldeman enthusiasts who at one time numbered more than 30,000.

But by the Vietnam war, libertarians had become dismayed with conservative allies who shared their free-market ideas but not their civil-liberties

Dennis Bailey is a staff writer for Maine Times, the state's only alternative weekly.



Communications director of the Clark campaign and publisher of *Inquiry* magazine, is Edward H. Crane (above). He's considered the spokesman for the most extreme libertarian wing and a fountain-head for much of the party's ideology. He is on leave from the libertarian think-tank in San Francisco, the Cato Institute.



Economics professor Walter Williams of Temple University, who spoke at the "Libertropolis 80" convention, is sympathetic to much of what the party is saying. "Uncomfortable as it is," says Williams, "we have to accept the idea that there will always be inequalities."

positions. David Nolan, a student at MIT at the time and now an advertising writer in Denver, recalls, "With Vietnam, it was getting harder and harder to be associated with conservatives and the YAF who were increasingly hawkish and seemed to be only too willing to impose all kinds of controls—taxation, the draft, censorship—for the holy cause of fighting communism. A lot of us said, 'What's going on here? I thought these people were for freedom.' Well, they weren't."

The first public split between the traditional conservatives and the libertarians came at a 1969 YAF convention in St. Louis. Ironically, it came about because of the draft—the libertarians opposed it and the "trads" were for it.

When Richard Nixon imposed wage-and-price controls in 1971, many libertarians lost all hope in traditional politics and began serious discussions about starting a third political party. On August 15, 1971, five people met in David Nolan's living room and agreed to get it rolling. The following year, 89 people showed up for the first Libertarian Party convention in Denver. It was the same weekend that five burglars were caught inside the Democratic National Headquarters in the Watergate Hotel. The Libertarian Party's tremendous growth since then is in many ways a result of the fallout from that burglary.

A Three-Man Race?

Presidential candidate Ed Clark looks like one of those late-night TV Baptist ministers, with his high forehead, nicely tailored suits, and a cherubic smile that makes him seem a lot younger than his 50 years. When he talks, though, such a comparison goes out the window because he holds no benevolence in his heart for Uncle Sam and is so dedicated to liberty that to him the 1980 census represents an invasion of privacy. Still, he manages to get high marks from fellow Californian Jerry Brown, who says Clark's ideas may be unrealistic "but he's certainly got the spirit of the times."

Clark was once a liberal Republican but crossed over to the Libertarian Party during the disastrous second term of Richard Nixon, "a sanctimonious man I at least had the intelligence not to admire," Clark says sarcastically. A Navy veteran and a graduate of Dart-

Since the party is refusing federal matching funds, the question is often asked: Where does the bulk of the campaign funds come from?

mouth College and Harvard Law School, Clark worked his way through the California party and ultimately became its leading spokesman during his run for governor in 1978. He saved most of his campaigning for the last few months, effectively used television spots, and finished with 377,960 votes—nearly 6 percent of the total and twice as many as the 1976 Libertarian presidential candidate received nationwide. His presidential campaign this year is expected to go much the same, with several million dollars being spent for national television spots starting in June. He's enough of a realist to know he's not going to win. "But the thing to remember is," Clark says, "this is a three-man race. The magic number for victory is no longer 51 percent. It may be 34 or 35 percent. So we could hold the margin of victory."

Greater Debates

One way Clark intends to get national exposure is to demand that he be let in on the presidential debates scheduled for October by the League of Women Voters. The league, which sets the rules for the debates, is usually reluctant to allow third parties to participate. The feeling is that if you let one in, you have to let them all in, from Communists to Yuppies. But as Clark says, "We're not like any other third party. We're going to be on the ballot in every state. We'll be running candidates for over half the seats in Congress, so theoretically at least, we could become the majority party. I think that separates us from other parties and I think that's why we should be allowed into the debates."

If Clark does get in, he would indeed liven things up. How would Carter or Reagan or any of the other candidates respond to some of Clark's positions, like objection to the draft purely on civil-liberties grounds, or his call for unilateral withdrawal of all U.S. troops stationed overseas, or his plans for massive tax and budget cuts—"bigger than the Republicans have ever dreamed of"?

"But what if you're in the debates," I asked Clark asked during a break at the New Jersey convention, "and President Carter looks at you and says, 'Mr. Clark, you're nothing but an anarchist who wants to tear down the government along with all traditions

and values; what would you say to that?"

With barely a pause, Clark answered, "I would say, 'If by anarchy you mean public disruption and chaos, then I am absolutely and completely opposed to that. But I believe in Thomas Jefferson's principle that that government is best which governs least, and I think much less government would make a more peaceful, a more tolerant, and a more prosperous world. And aren't you in favor of that, Mr. Carter?"

But Clark is not without his vulnerabilities. As the party gets bigger, it may have to answer to conspiracy theorists who will undoubtedly charge that the Libertarian Party is the mouthpiece for big business. Maybe the party anticipates this because, in press hand-outs, it lists Clark's occupation simply as "business counsel" when, more accurately, he's a lawyer for ARCO, the Los Angeles energy giant. Although on first glance the party's call for deregulation, the elimination of the Environmental Protection Agency and the Occupational Safety and Health Administration, and the repeal of labor laws would seem attractive to big business, it's a myth that big business backs the Libertarians.

"If there is one segment of society that is really against us, it's big business," says Ed Crane, the former financial-management consultant who now serves full time as Clark's communications director. "Large corporations are benefiting from regulation. Just look at the airlines and the trucking industries. They're fighting deregulation."

There's also the somewhat sticky problem that the Libertarians look like a group of predominantly middle-class, white people (one Libertarian in New Jersey guessed that the party is mostly made up of former Republicans) who have made theirs and want to keep it for themselves. The terms "social Darwinism" and "survival of the fittest" seem to hang over the Libertarians. Clark and others say it simply isn't so.

"It's government programs that create racial and economic discrimination," maintains Clark. "The freer the society, the better chance the poor have. Besides, we want to end subsidies to the rich first, the middle-class second, and stop subsidies to the poor only when the poor have jobs."

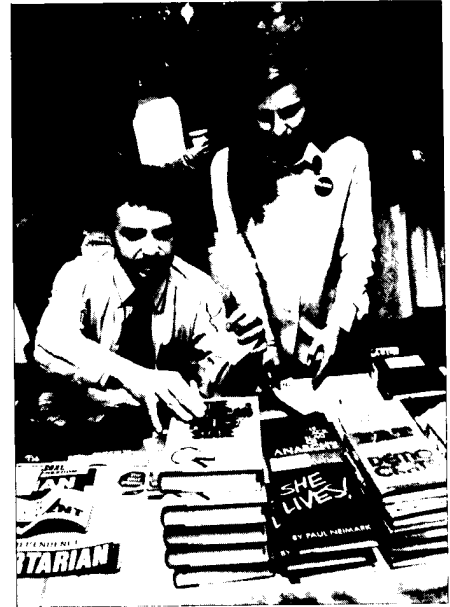
His views were echoed most persuasively at the New Jersey convention by Walter Williams, a brilliant economist from Temple University who, while not a Libertarian, is certainly sympathetic to much of what the party is saying. "Government's attempts to promote equality often lead to more inequality," he said. "Uncomfortable as it is, we have to accept the idea that there will always be inequalities."

Strong stuff, maybe, but it's Williams' view that the poor are poor because minimum-wage laws require employers to pay workers more than they're worth. So the employers just don't hire people. Williams believes, as does Clark, that the answer to problems facing urban minorities and the poor is to free up the system: The minimum-wage laws should be repealed, taxes on urban businesses should be ended (to induce firms to move back into the cities), and cities should be exempt from labor and union laws.

The Koch Connection

Perhaps the most controversial aspect of the party, both from the inside and out, is its Koch connection. Charles Koch (pronounced coke) is a bright, self-reliant industrialist who happens to be blessed with a family-held oil and gas conglomerate. His share is worth in the neighborhood of \$600 million, one of the largest personal fortunes in the country. Its annual sales reach \$3.5 billion. In 1976, Koch met Ed Crane and the two found they had similar ideas about freedom. They soon began laying the groundwork for spreading the virtues of laissez-faire policies. What followed was the Koch-founded Cato Institute of San Francisco, California, a nonprofit libertarian think tank that, since 1977, has spent several million dollars funding various Libertarian activities. Cato also owns *Inquiry* magazine—Crane, its publisher, is now on leave—and subsidizes *Libertarian Review*.

Cato seems to represent one extreme of Libertarian ideology, those who would gladly dismantle the government in a single day if possible. Other Libertarians refuse to go along with Cato's foreign-policy views, which would probably put the Army in private hands, along with everything else. There are fears, too, that because of its wealth and power, Cato may



Former Goldwater speechwriter Karl Hess (center, left) livens up the proceedings with his theoretical excursions but, for the time being, prefers to be thought of as "a small-l libertarian." (Right) Virginia Flynn, Libertarian candidate for Congress (New Jersey) gets an assist in hustling some of the party's basic literature from her husband, Len.

swallow the party, even though by law it can't contribute directly to a presidential campaign. Since the party is refusing federal matching funds—practicing what it preaches—the question is often asked, where does the bulk of the campaign funds come from?

That's where Charles Koch's brother, David, comes in. David Koch, 40, is president of Koch Engineering of New York, holds two chemical engineering degrees from MIT, and, like his brother, is financially comfortable—which may be the major reason he's on the ticket. Campaign laws say it's OK to contribute an unlimited amount to your own candidacy, but restrict everyone else to \$1000.

"He's very qualified to be vice-president," says Clark when I asked him about his running mate. "He originally said he wanted to make himself available so he could contribute more than the \$1000 maximum. But regardless, he's the best man for the job."

Nitpicking

In my view, some of the Libertarian arguments break down when they are pushed to their logical conclusions. Pollution, for example, is an issue where the party's views can get a little fuzzy. Since personal property is a key

element in the Libertarian ethic, it stands to reason that the nuclear industry or a chemical plant could buy an area of land to dispose of deadly wastes. That would be permissible as long as there is no contamination of someone's water or air supply. But who sets the standards? Who says how much pollution is tolerable and when a company has crossed the line?

"You go to court," replies Clark, launching into a lengthy, convoluted, and, at times, seemingly contradictory explanation of just how the Libertarians private court system might work. He concludes: "Of course, you don't have to belong to this court system. You could use another court system."

"Another court system?" I exclaim.

Party-liners call such a response *nitpicking*.

But the party will have to satisfy nitpickers like me if it is to become a serious political factor in the future.

In the meantime, regardless of how these confident folk do in the coming election, there is, as a San Francisco journalist noted a few years back, something refreshing about a party that can get Tim Leary and Howard Jarvis under one roof. Once the party's basic toleration of all lifestyles is accepted, even

pro-abortion feminists and devout Catholics can tolerate each other. They may not agree, but neither would try to impose his views on the other.

The Jersey City convention ended with a Puerto Rican dance group called Loisaida Folklorica, from the lower East side of Manhattan, which has perhaps the worst housing and unemployment of any urban area in the country. Before the dance, one of its members, Bimbo Rivas—a bearded barefoot poet carrying a walking stick—gave an overwhelming reading in "Spanglish" about the degradation in his neighborhood and the area's attempts to restore its heritage. Screaming at the top of his lungs, pounding his cane on tables where the Libertarians were seated, and generally condemning the government for abandoning the Puerto Rican people through bureaucratic incompetence and irresponsibility, he gave an amazing Libertarian performance.

But it was clear to me that he did not really know for whom he was performing.

On the way out I saw Bimbo Rivas getting an indoctrination talk from one of the Libertarians, who was showing him some of the party's literature. I'm not sure, but I'll bet he saw a lot of things he liked. ■

A SCENARIO FOR 1986 BIG MING MEETS BIG MAC

By Richard Lingeman

Back in 1978, when State Department insiders who favored closer ties to China talked about "playing the China card," little did they realize they might end up with the entire deck. The Chinese remain a fiercely independent people and continue to pay pragmatic obeisance to their Leninist, Maoist, and Dengist ancestors. But so rapid has been the pace of the Americanization plan adopted in 1984 by *Time's* Man of the Year, Chairman Ming (Big Ming) Bao Li, it is hard to recall now that the two nations fought a war in Korea or that their diplomatic relations were once so chilly that a ping-pong game took on the momentousness of the first American moon walk.

Now, of course, China's omnipresence in world sport is only one example of the handwriting on the Great Wall. China's ping-pong teams have long toured the world, but the rise of the Mukden Long Marchers to a position of power in the International Soccer League and the epic struggle of the Canton Anti-Revisionists in their 1985 Third World Series playoff against the Havana Fidels have introduced a whole new ball game. (Not to mention the individual stars China has produced, such as the late Song [Stretch] Deshin, the 7-foot, 8-inch basketball center whose brilliant career with the Harbin Globetrotters was cut short by his tragic death from glandular fever, inspiring the recent teleweeper "Song's Song.")

But sport is only the spume on the tidal wave of change that has swept over China since Ming, already Party

Chairman, stepped into the premier-ship after the death of Premier Wao Li Wen in a hang-gliding accident. At 40, Ming is the youngest leader in China's history (he denies that he underwent a wrinkle transplant and dyed his hair gray to overcome the "age issue"—China's traditional deference to older leaders) and looks firmly strapped into the driver's seat. His so-called Confluence of Two Rivers policy has opened up the once secluded Middle Kingdom to a flood of American fads, influences, and manufactured goods. Ming's policies have completely rewoven the fabric of Chinese life, and the new threads are unmistakably American.

Change has been a recurrent motif in the weave of Ming's career. Born in a peasant hut in Anhui Province, he seemed destined for a life of scooping night soil on rice plants—until his precocious denunciation of his parents for espionage won him a scholarship to the Nanjing Institute of Technology and Subsistence Farming, where he majored in advanced fertilizer. It was at NITSF that Ming first revealed his flair for politics. He led the Nanjing student body in the Great Proletarian Cultural Revolution of 1966,* an experience that stood him in good stead nearly 20 years later when he orchestrated the Great Counter Cultural Revolution.

In the ensuing years, Ming, like

*Instigated by Chairman Mao Zedong (formerly Tse-tung) to purge the party of "productionists" and "capitalist roaders" and advance the "proletarian revolutionary line."

many a rebellious youth, seemed ready to settle into the comfortable rut of job and family. After a period in the Bureau of Small Parts, he was transferred in 1979 to the Bureau of Foreign Trade, where his masterly denunciation of four fellow workers for "Soviet revisionism" caught the eye of his boss, Wao Li Wen. Ming was dispatched to Free Kampuchea in 1981 to revive a lagging Diet Pepsi franchise; his success at selling one-calorie soda to people whose total daily caloric intake was not much higher marked him as a comer. But then Ming and Wao were caught with their ideology down in the foreign-policy somersault of 1982, which resulted in the signing of the Sino-Soviet Friendship Treaty II. Ming's outspoken antihegemonism got him purged.

With the resilience that has marked his career, Ming made profitable use of his exile. Always something of a crypto-capitalist-roader himself, he took advantage of the growing Chinese craze for American fast-food that had followed the Sino-McDonald's Friendship Treaty of 1980. When the subsequent Sino-Soviet Treaty shut down all McDonald's on the brink of the chain's 40-billionth Big Mac, Ming took some fan-tan winnings and bankrolled the first of his Junk Food restaurants in Shanghai harbor. More of the floating junks with food to match followed, but Ming made his biggest killing on a new vogue for Jewish food—a vogue he helped create with the opening of a chain of Kosher King Dairy Delites. The restaurants, with their inverted kosher "U"



Brokers in conservatively cut Mao jackets watch quotations on the Great Screen for such companies as I.T. Tea, Forbidden Citibank, and Oriental Petroleum

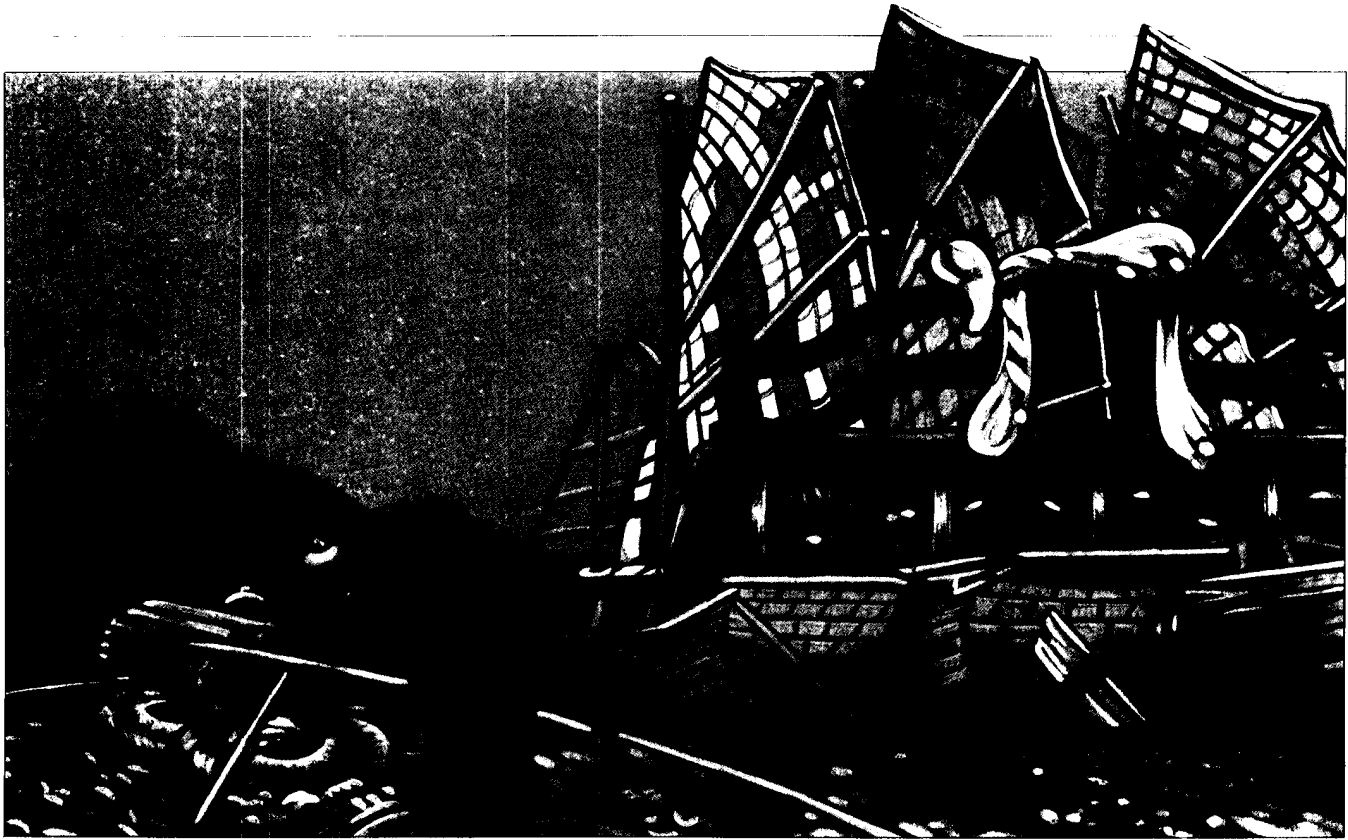


arches, their blintz-eggroll combo dinner, and jazzy slogan ("Two hours later you feel heartburn") became popular with China's bureaucrats and middle management who were then beginning to share in the prosperity from the Saudi-sized oil strike in Daqing.

Bored with fast-food profits, Ming began thinking of reentering party politics. Following the death of Vice Premier Deng Xiaoping in 1983, China had fallen under the rule of a triumvirate—the now notorious Three Stooges—who engineered the Northwest Wind policy of détente with the Soviet Union and clamped down on the rising appetite for consumer products created by Deng's Four Modernizations program. Chinese oil began flowing to the Soviet Union via the Trans-Siberian pipeline, and Deng's open door was slammed shut in the face of the American-run multinationals which had begun eagerly moving in on the Chinese market.

Meanwhile Ming's old mentor, Wao Li Wen, again in favor, brought Ming back into the government. What happened next behind the scenes remains obscure to this day, but the public result was the Great Counter Cultural Revolution of 1984. For two months, bands of consumer-minded young people in blue jeans and slogan-covered T-shirts roamed the cities and the countryside, handing out consumer goods such as Froot Loops, and discarded U.S. skateboards, reopening padlocked McDonald'ses, defiantly frying up Big Macs, and spray-painting walls and houses with banned slogans such as "Coke Adds Life," "Be A Pepper," and "We Do It All for You."

When asked about possible U.S. complicity in the upheaval that threw him to the top of the Chinese heap, Ming merely flashes the famed inscrutable grin featured in the official photograph that now hangs in every Chinese home beside the obligatory pictures of Mao, Deng, and Richard Nixon (whose reward for opening up China to U.S. recognition was the presidency of the huge Sino-American oil consortium, AmChiCon). Seated in his simple office, its walls lined with signed photographs from American friends Tip O'Neill, Spiro Agnew, and Shirley MacLaine, Ming exudes an aura of stolid charisma and speaks with the peasant bluntness that has earned him the nickname "the Chinese Khrushchev."



For a man with the destinies of 2 billion Chinese on his shoulders, Ming seems relaxed and at ease, attired in the natty red blazer and gray flannels that all members of the Politburo now wear. He is a paunchy man ("The Chinese like fat leaders," he explains modestly. "Look at Mao.") whose earthy charm has won him an immense personal following. But already wall posters have appeared decrying a "Ming Dynasty." Ming brushes such charges aside with a gruff laugh and says, in the slangy English he picked up while working for Pepsi Co: "All I know from Ming Dynasty is I collect the vases. They're a super-good inflation hedge."

As for his critics' more substantive complaints, Ming admits that China is "no workers' paradise," but insists, "My goal is a fair shake for the toilers—class struggle's still name for the game."

The specter of unemployment haunting China is a major preoccupation, but nonetheless the country is booming under the new system known variously as "Conglomerate Communism," "Collectivist Consumerism," or, more colorfully, "Capitalism with a Red Face." Basically, what Ming has done is make China a tax-free haven for

foreign corporations in exchange for a massive infusion of western capital and know-how. A number of large consortia, of which Nixon's AmChiCon is the prototype, engage in joint ventures with the Chinese government, exploiting the nation's abundant resources and labor pool. China's economy has made a giant leap forward from the fiscal disaster that followed the Great Default of 1981, when Deng's crash industrialization program came a cropper and China fell \$45 billion in arrears to western nations and Japan. But China's vast proven oil reserves, its seemingly bottomless supply of cheap labor, and its huge population of potential consumers for the goods turned out by the factories of the industrialized nations—melded to Ming's Americanization policies—have put it firmly back in the black.

That Ming's Second Great Leap will have a rough landing is always a possibility, but right now the country is bustling. The new spirit is evident to the traveler the moment he disembarks from his PanChin jet at Beijing's (formerly Peking's) Henry Kissinger Field, where he is greeted by a large sign proclaiming in English, "BEIJING—A

NICE PLACE TO LIVE, A NICER PLACE TO DO BUSINESS." It is obvious from the faces of office workers streaming through Nixon Square (formerly Tien An Men Square) on their way to the subway and their jobs in the new office buildings that punctuate the skyline. One can hear it in the cacophony of cries on the floor of the People's Stock Exchange on Great Wall Street, where brokers in conservatively cut Mao jackets watch quotations on the Great Screen for such companies as ET, Tea, Forbidden Citibank, and Oriental Petroleum. China's new People's Capitalism is predicated upon collective stock ownership by financial communes (roughly analogous to American mutual funds), whose members' pooled yuans are invested in a variety of red-chip companies. It is a good bet that most of these small investors have digested the distilled wisdom in Ming's much read book, *The Sayings of Chairman Ming*, a collection of Horatio Alger-style exhortations.

Richard Lingeman's new book, *A Small Town America*, is being published in June. He is executive editor of *The Nation*.

His big hits were "Blue Pajamas," "Ode to Billy Zhou," "Your Deviationist Heart," and "I Did It Mao's Way"

Western capital is everywhere evident in the names on the electronics, mica-chip, semiconductor, and television plants, which have fled high labor costs in Hong Kong and Taiwan to set up profitable operations in China. Unions are banned; communist economic planners explain that under socialism unions are unnecessary, in accordance with a revision of socialist doctrine that runs "From each according to his need to eat; to each according to his willingness to pay." When the workers at the Hi-Tech Dynamics plant in Tianjin walked out recently, demanding a 5 percent pay cut (instead of the scheduled 25 percent slash) and a mere 16-hour day, authorities simply drafted them and shipped them to the Russian border.

Nonetheless, the average Chinese worker is better off than his predecessor during the Great Famine of 1887. Already nearly every peasant home has its bicycle-generator-powered Japanese-made TV set, on whose 3-inch screen flickers a stream of government commercials, sports, reruns of U.S. shows, and Chinese-made sitcoms, variety, and adventure programs. "China is still in television's Paleolithic Age," says Chet Ritte of Warner-Desilu-MTM-Lear. "It's like the fifties all over again. They love Gorgeous George, Milton Berle, and My Little Margie."

Typical of the new breed of Chinese television producers is Chin Ching Wen, a voluble, long-haired 30-year-old, who learned American-style television at the Henry Kissinger-RCA Media Center at Beijing University, and whose talk is a stirfry of Mao, Ming, McLuhan, and Marcuse, and Marx (both Karl and Groucho). Chin dismisses his predecessors at the state-run Communist Chinese Broadcasting System (CCBS) as "elitist jackals"

whose programming resulted in "a lot of long-running dogs." Says Chin: "Your average Joe Chang wants to relax after a hard day at the loom, not listen to a lot of lectures on Leninism or shots of mass calisthenics. Sure, we gotta message, but we sugar-coat it. Karl Marx would have flipped over television—it's the original masses medium."

The message of this medium is a blend of nostalgic Cultural Revolution slogans and Madison Avenue-style soft-sell. One government commercial for physical fitness shows a pretty girl in running shorts, halter, and pigtailed doing deep knee bends, while murmuring, "A firm, strong body like mine will never be eaten away by the maggots of revisionist thought." A commercial for Coca-Cola shows a party cadre working late at the office: "We're putting in a late night for the party, so the socialist dawn will come a little bit earlier. Thanks, Coke."

The hottest purveyor of Chinese pop music right now is Red Chamber Records, housed in a gleaming new glass and steel pagoda on Great Opium Street. Groups such as Bing Bong Boxers, The Hu, and The Red Stars all record on the Red Chamber label, and its president, Barney Ho, is himself a successful pop composer, with credits going back to the Maoist 60s. Ho's oeuvre then included such surefire mainstream standards as "Militia Women in the Grasslands Bring Coal to the People's Liberation in the Snow" and "Songs of the Great Leap Forward;" and his first gold album, *Songs of the Four Modernizations*, offered the hit singles "Ballad of the Ningpao Bricklayers' Commune" and "Ballad of Pvt. Yung's Heroic Self-Detonation That Saved His Comrades of the 75th Regiment in the Victorious War

Against the Running Dog Regional Hegemonists of Vietnam." Still Ho was increasingly frustrated by the straitened ideological conventions of Chinese pop music, and his first musical break came when, in the late 60s, he happened upon a stack of hillbilly records that had been confiscated from American Korean War defectors. Inspired, he called the new sound People's Folk, in deference to the xenophobic tastes of the then cultural czarina, Jing Quing, wife of Mao. His big hits from that era were "Blue Pajamas," "Ode to Billy Zhou," and "Your Deviationist Heart." Nowadays he writes in an easy-listening rock mode with a hint of a disco beat (disco is just now catching on in China, five years after its American demise—about the average cultural lag). Ho currently has two songs on the Chinese charts—"I Did It Mao's Way" and a heavy-metal throwback, "Internationale Rock."

Such is the new China, a mix of revolution and rock, a gallimaufry of Maoism and Mingism. Its symbol could be ad-agency exec Lee Ching Wen, who is trying to resolve the dialectic of introducing a new product to the masses—Red Guard deodorant. Says Lee: "The Chinese are still imbued with the communist workers' ethic; they think sweat is good. We've got to change that." The solution hatching in Lee's shop is a commercial showing a group of workers marching home after a hard day of dam building. "Phew!" exclaims a man marching beside a pretty girl. "The night soil is really strong today." Whereupon the girl wrinkles her smudged nose and says, "That's not night soil, honey-bucket." Cut to an announcer holding up a can of Red Guard and intoning: "Red Guard takes the worry out of collectivism."

Can Comrade Lee make a nation of 2 billion B.O.-conscious? Can Ming ride the tiger of Americanization? Is Vladimir Ilyitch Lenin turning over in his glass-enclosed sarcophagus? The answers to these questions lie in the domain of seers and prophets but, like the dictatorship of the proletariat, they won't wither away.

When confronted by these imponderables, Ming merely smiles inscrutably. "We Chinese have a saying, 'A journey of a thousand miles starts with a single step, but a great leap takes one helluva jump.'" ■

THE SAYINGS OF CHAIRMAN MING

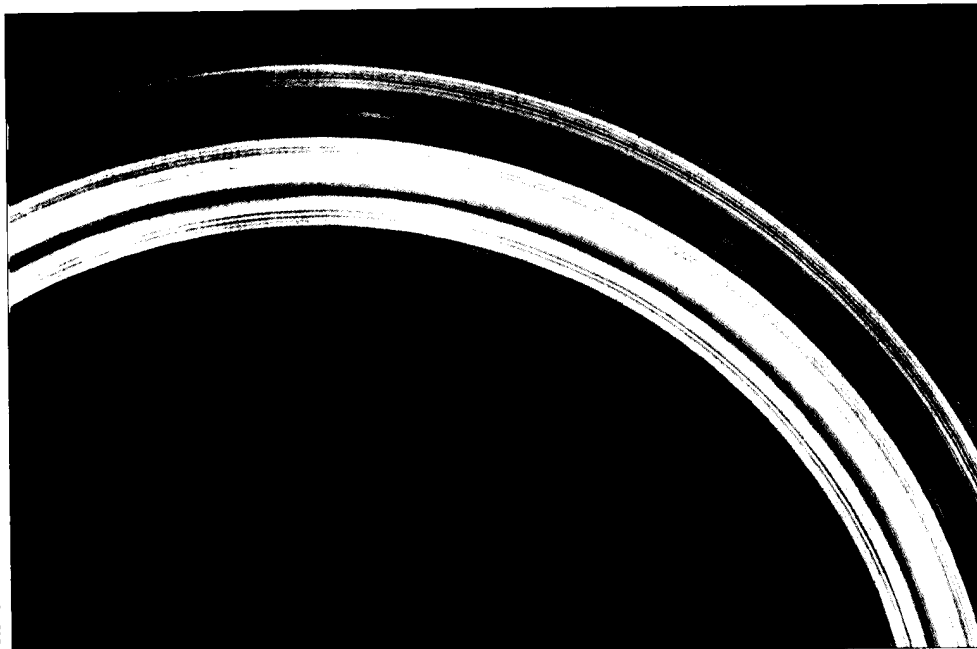
*Business is hegemonism
by other means.*

*To make a foo yung you
have to break an egg.*

*Let a hundred flowers
bloom—but first corner the
bulb market.*

*Without capitalism
Karl Marx could never have
written Das Kapital. So,
comrades, we practice
capitalism that
we may be
better socialists.*

TECHNOLOGY



Peter Simon

Minuscule fibers, fine as human hair, create precisely aligned swirls of colored light.

THE PROMISE OF FIBER OPTICS

Many things that for years have been only dreams—such as telephoning a central video-disk library and watching the movie you want on the family TV—depend on a cheap means of transmitting a lot of data. Telephone lines simply lack the capacity to carry video pictures. Optical fibers, now under development in many laboratories, can do the job easily.

Most people know that an enormous number of telephone conversations can be carried, in the form of light waves, over a single optical fiber. While optical fibers certainly presage improved telephone service, the larger implications are often missed.

For example, optical fibers potentially offer a workable means of tying distant offices together, so that people could work at home. Fellow workers would appear on television screens on one's desk, documents would be instantaneously squirted from place to place by electronics, and so on. Businesses would save the expense of maintaining office buildings. Urban sprawl would be unnecessary; executives could work from cabins in the Rockies. This happy possibility has remained remote because, first, the necessary cheap computers didn't exist, and, second, because there was

no economical way of linking distant homes with offices. Now the computers are here, and optical fibers are coming.

But they are still a way off. Bell Telephone, a leader in optical-fiber research, is only beginning to install fibers on its major trunk lines. Engineers point out that the home-office isn't going to appear in the next decade and not necessarily in the next two, at least not on a nationwide scale. Making offices of residences will require the development of better equipment to exploit the information-carrying capacity of fibers.

Nonetheless the dream of being able to watch any film you want, or of working for a New York firm while living in Colorado, is a big step closer to reality. —Fred Reed

QUICKIE TREES FROM A TREE PANTRY

Klaus Steinbeck, a forester with the gleam of science in his eyes, dreams in his futuristic moments about cities encircled by energy plantations, where trees will be fertilized with sewage, cultivated as a row crop, and harvested after as little as four years' growth to fuel power plants and feed livestock.

Right now, he says, it's just "an interesting pipe dream." But Steinbeck, a University of Georgia forestry professor, is

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already cultivating trees in ways God never contemplated when He made the green things—biomass, as the scientists say—of this world.

In an experiment financed by the Department of Energy, Steinbeck is re-using trees *from the stump down* to grow new trees faster. He compares a tree's established root system to "a pantry full of nutrients." But traditional harvesting methods leave the bottom of the tree to rot; replanting starts from scratch, and the seedlings are forced to spend much of their energy establishing new root systems.

That will change, says Steinbeck. Strolling through his experimental tree farm, he points to a row of 3-year-old sycamores grown from seedlings and to an adjacent row of sycamores sprouted at the same time from tree stumps. The sprouts are ten feet taller, inches thicker, and—with three or four sprouts per stump—far more abundant. Moreover, while the seedlings need at least 12 more years of growth and will require individual cutting, the sprouts will be ready for machine-harvesting in just 1 to 3 years. And the tree farm can use the stumps and their root systems over and over for generations.

You can't build houses with sprouts, of course, but Steinbeck does not see lumber as an important product of what he calls short rotational harvesting. "Traditional forestry is concerned with the size of the tree because it thinks in terms of board feet," says Steinbeck. "We're interested only in tons per acre." Tons of wood chips, that is, which are already firing boilers at paper plants and at least one textile mill. The wood yields only half the energy of coal, but unlike coal or petroleum, it is renewable, reliable, and very low in sulfur. With the supply of conventional fuels not always assured, Steinbeck says more industries are turning to wood chips as a backup, to avoid the enormous cost of having to shut their facilities down.

Steinbeck believes wood will become the fuel of choice for many companies, including utilities, as energy economics shift. This changeover will require guaranteed production of ten tons per acre annually (Steinbeck is now up to five). And it will help if the price of oil, already through the roof, continues on into the stratosphere.

To lower the cost of wood chips, Steinbeck and colleagues across the country are developing other new ways to get the raw material out of the ground faster, with reduced labor, and with less fertilizer—and to use it more effectively. Of tree cloning, for example, Steinbeck says, "We're not to the point where we can produce 10,000

test-tube babies, as it were, and plant 'em, but we're working on it and we'll get there." He's also working with nitrogen-fixing trees, such as locusts and alders, which draw one of the most costly plant nutrients from the air rather than from fertilizer.

Other science-struck foresters are seeking methods to convert tree cellulose into methane and alcohol, and to use cellulose in place of petroleum as a feedstock in the chemical industry. And a new method is already being used commercially to turn tree foliage into animal fodder.

Where does that leave Steinbeck's idea of tree-fueled cities encircled by energy plantations? "It's possible," he says, "that a city will have almost a closed system, using its own wastes on the tree plantation, and using the tree plantation to fuel its boilers." There may not be enough land or, hard as this may be to believe, sewage to guarantee energy independence. But he predicts that, in one form or another, cities tied to tree plantations will be a reality in the next century. —Richard Conniff

A SLICK WAY TO SCOOP UP OIL

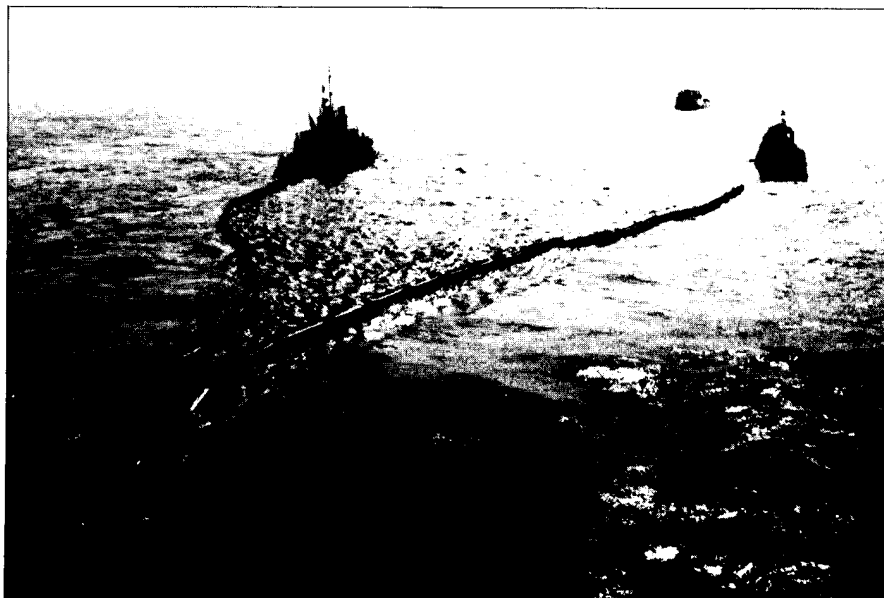
A simple, low-cost assembly that looks like a long link of gigantic plastic sausages may soon be available anywhere in the world to cope with marine oil spills. This "Oleanic Oil Skimmer," developed by the British Navy, will not only clear all those slicks, but will recapture most of the crude oil so it can be delivered to refineries ashore.

The British hit upon the skimmer idea only after a lot of other systems,

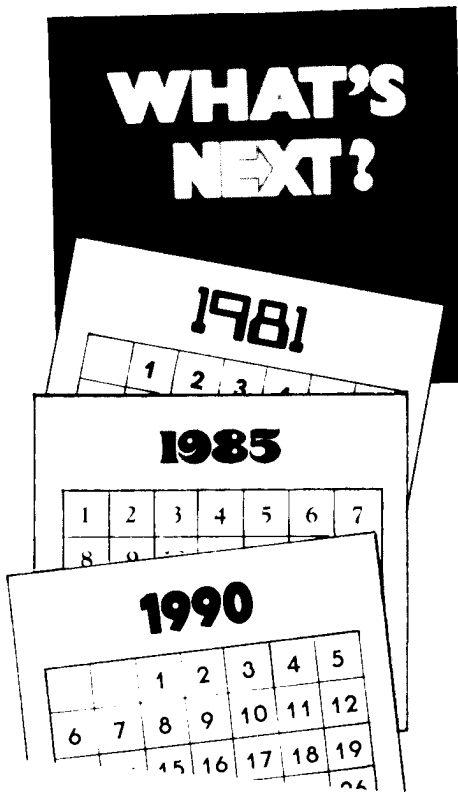
which looked good on paper, simply didn't work. Dispersal of oil slicks with detergents, they found, was costly—and all the oil was lost. The British then tried mopping up the slicks with huge absorbent plastic pads—which did the job, but inefficiently. Then they put together a sort of gigantic Mixmaster, thrust its rotor into an oily harbor, and switched on. From the whirlpool thus created, the experimenters actually managed to suck out most of the oil. But the churning emulsified the oil and water into a mayonnaise-like mess that couldn't easily be separated. And so in desperation the British turned to ancient technology, to a Greek method for extracting olive oil from water—with a skimmer.

Lieutenant Commander Geoffrey Teasdale, a Royal Navy expert in oil pollution, devised a pair of 130-foot-long, low-profile floating dams—the plastic sausage chains—which are deployed in a V-shape ahead of the skimmer.

In some experiments small boats towed the dams toward the oil slicks, and in others the dams were anchored where the slicks would drift into them. The edges of the dams that face the slicks taper upward out of the water, helping to smooth out the approaching wavelets. This tapering also allows oil films to pass under the dams, where blades that slope downward away from the stream channel the oil upward into openings in the sausages, and let the cleared water pass away downward. The angle of the blades can be finely tuned to cope with slicks of varying depths. A thin film of oil may be almost an inch deep by the time it reaches the blades.



British-developed skimmer can be maneuvered into position by ordinary tugs or launches; recovered oil is transferred to an accompanying tanker or barge for salvage.



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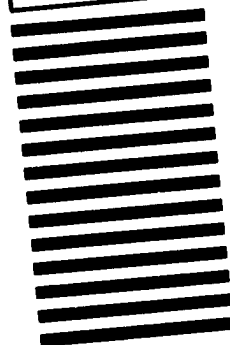
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The oil channeled into the skimmer is then pumped into tankers. Usually it isn't altogether free of water (the windier the day, the less pure the oil), but draining off the water is easy enough. Commander Teasdale determined that the average rate of oil recovery from slicks with his skimmer is about 80 percent—and much better on very calm days.

From the beginning, Teasdale's idea looked so good on paper—and in any case was so cheap and easy to develop—that the Royal Navy didn't waste time on tank tests with scale models. The first skimmer was the operational one shown here, capable of recovering 75 tons of crude oil an hour. The Royal Navy has calculated that building a skimmer of double this capacity would present no additional engineering problems. And such a skimmer would be capable of bringing under control any oil slick anywhere.

Thoroughly tested in Portsmouth, the Royal Navy's Oleanic Skimmer is now in regular service in Milford Haven, Wales, a major oil port where slicks are a day-to-day problem. Britain's National Research and Development Corporation, an agency that markets the inventions of British government researchers, is offering franchises to manufacturers all over the world.

—David Lampe

A TOMATO THAT FIGHTS OFF BUGS

Gardeners who feel uneasy dosing their tomato plants with the pesticide rotenone will be pleased to hear nature has a better way. Researchers at North Carolina State University have discovered that wild tomato plants exude a powerful insecticide through glandular hairs on their leaves. The researchers believe they can breed the same characteristic into garden-variety tomatoes within five years.

The secretion, 2-tridecanone, takes fruitworms, pinworms, leafminers, spider mites, greenhouse whiteflies, Colorado potato beetles, and tobacco hornworms and, in the words of a well-known television commercial, kills them dead.

Unfortunately, agronomists have inadvertently bred out the natural insecticide in developing today's mass-produced, standardized tomatoes. As a result, says Jon Bordner, professor of chemistry, wild tomato plants typically put out 74 times more natural insecticide than do cultivated plants. But wild tomatoes, says Bordner, taste "putrid," adding, "they don't even turn red."

Working in a year-round controlled environment, Bordner and his



Illustration by Mark Fisher

colleagues have used a grafting process to interbreed resistant varieties with marketable varieties through 12 generations. Bordner samples the resulting tomatoes "gingerly" and "not in great amounts." So far, he has come up with a tomato that is resistant and red, but "you wouldn't want to eat it." He expects to bring it all together many generations down the line.

The North Carolina State researchers are also looking at natural resistance in cowpeas, soybeans, and lima beans. "It's a big area," says Bordner. "Natural resistance may apply to a whole host of cash crops. Now that we can't use DDT and other synthetic insecticides, we're going to have to go back and find out what nature used from day one." Such a development could cut agribusiness pesticide costs and reduce toxic residues.

In an unrelated development on the tomato research front, Florida growers are preparing to market the MH-1 (for "mechanical handling"), a tomato strong enough to survive a fall at 13.4 miles per hour, or more than two-and-a-half times the impact a car bumper must withstand in a crash. This tomato is not naturally resistant to pests, but in its awesome impregnability, it may just scare insects off.

—Richard Conniff

ELECTRONIC GEAR THAT SAYS "YES SIR"

By 1982, you will be able to have the following conversation with your television set:

"Power on," you will say.

"Aye, aye, sir!" your TV will respond as the silent color image jumps on the screen.

"Volume," you will declare.

"Immediately, sir!"

Then, as the volume increases, if you hear a commercial being aired, you will merely have to say, "Silence!" and your TV will reply, "Okay," turning off the volume. Or if you wish to switch the channel to, say, CBS, you could issue the command: "Cronkite!" or rather, "Rather!" If the broadcast bores you, hurling an insult of your choice will elicit the response, "Yes, sir," and your TV will shut down.

"Talking electronics is the beginning of a whole new technology," says a representative of Toshiba America, which has developed prototypes of a voice-activated TV and hi-fi unit. Sophisticated microprocessor technology and a hand-held remote unit will enable you to program the TV with 30 brief commands pertaining to power, volume, and channel selection. Programs can be selected and commands given in any language.

The TV's circuitry is thoroughly personalized. It includes voice-analysis and speech-pattern-matching units, so that the TV will respond only to your commands. Execution is almost instantaneous—1.0 second for voice input, 0.5 second for reaction.

Toshiba's personal music system of the future, a remote-controlled hi-fi, will obey only your voice, permitting you to command 19 different operations. Equipped with turntable, tuner, radio, and cassette deck, the unit will respond to 15 programmed words, but unlike the TV, the hi-fi will not talk back. You will be able to verbally select a component, adjust the volume, tune the radio, play a record, or instruct the cassette deck to play, record, rewind, fast-forward, pause, or stop—all while you are cooking or otherwise occupied.

Verbal-control technology of the 80s will not be restricted to entertainment. Texas Instruments is developing a talking translator that will not only translate aloud almost instantaneously from English into the language of the person listening to you, but will also perform the reverse process. And as early as this summer, a digital clock will be available from the Sharp Corporation that will tell you the correct time aloud.

In the fall, if you are too busy to tend to your cooking you will program a Quasar microwave oven to verbally assist you in the kitchen. The oven will announce the temperature of the food being cooked, proper basting intervals, and remaining cooking time.

A broad array of household equipment may become voice-activated by the end of the decade, according to Toshiba. The talking television is just the beginning. ♦

TECHNOLOGY

Will consumers want to be surrounded by talking machines? "As technology grows more complex and people talk less to other people," says Toshiba, "some of us will welcome a response from our appliances."

—David Michaelis

OF CONCUPISCENCE AND COCKROACHES

The long, unwelcome reign of the cockroach in American households may soon be over. This good news derives from the recent synthesis of a substance that acts as a powerful sexual attractant for male cockroaches. It is different from anything that has been available up to now for getting rid of these ubiquitous pests.

The big problem with the established insecticides, as many a frustrated householder and commercial exterminator has discovered, is that cockroaches quickly learn to avoid them. Although roaches may seem to disappear after an exterminator's visit, they are soon back again in full force.

It has been known for some time that insects, including cockroaches, secrete hormone-like substances called pheromones. One of these produced by the female American cockroach, *Periplaneta americana*, is a sexual attractant for the males that practically drives them wild. Such sexual attractants in other insects often lure males from far and wide. Fortunately, the cockroach attractant, now identified as periplanone B, is a short-range excitant. Otherwise, it could not be used in households because cockroaches would pour in by the millions from miles away, literally inundating a treated home.

Two methods of utilizing the attractant are now being investigated. One is to combine the agent with a sticky nontoxic substance, such as is used in a Roach Motel. The other is to combine the attractant with a poison to which the males would be lured.

A major obstacle to isolating periplanone B was that it occurred in such small quantities in the insects' bodies. In 1976, Dr. C.J. Persoons of the Centraal Laboratorium TNO, in Delft, the Netherlands, produced 200 micrograms of this pheromone from 75,000 virgin female cockroaches. (A microgram is one-millionth of a gram.)

Dr. W. Clark Still, a professor of chemistry at Columbia University, then undertook to determine the chemical structure of periplanone B. Not only did he determine the structure by studying stereoisomers of the mole-

cule, but he succeeded in synthesizing periplanone B.

At present five manufacturers in this country and three in other countries are evaluating the commercial possibilities of producing periplanone B. The work is highly confidential, and the companies involved are unwilling to disclose their identities out of fear of being besieged by news media for progress reports. The latest word from Dr. Still, however, is that none of these firms has so far seen any obstacles to commercial production. It should be available within two years.

—Joseph Bernstein

A FAST SHUFFLE FROM A COLD COMPUTER

The next major advance in computers may be Josephson junctions, based on a technology developed by British physicist Brian Josephson in 1962. If the computers evolve successfully, they will offer computing velocities 10-50 times the speed of today's fast machines and, perhaps, much more.

The new computers should be very reliable and use very little power—only about one-thousandth as much as their semiconductor counterparts. However, they don't work at all unless chilled to the temperature of liquid helium, four degrees above absolute zero.

The speed of any computer is limited by the speed at which its switches work. A Josephson junction turns on or off in ten picoseconds or less—that is, in one-trillionth of a second.

The junctions are made of metals that, at very low temperatures, become superconductors, losing all resistance to electricity. Application of a magnetic field causes them to regain resistance. Consequently the magnetic field can be used to switch the junction to and from the superconducting condition.

Why do we need the new technology? Incredibly, because the speed of light, the ultimate speed at which electrical signals can travel, is too slow. If a modern computer is very large, a signal from one part takes so long to reach another part that the machine has to stop and wait for it. This is true even though light travels 12 inches in one-billionth of a second. The only current answer is to make very compact computers. This is one reason for the computer-on-a-chip.

Unfortunately, today's chips use a comparatively large amount of power, which is dissipated as heat. So the chips won't melt, they are attached to large heat sinks that cool the chips but also increase the distance between chips, causing delays.

Josephson junctions use so little

power that they do not heat up significantly. Since they must operate in a bath of cold liquid helium, they can be packed very close together, allowing the computer to take full advantage of their high switching speed.

IBM, the leader in Josephson junction research, expects to have a test model working "within a few years." It should be 30 times faster than a 370/168, IBM's big computer. The actual computer, as distinct from its refrigeration equipment, should fit in a two-inch cube.

IBM declines to speculate on the probable economic effects of Josephson computers. Some scientists believe, however, that Josephson computers will regain for the company the dominance it has been losing to competitors.

—Fred Reed

ON THE HORIZON

- A comeback for the propeller on commercial aircraft within the decade. United Airlines Chairman Richard Ferris says prop-fan engines will be 20-25 percent more efficient than even today's most modern jet engine. One approach calls for eight to ten boomerang-like propeller blades mounted on a spinner which would be driven by a jet engine.

- Instant TV Guide. A television set with an advanced microcomputer built in will let you view nine channels at once on a single screen, so you can scan the other channels during a commercial break and switch back to full screen just as the show of your choice is starting up again. A two-way split screen is already available from Sharp for \$1100.

- Release of barium from a rocket 40,000 miles above the equator to "paint" magnetic field lines for mapping. University of California, Berkeley scientists want to know more about the region where solar winds meet the earth's magnetic field. The green barium firewheel will appear somewhat bigger than the moon and will be visible all over North America for about 10 minutes just after sunset. The rocket will go up on May 22, with the outer-space fireworks occurring a month or so later.

- More coal-fired ships at sea. Coal now has a cost advantage over oil, even though it's only half as efficient, as well as being bulky to store and awkward to handle. The U.S. Maritime Administration plans to investigate new technologies to minimize these problems, and also intends to make an at-sea evaluation of coal-oil slurry as a fuel in marine boilers. ■



George Gerster

An open pit mine in Utah. The U.S. has plenty of copper in the ground, but companies say government regulations will cost them \$4.5 billion by 1987, forcing them to cut back production at home.

THE MINERAL SUPPLY CRUNCH AHEAD

What happened with oil in the 70s may well be repeated in the 80s with such essential metals as chromium, cobalt, copper, and aluminum.

"I can't see us getting through this century without two or three major crunches involving one or more critical minerals," says Timothy W. Stanley, president of the International Economic Studies Institute in Washington, D.C.

Congressman James D. Santini (D-Nev.) sees particularly "ominous implications" in our dependence on the Soviet Union and southern Africa ("the Persian Gulf of metals") for more than half our manganese (a key ingredient in steelmaking), cobalt (essential for jet engines, communication systems, and missiles), platinum (for catalysts in emission controls at chemical and refining plants, and in autos), and chromium (for heat-resistant alloys in helicopters, tanks, and other products, and for stainless steel).

Testifying before a congressional subcommittee, one defense analyst noted the richly varied "potential for resource denial by the Soviet Union through the promotion of civil disturbances, sabotage, preemptive purchases, subversion, or other tactics associated with low-intensity conflict." He cited

as one possible example the Cuban-supported Katangese invasion of Shaba Province, Zaire—source of 65 percent of our cobalt—that disrupted mining and drove up prices.

Growing "resource nationalism" could also threaten our mineral imports. Producer nations are already making joint marketing arrangements and attempting to exert "price leadership." One plausible OPEC analogy, according to Tim Stanley: Black African countries might combine to embargo nations dealing with South Africa's white minority government, if they thought it was the only way they could bring about black majority rule.

At government request, the International Economic Studies Institute projected other scenarios closer to home:

- In Canada, our leading foreign mineral source, a successful separatist movement could severely disrupt mineral imports from Quebec and other provinces. Political drift away from the U.S. could cause even a stable Canadian government to join producer cartels seeking economic and political leverage.

- In Mexico, "a rapid inflow of oil and gas revenues might produce a rupture in a tightly stretched social fabric similar to recent developments in Iran," threatening our silver, lead, and zinc imports.

Government studies say our stockpiles cannot protect us from the consequences ♦

SOCIETY

SOCIETY

of foreign disruption. One report notes that, under present schedules for procurement, it will take more than 25 years to meet stockpile goals for bauxite, cadmium, and cobalt.

Santini says government departments, including State and Defense, have either been indifferent to the issue or have worked at cross-purposes. Domestic mining companies complain that even where the U.S. is mineral-rich (for example, in copper, iron ore, lead, and zinc), federal environmental, safety, and antitrust regulations are forcing them out of production and limiting processing activity.

To protect our supply of critical minerals for the future, Timothy Stanley says the U.S. must make a "delicate, surgical analysis" of our vulnerabilities to supply disruption and develop a "risk-management framework" for policy making. That way, if we cannot avoid future mineral supply crunches, we can at least prepare for them. —Richard Conniff

THE EXCITING RETURN OF REAL FOODS

Schlitz has been test-marketing a mentholated beer; the whitener for your instant coffee is either super-boiled half-cream or a soybean derivative; hamburgers are extended with cottonseed and glue; Minute Maid has been trying to make real orange juice taste more like orange pop; the cane sugar in soda pop is being replaced by either fructose or a suspected carcinogen; pork producers are trying to make the poultry industry stop calling a certain product "ham" though diners can hardly tell the difference; and a fancy New York restaurant is featuring spaghetti in raspberry sauce, with truffles.

Yet food will be better in the years ahead, and for an unlikely reason. Food will get better because of OPEC and inflation.

Modern society as we know it was cooked up in \$1.50-a-barrel crude. You can taste the result directly only in some of our seafood, but the impact is in everything: the factories-in-the-field that grow food from petrochemicals, the processing plants that package it in plastic, the diesels that haul it to distant markets, the suburban blight that has covered the greenbelts that once nourished us, the synthetic essences that replace the missing flavors and perfumes of real foods, the palates debased by an artificial diet from infancy.

The oil that made all this possible is no longer cheap, nor is anything else. Suddenly the 3,000-mile haul to bring us the cotton tomato and the frozen

potato no longer makes any sense.

Witness a sturdy revival of gardening, farmers' markets, and kitchen crafts. These are subversive to a petroled economy. There is a chance that palates once again familiar with real food will not be hospitable to junk.

Now, as people rediscover the sensual delight of garden stuff and barnyard fowl and . . . well, they're going to have to figure out how to cook it. During the petrochemical age, what cooking was practiced became as artificial as the ingredients—and too often the goal was chic novelty rather than nutrition and deliciousness.

An optimist could conclude that America is going to have to reinvent great-grandma's home cooking.

—John L. Hess

ENERGY-CONSCIOUS BUILDINGS

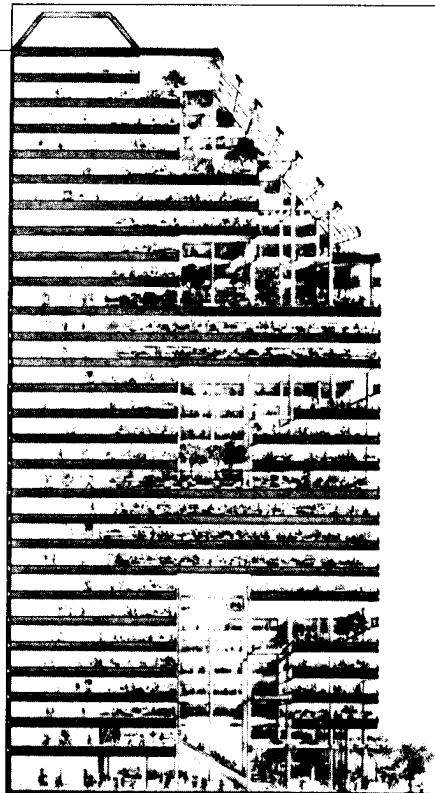
Having won plaudits by mandating higher mileage-per-gallon performance for automobiles, the federal government now plans to set annual limits for energy consumption per square foot in new commercial and residential buildings.

If proposed Department of Energy regulations become law, virtually all new dwellings and approximately 65 percent of all new nonresidential buildings will be subject to energy use regulation. The standards set the limits in BTUs (British Thermal Units), and leave the architect to determine how to lower consumption. Buildings that fail to meet the limit may lose federal loan or insurance benefits.

DOE estimates that the regulations will add 3 to 5 percent to the cost of new commercial buildings, but maintains that conservation measures will pay for themselves in energy saved within ten years. Architects are, of course, already working to design more efficient buildings. Here's a report on one new project that heralds a future as conscious of BTUs as we are now of MPG's:

It's good-by to the glass-and-steel towers of our urban skyline. A new office building in Chicago, designed by Skidmore, Owings & Merrill (SOM), promises to be a trendsetter for the next decade. Known simply as 33 Monroe Street, the building saves energy by bringing the outdoors in via three spacious glass-enclosed atria—open courts in the center of the building.

The first multi-atrium building in the country won't be the last. "I'm shy about predicting the future, but this is a direction we have to be moving in," says Bruce Graham, senior partner at



As the DOE puts a lid on building energy use, more skyscrapers may look like this.

SOM, which is also one of the building's future tenants. A longtime believer in the atrium concept, Graham found no general enthusiasm until the energy crisis hit. SOM is now designing a multi-atrium building in New York City that will cover an entire block.

In a city that claims the world's tallest skyscraper, 33 Monroe Street looks stunted. But its 27-story height is a key feature in an energy-wise strategy. A shorter building with larger floors can enclose more interior space with fewer exposed exterior walls. Three landscaped interior courts, rising through the structure from floors 1-8, 12-16, and 19 to the top, introduce natural light into the heart of the building and give inside rooms a view. They provide all the benefits of exterior wall space, yet remain protected from the elements. Full floors, which are more desirable to some tenants, separate the atrium floors.

A few other less visible design changes help bring the building's energy bill in at 30 percent less than typical current office-building requirements. Windows, champion sources of heat loss, cover only 38 percent of the building's envelope, as opposed to the usual 50 percent, and they are tinted, reflective, and double-paned. Each floor relies on its own separate fan system for heating, cooling, and ventilation; temperatures on each half-floor can be independently controlled. That means the weekend workaholic doesn't have

to heat the entire building just to sit in one warm office. Where the central core of most office buildings must be air-conditioned, even in the dead of winter, to counteract the heat that builds up from the lights and the people working, 33 Monroe Street recirculates the interior heat to the perimeter.

The new building has gotten enthusiastic comments from prospective tenants, who move in this spring. While some people still prefer to view the street's activities, many executives have selected offices on the atria.

—Jeanne McDermott

WILL DIVORCE INSURANCE INSURE TOGETHERNESS?

New York attorney Diana DuBroff thinks divorce insurance is on the verge of surfacing in this country. "It's taken a long time," she says, "but the major insurers are all interested now. It's just a question of the industry overcoming its conservatism. When the first one brings out divorce insurance, the others will follow."

As DuBroff sees it, divorce insurance will provide the beneficiary, typically a homemaker, with supplemental income for one to three years after a marriage breaks up. Either party to the marriage could buy the divorce insurance, which would be available at any time during a marriage. But to prevent fraud, insurers would probably require a waiting period (perhaps three to four years after purchase) for payment eligibility. They might also require medical or psychiatric testimony in support of a claim.

DuBroff says male and female chauvinists alike support divorce insurance, the former as an alternative to alimony, the latter as a form of protection for housewives.

But Joseph N. DuCanto, president of the American Academy of Matrimonial Lawyers, calls divorce insurance "improbable." He says the cost, which still has not been determined, will almost certainly be too high. A couple struggling to pay for baby's diapers probably won't be able to stretch the budget to make an insurance bet on their divorce.

For those concerned about the financial security of full-time homemakers, adds DuCanto, the Homemaker Retirement Bill seems a better solution. Introduced by Rep. Paul Trible (R-Va.), it would allow a homemaker with no outside earnings to establish an Individual Retirement Account (IRA), regardless of the spouse's eligibility. The homemaker could then deduct contributions of as much as \$1500 a year from

the family's taxable income. Trible's proposal, now in subcommittee, could be part of an eventual tax-cut package.

Would that kill the divorce insurance idea? On the contrary, says DuBroff, who believes homemakers will use their IRA tax savings to pay divorce insurance premiums. Even DuCanto says the congressman's bill could give DuBroff's idea "a great stimulus."

—Michael O'Gara

HOARDING HEAT TO SAVE THE FORESTS

While industrial nations ponder where their next thousand megawatts of electricity are coming from, developing countries and international aid agencies worry about the loss of the world's forests, now steadily being burned as cooking fuel. The U.N. Food and Agriculture Organization estimates that 70 percent of the timber cut in the Third World countries ends up under a pot. The long-term worry is that as the forests dwindle, erosion will advance on a massive scale.

One answer may be the Lorena stove, designed by Welshman Ianto (pronounced "Yahn-toe") Evans, an assistant professor of landscape architecture at Oregon State University.

Evans claims that, if used "sensibly," his stove burns about half the firewood needed with traditional methods. It's made of a single block of hardened clay and sand, carved inside to form a thermodynamically engineered tunnel connecting the firebox with the flue. Cooking pots sit in depressions in this block. Depending upon the local economy, the stove costs the equivalent of \$5-\$10 to build

and requires only the simplest of tools: a shovel, a machete, and a kitchen spoon.

"It's efficient in terms of how much wood it burns, because it conserves the heat of combustion," says Evans. "And it's efficient in that the heat that actually gets to the pots is not lost the way it would be on a gas stove. There, you're losing heat where the pot sits on the flame. With the Lorena, the pots are sitting in warm depressions in the stove top."

There are other advantages. The sand-clay mix is a poor conductor of radiant heat. This, Evans notes, "is exactly what you want in the regions where most of the world's population lives. Usually the cook is overheated by radiant emissions from the coals. We've got that contained. We've got the smoke out of the way, too, so the cook won't be all teary, and is shielded against all the diseases you can get from inhaling smoke. And we've also got the cooking up off the floor, so the dogs aren't sticking their heads in the pots."

The Lorena stove has been experimentally introduced in more than a dozen Third World nations so far, though on a limited basis. But Evans hopes to see Nepal alone produce 200,000 of them during the next four years. He is also working on a variation on the Lorena stove design for use in the U.S. and other "overdeveloped" nations.

Meanwhile, if you're sick of modern gas and electricity, you can build your own Lorena. For the 80-page illustrated construction manual, "Lorena Owner-Built Stoves," send \$3 to Appropriate Technology Project, Volunteers in Asia, Box 4543, Stanford, CA 94305.

—Michael Parrish



The Lorena stove's efficient design saves fuel—and may help save the world's forests. Because it contains heat so well, it's also more comfortable for the cook.

SOCIETY

DESIGNS TO AID THE ELDERLY

Nobody ever said growing old was easy, much less graceful. Social security and Medicare have eased the financial difficulties somewhat, but there are still the physical burdens. Brittle bones, arthritic joints, fading eyesight, and hearing loss can turn a walk down a corridor into an obstacle course for the elderly. Even settling into an easy chair becomes an ordeal.

Given the size of the elderly population—23 million Americans age 65 or older, and growing—products for old folk promise to constitute one of the booming markets of the 80s and beyond. Already architects, engineers, and product designers are researching all sorts of ways to adapt products and environments to meet the physical needs of the elderly.

The American National Standards Institute (ANSI) is recommending new design standards for both residential and public buildings. To help the elderly perceive their environments better, ANSI suggests, among other things, varying the surface textures and colors of building interiors. A floor should be carpeted if a wall is glossy; a door should be a contrasting color to set it apart from the wall.

"Glare is the single most bothersome problem for older persons," says Dr. Leon Pastalan of the University of Michigan's Institute of Gerontology. Sunlight streaming from a window at the end of a corridor, for example, can disorient an older person, making him stumble. Shadows are also problematic. To correct this, interiors should be bathed in a uniform soft light. The Boston Housing Authority has already adopted the ANSI lighting standards, and other cities are expected to follow.

Highway departments are also becoming color conscious. For most elderly people, a yellow "yield" sign is just a blur, and so are light-colored bus stops and streets signs. To accommodate older eyes, future signs may have light, reflective legends against dark, absorptive backgrounds.

Older people tend to drop, rather than ease into chairs. They often knock into furniture; some fall out of bed. Joseph Konchelik, an industrial design professor at Ohio State Univ., is tackling these problems with his soon-to-be marketed line of soft-edged, soft-sided furniture for the elderly. Beds, Konchelik says, should have bolsters and padded railings. Chairs should have firm, thick padding, arms to

push against when someone is getting out, and backrests designed for rounded shoulders and shorter torsos. Toilets and tubs should be flanked by handrails.

Manufacturers are beginning to respond. One Florida firm plans to market an automatic bathing unit. A person sits in a box-like booth while being gently sprayed from head to foot. Elderly infirm people could thus be bathed without the hazards of climbing in and out of a tub.

As Leon Pastalan sums it up, "Now that we have mass longevity, society just has to respond to it."

—Civia Tamarkin

ADAPTING TO OPEN ADOPTIONS

After 20 years as a social worker overseeing adoptions, Linda Burgess is about to do the "unthinkable"—bring birth parents and adoptive parents together before an adoption and have them communicate throughout the child's upbringing.

Conventional wisdom says that will wreck the child's chances for a happy adoption. So why is Burgess taking the risk? She thinks her plan will make more children available for adoption while making adoption itself healthier for the children and all other parties involved.

"Open adoption," to be sponsored by the Peirce-Warwick Adoption Service in Washington, D.C., and the Adoption Research Council in Maryland, will give both sets of parents the option of exchanging names and agreeing to visitation rights, and the chance to discuss personal histories and beliefs. The only requirement will be that the adopters keep in touch with the agency so the birth parents can find out what's happening to their child.

Burgess, who placed more than 900 children in new homes using conventional procedures, thinks open adoption is overdue. The increasing tolerance of illegitimacy has encouraged thousands of young, unwed mothers to raise their children themselves, often resulting in inadequate care for the children and lives of frustration and regret for the mothers.

The social worker believes open adoption will help such mothers give up their children because it will generate a feeling of confidence about the children's new home. It may also give pregnant women an alternative to abortion, she says.

But will adoptive parents welcome contact with the child's "real" parents? "They'll be hesitant at first," Burgess

concedes. "Some think it's great that they can meet these people and ask all the questions a social worker might not ask. Others are scared to death. They worry that the mother will harass them—so we'll have to be careful to choose birth parents who will play by the rules. But so many people want to adopt children that we won't have any trouble finding families willing to have this contact throughout the years."

What about the adopted child? Instead of feeling rejected by the natural parents, says Burgess, the child will learn that, before adoption, both sets of parents decided together on the best possible choices. Open adoption may also ease the usual adolescent crisis over having two sets of parents. "There will be less fantasy—'My real parents wouldn't treat me like this'—and more reality." Finally, the adoption records, including family history, will be open to the child as an adult.

Open adoption has worked well before. Eskimo, Hawaiian, and black American families have practiced it informally for generations. Burgess says the idea is new only to cultures that have inhibitions about illegitimacy. She argues that opening up the records will be the real beginning in this country for sane, healthy adoption. Her colleagues, meanwhile, are watching with a mixture of skepticism and interest.

—Richard Conniff

ON THE HORIZON

- Strengthening of the Texas-California axis forged by the oil and electronics industries. The two states already account for 25 percent of Defense Department outlays and, with projected defense increases, should soon top the entire Northeast in total personal income.

- Rationed airspace? FAA administrator Langhorne Bond says it's a good possibility because of increasing air traffic congestion and near-collisions around airports. The United States will have 300,000 corporate and private aircraft by 1991—up from 193,000 this year—and even the new air traffic control anti-collision technology due in the mid-1980s may not be able to handle them all.

- Another innovation lag? Genetic engineering is supposedly America's next high-technology giant. But U.S. Senator Adlai E. Stevenson (D-Illinois) credits the United States with only 39 "biotechnological" patents since 1977. In the same period, he says, Japan has obtained 124. ■



Jean Tuttle

MORE APPRENTICESHIPS TO CUT UNEMPLOYMENT

Where are the construction workers of 1985? According to U.S. Bureau of Labor statistics, nearly all the construction trades will require a new infusion of workers to build the houses, stores, factories, and office buildings that will be needed in the next half decade.

Expanded training programs to supply these skilled workers of the future could help solve the unemployment problem for a good number of the hundreds of thousands of disadvantaged young people in America. Apprenticeship programs have proven highly successful in Europe. In Great Britain, where even agricultural workers are apprenticed, apprentice jobs were increased by 20 percent through a system of government grants.

In the U.S., at the Department of Labor's most recent reckoning, there were 262,586 apprenticeships, of which 148,777 were in construction. Economist Walter E. Williams, a Temple University professor, says there is need for many more, and suggested as a target figure an eight-fold increase, which would mean the country would have more than 2 million apprentices at work. "There is really no numerical limit," Williams said, "it is just a question of how many such workers could be ab-

sorbed. Certainly a lot of contractors would like to have workers on hand to do some jobs, such as moving materials, but not have to pay them full union rates paid to skilled craftsmen."

Apprentice programs in U.S. construction trades generally are sponsored by local union-management committees, and, unfortunately, members of minority groups are often excluded. The programs usually entail about three years of on-the-job training, plus a certain number of hours per year in classrooms, learning such skills as reading blueprints and studying regulatory codes.

Because of the lengthy training period involved, the brick layers, cement masons, roofers, iron workers, and carpenters who will be required in 1985 should be starting their instruction now.

The U.S. Department of Labor offered an apprenticeship program to women in 1978, setting quotas for the enrollment of women in blue-collar jobs and requiring female participation in federally funded construction projects valued at more than \$10,000. But the effort to enlist women as apprentice construction workers was only partly successful.

A young bricklayer or other construction worker is paid during the first year at around 50 to 60 percent of the wage scale for an experienced worker in the trade. For most construction trades, depending upon geographic region and local contracts, ♦

WORK

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apprentices can expect to begin at around \$6 per hour. But first they must crack the barriers limiting admission to apprentice programs.

—Kenneth Anderson

GOOD NEWS FOR PHONE PHOBICS

• You've wrapped up business ahead of schedule and raced to the airport in time to wangle your way onto an earlier flight. You've got two minutes before boarding to call home and tell your ride when to pick you up. What do you get? A busy signal.

• You're phoning the boss to tell him you blew the big contract in Minneola. If you're lucky, he'll be busy or away from his desk. He isn't, and the old tyrant chews your ear off for a solid half hour, long distance.

For anyone who has slammed down a phone in frustration or picked one up in quavering trepidation, the future now holds hope. "Speech mail"—in which a telephone company computer records, stores, and forwards your message—will let you get word to a busy or unanswered number without repeated dialing. And it will help you avoid time spent chatting (or cringing) when all you really want is to deliver a short (not necessarily sweet) one-way message.

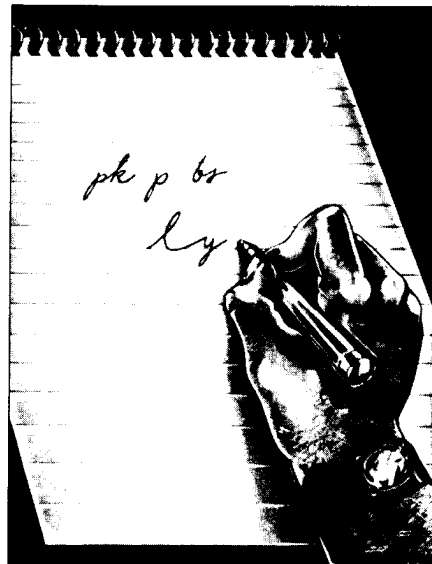
Bell Labs is now trying out the new services with telephone company employees in Philadelphia. Residential and business customers will probably get their chance—either from the Bell System or its competitors—within the next few years. Neither call forwarding (in which the computer dials a number as often as it takes to deliver your message) nor call answering (an automatic answering service) will require additional hardware. The cost? Customers may be able to pay for call forwarding as they use it, rather than by monthly fee, and sign up for call answering for only a few hours—such as when you've advertised your car for sale but have to be away from the phone.

Speech mail depends on electronic switching systems now used on only 30 percent of Bell System lines, but as such computerized systems spread nationwide over the next 10 to 15 years, several other attractive features will also become available, notably call screening.

Researchers at Bell Labs term this "the mother-in-law feature" and say it will allow you to automatically refuse all incoming calls from a given number. Or—if, for example, you really love your mother-in-law—you can arrange to accept all her calls and have them billed to you.

Says G.D. Bergland, head of digital systems research at Bell Labs, "You can make it either very hard or very easy for a person to get through to you."

—Michael O'Gara



Jean Turle

DON'T ASK HIM TO SIT ON YOUR KNEE

When the boss of the future says, "Take a letter," chances are good, though they're not 50-50, that the secretary will be a man. Over the next few years, secretarial jobs will attract considerably more male applicants. The jobs will be there—295,000 of them annually through 1985—and they will pay well and offer better opportunities for advancement than they do now. Contrary to stereotyped views, male secretaries will come in all sizes and types, including virile college graduates.

"Men see good opportunities because of the severe secretary shortage," says Fran Reilly of the National Secretaries Association. With 80,000 clerical and secretarial jobs going unfilled each year, secretaries now start at \$10,000 a year, and many earn much more. In addition, says Reilly, men generally get 25-30 percent more than women do for the same work.

Says Herb Nelson, an executive secretary who's also been appointed secretary of the corporation where he works, "You start out at a higher salary than if you were in the mailroom, and you're privy to what's going on in top management. Why start at the bottom when you can start at the top?"

Secretaries may also wield more influence as offices are automated. They'll be the first to learn to use and program office computers, and that skill should lead them naturally into management roles.

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WORK

aries, 25 percent of the secretaries are male, but men hold only a little more than 1 percent of permanent secretarial positions. Fran Reilly says that will grow to 30 percent by the end of the decade, and she welcomes the change. Because of sexism, she says, the influx of men means all secretaries will get more respect. —Richard Conniff

MISGIVINGS ABOUT THE ELECTRONIC OFFICE

A newly transferred researcher at a major computer corporation received an electronic message not long ago from her ex-boss, who was a friend. It read: "Where the hell is the assignment you owe me? Don't think you're getting out of it just because you got a new job."

If that sort of outburst—computer users call it "flaming"—isn't what you want to see on your desk first thing on some not-too-distant morning, beware. Students of office sociology believe flaming and other communication failures will soon become more common because of the very electronic devices now being designed to make working life easier.

The problem is not so much with the computers as with the people who will use them. Given typewriter terminals that allow instantaneous written communication, workers are unsure, especially in the beginning, whether to use the new medium as casually as a telephone or with the formality of a written letter. "One of the things people have to learn is a new kind of manners," says Marvin Sirbu, principal research associate at MIT's Center for Policy Alternatives. "It's hard in a written message to reflect irony or to put just the right edge in your voice. We're so phone-bound we've lost the art of expressing these things in writing." Unless they regain that art, he says, computer users can expect "horrendous" misunderstandings.

Even worse problems may result because of the absence in electronic conversations of such nonverbal clues as facial expression and tone of voice. Abrasive behavior may be "particularly tempting," says Murray Turoff, author of *The Network Nation*, because the computer protects the sender from seeing the recipient's reactions.

Replacing voices with electronics can lead not just to misunderstanding, but to isolation. Office workers now resolve many problems through informal socializing on the job, a phenomenon called the "schmooze factor." What will happen, asks Eleanor Wynn of Xerox Corporation, if computers bypass that process? One bank designed a new

computerized workplace with open spaces and modular partitions to accommodate the schmooze factor, but then found the computers worked so well the employees no longer had an excuse to talk. They soon lost their sense of teamwork, "as well as the support and greater confidence teamwork can give."

Somewhat further off is the problem of how people will deal with advanced electronic systems that allow them to work at home, miles apart from colleagues. Turoff questions whether "electronic socializing" will substitute adequately for socializing at the office. The electronic office may also aggravate existing problems, such as workaholicism. Some bosses with home computer terminals may never really leave the office.

Worse, they may expect employees (also on-line) to match their pace, and the computer may tempt them to use productivity measures that are not really valid. One boss monitored his workers' electronic appointment books, until the workers, feeling spied upon, abandoned the device. And Sirbu recalls one computer operator who was aghast that someone could use a new word processor to count her daily key strokes as a productivity measure. She now has two assistants and uses the key stroke counter on them.

"There's a horrible tendency in the automated office to focus on measures like key strokes," says Turoff, "which leads to the assembly-lining of the office, with all the morale and commitment-to-the-job problems that implies."

No one is suggesting that workers resist the introduction of computers into the office. The electronic office will reduce repetitive work and boost productivity, as promised. But Turoff compares the problems employers and employees face to those of a child learning telephone etiquette. There will be blunders along the way, and in the competitive business world, they may be costly ones. —R.C.

GREEN'S THE COLOR OF THE BEST PERK

What sort of perks, or perquisites, will serve to lure sought-after executives and specialists to change jobs in the years just ahead? We asked a number of professionals and found that tangibles are inviting. Many of those queried would consider a new car as attractive bait.

A runner-up perk would be a nice rent-free apartment. During our NEXT survey we found that a Canadian trade association had, in fact, just ensconced a new executive director in a snug

rent-free apartment in Ottawa and parked a new car outside his door. A New York TV station, however, found that a very telegenic newscaster would not accept just any car as a perk for signing a new contract. He was offered a Buick but asked for a Mercedes instead, plus a private secretary, and several other benefits that were outside the presidential guidelines for limited pay raises.

A successful food marketing executive who suffered from a dread of commuting by public transportation moved from a promising position in a large company to a smaller firm that offered him a chauffeured limousine.

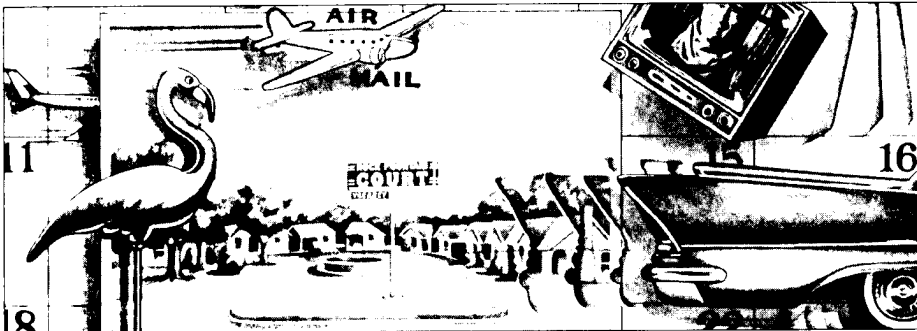
Executive recruiters report, however, that money still promises to be the prime lure. Whereas leaders of business and industry might have been willing to change jobs for a 10 percent salary increase in the 1970s, in the 80s they will expect a salary jump of at least one-third. And, while they may have accepted a company-paid life insurance policy equal to two years' salary then, executives will expect policy benefits equal to four years' salary. They also will want a severance pay guarantee if things don't work out and an "up-front" bonus for joining the new firm.

Michel Bergerac reportedly received an advance bonus of \$1,500,000 for becoming chairman of Revlon, Inc. Perhaps the peak of perks is dangled before candidates for president of the United States. It has been estimated that the fringe benefits of chauffeured limousines, rent-free houses, servants, office staff, and other emoluments are equivalent to an up-front bonus of between \$5-\$10 million per year. —Kenneth Anderson

ON THE HORIZON

- IBM to become a "gigantic service bureau," offering computer power the way utilities now provide electricity? So says Charles P. Lecht, president of Advanced Computer Techniques Corporation and author of *Waves of Change*. He says users will gain access to computer power through special plugs in either their home or office.

- Muzak for the glorious workers of the People's Republic of China. "We just got our man back from China," says a West Coast spokesman for the Muzak Company. "He spent a whole month there selling our systems. The Chinese were crazy about them." Big Ming reportedly approves (see "A 1986 Scenario" in this issue). ■



FIRST YOU SEE IT . . .

By Paul Dickson

While the major social and technological changes that occur in our society are well-noted in the press and everyday conversation, other changes are quiet and sometimes even mysterious. Little objects and customs are constantly slipping from view without so much as a fare-thee-well, let alone a small obituary in the evening newspapers.

Individually, these losses are hardly significant; but collectively they add up to a change in our total frame of reference. They are, in fact, a key ingredient in "future shock."

Some of these losses are the result of larger movements and events. Gas station giveaways ("Get your free 8-oz. official New York Mets tumbler with a fill-up") have decreased in direct proportion to OPEC's price increases. The decline of the drugstore soda fountain is the result of druggists finding it more profitable (and less messy) to fill that corner of the store with lines of cosmetics, racks of stockings, or magazines. Sometimes cause and effect are subtle. For instance, there is a theory that the American automobile fin of the 1950s was a casualty of the nation's shock over the launching of the Soviet Sputnik in 1957. The gist of the theory is that Sputnik forced Americans to realize that the fin along with Ford's ill-fated Edsel represented technology without purpose and should be abandoned.

For whatever reason things disappear, trying to remember all of them, Proustian fashion, is a lot of fun. NEXT has worked up a starter list, but it obviously doesn't do justice to all the little

Paul Dickson's most recent book is The Official Rules, published by Delta (1979).

losses that have taken place during the lifetime of even our youngest reader. So send us your additions. We will publish the best of them in a future issue, and the five outstanding contributors will receive classy NEXT T-shirts. To be eligible, an item need not be totally extinct—just clearly on the endangered-species list.

Our own list:

- Movie double features (and, come to think of it, short subjects, cartoons, and your basic, action-packed "coming attraction")
- Lawn ornaments in general; the lawn flamingo, in particular
- Chains dangling from the backs of trucks
- Curb-feelers, "necker's knobs," and dashboard icons
- Doctors' bags
- Those grimy, squat kerosene pot lamps at construction sites
- Phone booths (as opposed to the new noise-collecting, wind-catching phone stations)
- TV westerns
- The 6-ounce Coke bottle
- Tramps and hoboes
- Cabin-in-the-woods-style motels (Could the movie *Psycho* have been a factor?)
- TV test patterns
- Air mail
- The smell of burning leaves
- Mr. Zip, Johnny Horizon, the telephone book, Mercury, Peter Pain, and too many others to mention
- Standard-size packages (as contrasted to family, individual, economy, handy, mini-pack, etc.)
- Organ-grinders with monkeys
- In-store demonstrators extolling the virtues of "miracle" slicers, polishes, and frying pans

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Winning Entries from "Return With Us Now To Tomorrow" (Vol. 1, No. 1)

First, there were hundreds of wonderful entries. This did not make judging easy. There was also a remarkable unanimity in the responses to our request: "Send us your list of things that you believe we'll be seeing again in the next five years."

Among the most popular (the beginnings of some of these can be seen already):

- Long johns and various flannels
 - Victory (type) gardens
 - Radio dramas and serials
 - World war
 - Bomb shelters (see above)
 - Comic books
 - Home barbering
 - "Depression" foods (like Eagle brand milk boiled in the can for a sweet, gooey treat)
 - Quilts (and quilting)
 - Coal-burning stoves and furnaces
 - Non-power boats, lawn mowers
 - Passenger trains
 - Nightcaps
 - Home entertaining
 - Spinning wheels
 - Waterwheels
 - Richard Nixon
 - Bed warmers
 - Morality
 - Hoop skirts
 - Natural fibers
 - Coin collecting
 - Love
 - Domestic help
 - Snuff
 - The waltz
 - Hammocks
 - Goats and chickens in the backyard
 - Picnics
 - Murphy beds
 - Bird-watching
 - Marriage
 - Block parties
 - Ouija boards
 - Conversation
 - Milk bottles
 - Wagons, all the way from Little Red to Conestoga
 - And, of course, bicycles.
- Got the idea? With these things coming up (world war being the exception), the future doesn't seem quite so grim, does it?

Well, it was tough, but here are the winners, with a hint or two about why they won:

Edna Carstens of Norfolk, Nebraska On her list was "good neighbors." We'll bet she's one, herself! She also mentioned "cloth diapers, baby buggies, and clothes lines."

Michael Broughton of Jacksonville, Florida "Topical humor—if you can't beat bad news, laugh at it; glamour—if we don't have money, style will have to do; comedy duos—with hard times, getting laughs will be too big a job for just one person; and walking—a sensible compromise between jogging and driving"—we hadn't thought of it quite that way before.

Millie Miller of Denton, Texas "Window shutters, sidewalks, and flypaper"—the last because "People will be using air conditioners less and opening windows to keep cool. Result: pesty flies." Good thinking!

Charlotte Hansen of Greenfield, Wisconsin A list of 20 candidates, including "painting your own car, modesty—a new experience in sensuality, nonautomatic (easy) washers, and cats—have two if you're not at home a lot of the time."

Garth Tho of St. Petersburg, Florida "Patent leather, eye patches, Fatima prophecy mania, tap dancing, stringball collecting, and doctors' house calls."

Mario Moreno of Reedley, California "Chastity belts—in this age of sexual gimmicks and sex manuals, chastity belts will return as a fad, a turn-on."

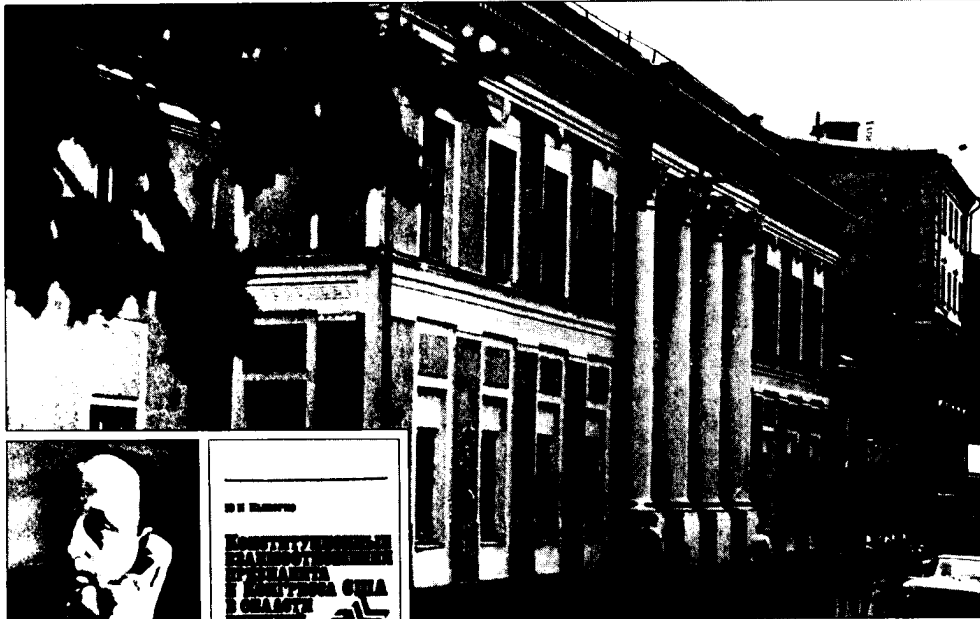
Jean Dawson of Royal Oak, Michigan We're obviously game freaks and her entry listed one we'd just barely heard of: euchre. It's a card game with similarities to bridge.

Arch Napier of Tucson, Arizona "Paper fans. They're cooler and more seductive than drafty air conditioners." Hear, hear!

Mrs. James W. Giles of Leetsdale, Pennsylvania This is reaching way back: "The new homes being built will have a special tank in the bathroom. The builder will construct gutters along the roof, at different levels, so the rainwater will flow along these gutters to a special drainpipe that leads into the tank. The rainwater will be warmed for baths and hair washing. A big money and energy saver." Also a good idea!

That's it. It's been fun hearing from all you folks and, win or not, we hope you'll be with us again. And if you have an idea for a good Diversions game and we use it, you'll receive more than a T-shirt. —Ed. ■

THINK TANKS



Sovphoto

Soviet analysts who produced the tract at left misjudged the U.S. response on Afghanistan. Purges may result for top Amerikanist "Yuri" Arbatov and his think tank (above).

TROUBLE IN THE HOUSE ON BREAD LANE

Amerikanologiya—Americanology—is the Soviets' term for their exhaustive study of our system and how best to exploit it in order, as Khrushchev said, to "bury" us. Housed in an ornate, 18th century townhouse on a street called Bread Lane just blocks from the Kremlin, the disarmingly named Institute of the USA and Canada painstakingly studies everything American it can lay its hands on. The purpose is to find weaknesses in our society and our governmental mechanism for future use by Kremlin policymakers and Communist-led "progressive forces" within our own borders.

This Soviet **МОЗГОВОЙ ТРЕСТ** ("think tank") has 100-plus researchers who work closely with the USSR Academy of Sciences, the Foreign Ministry, and the KGB. Its unfortunate leader, "Yuri" Arbatov, has been on the sick list since late fall. His illness appears to be both physical and political, since it turns out that the institute's research has been providing an erroneous picture of the U.S. Because of this, the institute is in for some tough sledding in the 1980s. It may, in fact, have to close down altogether, or—at the very least—be purged of a number of its administrators.

The trouble was that Arbatov and his

boys on Bread Lane saw more "disarray," as they called it, in our system than was actually there. In their journal, and books published under their auspices, the Soviet *Amerikanisty* ("America experts") told the Kremlin leadership that the Congress and the White House were working at cross-purposes. "In future," wrote one *Amerikanist*, "Congress is likely to increase its influence over foreign policy." Limitations on presidential powers, especially those related to defense, the expert wrote, were products of the "Indochina War, [which] helped strengthen realistic tendencies in Congress." In the institute's view, "intense contradictions" also exist both within and between America's two political parties. "Progressive forces" are in a position to influence the more liberal wings in both parties and make them accept the "altered world balance of forces in the Socialist favor." "Presidential wars," writes another institute collaborator, will no longer be possible.

Thus the American reaction to the Soviet invasion of Afghanistan last Christmas clearly took the Soviet policymakers by surprise. Grassroots America, the Congress, and the White House all raised an uproar. Instead of Congress tying the hands of the president, as institute prognosticators expected, the executive and legislative branches worked in unison to condemn the

THINK TANKS

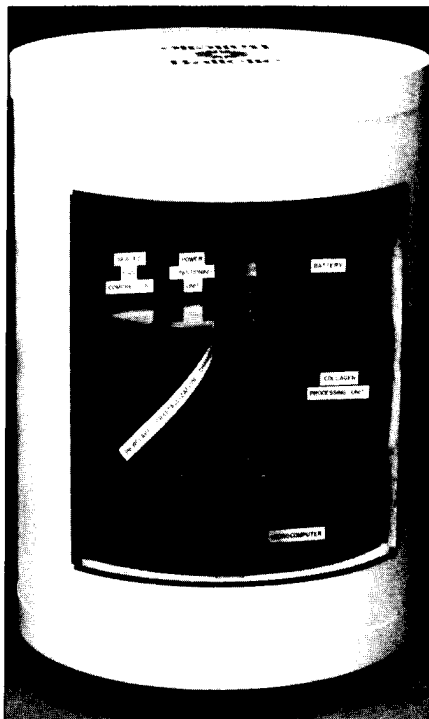
Soviet action. Result: cutoffs of grain shipments and high technology; withdrawal of the American team from the Moscow Olympics; dispatch of U.S. warships to the Persian Gulf; tabling of SALT II's ratification; overall strengthening of American military power in the 1980s.

The Kremlin is now asking itself how it so completely miscalculated the American response. The answer lies in the way the Amerikanisty went about their business, which was poorly. One of their mistakes was to let ideology blur their perception of the U.S.; they expected too much from those unnamed "progressive forces," the American "proletariat," and so forth. This, in turn, gave them a too rosy-red view of the American future and of the 1980 elections in particular. In their view, America has moved to the left. For those distant savants, this means the "military-industrial complex" has largely been put under the thumb of House and Senate committees, some of whose members reflect the "realism" that appreciates both Soviet strength and the "correlation of forces worldwide, which favors Socialism."

In the aftermath of Afghanistan, the institute itself is in disarray. Already there are signs of change on Bread Lane. An editorial purge seems to have been carried out in the offices of the journal *USA and Canada: Economy, Politics, and Ideology*, which has lately switched to the hardest of hard lines on America. And Comrade Arbatov is not recovering very fast from his "illness." In the years ahead, whatever objectivity the institute may have been inclined to display in its Americanology is likely to be crushed in the anti-U.S. campaign launched by Kremlin higher-ups when the Red Army was dispatched southward.

The result is that the Politburo will know even less about the way we operate. The post-Brezhnev leadership, which will be taking over soon, is made up of men who have never been to the U.S. and who must rely on indirect sources of information. The new generation of Soviet leaders is likely to let high-flown ideology guide its foreign policy. This will constitute a far greater danger than did the misleading material generated in the past by the Institute of the USA and Canada. For current Soviet ideology holds that the future will be marked by numerous "wars of national liberation" and by the "strengthening of the positions of Socialism in the anti-imperialist struggle."

Attempts to "bury" us may thus be accelerated.
—Albert L. Weeks



The space shuttle's payload canister, cut away to show where the collagen will grow.

MAKING BODY PARTS IN OUTER SPACE

Scientists at Battelle Institute's Columbus Laboratories in Ohio will be looking toward the heavens for the next few years, hoping for a breakthrough in making replacement parts for the human body. They plan to grow the protein collagen on board NASA's space shuttle.

In its natural form, collagen is the primary structure of nerves, tendons, skin, bones, blood vessels, and the cornea of the eye (which is 100 percent collagen). According to Battelle researcher Kenneth E. Hughes, processed collagen could be used to repair or replace human organs—including heart valves, blood vessels, and corneas.

As it is, collagen obtained from animal tissue can be formed into a fibrous, gel-like substance. The trouble is that the fibers in the gel settle out, resulting in a nonuniform material. Battelle expects that the weightlessness of outer space will allow the fibers to be more evenly distributed and give scientists more control over the collagen's structure.

Growing collagen in space could pave the way for a family of collagen-based biomaterials for use in ophthalmology, in burn treatment, and in open-heart, orthopedic, reconstructive, and cosmetic surgery. Says Hughes, "For openers, you could dispense with eye banks forever." —Civia Tamarkin

PLANNING AHEAD FOR THE END OF THE OIL

Now the Saudi Arabians are plunging into solar energy, using their flood of oil dollars to exploit and expand available U.S. technology.

Aided by the federally funded Solar Energy Research Institute in Golden, Colorado, the Saudis are investing \$50 million in a five-year solar-energy development program, SOLERAS. An equal amount is being provided by the U.S. government, which will share in the benefits.

Already under way is a \$16 million effort to build the world's largest photovoltaic power plant. To be installed next year on the desert sands atop the world's richest oil reserves, near Riyadh, the 350-kilowatt plant will convert sunlight directly into electricity for two small villages.

Other projects under way or planned include five pilot installations using solar energy to drive cooling units, two water-desalinization plants, and a controlled-environment agricultural project similar to a giant greenhouse. Four of the cooling units will be installed on a test basis in Phoenix.

"The Saudis have a farsighted energy policy," says Ivan Smith, project director. "They're looking ahead to the day when their petroleum is depleted. By using today's resources to invest in tomorrow, they're reserving as much oil as possible for high-return uses, such as petrochemicals. They don't want to burn oil to generate electricity." As a result of the Saudi efforts, Smith says, "We've been able to push the development schedule ahead a couple of years." —Jim Scheffter

DISHARMONY IN THE HEAVENS

"Space walk"—a term made popular back when astronauts on umbilical cords drifted happily outside their capsules—may soon take on a new, distinctly less pleasant meaning. Within twenty years, says Mark M. Hopkins of the Rand Corporation, workers stationed in outer space may be walking off the job to vent their grievances with Earthfolk.

In a paper titled "The Economics of Strikes and Revolts During Early Space Colonization," Hopkins looks at extraterrestrial industrial sites ranging from satellite power stations to space colonies of 10,000 people, and notes a variety of possible sources of labor unrest.

Space workers will be highly skilled and well paid, but they will live in a sort of company town. Their close quarters and increased sense of community may lead them to form unions,

POWER PLANTS: IS BIGGEST BEST?

Going against the utility industry's long-standing dictum that bigger means better, a study done by the Los Alamos Scientific Laboratory in New Mexico concludes that a number of small power plants may cost less and perform better than a single large plant.

The study, paid for by the Department of Energy, set up a hypothetical situation in which electricity would be generated from coal at a mine site in Utah for consumption in Los Angeles. Its conclusion: Six 500-megawatt plants would do the job better than a single 3,000-megawatt plant.

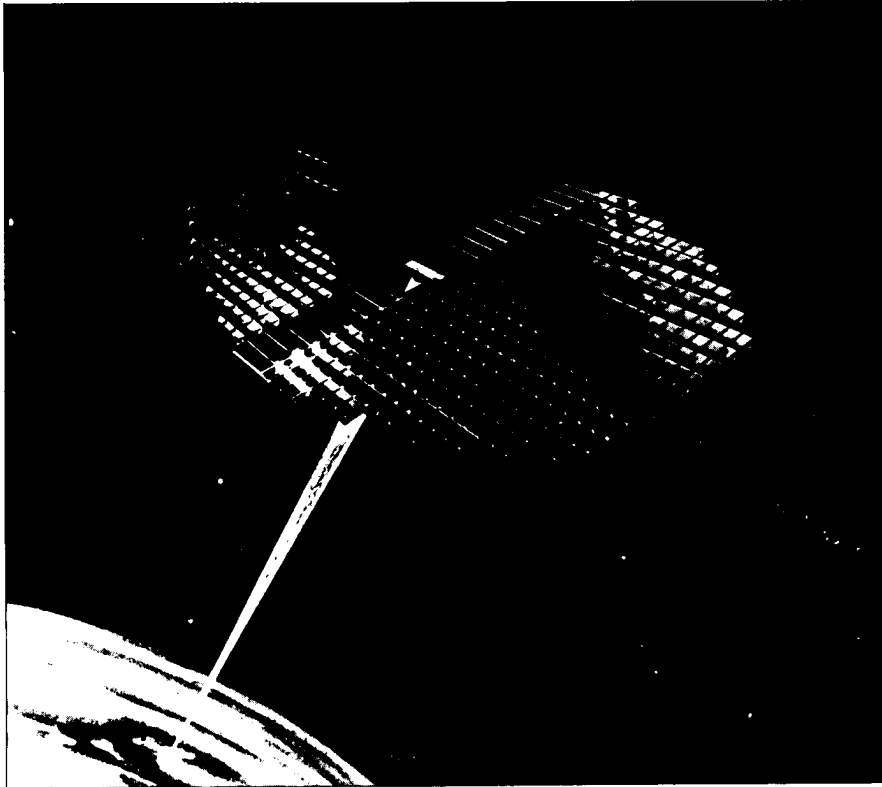
According to Andrew Ford, a specialist in technology and public policy and the author of the study, large plants have lost much of their economy-of-scale advantage because they take so long—and run up such high interest costs—being planned, approved, and built. They're also less reliable and take longer to repair than smaller plants, says Ford, because their designs are so complex. That means spending more for back-up generators.

Besides saving money, scaling down will pay off in less obvious ways, says Ford. The 4½-year construction time for small plants (versus nine years for large ones) will allow utilities to tailor generating capacity more closely to their forecasts of customer demand. The small-plants alternative would also distribute local property tax benefits more evenly, and preclude boomtown growth in a single host community. The disadvantages? Smaller plants would burn slightly more coal and require more water to produce the same amount of electricity.

Ford believes power plant impact statements should give consideration to the small-plant alternative. Minnesota's Power Plant Siting Program has recently commissioned such a study. A Michigan utility is checking to see how Ford's data applies to its generating system. And in Texas, a utility is considering a proposal to build five 300-megawatt plants, each half the size of plants it now has under construction.

Other utilities have reacted negatively, especially when Ford's report has been brought up at government hearings. "It's an oversimplification," says Walter Esselman, of the utility industry's Electric Power Research Institute. But even Esselman believes new technology, such as the fuel cell (an electrochemical generator), could soon lead to a future in which power plants will be neither all Volkswagens nor all Cadillacs, but an economical mix of the two.

—Michael O'Gara ■



Satellite power stations look serene in the artist's rendering, but there may be trouble in Paradise—from strikes and sabotage to charges of extraterrestrial imperialism.

says Hopkins, and they may strike not just over wages but over housing, food, and terms of rotation to and from Earth.

But where do you walk when you're 170,000 miles up, and how will space workers conduct their strikes? Hopkins says work stoppages, feasible in construction and manufacturing projects, will constitute a severe financial blow. It might take a staged "accident"—in effect, sabotage—to shut down a highly automated space power station, but the resulting shutdown could lose the owners revenues of \$8 million a day, in addition to causing hardship for Earth-bound energy users. On the other hand, management could discourage stoppages by charging workers for their high-priced living quarters—and even for the oxygen they breathe—for the duration of any strike.

In addition to labor-management problems, Hopkins also foresees significant cultural and political differences between space colonists and people on Earth. Resentment could arise if space colonists feel their tax burden is disproportionate to benefits received. Hopkins speculates that a government on Earth might even tax the space workers on the oxygen supplied to them. Another possible source of resentment is that most of the capital in the extraterrestrial company town "will be owned by Earthfolk who, due

to cultural and other differences, are likely to be soon looked upon as foreigners. Given the history of resentment in many nations toward foreign ownership of even moderate amounts of capital, it takes little imagination to foresee space colonists branding the owners as imperialists." A war for independence might result.

Seizure of the satellite space station they were hired to man could make the former colonists rich, Hopkins suggests, and "with the government authority destroyed, the former colonists might be able to participate in a cartel." In other words, OPEC in outer space. If predictions are correct that space stations will be major suppliers of energy early in the next century, such a cartel could wield considerable force.

To preclude this dire outcome, Hopkins suggests that a "deep, ideological commitment to the space program" be a criterion for selecting space workers. The close screening could begin with the staffing of the space stations scheduled for completion late in this decade. Later, as space communities expand, Earth-bound governments might grant the colonists their independence, after obtaining guarantees against cartels and against "nationalization" of capital, as the one sure way to preserve celestial harmony.

—Richard Conniff

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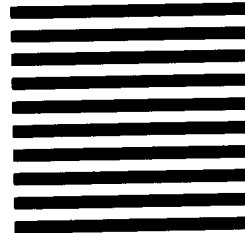
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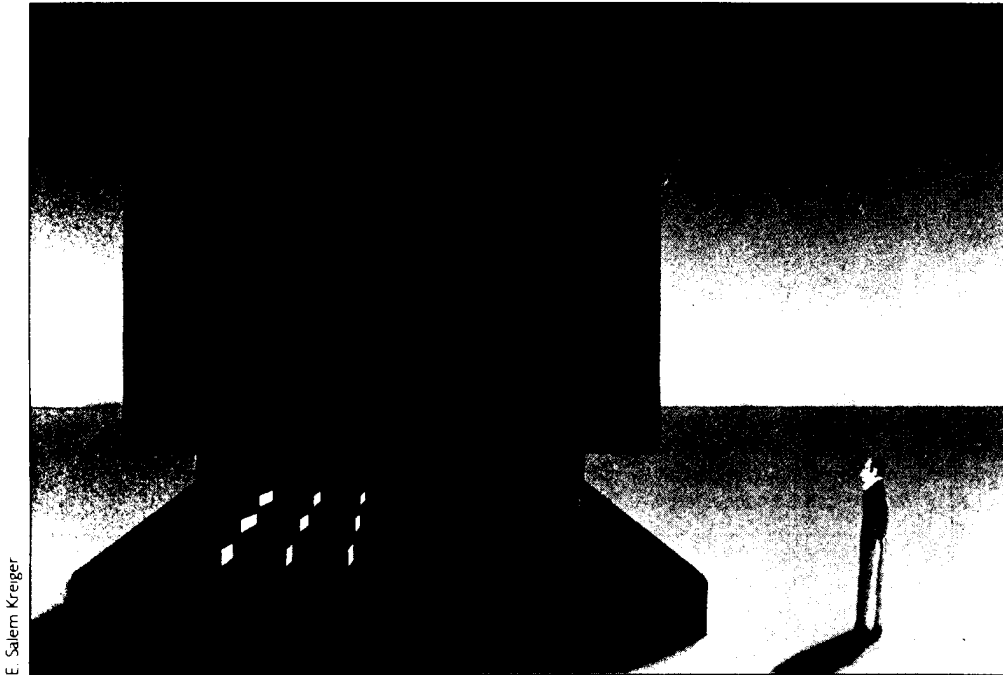
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E. Salem Kreiger

WHY JOHNNY CAN'T READ OUT

A new form of illiteracy will arise to bedevil educators within the decade. And the same problem will soon be giving the rest of us—even those considered the best educated—discomfiting encounters with our own ignorance.

Arthur Luehrmann, computer-research director at the University of California's Lawrence Hall of Science in Berkeley, calls the problem "computer illiteracy"—the inability to communicate with computers—and likens it to the inability to read or write. Just as plain, old-fashioned illiteracy delayed the adoption of the printing press, he predicts the computer illiteracy of over 99 percent of the population will hinder the acceptance and exploitation of our newest intellectual tool. In fact, he thinks this will constitute a national crisis in the 1980s.

"One estimate is that 40 million general-purpose computers are going to be in people's homes by 1990," notes Luehrmann. "That means 39 million people are going to have to learn to use computers between now and then. They don't know now, and I don't know who's going to teach them. There's no educational program big enough to handle the job."

That may sound like a national crisis only for the people who sell computers, but

Luehrmann disagrees: "Computing is really a basic skill in the same sense as reading, writing, and math. All of these provide ways to think about and to represent what we know. We become better problem-solvers if we can write well, if we can use mathematics, and if we can construct computer programs." Even if individuals don't immediately see the advantages of computer literacy, Luehrmann predicts employers will. They'll demand competence in this new basic skill.

According to Luehrmann, a few farsighted schools, mostly in areas with heavy computer-industry employment, are already facing up to that eventuality. "But they run into the same stumbling block. The classes go well and the kids like it, but the teachers all say, 'This curriculum is thin. Where can I go to get material to give my kids? Where can I go to get an eighth-grade book on computing? Is there some place I can go and learn to be a better teacher?' The answer is no. There's no curriculum guide, and there's no school of education teaching people to be computer teachers. There's no textbook because publishers haven't yet discovered that eighth-grade computing is a viable course. But there should be. I think it's a national need." (See NEXT, March/April 1980, "Computers Are Kid Stuff.")

Any school that teaches typing can ♦

EDUCATION

EDUCATION

also afford to maintain a computer laboratory, Luerhmann says; the cost is about the same. He predicts that many schools will realize this and establish programs, especially at the junior-high level, in the next three or four years.

What should such programs cover? "It doesn't bother me that people don't know the difference between RAM and ROM, or between bit and byte," says Luerhmann. "I don't think most people ought to care about the hardware. It's like the automobile. People should know how to drive, even if they don't know what's going on under the hood. By driving a computer, I mean programming it, being in charge, communicating with it."

And he adds, "A typical programming language uses only 50 words. It's not like learning French. Most kids pick it up in a few hours. It's not a burden; it's fun. And if the course is good, the students don't just learn the language; they also turn it around to solve some interesting problems."

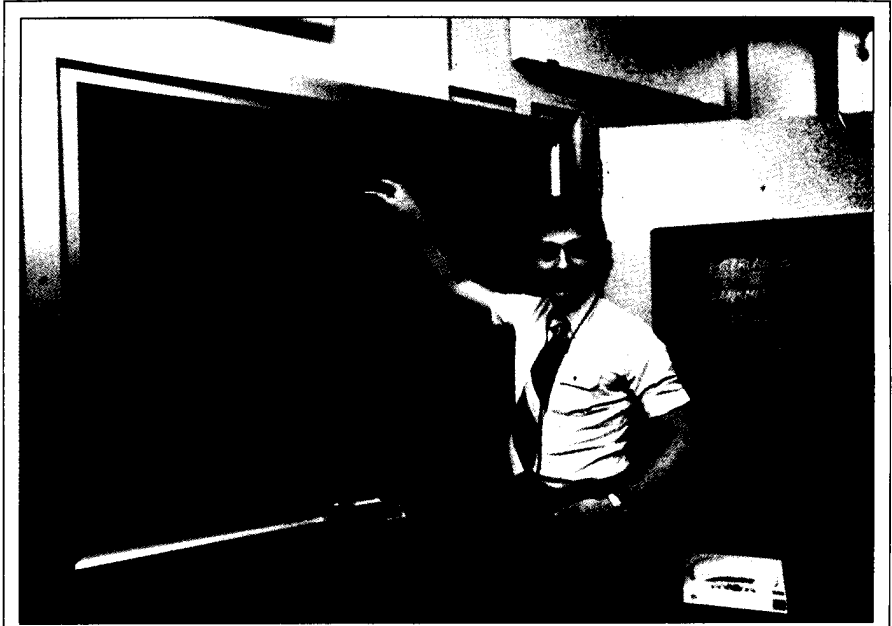
For adults who don't want their children or their employers to regard them as computer illiterates, Luerhmann recommends taking extension courses—with at least half the classroom time devoted to hands-on computer work. "An alternative," he says, "is to go out and buy a cheap computer, in the \$500–\$1200 range, and use the instruction manuals to learn how to run the machine. The computer won't provide \$500 worth of services—at least not in the beginning—but it will certainly give you \$500 worth of education." —Michael O'Gara

GROUCHES, MONSTERS—AND LEARNING

Some of the children are swimming in a pool filled 3 feet deep with multi-colored plastic tennis balls. Others are wading across a swamp of varied-density foam. Over yonder, youngsters are going wild over a variety of computer games and scientific experiments. Still others are devouring natural food they've just seen cooked behind glass-walled ovens. And a group of toddlers is exploring an imitation Sesame Street TV studio, complete with lights, cameras, and Oscar's trash can.

Welcome to Sesame Place! As Disney Studios spawned Disneyland (and World) so, in an intriguing experiment opening July 1 near Langhorne, Pennsylvania, the educational TV show Sesame Street is giving birth to Sesame Place. Of course, it's replete with representations of Oscar the Grouch, Big Bird, and the amiable Cookie Monster.

The point of the park, says project planner Marilyn Rothenberg, is for



This electronic blackboard, developed by Bell Labs, allows instructor to write or draw on it, and have his words or drawing reappear instantaneously at another site. The image travels over standard telephone lines and appears on a video monitor; it is accompanied by two-way voice communication. Any number of outlets can be connected with the originating site.

children "to learn through play," just as it is with the TV show. Enticed by all the fun, kids from 3 to 12 are supposed to make discoveries about the world they live in—about textures, materials, light, sound, and motion. No mind-bending thrills and chills in this amusement park. "The kids bring their own energy and creativity," says promotion director Robert Hatch. "They get out of the park what they put in."

Built by Busch Entertainment Corp. in conjunction with the Children's Television Workshop (CTW), creator of Sesame Street and the Electric Company, the park will consist of a large pavilion and a surrounding playground on 2½ acres next to a suburban shopping mall.

There will be room for 3,000 children and parents, at \$4 apiece. The "ball crawl" mentioned above will be for toddlers. Stilt walking and rope climbing are for the bigger fry. Working-model science displays that kids can operate will demonstrate the basic principles of pulleys and windmills. Sixty computer games will stress the interaction between child and machine: "They're much more sophisticated than arcade-style TV games," says Hatch.

If the venture is as successful as Busch Entertainment and CTW expect, the company will build a half-dozen more Sesame Places across the country by 1985. "Right now there's a scarcity of healthy, stimulating places to take

young children," says CTW's Marilyn Rothenberg. "A few science museums have bits and pieces of the Sesame Place concept, but no place has the whole thing. We still dichotomize too much between work and play in our culture. With Sesame Place, we hope to inform parents that play can be delightfully worthwhile." —John Sedgwick

HOW'S YOUR URDU, OR MAY WE SPEAK HAUSA?

America is crippled, linguistically, and this shortcoming threatens to get worse—and to impair our overseas relations—in the years ahead. A Modern Language Association (MLA) task force reports that the "less commonly taught languages" account for "only 1 percent of the nation's secondary school foreign language enrollments and 10.2 percent of the post-secondary enrollments. Yet these are the languages spoken by more than 80 percent of the world's population." (The languages include everything but English, French, German, Italian, Latin, and Spanish.)

Last year's report by the President's Commission on Foreign Language and International Studies pointed out that our linguistic shortsightedness—and chauvinism—are severely handicapping the United States in the world market free-for-all. Sen. S.I. Hayakawa, a semantics expert, has observed that there are 10,000 Japanese salesmen on the beat in America, all of

whom speak English, but only 900 American business reps in Japan—and the number that speak Japanese fluently is below 100.

For Americans who want to break the language barrier, Mike Strumpen-Darrie of Berlitz advises: "If I had to choose just one, I'd recommend French—at least for travel. So many people in outlying places, in Africa and Asia, speak it; you also have Canada, Europe, and Egypt. But Spanish has been our biggest seller for some time. We're seeing a boom in Portuguese—Brazilian Portuguese, that is—since a lot of American families are being transferred to Brazil by corporations. Japanese is coming up strong, too. We've gotten a lot of corporate feelers about Chinese—how much would it cost to train 500 people? The demand for Russian hasn't fluctuated much in years."

Robert Frye of Holiday Personnel in New York, an agency which handles many corporate calls for multilingual workers, says his clients prize proficiency in French and, above all, in Spanish. "It's important," he says, "for public contact, especially in this city, and also for international trade." But the big international corporations aren't really leaping at linguists. "American corporations generally want to solve an immediate problem when they hire," says Dr. Kurt Müller of the MLA. "If you know Portuguese, sure, that's wonderful—but first they look at your marketing experience or technical training."

The MLA, on the basis of its task-force study, recommends the "energetic promotion" of instruction in Arabic, Chinese, Japanese, Russian, Hindi, Urdu, Indonesian, Portuguese, Hausa, and Swahili.

These are not languages one sees offered in high schools, or even in most colleges—but they are the languages of the world more and more Americans will be living in and working in over the decades ahead. —Evan Eisenberg

LIP SERVICE TO SCIENCE

Courses with such catchy titles as "Physics for Poets" will no doubt continue to proliferate on campuses as science educators court students inclined toward the humanities. But a University of Washington physics professor warns that, despite "perpetually enthusiastic student testimonials," such courses are a betrayal and will leave "virtually nothing permanent or significant in the student mind."

Instead, says Professor A.B. Arons, they "invariably submerge students in an incomprehensible stream of techni-

cal jargon not rooted in any experience accessible to the student, and presented much too rapidly and in far too high a volume for . . . any significant understanding of ideas, concepts, or theories."

Often dazzled—Arons says "drowned"—by their lecturers' brilliance and range, students passively accept scientific concepts on authority and learn them by rote. He complains: "Students who have no notion how to define 'local noon,' midnight, or the north-south direction, who have no idea of the origin of the seasons or the phases of the moon . . . who are unaware that the stars have a diurnal motion are subjected to lectures on stellar nucleosynthesis, quasars, pulsars, and black holes . . . Students are conned into reading and talking about DNA . . . when they have no idea why we believe in atoms and molecules."

He adds: "Even when the jargon is remembered in bits and pieces, students cannot put it together into meaningful statements or insights of their own."

"Among the students being debilitated in this way," he charges, "are many of our future elementary teachers. Is it any wonder they emerge totally unable to handle the new elementary science materials?"

Robert March, physics professor at the University of Wisconsin and author of the text *Physics for Poets*, concedes that "a good third" of his students fail to notice a correlation as basic as that between the changing seasons and the average daily duration of sunlight. But he says his course provides a useful option to students who seek exposure to some of the "frontier" concepts of twentieth century science. Besides, he says, that's what interests him.

Arons argues that the students would be better served by much narrower courses taking them step-by-step through the thinking of Galileo, Newton, Faraday, or other innovators. "They must be allowed to doubt with the early participants, to articulate uneasiness about the interpretation of some of the evidence—not just to be stuffed with a few disconnected and, in themselves, unconvincing arguments, followed by assertion of the end results." Instead of "regurgitating secondhand pronouncements," he says, they should grapple with enough scientific detail "to make their involvement genuine—but not so much as to bury them."

Arons does not expect his arguments to win the day. The "science for poets" courses allow students "to think they have mastered profound levels of knowledge," while he offers instead only hard thinking and doubt. These ♦

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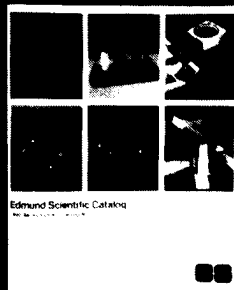
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EDUCATION

are quantities for which he says many liberal educators today seem to have little use, and which are likely to become even less popular in the future.

—Richard Conniff

ELDERHOSTELING BY AN ELDERHOSTELER

For many older people, the winter years of their lives are assuming some of the freshening qualities of spring. The reason: Elderhostel. Modeled after the folk schools of Europe, elderhostels offer college courses, room and board, and extracurricular activities to men and women over 60 on university and college campuses across the country.

Two administrators at the University of New Hampshire launched Elderhostel in this country just five years ago. Since then, the program has mushroomed into a fully incorporated, non-profit institution that now caters to 20,000 hostellers at 325 different schools.

Students usually enroll through Elderhostel's national office in Boston. But each school sets up its own schedule and designs its own courses—2,000 of which appear in a catalogue available free from Elderhostel (100 Boylston St., Boston, Mass. 02116). Teachers try to keep away from fusty subjects. Among the intriguing courses offered: "Cowboys, Miners, and Ghost Towns," "Human Sexuality," "Computer Games," and "Mystery With a Touch of Lemon" (this class delves into Agatha Christie novels while the students enjoy tea and crumpets). Most elderhostels run for one week during the summer, though this year a few have started winter programs.

The maximum weekly cost per pupil is \$130. Elderhostel collects a \$10 fee from each student.

"The past success and future promise of Elderhostel is due to a growing group of truly exceptional individuals—the hostellers themselves," says William D. Berkeley, president of Elderhostel. "Their physical and intellectual energy belies their years, and their eagerness to enrich their lives is inspiring."

Carsten Ahrens, one of those exceptional individuals, sent the editors of NEXT an account of the elderhosteling experiences he and his wife had last summer, which we present below. Ahrens, 74, is a retired high school biology teacher and former national park ranger who now lives in Pittsburgh. His wife, Dorothy, who will admit only that she is younger than her husband, has a Ph.D. in education, and has worked as a school psychologist.

—K.B.



Carsten Ahrens explored the world of "elderhosteling" and liked what he saw.

*Grow old along with me!
The best is yet to be,
The last of life, for which
the first was made . . .*

If Robert Browning, who wrote those lines, were still around I'll bet he would be gung-ho about elderhosteling. He would never be in favor of retiring from living merely because the world wanted to put him up on the shelf.

My wife and I discovered that a good many oldsters have an I'm-not-through-yet attitude when we attended three elderhostels last summer—one each in June, July, and August. There were pupils as young as 60 and as old as 84 in our classes. Some were university graduates, others were enrolling for the first time. We were trying elderhostels as neophytes but one couple from Texas was enjoying their 26th summer-school of higher learning.

We were prompted by the gas shortage to select institutions that were within one gas tank's drive of our home, and we decided to stay within Pennsylvania's borders. We knew nothing about the three schools we attended; we chose them simply because the courses sounded interesting. ("Who Are the Amish?" and "Southern Africa—Behind the Scenes" appealed to us, for we drove through an Amish settlement every time we visited my boyhood home, and I had lived briefly in South Africa.) Two of our summer "alma maters" were out in the country (Messiah College in Grantham and Mount Aloysius Junior College in

Cresson); one was in the heart of a city (Gannon College in Erie).

A class might run for an hour and a half, or for half a day if a field trip was planned. All of our professors were first-rate. The subjects required no involved prerequisites. There was no homework, and there were no examinations or report cards. We slept in comfortable bedrooms on the first floor, and at two of the schools each bedroom had its own toilet facilities. (At the other, we were introduced to co-ed bathrooms!) Our three meals a day, good and substantial, were served in tidy college cafeterias, each with a tempting salad bar.

Maybe it was just luck, but we found a congenial group of people in each of our three hostels. There was always someone among the 30 members who could "call" for square dancing, play an instrument, or lead the singing of those old-time songs we had grown up with. Outgoing and thoughtful summer students drove our buses, performed at concerts, hosted at picnics, and escorted us on our visits to malls, shops, gardens, and museums.

Too many people believe life is over when they are forced to retire. For them, the days ahead seem to offer nothing more than an easy chair before the TV set. But Elderhostel believes it is better to wear out than rust out. I wouldn't have missed a minute.

—Carsten Ahrens

ON THE HORIZON

- Added emphasis on geography. Political flux around the world has increased student interest at the same time that testing shows their ignorance—even about what states border their own. It may soon be cheaper for schools to keep up with changing international identities. Hammond Inc., the mapmaker, hopes to offer replaceable "skins" for periodic updating of classroom globes.

- New test for alumni loyalty. With the lowered birthrate threatening the survival of some colleges, one admissions dean urges colleagues to publicize their long-term recruiting needs with this bumper sticker: "Save the college of your choice—have a child."

- A decline in the intellectual and academic skills of teachers. Fewer talented students are going into teaching because of its relatively unpromising employment prospects; the brightest tend instead to seek careers in business and engineering. W. Timothy Weaver reports in the *Phi Delta Kappan* that the mean 1976 grade point average for graduating seniors majoring in education was 2.72 compared with 2.97 for all majors. ■

A MEDLEY OF FEARLESS FORECASTS

If the Indian government doesn't remove a new oil refinery located 24 miles north of the Taj Mahal in Agra, the Taj Mahal "will crumble down in 30 years."
Tippinej Shivaji Rao,
Indian environmental engineer

"Many of the traditional rules of our presidential politics have fallen away in recent years. We elected Catholic John Kennedy and we elected Southerner Jimmy Carter. And someday—not too far off, many would say—women, blacks, and Jews will be easily accepted in our presidential sweepstakes. There's still one rule, however, that shows no sign of wear: No fat person can make it to the White House."
Dan Greenberg,
New Scientist

"Because most of the color films of the past 25 years were made in Eastman Color rather than in Technicolor, they are likely to fade into oblivion before the technology to rescue them is perfected. Eastman Color supplanted Technicolor because, among other things, it was cheaper. But its dyes are less stable."
Paul C. Spehr,
American Film

Will men begin using birth-control pills soon? "Every postpubescent American female reading this will be past the menopause before she can depend on her male sexual partner to use his Pill."
Dr. Carl Djerassi,
synthesizer of first oral contraceptive

"I believe that cancer will turn out to have a single switch gone wrong, somewhere deep in the interior of the cell. When this is uncovered, as I believe will happen, the disease can be turned around in its tracks or prevented outright."
Dr. Lewis Thomas,
Sloan-Kettering Institute

"In the 80s, some bishop somewhere in the world is going to ordain a woman, and present the Vatican with an enormous dilemma. I think that's one of the things you can feel pretty confident about."
Father Andrew M. Greeley,
sociologist

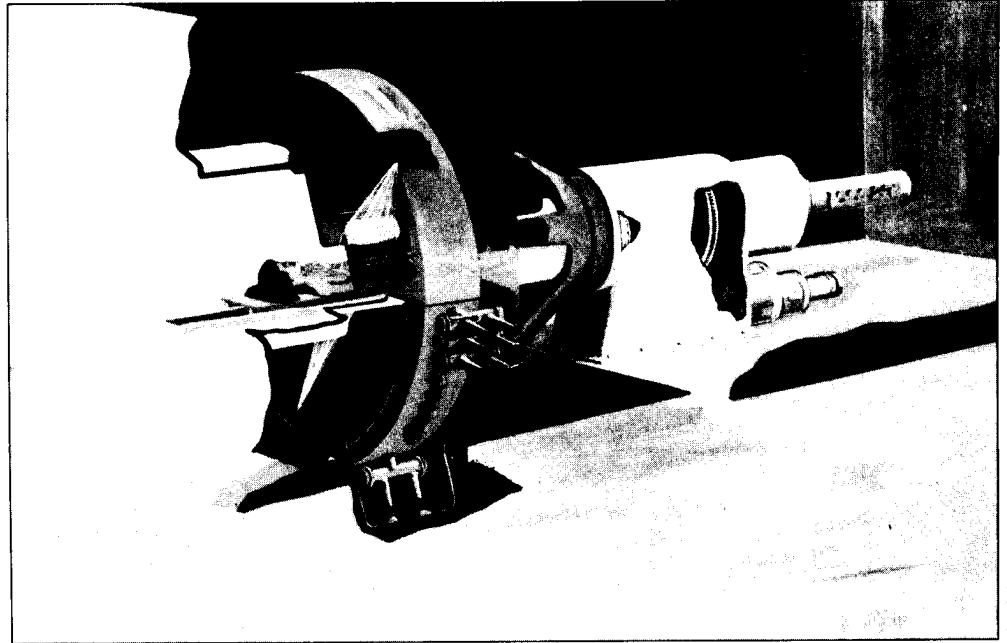
"Could our one-cent coin become the first plastic money? That would depend on how much longer copper stays below \$1.50 a pound. If the change takes place early in the decade, we're likely to see an alloy (perhaps aluminum) cent. If, however, the copper cent survives past 1985, we may see the new plastic planchet perfected."
Joseph Dziezawiec,
coin columnist

"A question that springs to mind is whether Earth animals and extraterrestrial animals could eat each other. If we did try to eat them, or vice versa, the most likely result would be indigestion. Their chemistry is probably quite different from ours, with perhaps a few small molecules shared by chance. Small changes within large molecules on Earth can be sufficient to alter foods we can digest, like starch, into ones we cannot, like wood . . . The effect of munching an extraterrestrial 'carrot' could be approximated by sampling the contents of a chemistry lab at random."
Gerald Feinberg and Robert Shapiro,
Life Beyond Earth (1980)

"Unless housing production is stabilized at high levels, the median price of new homes nationally, by 1985, could top \$100,000."
Merrill Butler,
president, National Association of Home Builders

"In some ways, the 1980s should be a quiet period. The members of the baby boom generation were rioting in the 1960s and suffering high unemployment in the 1970s, and they will create massive problems when it comes time to retire. But in the 1980s and 1990s they will be in the prime worktime, and it will be an era of relative calm."
Michael L. Wachter, labor economist,
University of Pennsylvania

At least one-third of today's 1,800 life insurance companies will not survive the 80s. "There are too many companies fighting for a fixed amount of premium dollars."
Herbert E. Goodfriend, vice-president,
Bache Halsey Stuart Shields ■



Robert Oliver

An artist's rendering of the next big advance in X-ray technology, which will soon provide physicians with detailed views of internal organs in motion, from any angle, without surgery.

MOVING PICTURES OF INTERNAL ORGANS

Taking an imaginative leap beyond the computerized X-ray machine called a CAT scanner, a team of researchers at the Mayo Clinic has developed an X-ray "scalpel" capable of exploring the body electronically to give physicians moving pictures of any organ, from any angle, almost instantaneously.

When the new Dynamic Spatial Reconstructor (DSR) becomes available within the decade a physician will be able—without surgery—to look at his patient's beating heart or breathing lungs, rotate the organ on a television screen, and cut it open, electronically, to examine interior structures in motion. He will even be able to "dissolve" the organ, again electronically, and study only the arteries.

Called revolutionary by the National Institutes of Health, which is putting up \$5.2 million in research grants, the DSR could provide new insights into physiology and dramatically improve the diagnosis of disease. For example, it will help doctors spot an incipient lung tumor that in a conventional X-ray might be hidden behind a rib. And having helped find the tumor, it will zoom in to give the doctor a detailed close-up. A cardiologist studying the effects of a malfunctioning heart valve will be able

to speed up the picture, slow it down, or stop it completely for a freeze frame or for instant replay.

The Mayo Clinic research team is already working with a full-size 15-ton DSR research scanner built largely by Raytheon Company. When testing on humans begins in 1982, a patient will lie on a radio-translucent table within the 10-foot long cylinder, encircled by a wheel moving at 15 revolutions per minute. Lining the inside of the wheel, 28 X-ray "guns" (a CAT scanner has only one) will fire in computer-controlled sequence. An equal number of video cameras, opposite, will pick up the images from a fluorescent screen, intensify them, and feed them into a computer. For the patient, the experience could be as quick as a conventional X-ray, with an equivalent exposure to radiation. But in the five seconds it takes the fastest CAT scanner to deliver a single cross-section, the DSR will spew forth 18,000, enough to strain the Mayo Clinic's computer and software capacity.

The researchers are now developing their own software and special purpose computers, which they expect will be able to digest the data from the DSR, eliminate unwanted information (bone-tissue data, for instance), and deliver the resulting picture to the physician almost simultaneously with the camera exposure. Thus, the doctor will see the image of the beating heart ♦

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HEALTH

almost at the moment it is beating. The Mayo team also hopes to develop a device to provide a three-dimensional display of a patient's internal organs.

In a completely separate project at MIT's Innovation Center in Cambridge, Massachusetts, researchers have already developed such a technique for use with CAT scanners. Their device, an 8-inch-tall cylinder with a 10-inch diameter, will receive a sequence of two-dimensional X-ray views from the CAT scan computer. Within the display, light-emitting diodes spinning at 300 revolutions per minute will reassemble the two-dimensional data in a near-perfect 3-D image.

The visual effect, according to the developers, is "exactly as if the human body were covered by a see-through Plexiglass skin." Unlike the most advanced holographic processes (whose viewing range is limited to 40 degrees), or 3-D computer graphics (where the third dimension is an illusion), this display allows the physician to walk around the image and look at the heart, for example, in 360 degrees. Microscopic "slices" inside the organ can also be viewed with clarity in three dimensions. But because the device will be paired with the CAT scanner, rather than the DSR, it will give a still rather than a moving picture.

The Innovation Center will have a small prototype of the display completed this summer, and believes surgeons will be able to begin using the device for pre-operation examinations as early as late 1981. Meanwhile, the Mayo Clinic team is beginning animal studies with its DSR, to be followed by several years of testing on humans. —Richard Conniff & David Michaelis

CAN HUMANS REGROW LOST LIMBS?

Biologists have long believed the possibility of growing back lost limbs in higher animals belonged more to science fiction than science. Although lower animals, such as salamanders and lizards, have such regenerative capacity, this was assumed to be lost with their evolution into higher organisms, such as birds and mammals.

But now an authority on tissue and organ regeneration, Dr. Richard J. Goss, of Brown University, has come round to the view that limb regeneration by man is possible. He bases his optimism on (1) the recent discovery that amputated fingertips in young children can grow back, (2) his observations about annual regrowth of deer antlers, and (3) experiments on regeneration of ears and other organs in other mammals.

The standard surgical procedure in the past for treating severed fingertips in children was to suture flaps of skin over the stumps. Today, the surfaces of the tips are simply treated with suitable dressings and left alone. The wounds heal mainly by the epidermis growing over the exposed tissues and by wound contraction. An important factor, according to Dr. Goss, is that there is apparently *no scar tissue formed at the site of healing*. "This leads to the replacement of the fingertip in a matter of weeks," Dr. Goss says, "including the development of fingerprints and a new fingernail." While the finger seldom regains its original length, it is a true regeneration of a complex structure composed of skin, muscle, bone, blood vessels, and nerves.

Dr. Goss's studies of antler regeneration in deer provided him with more evidence as to why lost limbs don't grow back in mammals. When the antlers are shed, the new antlers spring from the tissue at the healing site. Significantly, this nub of tissue—like the children's fingertips—is not covered by scar tissue. The new tissue is virtually embryonic in nature, in that it is able to elaborate complex structures in the course of development. Other experiments have found that rabbits, cats, and other animals can grow tissue to fill out holes in their ears, without scar tissue.

Says Dr. Goss, "the failure of most mammalian structures to regenerate may be due to the precocious scar formation that occurs in their healing wounds." This scar tissue, he believes, interferes with the communication between the wound epidermis and the underlying tissues that produce the "embryonic" cells (blastema) that could regenerate a limb. The way to go about inducing such regeneration, says Dr. Goss, "might logically involve the manipulation of wound healing so as to deflect the natural tendency for scar formation and instead to encourage blastema production."

In tests on amputated animals, Dr. Goss tried removing scar tissue—but new scars formed. Trying to regenerate rabbit ears, he has tested a substance capable of interfering with tissue metabolism—again, unsuccessfully.

Now he is considering methods that would interfere with the protein synthesis of scars and not other tissues, and the use of cortisone, which deters scar formation. Still another approach is the application of electrical fields, useful in bone regeneration. But Dr. Goss thinks this would present great technical difficulties.

Why did higher animals, which possess some capacity to regenerate tissues, lose the ability to regenerate limbs in the course of evolution? One reason: Scar tissue, while preventing regeneration, serves the invaluable purpose of keeping a wound relatively free of life-threatening bacteria.

—Joseph Bernstein

SENDING IN A CIGARETTE SUB

A nicotine chewing gum to help people stop smoking has gone on sale in Switzerland and Canada, and it may be coming to the U.S.

One stick of the spice-flavored gum, called Nicorette, can satisfy a smoker's nicotine craving for up to 30 minutes, according to the manufacturer, a Danish concern called A/B Leo. A



Ray Hamilton

What are your chances for surviving a heart attack at the wrong end of one of those interminable airport walkways? Good, if other airports adopt the mini-ambulance introduced by Dr. Lawrence A. Smookler, above, at San Francisco International. The \$16,000 units travel 10-15 m.p.h. and can reach victims within 2-5 minutes.

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Robert Neubecker

son won't say what the substance is because a patent on it is pending.) Thus, drawing on the fake cigarette doesn't coat the lungs with dangerous tar or fill them with carbon monoxide, though it does give them about half the nicotine vapor provided by a puff on a real cigarette. So far, reports Dr. Jacobson, all who have tried the noncombustible cigarette have either cut down or stopped smoking for up to two years.

—Larry Frederick

A NEW ASSAULT ON COMMON COLDS

"A-A-CHOO!" Forget the "Gesundheit" and pass the LY 122771-72.

The common cold may meet its match in a new drug developed by the Eli Lilly Co. of Indianapolis. According to Lilly, the drug can attack some 60 of the more than 130 cold viruses. Existing vaccines generally affect no more than 15 viruses at one time.

So far, the Lilly drug—code-named LY 122771-72—has been successful only in human-tissue cultures. Lilly is awaiting approval from the Food and Drug Administration to start testing the drug on humans. But even then it may be several years before the drug hits the drugstore shelf.

Lilly researchers, using virus-inoculated nasal passages of freshly aborted human fetuses, found the drug halted the virus within several hours after contact. Lilly says the chemical also stops the growth of polio viruses.

Other big pharmaceutical makers, such as Abbott Laboratories and SmithKline Corporation, have also been experimenting with anti-cold drugs. But their drugs do not cover all the cold viruses that the Lilly drug attacks. It's not surprising the race to find an effective cold fighter is at fever pitch. Estimates of the market for such a drug start at \$1 billion a year.

—Civia Tamarkin

PLACING A BET ON REHABILITATION FOR GAMBLERS

With legalized gambling flourishing in 44 states, Maryland's new treatment center for compulsive bettors may fast become a much copied model. At least a dozen other states are considering similar facilities, including New York, New Jersey, and California.

Last January, using funds from Maryland's popular lottery, the State Health Department converted a graceful colonial house in suburban Baltimore into the nation's first "Compulsive Gambling Counseling ♦

pack of 15 sticks is intended to replace a pack of 20 cigarettes, and pack for pack, the cost is about the same.

The rationale for the gum is that the biggest hurdle to giving up smoking is not lack of will power, but a peculiarly stubborn form of drug addiction—addiction to nicotine. The gum serves as a nicotine crutch during the crucial initial abstinence stage. It is meant to be used for only a few weeks.

Invented 10 years ago, Nicorette has gone through nine field tests in Europe involving 3,000 volunteers. Most of the studies have found it effective. The first U.S. study—a government-financed trial at the UCLA medical school—is just now getting under way.

The gum is not without drawbacks. Many people don't like the taste, and some suffer side-effects—throat irritation, excessive salivation, and hiccups among them. These vexations can be rather severe with the high-dosage form (it comes in two and four milligram preparations).

Nicorette is available, by prescription only, in Canada but is sold over the counter in Switzerland. The Dow Chemical Company, which sells the gum in Canada under agreement with A/B Leo, hasn't decided which approach to adopt when it seeks government approval to market the gum here.

Meanwhile, another ingenious way of getting people to stop smoking is being tested by a San Antonio internist, Dr. Norman Jacobson. He has invented a fake cigarette—one you don't light but puff on anyway. Instead of tobacco it contains an inert substance heavily laced with nicotine. (Dr. Jacob-

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Center." Four patients now live at the center, scores come in for weekly two-hour therapy sessions, and hundreds more use the 24-hour hot line for emergency telephone aid. There is a staff of 15 counselors and therapists, several from Johns Hopkins University.

The center's program is based largely on an approach developed by Dr. Robert L. Custer, a Veterans Administration psychiatrist who has fashioned gambler-rehabilitation programs for several VA hospitals. Much of the therapy is conducted in group sessions, and the "clients" include not only gamblers but their spouses as well. Also sitting in on most sessions are reformed gamblers, who, according to Dr. Custer, help put patients at ease.

"As therapists," says Dr. Custer, "our goal is to remobilize the gamblers' good qualities and to try to get these people involved in work or some physical activity as a substitute for wagering." Dr. Custer adds that three out of four of the clients are men, most of them "energetic, competitive types who lack self-esteem."

Dr. Custer describes compulsive gambling as a "progressive behavior disorder," and estimates that it afflicts up to 10 million Americans. He says he knows of no true pathological gambler who's ever quit on his own for more than a short period. But even with intensive therapy, the quitting rate is only about 50 percent. The Maryland center is shooting for 80 percent, basing its optimism on its plans for intensive follow-up.

Will the trend toward legalized gambling increase the number of compulsive bettors? "Definitely," says Dr. Custer. "Widespread legalized gambling provides all the ingredients a pathological gambler requires: a wide variety of betting opportunities, frequent wins, and close proximity to wagering establishments."

—Larry Frederick

SEALING THE GOODNESS IN YOUR TEETH

Tooth decay, mankind's most prevalent disease, may soon be a thing of the past. Fluoridated water, available to over half the American population, has already reduced the incidence of caries by 60 percent since 1945. Now a preventive technique that coats the decay-prone rear teeth with a glaze-like plastic sealant is being perfected, and it promises to wipe out cavities entirely.

"The sealant could definitely mean the elimination of cavities," says Dr. John A. Hargreaves, professor of pediatric dentistry at the Harvard School of

Dental Medicine. "After fluoridation, it's the biggest thing that's happened in the control of tooth decay."

Fluoridation, Hargreaves explains, protects the smooth surfaces on the sides of teeth. The sealant completes the job by keeping decay-forming bacteria from the rough, pitted areas of the chewing surfaces.

The liquid sealant is brushed on painlessly by a dentist. "It's like painting with water," says Hargreaves. In minutes, the sealant hardens—either chemically or under ultraviolet radiation—to produce an almost imperceptible thin film of plastic over the molars. "The teeth just feel slightly glassy when you run your tongue over them," says Hargreaves.

Prototypes of the sealant have been used on a small number of children—whose teeth are the most vulnerable to decay—with considerable success. Where the sealant has been retained, virtually no cavities have occurred. A recent study has shown, however, that only three-quarters of the plastic is still there after five years. Hargreaves thinks it must last ten years if it is to be worthwhile. Also, in order for the sealant to adhere, the child's teeth have to be dried thoroughly and then etched with a mild acid. This is time-consuming.

Hargreaves looks to the day when a dentist can "walk into a classroom and paint the sealant onto all the students' teeth in no time." Reapplied every ten years, the sealant would keep cavities away for life. To make this possible, Hargreaves is hunting for a bonding agent that can be quickly applied and prove long-lasting. Since roughly one hundred other dentists are also working on the problem, Hargreaves is confident the solution will be in hand "within ten years." —John Sedgwick

CANCER OR CARS: WHICH IS WORSE?

We have long assumed that we should give priority to combating those diseases that kill the most people—cancer, for instance. Now serious doubts have been raised. The chief victims of cancer, after all, are the elderly. If cancer were eliminated, as a study in the *American Journal of Public Health* recently noted, the average American would live only one year longer.

The new thinking is that we should give priority to combating diseases that reduce the typical person's life span the most. In effect, not just those diseases that kill many people, but diseases that most often attack the relatively young.

A landmark Canadian study suggests what those threats to health are. If

the average person can be expected to live to 70, then suicide accounts for about 4 percent of the people who die before that age. Respiratory diseases: 8 percent. Cardiovascular diseases: about 12 percent. The greatest killer, by far: accidents. They account for 24 percent of all the years of life prematurely lost—and motor vehicle accidents cause the lion's share: 13 percent. Hence the view among a growing number of public health authorities that our society should spend more time, energy, and money trying to lower the incidence of accidental death.

"Lest we forget," as Dr. David A. Hamburg, president of the National Institute of Medicine, has put it, "the greatest threat to health in the future is not cancer, not cardiovascular diseases, or even malaria, but violence—accidents, suicide, homicide, terrorism, and war."

ON THE HORIZON

- Possible correlation between sunny summers and increased incidence just two years later of malignant melanoma, a rare but deadly skin cancer. The two-year connection suggested in the *British Medical Journal* substantiates the need for caution when sunbathing. Malignant melanoma kills more than a third of the 14,000 Americans afflicted with it each year.

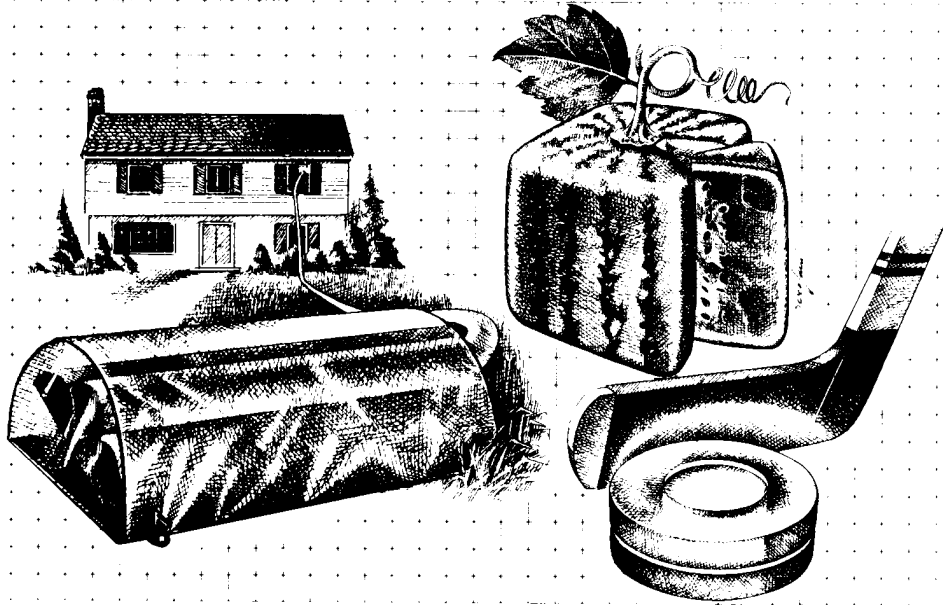
- Farewell to X-ray film. Digital electronics will soon make possible computer storage of all X-ray images, not just those from sophisticated CAT scanners or DSRs (described above). The booming cost of silver-based X-ray film will make the switch economically practical.

- A painkiller 200 times stronger than morphine. Dynorphin, from the pituitary glands of pigs, is now being tested for effectiveness in humans. Because the substance is normally present in small amounts in humans, researchers hope it won't be addictive.

- Ill-treated elderly as the next focus of public concern? A University of Michigan study says many elderly suffer verbal abuse or neglect from their families, often with serious health consequences. The study questions the old stereotype about the inadequacy of institutions compared with the home, and urges better support for caretaking families through tax breaks, medical care compensation and counseling.

- Flesh-toned adhesive bandages for blacks. Even the "transparent" bandages now on the market have a pinkish cast. But not Soul-Aid, which is being marketed in Indianapolis and is scheduled to reach other cities soon. ■

Joseph Scrofani



ELECTRIC MUSCLES FOR THE HEART

An artificial muscle for heart patients that circumvents the need to implant a bulky motor or pump has been invented by Thomas Runge of Austin, Texas (patent 4,176,411). The muscle consists of rods made of an elastic material such as foam rubber. Inside each of the rods is a row of electromagnets. By a process called induction, the electromagnets are magnetized by an electrical field, supplied by a larger coil outside the body. When activated, the electromagnets attract metal fragments in the rods and cause the rods to contract. If the electrical field is turned on and off 70 times a minute, a normal heartbeat pace, the rods contract and relax at the same rate.

In Runge's invention, the rods are arrayed along a section of artificial artery, made of a substance such as Dacron. This is put into place surgically to form a section of the patient's artery. One-way valves let blood flow in one direction only. When the electrical field is applied, the muscle contracts and expels the blood inside. The muscle relaxes as the field is turned off, fresh blood flows in through the one-way valve, the muscle contracts again and, presto, the patient has better circulation.

A LIGHTWEIGHT SUN TRAP

If you would just as soon not freeze when the oil wells go dry or the Mideast

goes up in smoke, an inflatable solar heater may be just the thing (patent 4,182,307, invented by Dannie Brindle of Golden, Colorado, and Donald Shanfelt of Lakewood, California).

Made of transparent plastic film, the solar heater works from your lawn. It is inflated with air from a compressor mounted in your window like an air conditioner. Inside the heater is a sheet of dark plastic, angled to catch the sun. Sunlight passes through the transparent outer walls. The dark sheet within absorbs the light, becomes warm, and heats the air inside the heater. A labyrinth of small tunnels in the dark layer increases its surface area and thus improves the efficiency of heat transfer. A hose carries the warm air into your house.

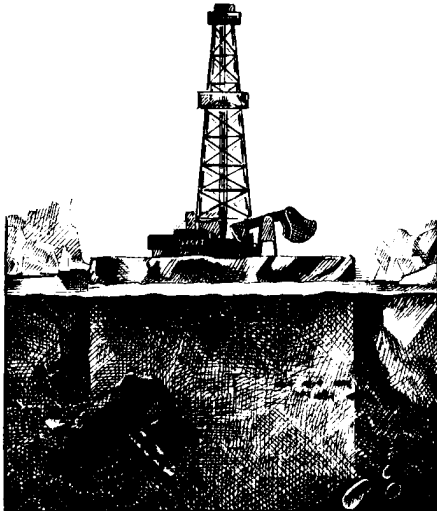
Brindle says the heater is 90 percent as effective as solid-plate collectors and costs only a fraction as much. A 50-square-foot model weighs 12 pounds, which should present no problem for the average person. Assembly is said to be simple.

"The nice thing about it is that there is no installation cost," says Brindle. "You just put it where you want it and blow it up. We think it has potential on farms and in factories as well as in homes."

COLD COMFORT IN THE SEA

The oil shortage has encouraged exploration for offshore oil in the Arctic, raising an unusual question for the sophisticated ♦

PATENTS



oil industry: How does one erect an oil rig to do the drilling? Traditional platforms don't work because drifting ice damages them. Exxon now has an answer, which is to build an island of ice (patent 4,187,039).

The technique is to drive a ring of caissons into the seabed, with the tops of the caissons extending above the ocean surface. Rows of "heat pipes" are then driven into the seabed within the ring, their tops also reaching the surface. (A heat pipe is simply a length of pipe, closed at both ends, that draws heat from its surroundings and thus promotes freezing.)

The pipes freeze not only the enclosed water, but also the underlying seabed. Because the ice island and the sea bottom are frozen together, the island resists the sideways force of drifting ice floes. An artificial island made of soil—not always available in the Arctic—would not be attached to the sea bottom, but would lie on it, and therefore tend to erode.

WRISTBORNE DISASTER WARNING

A diabetic who accidentally takes too much insulin can go into insulin shock, which in turn can cause unconsciousness and even death. While awake, he will probably notice that something is wrong, and eat sugar before it is too late. Should he go into shock while asleep, though, the outcome may be tragic—for example, convulsions or a heart attack.

Elger McNamara of Santa Barbara, California, has invented a sensor to wake the diabetic at the onset of insulin shock (patent 4,178,916). As shock approaches, body temperature falls and the electrical resistance of the skin changes. McNamara's invention is a sensor, worn like a wrist watch, that detects these ominous signs. It then emits a radio

signal. A nearby receiver (perhaps an ordinary radio) picks up the signal and sounds an alarm, waking the patient.

The device is not limited to use with diabetics. It can provide constant physiological monitoring of anyone with a disease that produces changes in skin resistance and temperature.

A SQUARED-OFF MELON: WHY INDEED?

For those who have been secretly dissatisfied with the spherical shape of melons, and longed for a cubical variety, Tomoyuki Ono of Tokyo offers hope. He has invented a mold (patent 4,187,639) for persuading a variety called a net melon to grow into a neat cube.

A transparent plastic box with a hole for the stem is mounted around the immature fruit. The mold is large enough to permit further growth of the fruit, but small enough to force it into the desired box-like shape. Before being thus imprisoned, the fruit is allowed to grow in its normal nude state long enough to develop the net-like pattern that characterizes net melons. The result, states the patent, is "a completely ripe, molded fruit for use as a food."

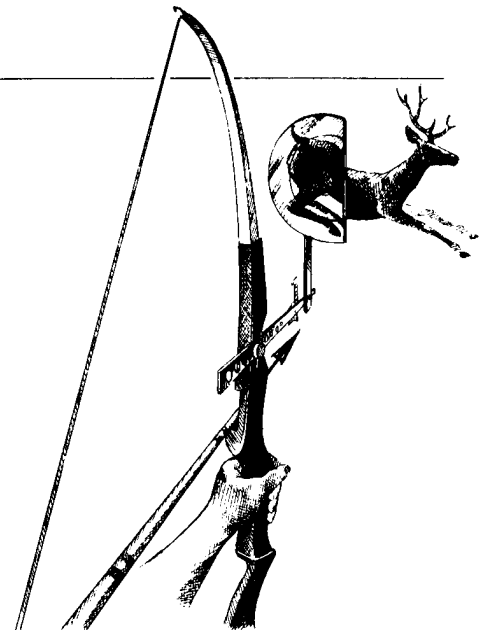
One may only speculate as to the advantages of a melon with corners. As the Japanese often vent their aesthetic urges on nature—rock gardens, shaped trees, and so on—the probability is that decoration is intended. Let us hope so. If an American were behind it, the aim would be greater packing density in fruit trucks. Your melon would still be green and half-ripe, and taste like a plastic coin-purse, but at least it wouldn't roll about on the plate.

A SIGHT FOR STRAIGHT ARROWS

Technology is bringing new accuracy to an old sport. Gene Smith of Colorado Springs, Colorado, has invented a split-image archery sight and range-finder (patent 4,178,693).

Because an arrow travels a curved path, an archer's accuracy depends on how well he knows the distance from his target. With Smith's sight mounted on the front of the bow, the archer is able to put the point of aim—analogue to crosshairs in a rifle sight—on the target.

In the sight the target may appear split in two unaligned pieces, as in the split-field range-finders of expensive cameras. The archer pulls a trigger on the sight, which causes the split image of the target to come together into a whole image. It also moves the point of aim on the target. When the point of aim is on one complete image, the archer knows he is exactly on target.



Smith says the sight will be about 6 inches high and guesses that it might cost \$175. He reports that Accra Manufacturing is negotiating to produce the device. It can be motor-driven if the archer desires. "It's going to be a must for hunting," says Smith.

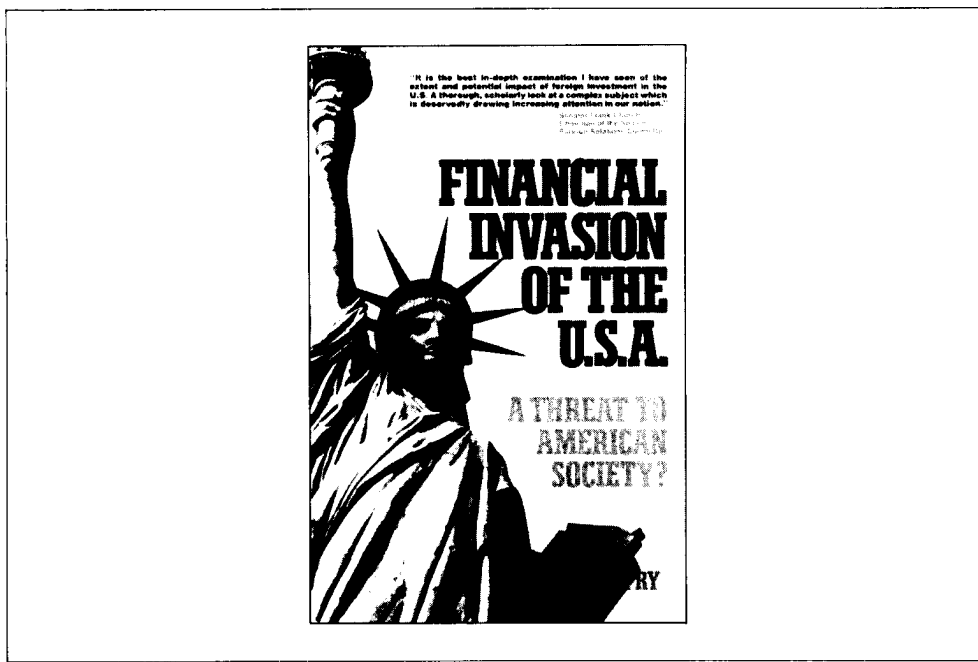
COULD YOU LIGHT THE GOAL, TOO, PLEASE?

The need for an illuminated hockey puck became clear to Nicholas Platt of Madison, New Jersey, when he was in high school. Platt is a hockey fanatic and frequently played until late at night on a lake near town. Unfortunately the lighting was not adequate. "We kept losing the puck," he says. "It kept going into the woods. We tried playing with flashlights, but that didn't work very well."

He tells of trying to make a lighted puck with batteries and a light bulb, but not being able to find a bulb with enough stamina to withstand the whack of even one cross-ice pass. Next he thought of chemical luminescence. Certain chemicals, used in emergency lights, glow when mixed. For this he needed a transparent puck, which he made by pouring clear commercial plastic resin into a mold. "I used a tuna can. It's just the right size." Then he drilled a hole in the middle and prepared a small container to hold the chemicals. Lo! It worked, glowing the liveliest green. The patent number is 4,183,536.

Platt plans to go commercial. He figures he can afford to give away the pucks, which are cheap to make, and turn a profit by selling replaceable containers of the chemicals which will glow for about an hour. "You know," he says, "like razor-blade companies give away razors so they can sell blades." ■

Patents Editor:
Fred Reed



THE SELLING OF AMERICA

By **Kenneth C. Crowe**

Financial Invasion of the U.S.A.: A Threat to American Society? by Earl H. Fry: McGraw-Hill Book Co., 202 pages, \$9.95.

Foreign investors are pouring money into the United States in a torrent, buying farmlands, oil lands, factories, shopping centers, office buildings, and even corporations. This buying spree is going to continue for a long time, until America gets a grip on itself and somehow ends its gluttony for foreign oil and cars and consumer goods.

For all of the joy expressed in Washington and Wall Street when foreigners come here to buy a piece of corporate America or real estate, they aren't bringing new capital into the country. They are using the money Americans spent on perishable goods overseas to make permanent investments in the United States.

We will spend about \$75 billion for imported oil in the coming year and, figuring almost certain OPEC price increases, even greater amounts every year into the foreseeable future. And every one of those

Kenneth C. Crowe is a Pulitzer prize-winning reporter on the staff of Newsday. He is also the author of American for Sale, a Doubleday Anchor Book (revised edition, 1980).

dollars is exchangeable for American-produced goods or pieces of corporate America.

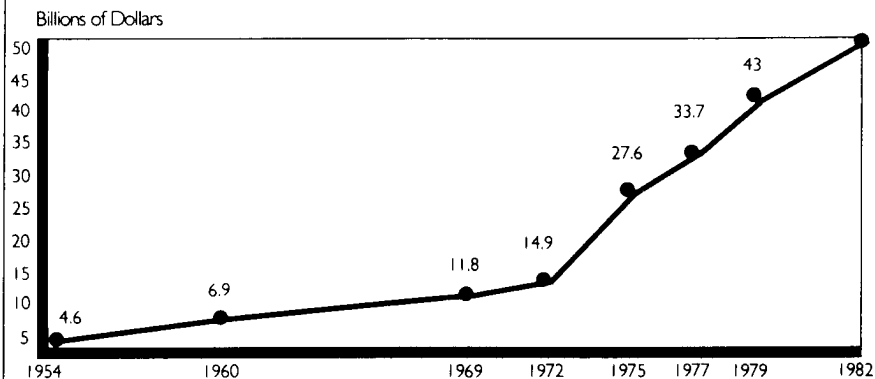
The buying of America is going on at such a frenzied rate and in so many diverse areas that it is hard to get a clear perspective on what is really happening. But many Americans are upset. Farmers are frightened of visions of Arabs and Germans buying up their children's birthrights in the land. The financial community has sent out signals that foreigners hoping to grab control of any of the superbanks had better forget it.

The rapid movement of foreign money into the United States is well described in Earl H. Fry's book *Financial Invasion of the U.S.A.: A Threat to American Society?*

Fry points out that foreign assets in the United States reached \$311 billion by 1977, and the biggest single purchase at the time of his book was the \$482 million that Unilever, the British-Dutch combine, spent buying National Starch & Chemical Corp. By the time *Financial Invasion of the U.S.A.* reached the bookstalls, foreign holdings were well over \$400 billion, and the National Starch deal had already been eclipsed by two other transactions. Last year, the Imperial Group Ltd., a British conglomerate, announced it was putting up \$630 million to acquire Howard Johnson's, the restaurant and motel chain, and the foreign controlled Shell Oil Company de-

BOOKS

Foreign Investment in the U.S.



By the early 80s, estimates Arthur D. Little, Inc., foreign investment in the U.S. will total over \$50 billion—not including such investments as mutual funds and treasury notes.

cided to spend \$3.65 billion for California's Belridge Oil Company.

American farmland and banks are the two most controversial areas of foreign investment. No one is certain how much farmland has been bought up, although just the fear prompted Iowa to pass a law last year prohibiting foreigners from buying any more. (Only 15,000 of Iowa's 36 million acres of farmland—.004 percent—are actually owned by foreigners.) The sponsor of the law, State Rep. Horace Daggett, said, "We closed the barn door before the horse escaped."

It is in dealing with such curbs on foreign investment that Fry throughout his book contradicts himself. In one place he writes: "... much of the controversy swirling around the farmland issue has been fomented by conjecture and hearsay, and government leaders at the national and regional levels should not be stampeded into rash actions because of the emotional outcry of some of their constituents." But later on Fry sounds like one of those constituents himself: "The United States is the major breadbasket of the world, and certainly the great bulk of agricultural land should remain under direct American ownership." The only likely way that could happen is if the foreigners, who are mightily attracted to American farmland (which is cheap by their standards), decide to refrain from buying it. Or if strict laws are passed, as in Iowa.

The foreign movement into American banking is clearly mapped out by Fry. Foreign banking assets have risen from \$26.8 billion in 1972, the first year that the Federal Reserve bothered to keep statistics, to about \$150 billion this year. In 1978, when the Hong Kong and Shanghai Banking Corporation began trying to acquire control of the

Marine Midland Bank, the 13th largest bank in the United States, it became obvious that just about anything was for sale. The next thrust could be towards one of the superbanks: the Bank of America, Citibank, Chase Manhattan, Manufacturers Hanover, and Morgan Guaranty. But the word went out that this shouldn't be allowed to happen. G. William Miller, then the Federal Reserve Board chairman, announced that the board probably would oppose "unfriendly" takeovers of American banks. Paul A. Volcker, then president of the New York Federal Reserve Bank, followed up by telling the world that major acquisitions should be "required to pass a test of identifiable positive benefits."

Although Arab OPEC nations or their citizens have yet to acquire a major U.S. corporation, they have bought controlling interests in several banks and manufacturing companies. And they are also estimated to have anywhere from \$50 billion to \$90 billion invested in the United States, mostly in Treasury notes, stocks, bonds, and bank deposits. Kuwait alone admits to having \$20 billion invested here. Against those numbers, Fry makes the amazing statement, "...one must conclude that on an overall basis, OPEC investment in the United States has remained at a very modest level."

Despite the huge sums the Arabs have available for investment, the British, the French, the Dutch, the Germans, and the Canadians seem to stand out when headlines blare about take-overs of corporations like A&P and Grand Union. In fact, almost the whole outside world seems to have come to invest in America—because of a combination of our relative economic stability, the enormous size of

the market, and our openness to investment.

Fry, who is on the faculty of the State University of New York at Plattsburgh, is half-way enamored with the concept of an interdependent world built upon the bulwark of international investments. The United States, after all, has more invested abroad than foreigners have here, although the gap is narrowing with each passing year. Besides, there isn't a chance that foreign investment could be a threat to American society, according to Fry, because of all the laws that give the government the power to seize those investments in emergencies.

"In an increasingly interdependent world," Fry states, "the American public must not succumb to xenophobic impulses which might prompt them to demand that the American open door be slammed shut in the faces of overseas investors."

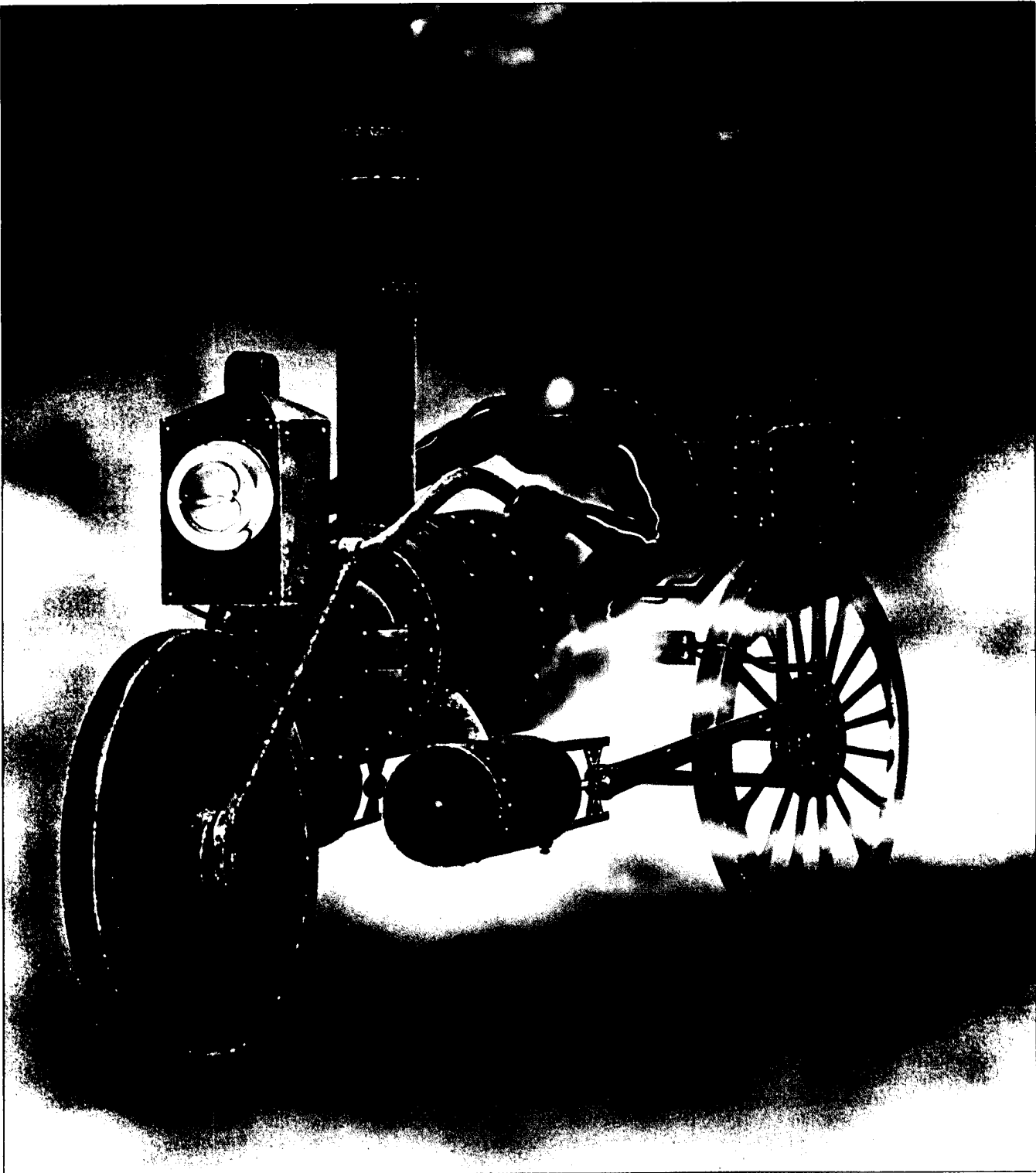
But after singing of the joys of interdependency and foreign investments, Fry draws conclusions that do not seem to follow from his previous statements: "Even though foreign investment activity does not presently imperil the U.S. interests, and the U.S. government does have measures at its disposal to cope with future contingencies, America's traditional open door policy must nevertheless be modified."

Fry's idea of a suitable modification does not call for excluding foreign investments, but for creating a federal agency to monitor those investments and to investigate complaints about technology drains and product "dumping"—although I am at a loss to understand what "dumping" of cut-rate products into the United States has to do with foreign investments.

I don't think Fry's proposal for a new federal agency goes far enough. Information on foreign investments is now gathered by the Treasury Department, the Securities and Exchange Commission, the Department of Agriculture, the Department of Commerce, and the Federal Reserve Board. What is missing is an agency capable of gathering all that information, analyzing it, and telling us what it means. That same agency should have the role—similar to the function of a military war game—of imagining worst-case scenarios and creating plans to deal with them. For example, what would be the impact of a takeover of General Motors, or a superbank such as Citibank? We don't know what it would mean to have a major segment of our economy dominated by foreigners, because it hasn't happened yet. But if the ambivalence of Fry's attitude remains the norm, I'm positive the way things are going, it will. ■

A LEADING ILLUSTRATOR IMAGINES
A FUTURE THAT JUST MIGHT BE.
BY WAYNE McLOUGHLIN

VISIONS



1988 MIT unveils its answer to the energy crisis—a solid iron steam-powered motorcycle weighing more than 3 tons. Trying to maneuver with one hand while shoveling coal with the other requires unusual driving skills, and riding it in the summer is extremely uncomfortable. To the surprise of few, the public rejects it.

—W. McL.

NEXT 113

NEXT & LAST

THE RISKS OF OUR TECHNOLOGICAL IGNORANCE

By Joseph F. Coates

Risks in our society are largely derived from technology—directly or indirectly. According to the book, *Technology and Social Shock*, by Ed Lawless of the Midwest Research Institute, a fairly straightforward tally found approximately 1,000 instances of technological gaffes, goofs, blunders, and failures since World War II that were important enough to have made the headlines of the national press. What that amounts to is two significant technological blunders per month—month in, month out—for 35 years. The minimum I can conclude is that there is something amiss in our social management of technology.

Risk management implies conflict, and the government has a great deal of difficulty in dealing with conflict. It also does not have expertise or experience in looking for the side-effects of new technology. Envisioning side-effects requires subtle thinking—something bureaucrats are not noted for. In fact, side-effects are the single most difficult thing for bureaucrats to foresee. Yet, virtually every major disaster we have had has resulted from unforeseen side-effects.

New technology has historically been evaluated by three criteria:

- Can it be done? Is it possible to span this, build that, design the other?
- Will it sell? Or, more recently, will the government pay for it?
- Is it safe to use? Will it pass a vague, "commonsense" standard?

Yet the problems our society faces today rarely result from the failure of those criteria because our problems are side-effect problems. The aluminum cans in Yosemite Park, the thalidomide birth defects, the contamination of a whole year's crop of cranberries by pesticides, air pollution from auto exhaust, toxic seepage from chemical dumps—all are

Joseph F. Coates, formerly a senior associate at the Congressional Office of Technological Assessment, is president of J.F. Coates, Inc., a policy research organization.



Walter Gurneo

side-effect problems. There is a mismatch between traditional technoeconomic planning criteria and what ultimately turns out to be important.

At the same time, there has never been a greater amount of ignorance about the human environment than there is now among middle-class Americans. Ask the ordinary citizen a series of simple questions about our world: What is nylon? Where is the TV picture when it is not in your living room? Where does your sewage go when you flush the toilet? Why do fluorescent lights flicker? See what kinds of answers you get.

Obviously, every new technology generates even greater ignorance. Yet that basic observation is rarely integrated into our planning.

Let me give two examples. First, a minor one: There are about 16,000 women in the United States between 16 and 40 who scuba-dive. It was discovered a few months ago that fetuses are more susceptible to the bends than their mothers. One study found that as a result five of 24 pregnant scuba-divers bore deformed babies. An interesting side-effect problem, isn't it?

For a major example, consider nuclear power, which is a clear case of new technological knowledge generating new ignorance. Harold Green is a George Washington University law professor who has been

in the nuclear game for 25 years. He has pointed out repeatedly that the Atomic Energy Commission and its descendants have had the dual responsibility of regulating atomic energy and campaigning for it, too. Being basically technologically oriented, the commissioners naturally framed the regulations to facilitate the development of atomic energy. Thus, atomic energy did not evolve the way other technologies have evolved—small scale, piecemeal, trial and error. It developed in a way that was almost the antithesis of every successful technology that we have in the United States. One result was the accident at Three Mile Island.

A major reason we have been inattentive to such risks is that our middle-class, in their ignorance of technology, has delegated the task of overseeing it too exclusively to experts. Complexity demands expertise. The expert, of course, must be housed somewhere. That place is called a bureaucracy. We know a number of melancholy and alarming things about bureaucracies: They are conservative; they do not exist to serve the public interest but primarily to preserve themselves. They lie and they shirk responsibility.

How can bureaucracy change its ways? It must begin by recognizing that, to head off undesirable side-effects, a good tactic is prudence. Instead of proceeding full speed with any new technology, let's wait a bit, to mull over any distant warnings. Let's approach risk in an incremental, experimental, trial-and-error way, and thus improve, reinvent, or redesign processes and devices.

To succeed at risk management, the government bureaucracy will need unbiased feedback that is direct, immediate, and continuing on both the effects of new technology and the effects of government action.

The government will also need flexibility. A future that is always changing, a complex future, demands that we be flexible in our responses.

Finally, we need forecasting—an attempt to see in advance the unexpected, undesirable consequences of our current actions—the side-effects, or we shall be in for more and more technological gaffes, goofs, and blunders. ■



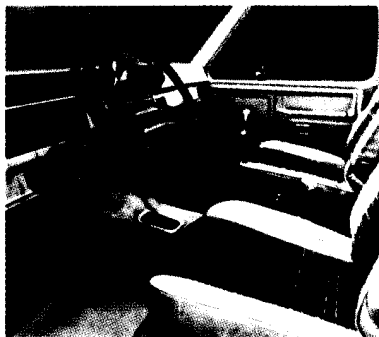
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