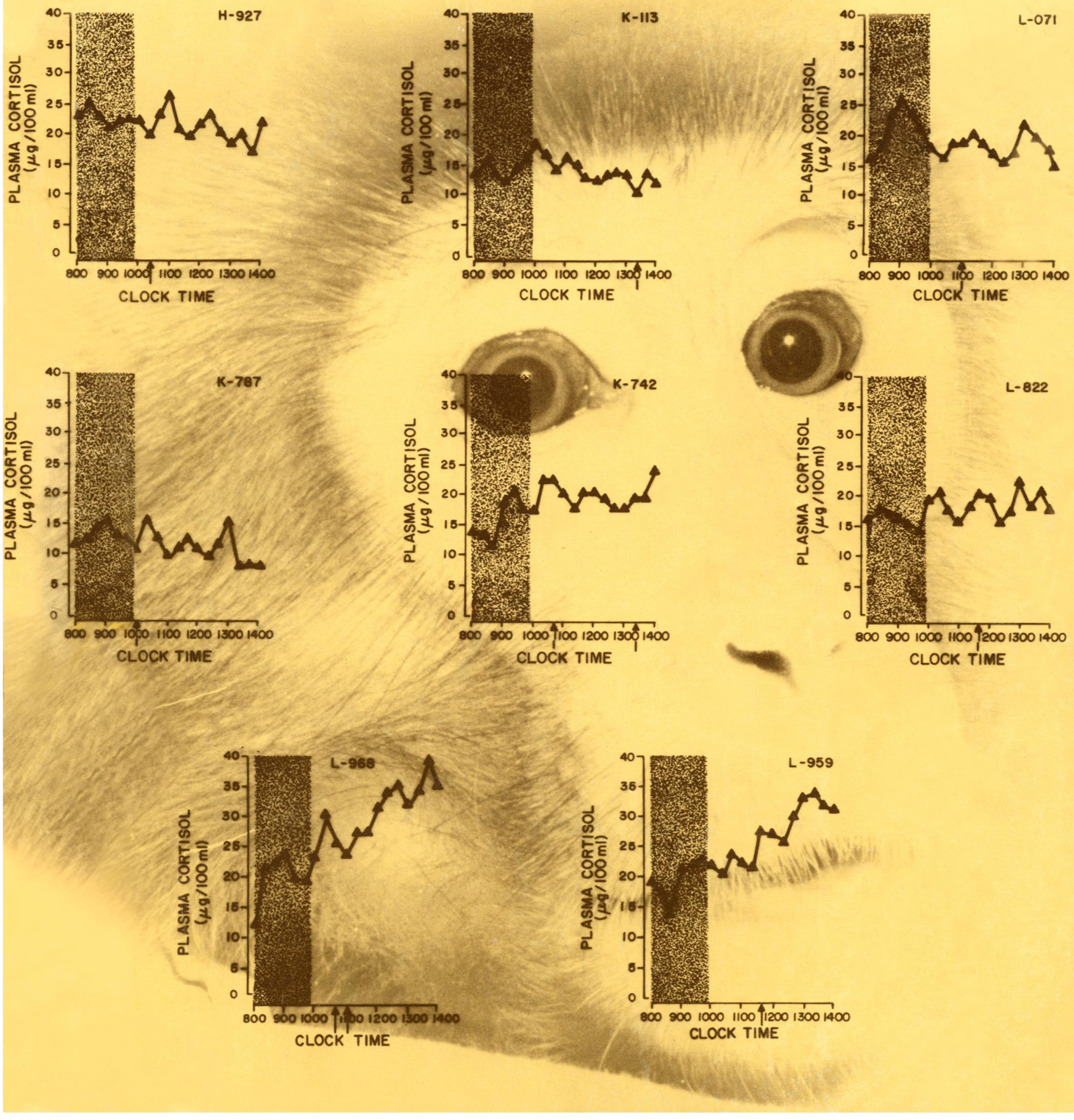
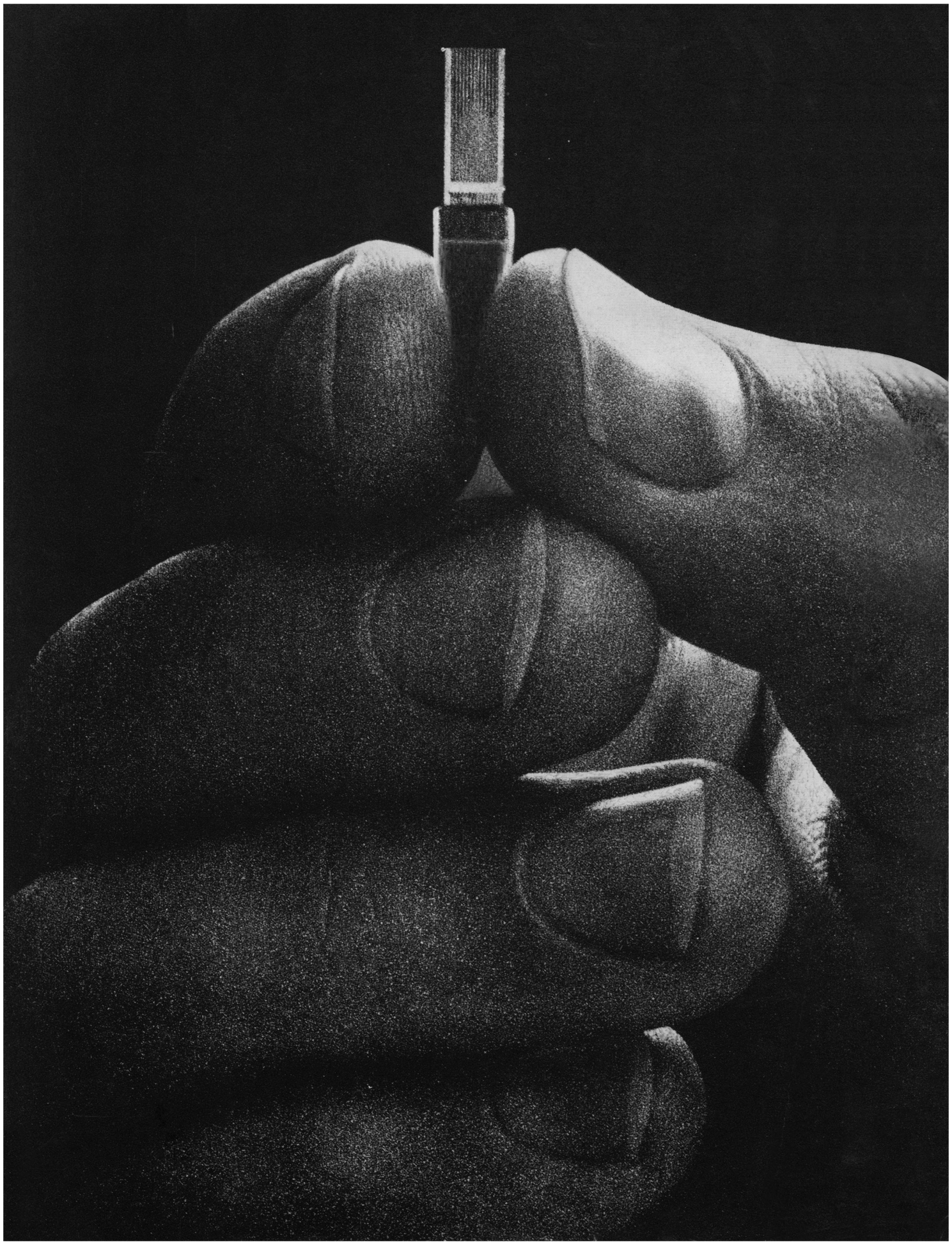
SCIENCE

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

7 October 1977, Volume 198, No. 4312





The Chicago Connection.

With it, the phone system of tomorrow is in Chicago today.

A while ago, we told you lightwave communications was just around the corner. Today, it's in the streets of Chicago.

For the first time, the human voice, business data and even video signals are being carried by lightwaves traveling over hair-thin glass fibers. Instead of electric current traveling over copper wire.

But without that little link you see on the opposite page, lightwave communications for such a wide range of services might still be an experiment in a lab. And without Western Electric technology, the link might still be a design on a blueprint.

The link is an outgrowth of an idea from the people at Bell Labs. While they were putting the major components of the lightwave system together, they had to find a way to splice the glass fibers and get the light across the splice.

A Simple Idea

The idea they came up with was deceptively simple. A coupling device made up of tiny grooved chips, smaller than the tip of your finger, that would guide the ends of the hair-thin fibers and butt them up in perfect alignment.

There was only one hitch. Making one chip was easy. But there was no machinery that could mass produce all the identical chips that would be needed for a lightwave system like the one in Chicago.

Making Ideas Reality

That's where Western Electric comes in. Turning ideas into technological innovations is nothing new at Western Electric.

Over the years, Western Electric has piled up an impressive list of innovations that have become manufacturing standards.

It was the first company in the world to manufacture the transistor.

It was the first to put the laser to work as a useful production tool.

And it is the company that went beyond conventional machining techniques to make the chips for Chicago's lightwave system.

Each chip is pure silicon crystal. Its internal structure (a criss-cross arrangement of intersecting planes) provides a built-in blueprint for regularly spaced grooves. And because the crystal's diagonal planes etch faster than its perpendicular planes, uniform grooves can be chemically cut into the chip.

By combining the science of chemistry and the art of lithography, Western Electric's Engineering Research Center developed a way to etch 12 ultra-precise, perfectly shaped, identical V-grooves on each chip. With each groove no wider than a hair and separated only by a hair's breadth from its neighbors.

And, more importantly, they were able to reproduce these chips so that each one was a perfect double of the other.

Teamwork is the Key

The telecommunications revolution beginning in Chicago is another good example of how Western Electric and Bell Labs help put new technology into practical use for the Bell telephone companies, quickly and economically.

Their close relationship is an important reason why your telephone system is the most efficient and reliable communications system in the world. And it's a basic reason why innovations in technology are a common occurrence in the Bell System.

Western Electric

7 October 1977

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SCIENCE

SCIENCE is published weekly, except the last week in December, but with an extra issue on the third Tuesday in September, by the American Association for the Advancement of Science, 1515 Massachusetts Ave., NW, Washington, D.C. 20005. Now combined with **The Scientific Monthly**®. Second-class postage paid at Washington, D.C., and additional entry. Member rates on request. Annual subscriptions $60; foreign postage: Canada $10; other surface $13; air-surface via Amsterdam $30. Single copies $2 (back issues $3) except **Guide to Scientific Instruments** $6. School year subscriptions: 9 months $45; 10 months $50. Provide 6 weeks' notice for change of address, giving new and old addresses and postal codes. Send a recent address label, including your 7-digit account number. **Postmaster: Send Form 3579 to *Science*, 1515 Massachusetts Avenue, NW, Washington, D.C. 20005.** ***Science*** is indexed in the **Reader's Guide to Periodical Literature.**

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

COVER

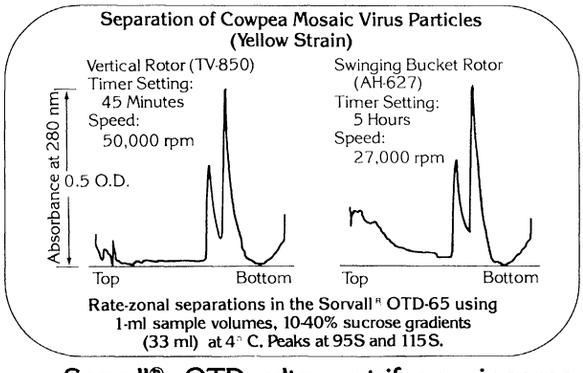
Individual cortisol patterns of eight chronically maintained adult rhesus monkeys; the fast-frequency ultradian rhythm is obvious to the eye. When time-series analysis was applied to these fluctuations, they were found to be synchronized among monkeys, to have a predominant periodicity of 85 to 90 minutes, and to be relatively independent of ACTH concentrations. See page 56. [Benjamin Natelson and Division of Medical Audio Visual Services, Walter Reed Army Institute of Research, Washington, D.C.].

Density gradient spin times can Sorvall® OTD ultracentrifuges

High resolution and time savings result when the combined advantages of a Sorvall® OTD ultracentrifuge and a Sorvall® vertical rotor are used for density gradient separations.

These patented rotors* hold the tube in a fixed vertical position while tube contents are reoriented 90°. The sedimentation path length is thus reduced from the length to the width of the tube, resulting in shorter spin times. Three vertical rotors are available to suit a wide range of capacity requirements.

Typical results are shown in the rate zonal separation of cowpea mosaic virus particles using 1 ml samples. Use of a Sorvall® 8-place vertical rotor instead of a 6-place swinging bucket rotor of comparable tube volume reduced spin time more than 80% while maintaining resolution. These rotors are equally suitable for isopycnic density gradient separations.



Rate-zonal separations in the Sorvall® OTD-65 using 1-ml sample volumes, 10-40% sucrose gradients (33 ml) at 4° C. Peaks at 95S and 115S.

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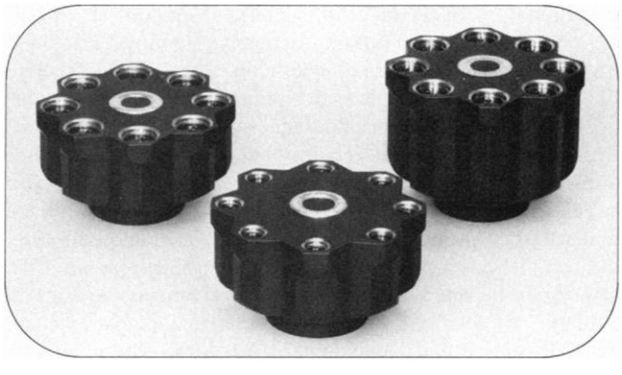
be reduced more than 80% by with new vertical rotors.

The oil turbine drive also eliminates the maintenance and replacement of gears, belts and brushes. The many other features of OTD centrifuges include trouble-free self-contained cooling system; precise, wide-range temperature control; and automatic and manual vacuum pumping system.

For full information on Sorvall® OTD ultracentrifuges and vertical rotors, write to DuPont Instruments, Biomedical Division, Room 36005, Wilmington, DE 19898.



*U.S. Patent 3,998,383

With Sorvall® Centrifuges the spin times are changing.

DuPont Instruments

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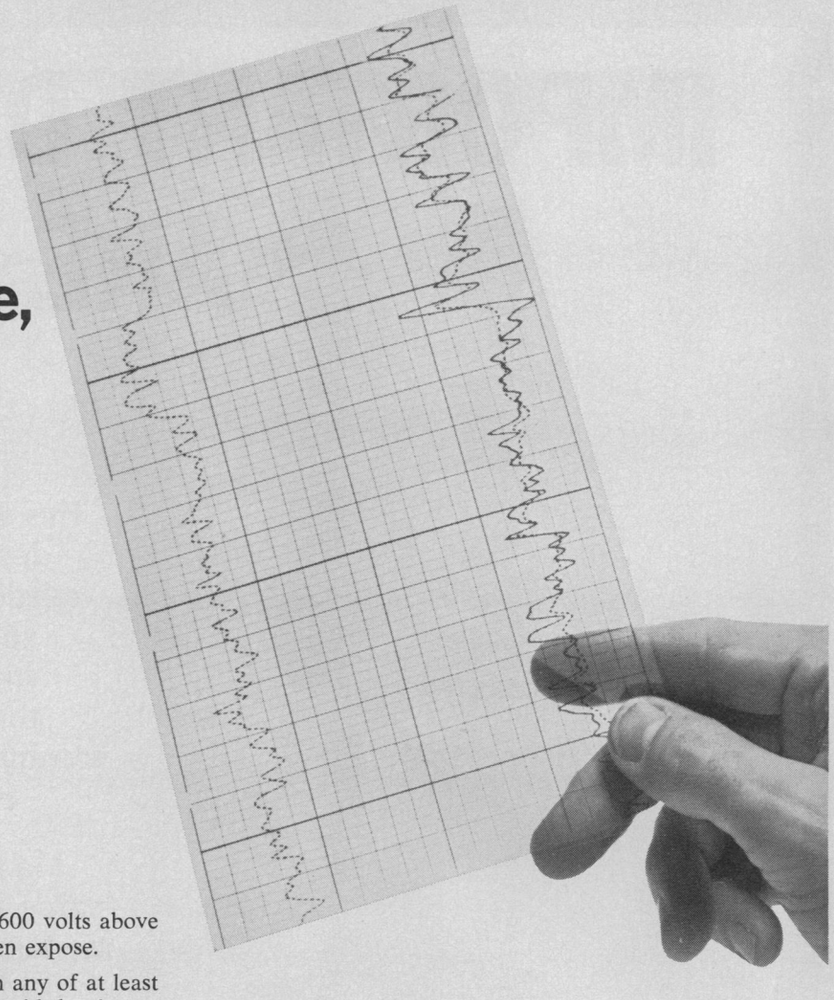
Handle this new film in the light.

To add more image, make it light-sensitive again with a corona discharge.



Just put the upper photoconductive surface 600 volts above the internal transparent conductive layer, then expose.

Develop in a second or two by a dip through any of at least three makes of commercial electrographic liquid developers that carry positive-charging toner particles. Negative toners can also be used.

Blow dry and heat the image by hot air or otherwise to fuse the carbon toner particles in place. They'll stay put for a long, long time.

Don't worry about keeping it cool before use or in later storage. It probably will never run out of date. (But don't leave it lying in the sun just before charging and exposing.)

For tone rendition instead of just line reproduction, apply the right kind of electrical bias during development. Tune reproduction characteristics to your needs by varying the relationship between charging voltage and bias.

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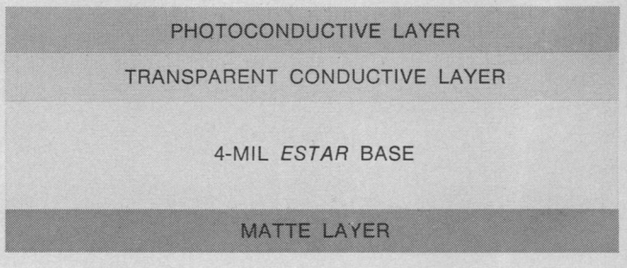
The limits of resolution depend mostly on the nature of the developer-toner particles. We've seen well over 300 line pairs/mm.

The quite transparent active layer is organic instead of inorganic as in hitherto most familiar xerography. (Nothing to do with gardening or chickens.)

Spectral sensitivity of the immediately available product matches the output of the P-47 phosphor in CRTs. No known impediments to sensitize anywhere else in the visible spectrum, as needed.

Speed currently comparable to that of silver-based non-camera films. Reasonable to expect higher speeds before long. This is a whole new ball game, being played by people who have learned a thing or two over the decades about clean, uniform coating of light-sensing layers on a massive scale.

Priced about the same as conventional silver halide film.



The metal spools on which we provide the film are in electrical contact with the transparent conductive layer. The equipment you will design and manufacture to use this film may have a trickier way to control the electrical state of this layer.

Who?

You, of course. The purpose of this ad is to make you take the first step toward involving your organization in an exploration of this technique. That first step consists of getting in touch with Joe Pisconski at 716-724-4582. Let him know your outfit wants to explore the possibilities. Mailing address: Graphics Markets Division, Kodak, Rochester, N.Y. 14650.

Kodak

7 October 1977, Volume 198, Number 4312 **SCIENCE**

The Leadership of the Geological Survey

In its actions with respect to science, technology, and medicine, the Carter Administration has compiled a mixed record. During the transition period last December, actions of some of the Carter transition team were amateurish. At that time, a number of leading scientists received telephone calls asking them to identify possible advisers about science-related positions in the government. Some of the callers obviously knew little about the scientific community. When one of the team was told to consider the name of Jerome Wiesner, the caller asked "How do you spell it and where is he at?"

Within days of the Inauguration in January, there were peremptory firings of heads of agencies before replacements were in sight. In the filling of vacancies, the physical sciences did not fare very well. For example, Robert White, an excellent scientist and administrator of the National Oceanic and Atmospheric Administration, who resigned of his own volition, has been replaced by a lawyer. The post of director of the National Bureau of Standards, long vacant, has still not been filled.

Lately, the performance of the Administration has improved markedly and excellent appointments have been announced. However, the recent dismissal of Vincent McKelvey, director of the U.S. Geological Survey, was disquieting for it seemed a step toward politicizing the Geological Survey.

During nearly 100 years the Survey has maintained a tradition of excellence recognized throughout the world. It is one of the few federal agencies whose activities represent an investment for the future. Throughout its history, the Survey has been directed by distinguished geologists. In turn, the heads of the operating divisions have been scientists broadly recognized for their competence. The Survey has been a research organization. It has been customary for professional staff to engage in fieldwork at some time during the year. Survey geologists have endured hardships in the process of studying the rocks on virtually every square mile of this country as well as on much of the rest of the earth. They have a degree of contact with the world outside Washington that is unusual in a federal agency.

A report on the Geological Survey prepared for Senator Jackson by Allen F. Agnew has provided a historical background and listed some of many major programs and goals.* In the report Dr. McKelvey summarized what he considered to be the mission of his organization. "The Survey's principal mission is to provide the knowledge about the earth that can serve as a basis for the identification and evaluation of resource and land use alternatives and for policy- and decision-making on the part of the Administration, the Congress, and the general public. Although the Survey's principal mission is to develop basic information on the earth and its resources, its responsibilities for the classification of Federal lands and the supervision of lease development are no less important. Essential in these missions is to insure that the nation's public resources are identified, conserved, and developed wisely, that the public receives its fair share value of leased resources, and that mineral exploration and production do minimum damage to other resource or environmental values. The Survey uses its scientific and technical resources to help achieve these objectives."

The Geological Survey has traditions of rigor and excellence and an uncommon respect for facts and truth. The nation would lose a great institution if an inappropriate choice of the new director were made. A committee of the National Academy of Sciences has nominated a panel of first-class scientists who are qualified to serve. If the name of one of these is submitted to the Senate, damage will be limited. Joan Davenport, Assistant Secretary for Energy and Minerals at the Department of the Interior has stated that a distinguished scientist will be chosen. Her commitment to foster this action is reassuring.—PHILIP H. ABELSON

*A. F. Agnew, *The U.S. Geological Survey* (Committee Print, Senate Committee on Interior and Insular Affairs, 94th Congress, 1st Session, December 1975).

The Computer for the Professional

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PolyMorphic Systems

(Continued from page 44)

ciety's annual forum, "Research for Survival," held in Toronto in May. Founded in 1970, SCITEC seeks to foster interdisciplinary communication among Canadian scientists and to bring science and technology to bear on problems of development, public policy, and public understanding. Members include individuals as well as more than 60 professional societies and an active contingent in both houses of Parliament.

CONICIT (Costa Rican National Council of Scientific and Technological Research) also was admitted to the IA as an affiliated organization during the IA annual meeting.

The two organizations were formally accepted into the federation at the inaugural of the 4-day symposium on marine sciences, one of an ongoing series sponsored by the IA. The July symposium, which was cosponsored by IA and CONICIT, brought together 60 to 70 scientists from a dozen countries in the Americas, as well as representatives from Japan. Arranged by Manuel Murillo, vice president of the University of Costa Rica, and Roger Revelle of the University of California at San Diego, the conference addressed such topics as aquaculture; ecology and environmental protection; education; training and technology transfer in marine sciences; and cooperative research in the marine field. The program included some two dozen presentations during regular panels and a similar number of contributed papers. The entire proceedings will be published and some of the papers will appear in *Interciencia*, the Interciencia Association's trilingual journal.

In the past, the IA has sponsored symposia in cooperation with AAAS, the Brazilian Society for the Progress of Science, and the Venezuelan Association for the Advancement of Science. Its symposium program, along with publication of the journal *Interciencia*, constitutes a primary activity of the Association, which was founded in 1974 by AAAS and representatives of scientific societies of other American nations. In addition to Canada and Costa Rica, countries represented in the federation include Argentina, Brazil, Colombia, Mexico, the United States, and Venezuela. President of IA is Oscar Sala of the Brazilian Society; vice president is Leonard M. Rieser of AAAS; and secretary-treasurer is Salvatore Pluchino of the Venezuelan Association. Editor of the journal *Interciencia* is Marcel Roche of Venezuela.