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January 7, 1956

VOL. 69, NO. 1 PAGES 1-16

SCIENCE NEWS LETTER



THE WEEKLY SUMMARY OF CURRENT SCIENCE

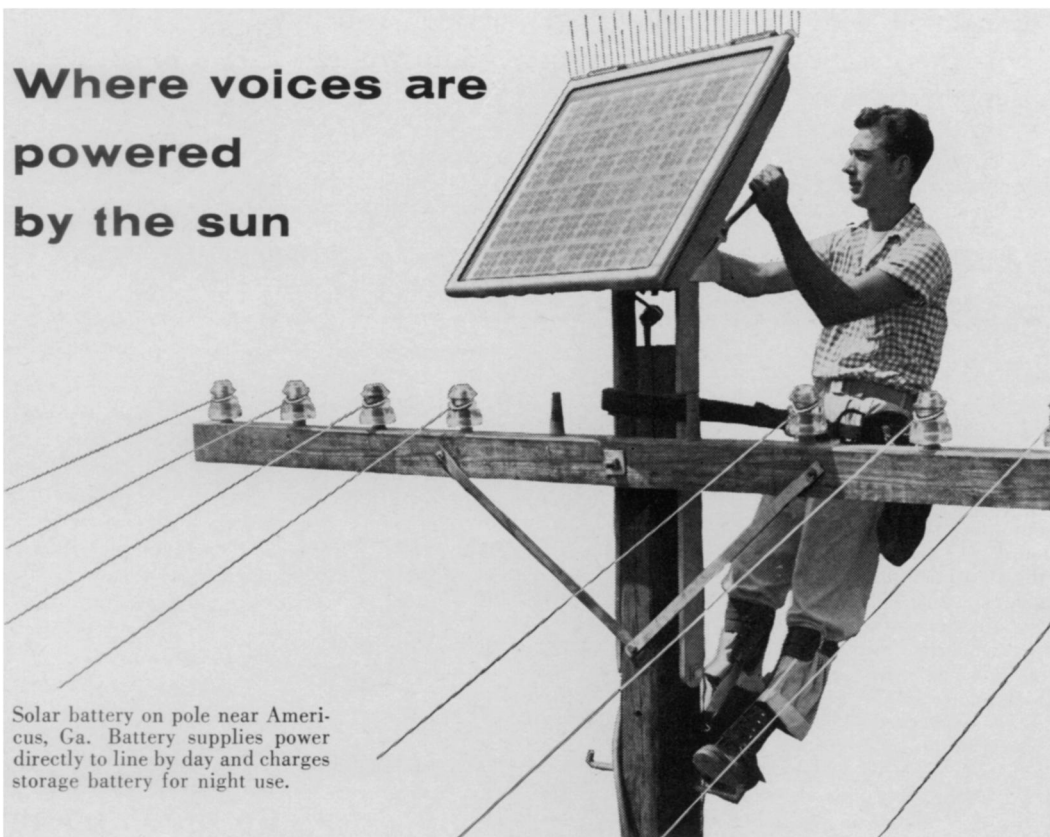


Island Universe

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A SCIENCE SERVICE PUBLICATION

**Where voices are
powered
by the sun**

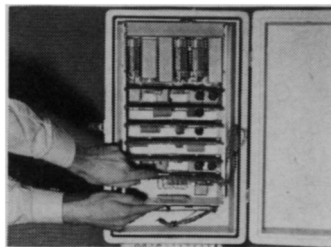


Solar battery on pole near Americus, Ga. Battery supplies power directly to line by day and charges storage battery for night use.

A new kind of telephone system developed by Bell Telephone Laboratories for rural areas is being operated experimentally by electric current derived from sunlight. Electric current is generated as sunlight falls on the Bell Solar Battery, which a lineman is seen adjusting.

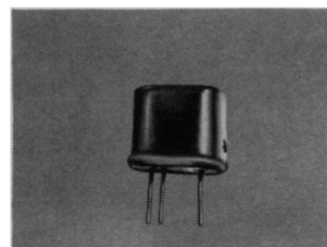
The exciting achievement is made possible by two Laboratories inventions—the solar battery and the transistor. The new system uses transistors to the complete exclusion of electron tubes. Transistors require little power and this power can be easily supplied by the solar battery.

Compact and economical, the system can carry several voices simultaneously without interference. It has proved its ruggedness by standing up to heat, cold, rain and lightning.



In sending and receiving terminals, transistors are used as oscillators, amplifiers and regulators, and for signaling.

It promises more and improved telephone service for rural areas and it typifies the Laboratories' continuing efforts to make American telephony ever better.



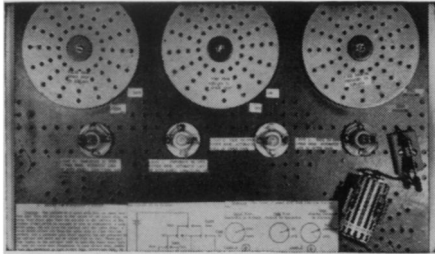
One of the transistors (actual size) used in the new system. The project called for new ideas, equipment, tools and methods.

BELL TELEPHONE LABORATORIES



Improving America's telephone service provides careers for creative men in scientific and technical fields.

Why have hundreds of schools bought GENIAC, The Electric Brain Construction Kit?



This is the control panel of GENIAC set up to solve a problem in symbolic logic analysis.

We think it's because GENIAC is the only kit and text combination that presents the basic ideas of cybernetics, boolean algebra, symbolic logic and computer circuitry so simply that a twelve year old can construct what will still fascinate advanced students.

The partial list of our institutional purchasers below indicates a cross section of our customers. GENIAC is not only an excellent classroom demonstrator but it provides hours of fun abuilding. As such it makes a perfect Christmas present for the science minded teen-ager. As a father-son project it can't be beaten.

GENIAC is sold to all customers on a one week return guarantee. You may actually use it in that time, returning it as is if you decide not to keep it.

Order yours now only \$19.95

Some of the 33 GENIACS you can build from the completely detailed instruction manual are:

- LOGIC MACHINES: Comparing; Reasoning; Syllogism Machine; Intelligence Tester.
- GAME PLAYING MACHINES: Tic-Tac-Toe; Nim (Think you can beat the machine?).
- ARITHMETICAL MACHINES (Binary and Decimal): Adder; Subtractor; Multiplier; Divider; Arithmetical Carrying.
- CODE MACHINES: Secret Coder; Secret Decoder; Combination Locks.
- SIMPLE MACHINES: Burglar Alarm; Automatic Oil Furnace Circuit.
- PUZZLE SOLVERS: The Space Ship Airlock; The Fox, the Hen, the Hired Man and the Corn; The Uranium Shipment and the Space Pirates.
- ACTUARIAL: Douglas MacDonald's Will.

GENIAC parts are specially manufactured to high tolerance; they include a special six deck switch of unique design and over 400 components plus a book "GENIACS SIMPLE ELECTRICAL BRAIN MACHINES AND HOW TO MAKE THEM." GENIAC is a remarkable buy for

only \$19.95

Kit and instructions are returnable for full refund in seven days. This is a perfect father and son project; your whole family and your friends will enjoy the finished machines. You can design new computers from the adaptable parts.

----- MAIL THIS COUPON -----

SCIENCE KITS, Dept. 5L-16, Oliver Garfield Co., 126 Lexington Ave., New York 3, N. Y.
Please send me:

- 1 GENIAC Electric Brain Construction Kit and Manual.
- \$19.95 (East of Mississippi)
- \$20.95 (Elsewhere in United States)
- \$21.95 (Outside the United States)

Returnable in seven days for full refund if not satisfied. I enclose \$.....in full payment.

My name and address are attached.

SOME FIRMS AND INSTITUTIONS THAT HAVE ORDERED GENIAC:

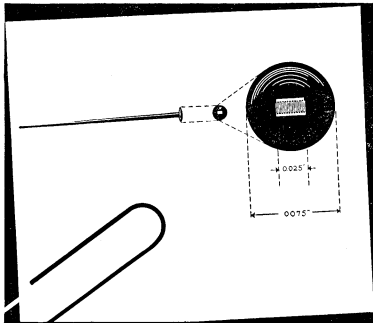
- Allis-Chalmers
- Remington-Rand
- International Business Machines
- Wheeldex Mfg. Co.
- Manuel Missionary College
- Walter V. Clarke Associates
- Barnard College
- Westinghouse Electric
- Phillips Laboratories
- General Insurance Co. of America
- Lafayette Radio
- Rohr Aircraft Co.
- Southwest Missouri State College
- Fibreglass Corp.
- Stamford Research Institute
- The Heath Co.
- American Management Assoc.
- De Paul University Hydro Electric Tower
- Adams State Teachers College
- Abercrombie and Fitch
- Kleinschmidt Laboratories
- Kansas State Teachers College
- Albert Einstein Medical College
- Naval Research Laboratories
- Board of Education, Tecumseh, Nebraska
- Marshfield Public Schools
- Los Angeles Public Schools
- Jefferson Union High School
- Oklahoma A&M
- Kansas City University
- Duke University
- Coral Gables Senior High School
- Courtland Jr. High School
- Bell Telephone Laboratories
- Lovell Public Schools
- Clearwater High School
- St. John's Seminary
- Orange County Community College
- Morningside College
- New Hampshire Public School
- Kentucky Wesleyan College
- University of Ottawa

... and hundreds of other individuals and institutions

Kodak reports to laboratories on:

how to carve a fancy design on a microscopic bit of semi-conductor . . . riding the new speed vs. sharpness curve

Here's how



Here is how to carve a microscopic bit of a semi-conductor like germanium or silicon into as intricate a structure as you need to beat a complex vacuum tube at its own game:

Draw up the pattern nice and big with India ink. Photograph it down to a stencil of desired size with a good lens (like a *Kodak Process Ektar Lens*) on a virtually grainless, all-or-none material (like *Kodalith Ortho Film*, or for really tiny work, a *Kodak High Resolution Plate*).

Saw out a blank of the semi-conductor crystal. Lap and polish it, finishing up with 0.5μ grid-size diamond paste. Etch off the remaining few microns of work-strained layer. Wash in trichloroethylene, rinse in distilled water, and dry.

Avoiding daylight or ultraviolet, filter a little *Kodak Photo Resist*. With it, coat the polished semi-conductor surface thinly. Dry under a heat lamp. Hold the stencil tight against the semi-conductor by vacuum. Expose to an arc lamp. Immerse in *Kodak Photo Resist Developer*. Take out. Put on a few drops of *Kodak Photo Resist Dye* to make the developed image visible. Hold under a stream of tepid distilled water to wash away the resist where the dark portions of the stencil shielded it. Pull up the window shades. Blot off the surface moisture. Inspect the pattern with a microscope. If OK, bake for a few minutes to harden the resist. Let an

etchant suitable to the specific semi-conductor remove it to any required depth in those areas where there is no resist left to resist.

Over the whole, deposit a metal electrically, chemically, or by evaporation. Immerse in *2-Ethoxyethyl Acetate** for 10 minutes and gently swab. This solvent, undeterred by the overlying metal film, removes the remaining resist.

There's your little triumph in applied solid state physics, complete with electrodes.

This is basically Bell Telephone Laboratories' idea, not ours. All we did was to suggest Kodak Photo Resist. Apparently it was a good suggestion. Anybody else who wants any suggestions about the Kodak products involved can write Eastman Kodak Company, Graphic Reproduction Division, Rochester 4, N. Y.

Enlarging the breakthrough

Looked back at now, the film emulsion-making practices of, say 1953, seem unsophisticated. We shall have to let the remark stand at that. The fact is that there has been an abrupt rise in a quasi-quantitative quantity, the product of film speed and sharpness.

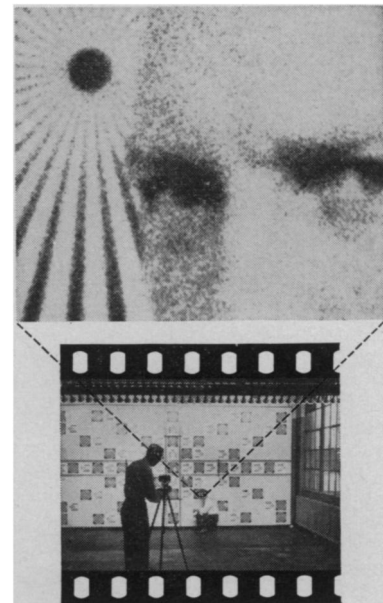
About measuring speed there is a lot to be said, but we won't say it here, except that the *Kodak Tri-X Film* which we introduced a year or so ago has significantly expanded the scope of photography.

Sharpness, a subjective impression, has now likewise had a metric imposed on it. There is a mathematical statement—termed acutance—of the density variation across the photographic image of a knife edge. It is quite different from resolving power, a quantity related to the smallest repetitive detail distinguishably reproducible, whether the detail looks sharp or not.

Riding the new speed vs. sharpness curve, we here announce reac-

*Available as Eastman Organic Chemical No. P2378 at \$2.05 for 1 kg. from our division, Distillation Products Industries, Rochester 3, N. Y.

tivation of the name *Kodak Panatomic-X Film* to apply now to our sharpest roll film, 35mm and other sizes, for general photography. Its Exposure Indexes are 25 for daylight and 20 for tungsten. Its emulsion is less than half as thick as usual in negative film. This shortening of the path along which light can scatter on its way down is part of the reason for the greater sharpness, but only part. The thinness also speeds processing. As for resolving power, witness the following demonstration, as filtered through the press that printed this page:



Kodak Panatomic-X is an extreme, as is *Kodak Tri-X*. For those who have been getting along just fine with the speed of *Kodak Super-XX*, but want the sharpness benefit of the 1954 breakthrough, we recommend a new 35mm and 70mm film we are calling by the old name *Kodak Plus-X*. The noble old name *Super-XX* is being retired, except for sheet and aerial film.

Already both of these new films are among the most widely distributed manufactured products in the United States.

Price quoted is subject to change without notice.

This is one of a series of reports on the many products and services with which the Eastman Kodak Company and its divisions are . . . serving laboratories everywhere

Kodak
TRADE-MARK