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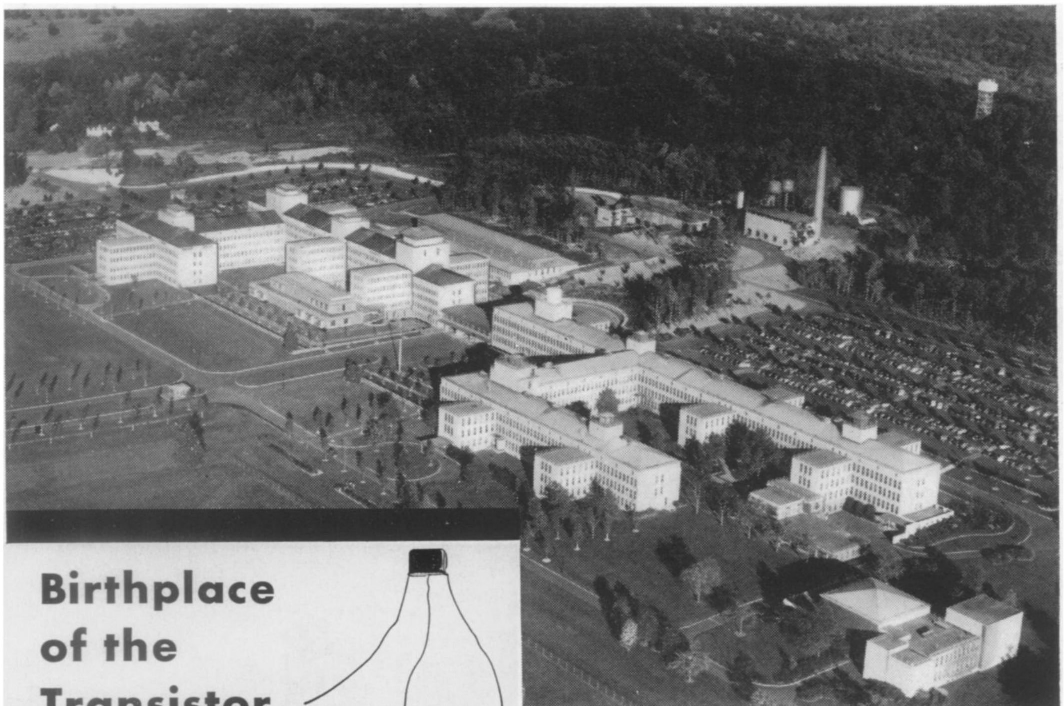
SCIENCE NEWS LETTER ®

THE WEEKLY SUMMARY OF CURRENT SCIENCE

Tree-Ring Dated

See Page 10

A SCIENCE SERVICE PUBLICATION



Birthplace of the Transistor

Bell Telephone Laboratories at Murray Hill, N. J. Other laboratories are in New York City and at Whippany and Holmdel, N. J.

The ***Transistor,*** that revolutionary new electronics device, is a product of *telephone* research. It was conceived, invented and developed at Bell Telephone Laboratories by men in search of ways to improve telephone service. It was announced just five years ago.

The ***Transistor*** can do most of the things that vacuum tubes can do—and others, too—but it is not a vacuum tube. It works on entirely new physical principles. Rugged, simple and tiny, the Transistor uses incredibly small amounts of power—and then only when actually operating.

Transistors promise smaller and cheaper electronics equipment and the spread of electronics where other equipment has not been able to do the job as economically. They are already at work in the Bell System, generating the signals that carry dialed numbers between cities, and selecting the best route for calls through complex switching systems. Engineers see many other possibilities: for example, as voice amplifiers in telephone sets to aid the hard of hearing, and as switches.

Recognizing the tremendous possibilities of the ***Transistor*** in every phase of the electronics industry, the Bell System has made the invention available to 40 other companies. Thus, again, basic research to improve telephony contributes importantly to many other fields of technology as well.

TRANSISTOR SUMMARY

Basically, a ***Transistor*** is a tiny wafer of germanium with three electrodes, over-all about the size of a coffee bean.

It can amplify signals 100,000 times on much less power than a pocket flashlight requires. This opens the door to its use in smaller telephone exchanges where vacuum tube equipment would be too costly to operate.

Unlike a vacuum tube, the ***Transistor*** has no vacuum and no filament to keep hot. It operates instantly, without "warm-up" delay. The Transistor can also be used as an electric eye and to count electrical pulses.

BELL TELEPHONE LABORATORIES

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

What General Electric people are saying . . .

L. T. RADER

Dr. Rader is Manager—Electronic and Specialty Control Planning Study in the Control Department

". . . Regardless of the principle chosen, whether it be a new approach or a modification of an old one, the skill of the designer in designing for inexpensive and easy manufacture often is the difference between success and failure.

Men with a good knowledge of manufacturing methods are invaluable in determining if punch-press stampings can be used instead of expensive screw-machine products, or if it is better to use punched phenolics instead of molded parts. They develop ingenious methods of fastening components together, break a unit down into subassemblies to give flexibility, make certain that standard parts are used where possible, and in general, make certain that over-all product costs are maintained at competitive levels.

Because designers have so many diverse problems to solve, they are always willing to try new materials that may offer design advantages. It is far easier—and less risky—to make ten samples of a pressure switch out of a new material and have them field tested, than it is to try the same material on a large and expensive machine.

Because of this, we find that insulating materials such as the silicones, permafil, nylon, and teflon are applied in small devices almost immediately upon discovery. Special magnetic materials like oriented silicon and alnico have also found immediate application. Plastics of every formulation and property and special metals like stainless steel, curie metal, beryllium copper, and Z-nickel have been used immediately upon development. In the area of current conduction and interruption, special alloys made of combinations of practically all known metals are used extensively for their special properties. Because of its nature and form, small apparatus design eagerly accepts new materials almost immediately upon their release to industry and finds useful work for them to perform.

G. E. Review

C. G. SUITS

Dr. Suits, a Vice President, is Director of the Research Laboratory

". . . Some calculations have been carried out in our laboratory recently, to determine in detail the quantitative effect of some typical lattice defects on tensile strength of metals. For the case of alpha brass they show that the magnitudes involved are sufficiently large to account fully for the experimentally observed tensile strength of the actual crystalline material. This recent work has, for the first time, made possible a quantitative understanding of this most important property of crystals. It would be difficult to overestimate the value of this work for it seems certain that great progress may be expected from a full development of current studies of crystal defects.

The study of the growth of crystals has provided a particularly good opportunity to observe the role of defects and dislocations. When crystals are grown from solution it is observed that the growth rate may vary widely from one crystal to another of the same chemical composition, and this difference can be explained by the relative abundance and character of the dislocations present. A particularly important defect in this case is the lattice displacement known as an edge dislocation. This defect arises from the displacement of many layers of atoms relative to their neighbors, on a line perpendicular to a plane of the lattice. Consider the function of this edge dislocation in a crystal experiencing growth from a supersaturated solution. Atoms from the solution migrate to the crystal where they are held by surface forces, which however are particularly weak on an atomically smooth plane of a perfect crystal. In the neighborhood of the edge dislocation, by virtue of the geometry, these forces are very much greater, with the result that practically all of the crystal growth phenomena takes place at these points. The abundance or scarcity of such defects can thus account for a vastly different rate of crystal growth in different crystals of identical chemical composition, the most perfect crystals experiencing the slowest growth.

at The American Philosophical Society
Philadelphia, Pa.

R. E. FALCONER

Mr. Falconer is a meteorologist at the General Electric Research Laboratory

". . . It seems to the author that there may be an electrical effect associated with the jet stream which can be readily detected by as simple a device as a radioactive collector and a suitable sensitive current indicator or recorder.

However, before drawing definite conclusions, observations at other locations around the country should be made to determine more definitely whether the electrical effects observed at Schenectady apply generally. It is suggested that a network of such instruments might be useful for continuously checking on the location of jet streams. Such information might be useful in detecting the possibilities of tornadoes, thunderstorms, turbulence, and general precipitation since all appear to be related to the effects of the jet stream.

The author has now found that a General Electric photoelectric recorder having a sensitivity of 0.266 microamperes shunted to read 0.50 microamperes full scale is about the right sensitivity to use. Such a recorder was recently installed and this eliminates the need for an electrometer which tends to drift and cause misleading results unless a frequent zero check is maintained.

at The American Meteorological Society
Washington, D. C.

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