ELECTRONICS

Vacuum Tube Has Rival

New transistor, made of semi-conducting germanium metal, may result in more stable and durable radios, television sets and electronic devices.

See Front Cover

➤ THE glass vacuum tube in your radio has its first rival in 40 years—a bit of semi-conducting germanium metal that amplifies or oscillates current without the complexity of plates and wires in an airless bulb.

This new transistor, as it has been christened, should allow more stable and durable radios, television sets and electronic devices. Radios may be made smaller, when the new cylinder, slimmer than a pencil and less than an inch long, as shown on the cover of this week's SCIENCE NEWS LETTER, comes out of the development laboratories into production.

Because the new device has no filament that must heat up before it operates, it goes into action instantly. It will do some electronic tricks that conventional vacuum tubes can't do. This means new electronic devices.

Invented at Bell Telephone Laboratories in New York, the transistor's operation is possible because the ability of a semi-conductor to carry electrical current can be controlled. This is done by changing the electronic structure of a small bit of material under the influence of the incoming current, fed to it through a fine "cat's whisker" wire. The current coming out of the other wire, just about two thousandths of an inch away, is boosted in volume a hundred fold.

Dr. John Bardeen and Dr. Walter H. Brattain made the key investigations in the Bell Telephone Laboratories that produced the transistor, while the program was initiated and directed by Dr. William Shockley.

Since electrical speech waves traveling between telephones can be amplified, the transistor will probably replace the vacuum repeater tubes now used on long distance and other telephone lines.

A superheterodyne radio set with about a dozen transistors instead of conventional tubes has been demonstrated and probably is the forerunner of a new family of radios.

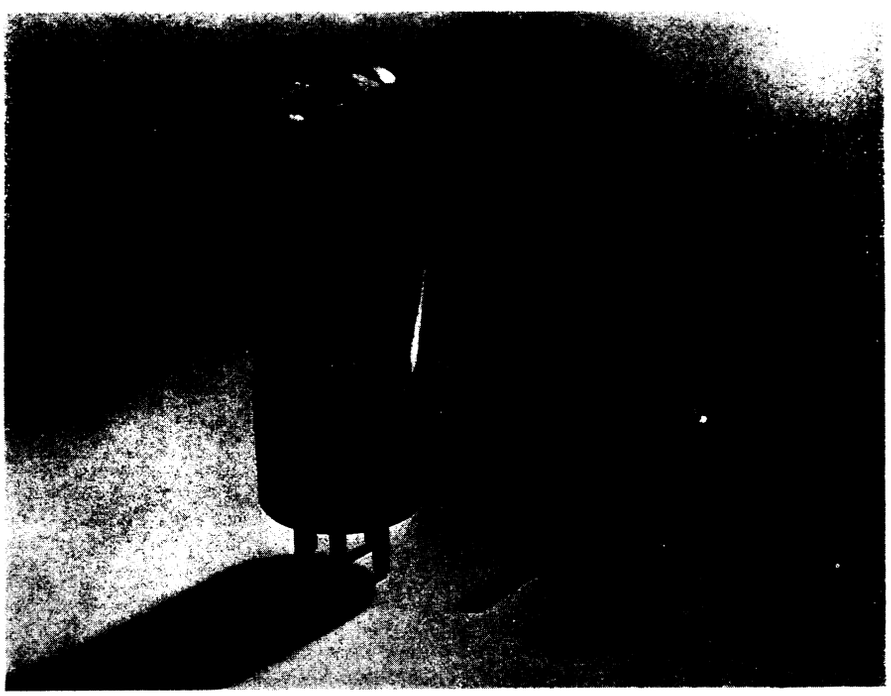
Because it can oscillate as well as amplify, the transistor will be used to produce standard frequency tones and for other similar uses.

Germanium metal specially treated is the semi-conducting material used, but other semi-conductors include silicon, some metallic oxides and other compounds. Semi-conductors have electrical properties intermediate between those of the metals and insulators.

Semi-conductors, copper oxide and selenium have been used previously to rectify alternating to direct current, and silicon has been used as a detector, particularly for microwave radio apparatus.

The transistor as now developed has a frequency limitation of about 10,000,000 cycles per second, but it is quite satisfactory in the television ranges.

Science News Letter, July 10, 1948



TRANSISTOR—Overshadowed by two bulky vacuum tubes on either side, it may replace them in many electronic devices that will benefit from its small size, absence of glass envelope, plates and wires.

PUBLIC HEALTH

Later Years Are Rated Special Concern of Women

➤ BECAUSE the average woman is destined to outlive the average man, the middle and later years are of special concern to women, says Dr. Clive McCay, professor of nutrition at Cornell University.

"Furthermore," he says, "wives are usually younger than husbands, and like it or not, the average wife must face five to eight years of widowhood."

All of which means that older women must face the future realistically. "The best insurance for health during the late years is to cultivate good food habits throughout life."

Fixed food habits centered on poor diets such as living on tea and crackers insure poor health and disaster during the late years, he warns.

Pointing out that many more women than men are in homes for the aged, Dr. McCay says the time would seem ripe for women's organizations to demonstrate what they can do in solving problems for the aged. These problems involve economics, sociology, housing, employment, recreation, psychology, medical care and numerous other fields.

"These problems are solvable," says the Cornell scientist, "but few of us face them until our minds and bodies are too far exhausted."

Science News Letter, July 10, 1948

ASTRONOMY

Nova Formed by Big Shell Blown Off Star's Surface

➤ A NOVA or "new star" appears in the sky when a star literally "blows its top."

A star flares into a nova when a huge shell of very bright material is blown off its surface, Dr. Dean B. McLaughlin of the University of Michigan reported to the joint meeting in Pasadena, Calif., of the American Astronomical Society and the Astronomical Society of the Pacific.

The outburst, in which the star's apparent brightness may increase 10,000 times in 24 hours, is probably only a single eruption

of energy, not a series or train of explosions, Dr. McLaughlin stated.

The spectra of two bright novae were carefully examined by Dr. McLaughlin. One of these exploding stars was found in the constellation of Perseus in 1901, the other in the constellation of Gemini, the twins, in 1912. Both stars remained bright only a short time and have since subsided to relative insignificance, the usual procedure for novae.

Light from a shell of gas approaching the earth at the rate of about 400 miles a second was the most prominent feature of the spectrum of Nova Persei. It was present within a day after the star's maximum brightness and still prominent 18 months later. Many years later a nebula with exactly this same velocity was visible, expanding around the star.

There is some evidence of more than one outburst for Nova Geminorum. But all the prominent structural features of the expanding shell were present within four days after the star's maximum light had been reached.

Science News Letter, July 10, 1948

ASTRONOMY

Hydrogen Gas Robs Star

➤ HOT clouds of hydrogen gas in an active state may rob a star's spectrum of the visible evidence that ample quantities of such elements as calcium, zirconium and magnesium exist in the star.

This theory was proposed by Dr. Jesse L. Greenstein of the Yerkes and McDonald Observatories of the Universities of Chicago and Texas before the joint meeting of the American Astronomical Society and the Astronomical Society of the Pacific in Pasadena, Calif.

Most of the stars are much alike in the kinds and amounts of elements of which they are composed. But there are many exceptions. A certain peculiar star, about as hot as our sun, for example, appears to have only about 10% as much calcium, scandium, zirconium, magnesium, titanium and vanadium as does the sun. Other elements, however, are present in normal amounts, Dr. Greenstein found by analyzing spectra taken with McDonald's 82-inch reflecting telescope.

The apparent deficiency of these elements may be only a delusion, Dr. Greenstein reasons. Ionized hydrogen may rob the spectra of the very lines by which astronomers are accustomed to identify these elements.

From below the visible surfaces of stars such as the peculiar one studied by Dr. Greenstein may escape hot clouds of hydrogen gas, itself in an ionized state. This hydrogen, each atom of which lacks its single attendant electron, is greedy for electrons to such an extent that it may rob the nearest atoms of these elements.

The outward flow of some hotter ionized material from the interior of a star may thus upset the star's spectrum.

Brightness of Stars

The all-important relation between a star's brightness and its temperature may be simplified because of observations made by Olin J. Eggen of Washburn Observatory, University of Wisconsin.

Blue stars are known to be hot; yellow and red ones are relatively cool. A normal star of the same color and temperature as the sun probably has the same intrinsic brightness, Mr. Eggen reported at the astronomers' meeting.

In the past some stars of the same color and temperature as our sun have been considered brighter, some fainter. This is due largely to previous errors in measurement rather than to any complex nature of the stars themselves, he stated. Once again observations with the war-developed photoelectric photometer promise to outmode those made by earlier methods.

Stars in the famous cluster known as Berenices Hair and the Hyades, in the constellation of Taurus, the bull, were studied because in a cluster sufficiently far away from us we can assume that all the stars are at about the same distance. Thus distance is eliminated as a factor influencing the star's apparent brightness.

All stars brighter than photographic magnitude ten in the Coma cluster were observed during this study. Only some 50 of the 150 stars in the Hyades cluster were examined, the observing season being one of the poorest in years for Madison, Wis.

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