PHYSICS

Grow Germanium Crystals

Electronic temperature controls help to lick problem of growing germanium crystals having exactly the desired shape for use in transistors.

➤ GROWING PRECIOUS crystals of germanium is as touchy as growing hothouse orchids. Both depend largely upon careful temperature control.

To lick the temperature problem, engineers at Minneapolis-Honeywell Company got together with scientists at the Massachusetts Institute of Technology. They created an electronic temperature control system to supervise the heat aspects during the critical crystal-growing stage.

The temperature must be just right if the right kind of crystal is to emerge from the molten metal. The whole process must be carefully handled if a crystal that resembles a quarter-pound stick of butter is the form desired. Otherwise, a six-inch-long carrot-like crystal may be the result.

Germanium is the metal of which transistors are made. Transistors are rugged, revolutionary and pea-sized devices that may replace the fragile vacuum tube such as you will find in your radio. Transistors do a better job than vacuum tubes, can withstand rough treatment and are more efficient.

They now are going into smaller and lighter hearing aids and may wind up eventually in your television set.

Lead mines in Missouri now supply the biggest part of commercial germanium to American manufacturers. It comes as an oxide that reacts with hydrogen to yield germanium powder.

The powder is melted and heated to about 1,800 degrees Fahrenheit as the first step in the crystal-forming process. Then it is cooled about 90 degrees and a small "seed" of germanium is touched to the surface of the molten metal. A crystal begins forming on the seed. As it forms, the crystal is drawn slowly from the molten metal.

Scientists at Bell Telephone Laboratories get a crystal having roughly a square cross-section by watching the temperature closely and by rotating the crystal slowly as it forms. If this is not done, the crystal may grow lopsided.

A single crystal of germanium is desirable for transistors because it makes the transistors interchangeable. That is, one transistor can be substituted for another in a given circuit.

The first transistors were made of many small crystals of germanium stuck together. But sometimes the manufacturing control was not accurate enough to permit the crystals to be switched around in the circuit without redesigning the circuit somewhat.

Scientists discovered this was because germanium was in its "polycrystalline" form. By using a large single crystal, scientists got around the problem.

Science News Letter, March 21, 1953

GENERAL SCIENCE

Fourth Science Fair

➤ THE ATOMIC city of Oak Ridge, Tenn., whose very existence was a military secret for two years during the war, is preparing to play host to young scientists from all over the country when they come to the Fourth National Science Fair to be held there on May 7, 8 and 9.

The teen-age students who come out on top in local science fairs will be guests of the Oak Ridge Institute of Nuclear Studies and the Union Carbide and Carbon Corporation.

The boys and girls will set up their exhibits in the American Museum of Atomic Energy alongside world-famous mementos of the history of atomic energy. They will come from all over the nation, from science fairs held from California to Connecticut, and will have earned their trips by winning out against thousands of their fellow students in local fairs sponsored by scientists, educators and home town newspapers.

While at Oak Ridge, the finalists will be permitted to see many of the atomic installations, some of which have not been shown to the public before. Much of the area, of course, is still behind security walls.

The finalists, however, will be able to explore the museum in which their exhibits are to be set up, see the reactor and isotopes being separated, and visit biological and electro-technical laboratories as well as TVA's Norris Dam. Upon arrival, each will be presented with a rainbow-ribboned gold and silver National Science Fair medal.

Famed scientists, now working in the laboratories at Oak Ridge, decide who will win the more than $1,000 in awards to be made to the boys and girls with winning exhibits in the various categories.

Four first "wish awards," valued at $125 each, will be given. These prizes allow the winners to receive the scientific equipment they desire. There are also four second place "wish awards," valued at $75 each, and four third place awards, valued at $50.

Only those boys and girls attending classes in the last three years of a secondary school, whose exhibits have won highest honors in area selections, come to the National Science Fair.

The National Science Fair is an effort to seek out potential scientists and engineers among the nation's youngsters, and to encourage as many of them as possible to secure their advanced training. The National Science Fair is conducted by Science Clubs of America, administered by SCIENCE SERVICE.

Science News Letter, March 21, 1953

TAXONOMY

Forest Service Lists 1,035 Tree Types in U. S.

➤ DISCOVERY OF a new species of ash tree restricted to a narrow Arizona Canyon has brought the "official" list of tree types from the United States and Alaska to 1,035.

The new tree, named the Goodding ash, *Fraxinus gooddingii,* in honor of its discoverer, botanist Leslie N. Goodding, is the 873rd distinct tree species listed by the U. S. Forest Service. In addition, there are 61 different varieties and 101 hybrids to complete the total.

Science News Letter, March 21, 1953

ELECTRONICS

"Electronic Scheduler" To Eliminate Bottlenecks

➤ THE BASIC design for an "electronic scheduler" has been developed at the University of California at Los Angeles.

It would anticipate manufacturing bottlenecks from an hour to as much as two months before they occur, and is said to be one of the most important advances in scientific production scheduling in 30 years.

"This conception is a major contribution to the technical know-how necessary for tomorrow's push-button factory," said Dr. Melvin E. Salveson, director of U.C.L.A.'s Industrial Logistics Research Project, which is financed by the Office of Naval Research. "It promises to be one of the most important advances in scientific production scheduling in 30 years."

Basic design of the "electronic scheduling computer" was worked out by Richard G. Canning, electronics engineer on the project, who developed plans for such a computer after an intensive study with Dr. Salveson of a 1,000-employee plant in the Los Angeles area.

Using electronic components, most of which are already commercially available, the two men say they can assemble a scheduling system that virtually will eliminate the need for expediters in factories.

The two men estimate installing such a system in the plant they studied would cost about $250,000 but add that it would pay for itself in clerical savings alone within three years. Savings from more efficient production, they believe, would amount to from three to ten percent of the factory's annual product, depending on the plant.

Science News Letter, March 21, 1953