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New Products

Space Enterprises, Inc.

new products

high speed computer elements

Ultra-high-speed, radically advanced electronic computer elements so fast that they can perform 10 million computer operations in the time it takes to say their name were announced here today by **Aeronutronic,** a Division of **Ford Motor Company.**

Known as BIAX, the new Aeronutronic computer elements are expected to become the principal components in the next generation of electronic computers—and result in faster, cheaper and much smaller computing equipment.

The new BIAX units are small rectangular bars of ferrite magnetic material so tiny that more than 310,000 will fit into a quart milk carton. More than 5,000 can be held in the palm of your hand.

BIAX can operate at a wide temperature range—from 260° Fahrenheit, or more than 50 degrees hotter than the boiling point of water, to Arctic temperatures well below the freezing point of water—in carrying out ultra-high-speed computing operations at millionths of a second.

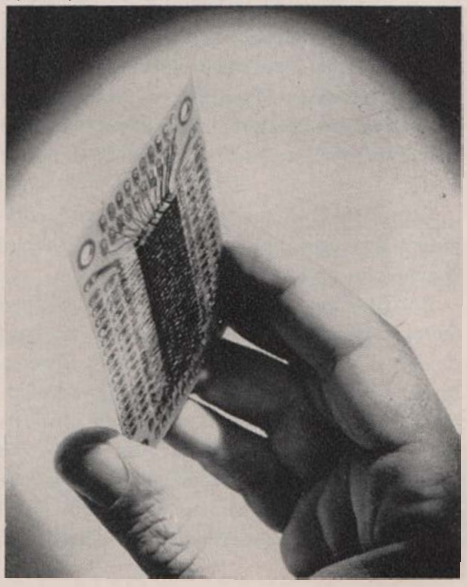
BIAX computing equipment will result in much lower cost computers, because the tiny, relatively inexpensive elements will replace expensive semiconductor devices such as transistors and diodes.

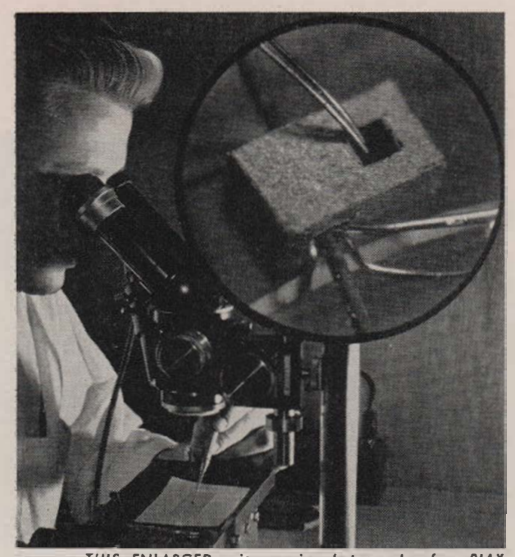
Two configurations of BIAX have been developed and are now being produced by mass production techniques. One is a "memory" element, and the other is a logic, or "reasoning" device.

Minuteness of the BIAX elements and their favorable environmental characteristics will make possible extremely small computer packaging, which is highly important in the space age. BIAX elements can be used in a number of types of computing equipment, for both military and commercial applications. Included among these will be missile and satellite installations, language translation, library

MINUTENESS OF BIAX is shown in this photo of several hundred of the new computer elements with a nickel. More than 5,000 can be held in the palm of your hand, and 310,000 will fit in a quart milk carton. BIAX is now in mass production, and complete BIAX memory systems and computers are now being marketed for special commercial and military applications.

A TYPICAL BIAX ARRAY for an electronic digital computer memory unit, this printed circuit card contains more than 300 BIAX elements. Multiples of such printed circuit cards, containing BIAX, are mounted adjacent to one another in a computer to provide large memory capability.





THIS ENLARGED microscopic photograph of a BIAX memory element shows details of wiring in the tiny, radically-advanced new computer component developed by Aeronutronic, a Division of Ford Motor Company, Newport Beach, California.

searching, de-coding, and scientific computation such as calculating flight trajectories for missiles and rockets.

In the forthcoming human-space experiments, BIAX elements will permit scientists to track "man in space" capsules with real-time calculations, and thereby determine the precise location of the space explorer at the exact time he is there. BIAX elements have a low electrical conductivity, and are not affected by radiation—making them highly effective for missile and space vehicle applications.

The BIAX concept and associated BIAX computer components were invented by Cravens L. Wanlass, director of research for Aeronutronic's Computer Operations, and are the result of a number of years of intensive study.

Complete BIAX memory systems and computers are now being marketed for special commercial and military applications.

Aeronutronic, formerly a subsidiary of Ford Motor Company, became a Division of Ford on July 1, 1959. Since its formation, Aeronutronic has had as its objective the development and manufacture of advanced products for military and commercial purposes in the areas of weapon and space systems, missile range systems and instrumentation, advanced electronics, data processing systems and computers.

cast optical silicon

Hughes Aircraft Company metallurgists have perfected a method of casting optical-quality silicon for use in infrared sensors in military weapons systems, Raymond B. Parkhurst, vice president, reported here today.

The new process permits volume production of silicon lenses, domes and flats. Until recently it was necessary to "grow" individual crystals for each optical element which, in turn, had to be laboriously machined before use.

Parkhurst reported that molds are designed to the approximate shape af the finished part and the castings given a final finishing on standard optical machinery. By holding castings to close tolerances, metal waste and finishing time is kept to a minimum.

"Designers can now specify silicon optics without worrying whether or not the necessary material would be available in quantity," Parkhurst said. "Using cast optics, manufacturers can plan on production rates equal to those of other optical manufacturing pracess."

Hughes engineers disclosed that there is no severe size limitation on elements that can be made. Infrared domes with an outside diameter of more than eight inches already have been cast successfully.

Two major difficulties faced the Hughes researchers in developing the process. First was the need far a refractary material that would withstand the high temperature and salvent action of the malten silicon. The Hughes laboratories investigated a number of different compounds and materials before finding a suitable one. Methods also had to be developed for melting the silicon under inert atmospheres, and pouring the metal into the mold. Fortunately the refractory material selected allowed the molds to be used again and again, lowering the cost of the process and making it more adaptable to mass production.

The second problem related to the optics of the cast part. Earlier it had been generally assumed that polycrystalline silicon, such as any casting process produces, would display optical qualities drastically different from those of single-crystal optics. But this has not proved the case. In test after test, no signifi-

cant difference has been detected in the behavior of infrared rays as they pass through sections of the two materials. Physical tests indicate that the cast metal has exactly the same density as single-crystal silicon, showing that it is free of voids that would interfere on a random basis with the optical qualities.

vapor coating

Successful modification and improvement of a long-known process for vapor phase deposition of chromium, molybdenum and tungsten to produce adherent coatings of the metals on various substrate materials has been announced here by **Alloyd Research Corporation.**

Potential applications, utilizing chromium as a protective corrosion-resistant cladding, appear in the chemical, dairy and food industries as a low-cost substitute for stainless steel in valves, tubing and other equipment.

Promising electronic industry applications include coatings of certain components with high purity, high density tungsten to prevent contaminants in the base materials from adversely affecting the electronic emission characteristics. According to the company, by producing thicker "coatings" the possibility exists for fabricating thin electronic parts of refractory metals in this manner. Heavy coating of tungsten on graphite also appears possible for missile and rocket nozzles.

Qualitative bend tests of chromium coatings up to 0.005 inch thickness on copper and steel show no indication of cracking, spalling or flaking after extensive deformation. The same thickness of chromium deposited on copper gave complete protection to the base metal when immersed in a 20 per cent nitric acid solution during a test period of 64 hours. Compared with electroplated chromium, the Alloyd Research coating is nonporous, less brittle and does not risk hydrogen embrittlement of the substrate. Other advantages of the process include:

1. coatings of uniform thickness.

2. coatings that may be used at temperatures well above 300°F where plastic coatings for corrosion resistance fail.

3. coatings which can be applied to nonmetals such as glass and ceramics.

4. deposition temperatures can range from 700°F to 1700°F depending on the substrate material.

5. the process offers excellent throwing power permitting coating of complex shapes.

The Alloyd Research process is an outgrowth of a research and development program aimed at volume production of very high purity metals. Recently developed and improved chemical compounds of chromium, molybdenum and tungsten are credited in part for the success achieved. The company emphasizes, however, that the process is in the developmental pilot plant stage and is quoting interested organizations on this basis.

power transistor for military use

The production of a new military-type germanium power transistor, designated 2N297A, has been announced by the **Bendix Aviation Corporation.**

The rugged unit, which meets the military specification MIL-T-19500/36A (SigC), is the first of its type to be placed in production by the company, according to Dr. Robert R. Meijer, manager of semiconductor marketing of the Red Bank division.

It can be used in numerous military applications, such as in missiles and supersonic aircraft, and also in many commercial fields for high-current switching, audio amplification, regulators, power supply circuits, and oscillator circuits.

The 2N297A has a maximum collector voltage rating of 60 volts, and a maximum collector current rating of 5 amperes. It has a dissipation of 35 watts at 25 degrees C. and 10 watts at 75 degrees C.