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ries for work with substances that do not emit large amounts of gamma radiation or neutrons, but do contain alpha emitters. Intense alpha emitters, however, will be handled within the shielded cells in special sealed boxes. The boxes are designed so that they can be dismantled and disposed of by remote control.

The new laboratory is being constructed in connection with a cooperative program to obtain and study chemically useful samples of elements whose atomic numbers are greater than that of plutonium. Although a number of reactors have been used for the production of such elements, the largest amount of the work since 1952 has been done at the Materials Testing Reactor at the Atomic Energy Commission's National Reactor Testing Station in central Idaho. Irradiation of a 78-gram plutonium sample over a period of two years produced approximately one gram of americium-243, half a gram of curium-244, and six grams of plutonium-242—the largest quantities of these isotopes ever produced. These samples will be re-irradiated, and in three years they should yield about one milligram each of berkelium and californium and a lesser amount of einsteinium.

In a more ambitious project, begun two years ago, 12 kg of plutonium-239 were inserted into a reactor at the AEC's Savannah River ordnance plant. By 1963 or 1964, this should yield relatively large quantities of plutonium-242, americium-243, and curium-244, as feed material for further irradiations. These samples will then be re-irradiated (in the MTR in Idaho and in the high-flux isotope reactor now being constructed at Oak Ridge) and should produce much larger quantities of berkelium and californium than are now available for study.

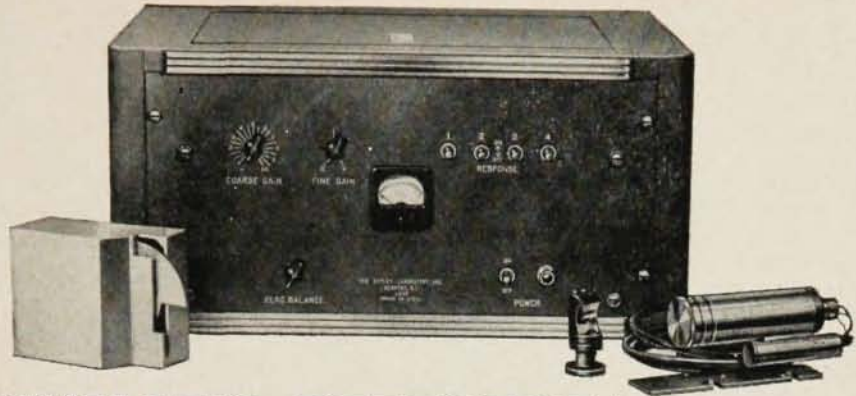
Reactors

Ground was broken on September 15 at Brookhaven National Laboratory for the construction of a new uranium-fueled research reactor to be used primarily for experiments involving neutron beams. It is expected that with only a two-fold increase in power the new high-flux beam reactor (HFBR) will produce a neutron flux nearly 100 times more intense than that of the present Brookhaven graphite research reactor.

According to a statement issued by the Laboratory, the essential feature of the HFBR will be its compact, undermoderated core operating at high power density in heavy water. The resulting abundance of neutrons in the region outside of the core is expected to provide a high degree of flexibility in the setting up of experiments. Heavy water, which will absorb only a few of the neutrons which pass through it, will be pumped through the core at a rate of 18 000 gallons per minute to remove the heat generated by the operating reactor.

The HFBR will be housed in a three-level tank-type building. It will be operated from the top floor, and the neutron-beam experiments will occupy the whole main floor. Auxiliary machinery and a canal

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*Fundamental and experimental aspects of this detector are discussed in the following publications: Rev. Sci. Inst. 18, 347 and 357 ('47); ibid. 20, 816 ('49); Proc. IRE 40, 1161 ('52).

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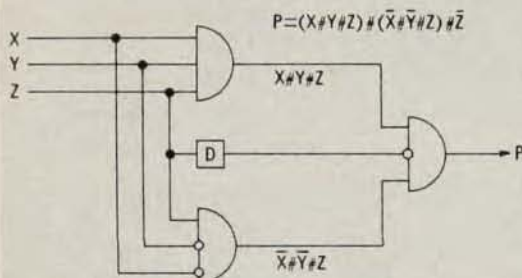
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DERIVING MAJORITY LOGIC NETWORKS

FUND THM: $f(X,Y,Z) \equiv (X \cdot Y \cdot f_{xy}) \# (\bar{X} \cdot \bar{Y} \cdot f_{\bar{x}\bar{y}}) \# f_{xy}$

DEFINITIONS: $X \cdot Y \cdot Z \equiv \text{Maj}(X,Y,Z)$; $f_{xy} \equiv f(X,X,Z)$; $f_{\bar{x}\bar{y}} \equiv f(X,\bar{X},Z)$

DERIVATION: Let $f(X,Y,Z)$ be even-parity function P .
Then $f_{xy} \equiv \bar{Z}$ and $f_{\bar{x}\bar{y}} \equiv Z$ so



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for spent fuel elements will be in the basement. The reactor complex is expected to cost \$12.5 million and to take about two years to complete.

A prototype light-weight reactor has been constructed and successfully operated by North American Aviation's Atomics International Division for the Atomic Energy Commission's Snap 2 project. Designed to generate 50 kilowatts of heat for the production of auxiliary power for space vehicles, the reactor weighs 200 pounds without shielding, is fueled with a uranium-zirconium hydride alloy, and employs a core thirteen inches high by nine inches in diameter. The second such reactor designed and constructed for the AEC by North American, it is expected to generate three kilowatts of electricity when combined with a power conversion unit.

Research & Development

A new research division, composed initially of five departments, has been set up at Remington Rand Univac, St. Paul, Minn. S. M. Rubens, formerly manager of the physical research department, has been appointed director of research. Associate director and manager of a new department in biological and chemical physics is Victor Hicks. Other new department managers are Robert W. Olmen, materials research; William W. Davis, circuits research; William M. Overn, components research; and Charles D. Olson, electromagnetic-measurements research.

Union Carbide Corporation recently consolidated the activities of its Research Institute by moving its staff into a new laboratory building at Eastview, near Tarrytown, N. Y., thus bringing together under one roof work which had been dispersed among four Union Carbide laboratories in addition to space which had been leased elsewhere. A staff of sixty persons will be engaged in various research projects, including theoretical and experimental studies involving high-temperature materials, as well as work in organic chemistry, catalysis, biochemistry, and other fields.

Scientists at the Air Force Cambridge Research Laboratories in Bedford, Mass., have acquired a Dynamitron accelerator manufactured by Radiation Dynamics, Inc., Westbury, L. I., New York. The installation, which furnishes an extended range of operational parameters, from 0.6 to 1.2 Mev and from 10 μ a to 10ma, will be used for research on crystal lattice structures and elemental electronic components.

Research facilities available to Fairchild Semiconductor will more than double with the completion next year of the firm's new \$1.5 million research and development center, which is now under construction on a nine-acre site in Stanford Industrial Park near Palo Alto, California.