

Bell Labs

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ics. There is even research in astrophysics, both because of possible application to long-distance communication and because of its intellectual interest among physicists.

Clogston notes that the Labs has drawn the line at experimental high-energy physics, even though much of the best intellectual effort over the past several years has gone into high energy. Nevertheless several Bell Labs theorists are doing high-energy theory—for example, John Klauder, who is doing axiomatic field theory, and Bertrand Halperin, who along with others at the Labs, is using renormalization-group theory, which has had considerable impact on statistical mechanics.

What would divestiture mean? The Bell System is integrated, both horizontally and vertically. It is horizontal in the sense that all the local operating companies, such as New York Telephone, Bell of Pennsylvania, and so on, are linked together. It is vertical because the ultimate service to the customer, the manufacturing, and the R&D are all linked together. Divestiture of Bell Labs, Western Electric and Long Lines would specifically destroy the vertical integration. Hannay argues that it is the vertical integration that makes the Bell System superior to telephone systems in other countries, most of which are operated by their respective governments and generally do not have manufacturing as part of the system.

The Bell System has just put into regular operation a No. 4 ESS (Electronic Switching System), a centralized machine that is at the top of a hierarchy of smaller switching systems. This system cost Western Electric over \$400 million, of which \$150 million is attributed to development costs. Hannay points out that a company with a smaller R&D commitment would never have handled the development of such a system. In the United Kingdom, for example, when the British Post Office decided to build a switching system much smaller than the No. 4 ESS, it had to assemble a combination of five companies to work with it, he said.

An important feature of vertical integration is the interaction among people, Keefauver told us. "This money just doesn't come through the door in sealed envelopes;" there are many interactions between Bell Labs people, those at Western Electric, those at AT&T and those in the operating companies. At the Laboratories people in basic and applied research and those in exploratory development know each other and talk over their problems. If the Bell System is split up, Keefauver observes, one will have to worry about proprietary information, premature leaks, and so forth.



CLOGSTON

"It would make jobs for lawyers and interfere with scientists and engineers."

Bell Labs president, William O. Baker, in testimony before the US Senate Subcommittee on Antitrust and Monopoly in the summer of 1974, said that "disintegration of the Bell System will destroy Bell Laboratories . . . The notion that Bell Laboratories could endure and function away from AT&T, Western Electric and the operating integrated Bell System would be laughable were it not so sinister and so ominous."

—GBL

R&D growth rate revives, Battelle believes

Expenditures for research and development in the United States in 1976 will reach almost \$38.2 billion, 5.8 percent more than in 1975, estimates Battelle Columbus Laboratories. Only half of the increase, it is forecast, will be due to inflation.

Most of the anticipated hike in research and development spending is expected to come from Federal and industrial funding increases. With almost 53 percent of the total expenditures in this area, the Federal government will increase its support for research and development by 11.4 percent (in other words, to \$20.2 billion, up \$2.1 billion from 1975), according to Battelle. A similar rise, 11.1 percent over last year, is expected in industrial funding, which accounts for 43.5 percent of the total. Support for research and development efforts from academic institutions and nonprofit groups makes up another 3.4 percent of total funding.

The increase is said to reflect concern over energy problems and a more positive attitude in Congress toward military research and development pro-

grams. Beginning in 1968, a decline in Federal funding began, but the growth rate for research and development, Battelle notes, in current dollars appears to have returned to the pre-1968 rates.

Rasool takes up new post at NASA

S. Ichthiaque Rasool, special assistant to the deputy associate administrator of NASA, has been appointed deputy associate administrator for space science (science). He will serve as chief adviser to Noel W. Hinners, the associate administrator for space science, in establishing the goals and objectives of the space science program.

Rasool joined NASA in 1965. He was senior research scientist at the Goddard Institute for Space Studies until 1971, and deputy director for planetary programs in the Office of Space Science from 1971–1974.

in brief

The papers of Ernest O. Lawrence, founder and first director of the University of California Radiation Laboratory, have been arranged for access by scholars interested in the history of physics. For information contact Arthur L. Norberg, The Bancroft Library, University of California, Berkeley, Cal. 94720.

The European Organization for Nuclear Research (CERN) and the USSR have extended a collaboration that allows physicists from CERN's 12 member states and their Soviet colleagues to perform joint experiments at CERN's laboratories and at sites within the USSR.

The Dutch Society of Sciences will publish the correspondence of H. A. Lorentz and is interested in obtaining copies of his letters with permission to publish them. Persons or institutions who have custody of such letters should write to Hollandsche Maatschappij der Wetenschappen (Lorentz Committee), Spaarne 17, Haarlem, Netherlands.

Copies of AIP Pub. No. R-268, *Nuclear Physics Manpower*, may be obtained from Beverly F. Porter, Director, Manpower Statistics Division, AIP, 335 E. 45th St., New York, N.Y.

The following appointments have been made at the Nuclear Regulatory Commission: Robert B. Minogue as director of the office of standards development, Robert E. Heineman as director and Frank Schroeder as deputy director of the division of technical review and Saul Levine as deputy director of the office of nuclear regulatory research. □