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# SCIENCE





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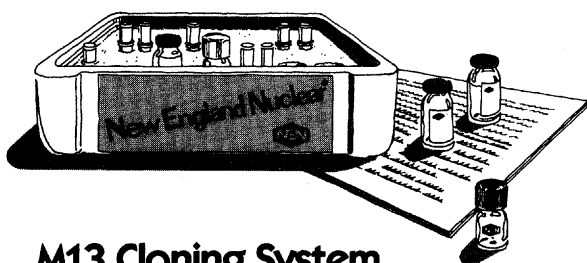
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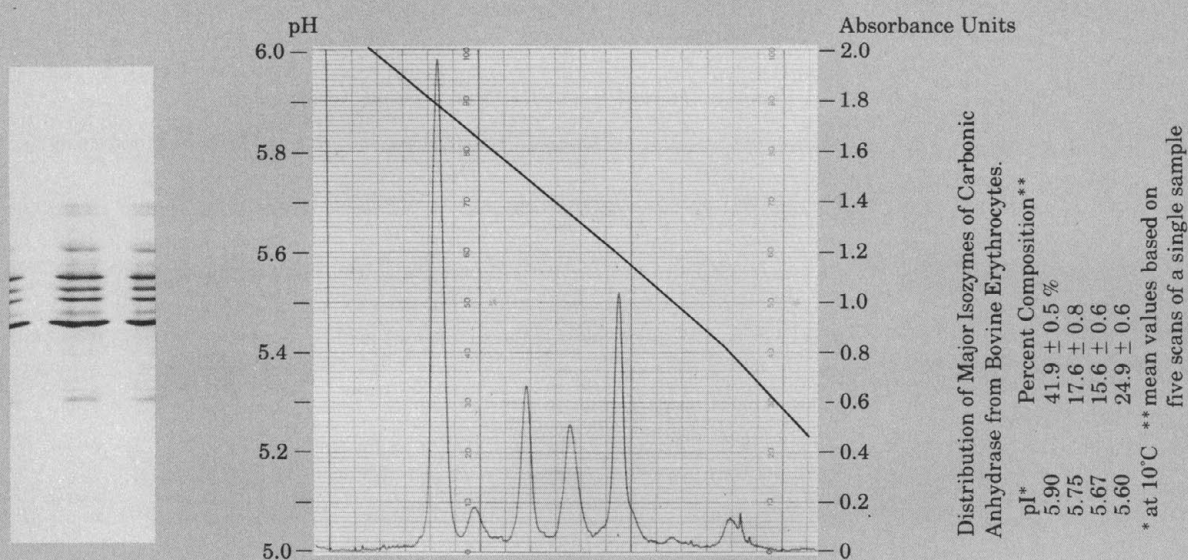
Full moon over the Great Selima Sand Sheet, northern Sudan, illuminated by dawn's light. Test pits and surficial archeology reveal the sand sheet to be underlain by stratified Quaternary alluvium as well as aeolian sand and paleosols of at least three ages. See page 629. [Vance Haynes, University of Arizona, Tucson 85721]

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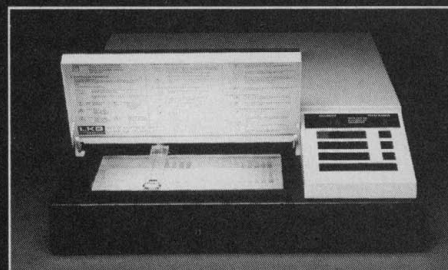
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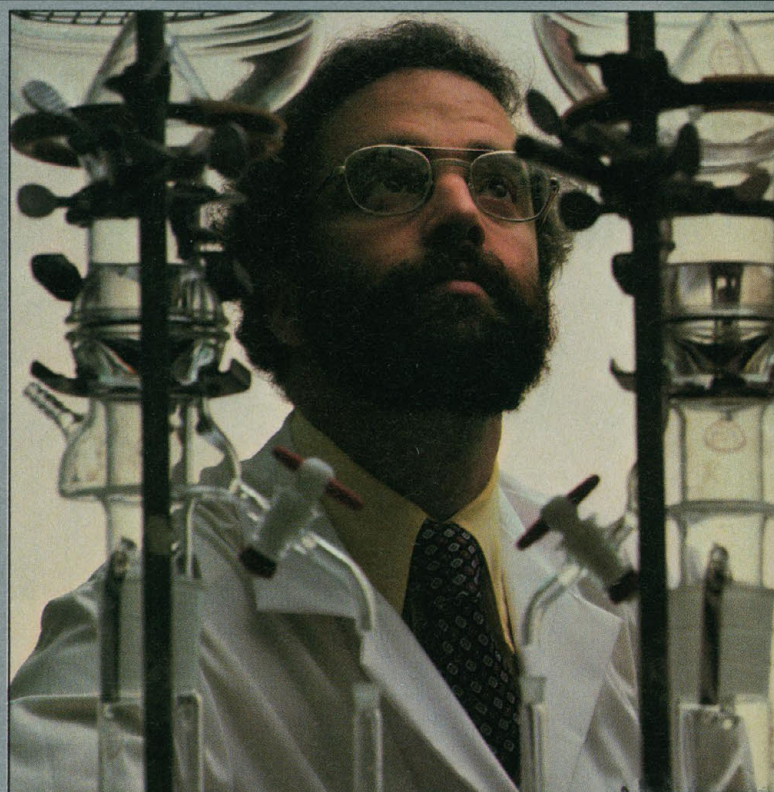
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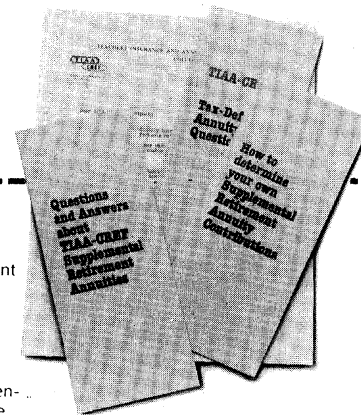
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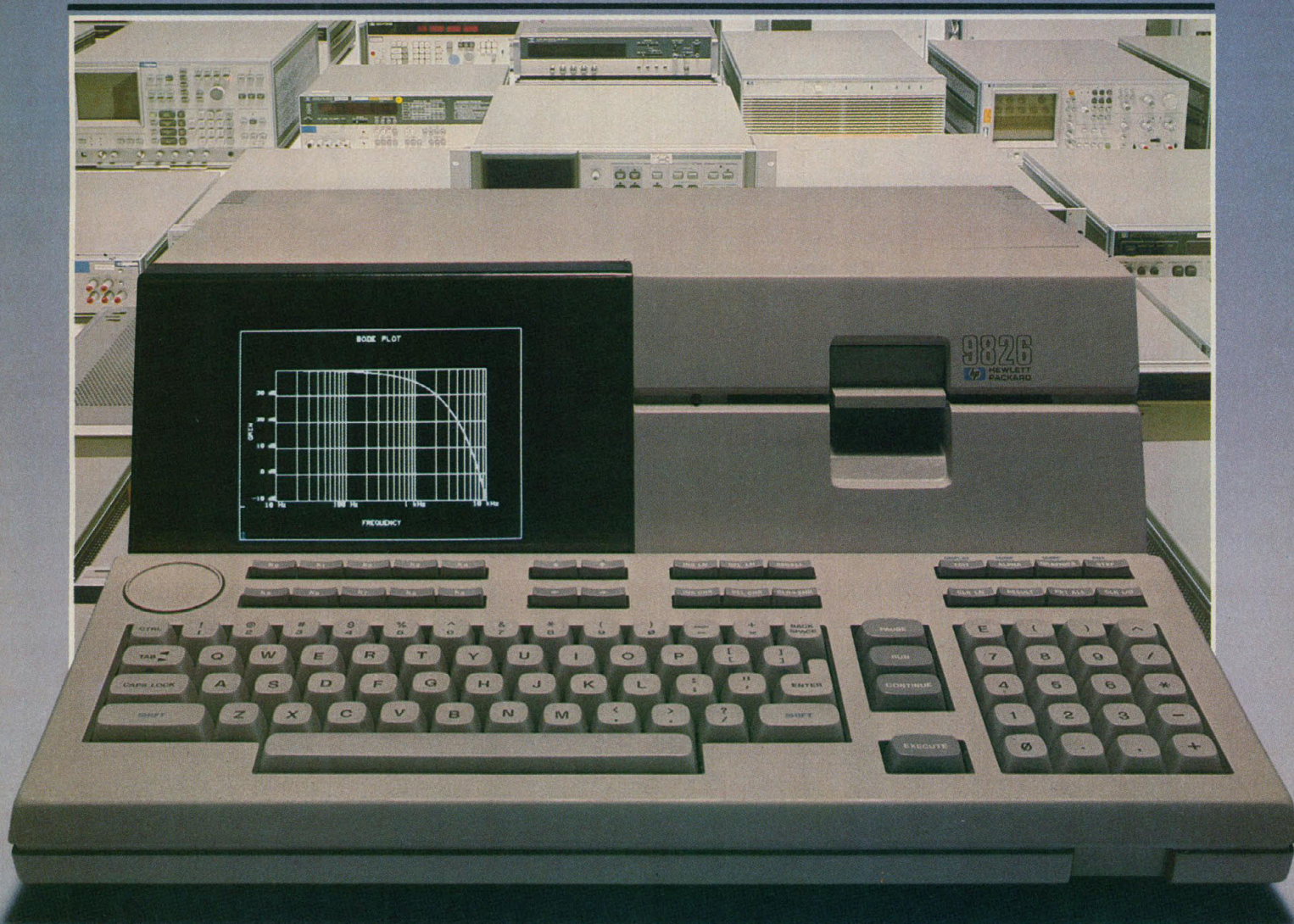
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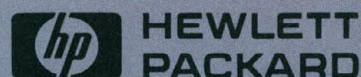
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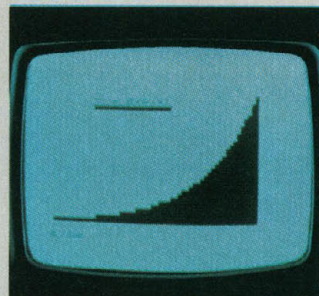
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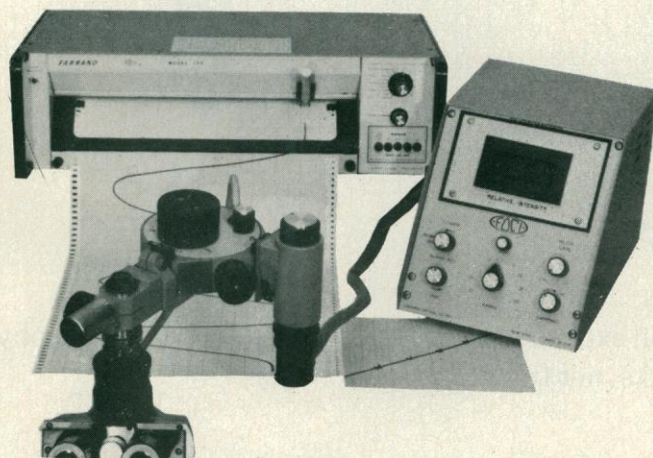
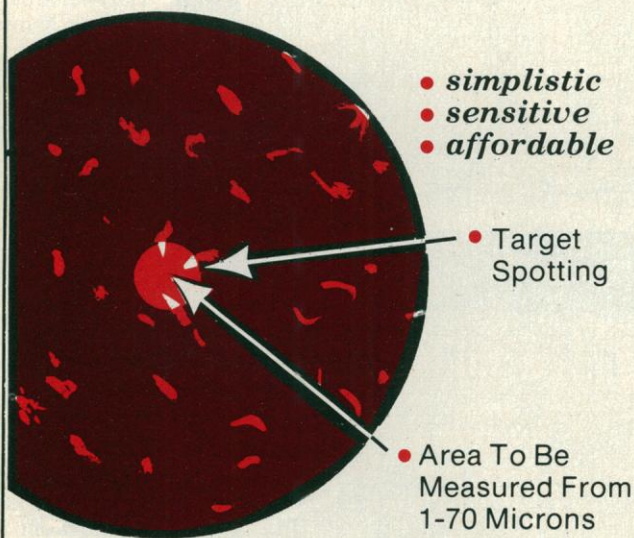
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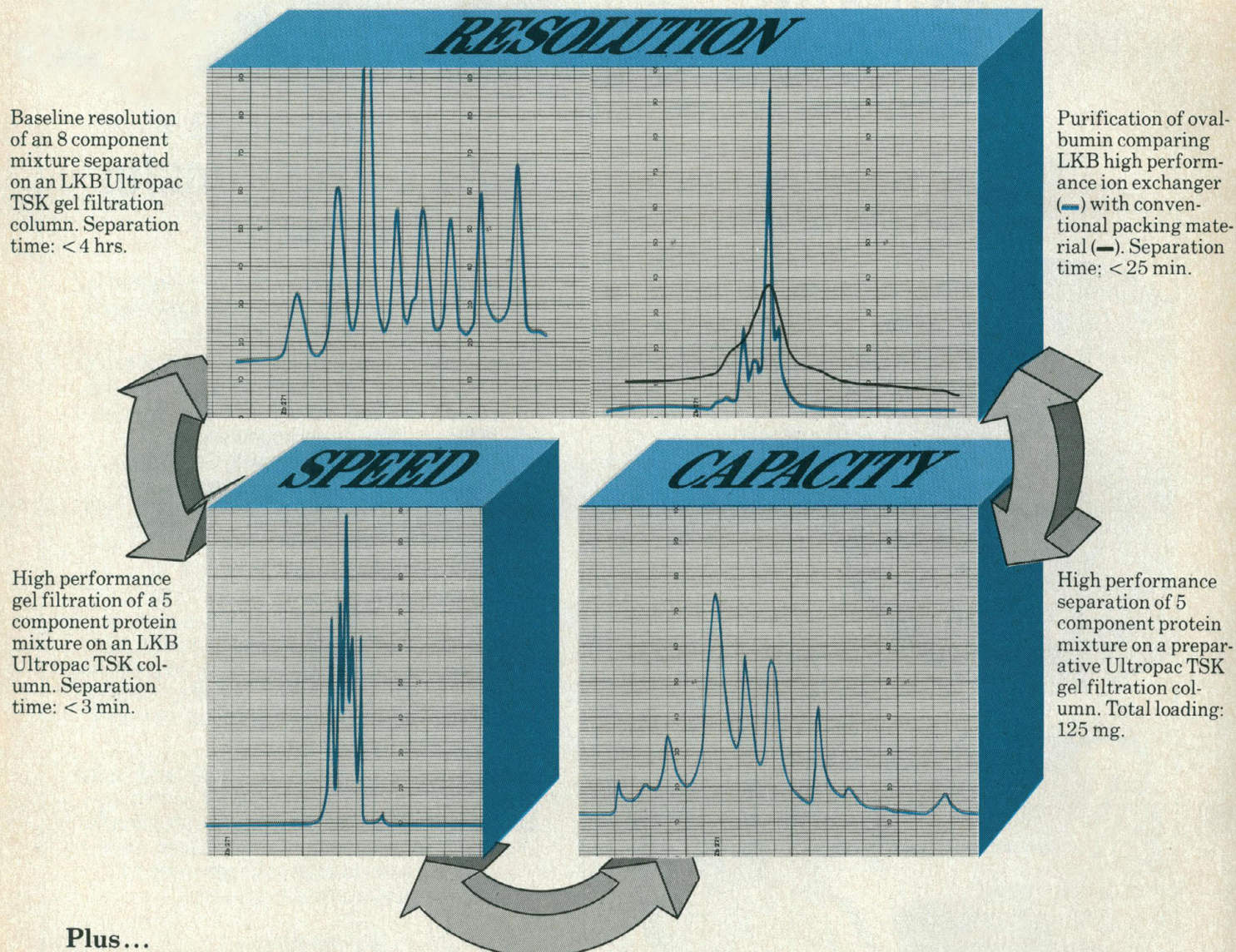
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# To Prune, Promote, and Preserve

In times of austerity and turbulence, it is essential to prune, yet to promote new growth and, above all, to preserve values for tomorrow. These are such times. The United States still supports the most extensive and the most successful scientific enterprise in history. But low investment, high interest rates, and demands for instant gratification have combined over the past decade to erode long-term commitments. Thus, while the 1970's were marked by a striving in the science community to recreate the conditions of the golden age following World War II, when the federal-academic research axis reigned supreme, few believe it is practical today.

Science is indeed an endless frontier, but federal science budgets most decidedly are not. There is lip service to the Bushian ethic in Washington, but at the core there is skepticism of research and development as autonomous functions. Autonomy is giving way in industry, government, and academia alike to a closer integration with the innovation system. A symptom of this trend is the rapid growth of industrial funding for academic research—one of the only growth segments of university and college support.

Regardless of how this trend may be perceived, there is little doubt that we are entering a new era in the funding and performance of R & D in the United States. And, as befits a new era, new initiatives are emerging. Much of academia is showing verve and ingenuity in meeting such critical problems as uncompetitive faculty salaries, a paucity of U.S. graduate students, inadequate research funds, and antiquated laboratories. In fields such as microelectronics, robotics, microbiology, and catalysis, industry-university research consortia are achieving prominence. University and industry groups have banded together to support common goals in organizations such as the Council for Chemical Research and efforts such as the National Engineering Action Conference, held on 7 April (*Science*, 30 April 1982, page 465).

To procure vitally needed instruments and facilities, Colorado State University has used debt financing. George Olson, Vice President for Research at Colorado State, has pioneered this technique successfully for more than 10 years. Similarly, there is thinking that mechanisms for setting up limited partnerships to finance development projects might be applied to financing academic research as well.

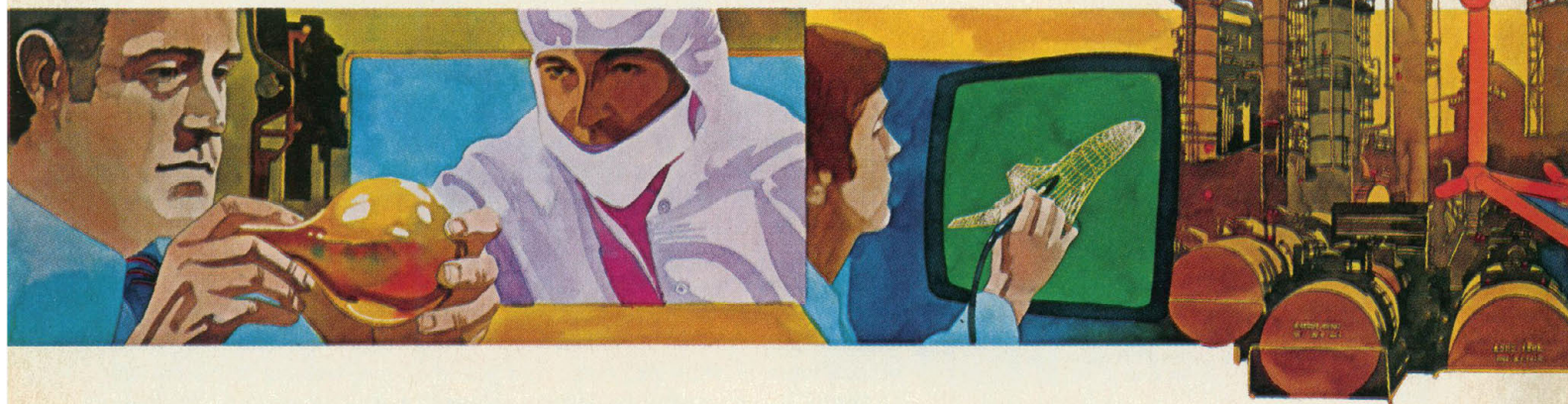
Despite these vigorous responses, it is possible that not all needs will be met. Even so, we must remember that R & D does not prosper through funding alone; there are values to preserve. Essential are the integrity of the scientific research process, the freedom of academic opinion and expression, and the dominance of excellence. These and other necessities will be harder to preserve in this era as new techniques and relationships are brought into play.

Less well recognized is the need to preserve the privilege of decision in R & D activities. In order to tap the creativity of people, it is necessary to give them a certain freedom of action and leeway to follow their ideas. Otherwise, society cannot take advantage of their talents. On the other hand, the funder, whether it be a corporation, government agency, or limited partnership, must set a framework for evaluating technical activities in relation to its own purposes.

Balancing the influence of the performer and that of the funder is a delicate matter and a prime test of R & D leadership. Today the balance is tipping again toward the funder and away from those who tend the base of knowledge and technique. A priority for scientists and engineers is preservation of the balance, and this will be achieved most effectively through persuasion. Those in industry must recognize that their institutions cannot micromanage academic or industrial fundamental research. Even if that were possible, it would negate much of the value to be found in first-class research. This point must be stressed; funders of research will, first and foremost, be buying human talents. It is those talents which will create a better future.—EDWARD E. DAVID, JR., *President, Exxon Research and Engineering Company, Florham Park, New Jersey 07932*



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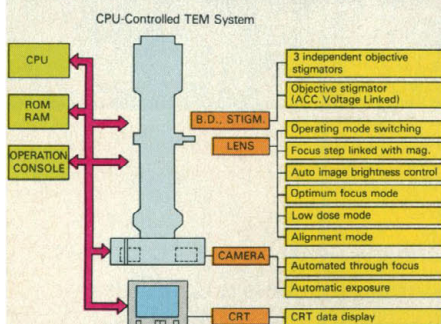
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