SCIENCE

30 June 1967

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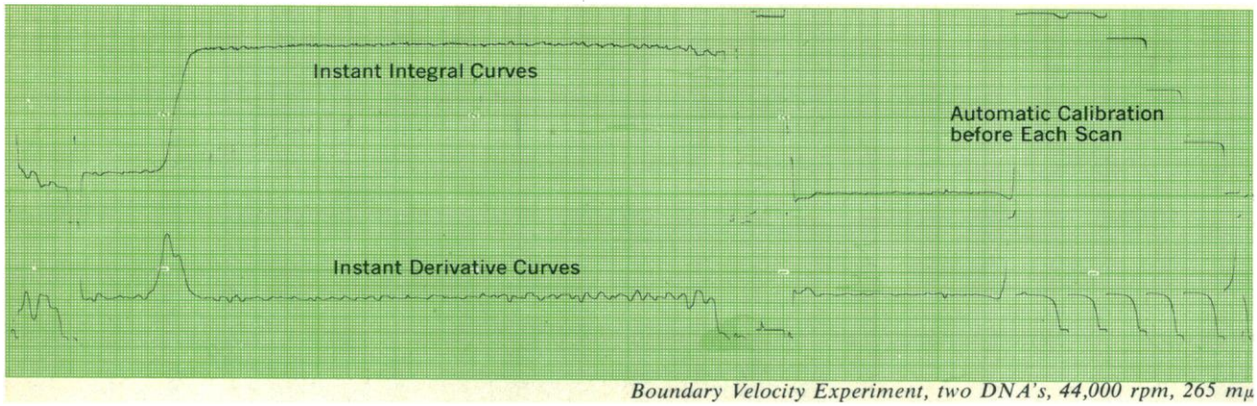
AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

PRECIPITATE PARTICLE

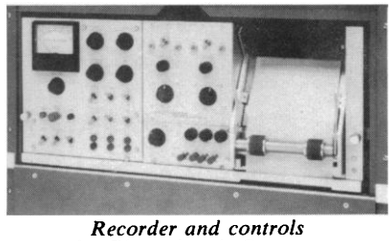
Index Issue



Boundary Velocity Experiment, two DNA's, 44,000 rpm, 265 mμ

Direct Scanning...the new era in analytical ultracentrifugation

The Photoelectric Scanner permits investigators, for the first time, to take full advantage of the highly discriminating absorption optical system of the Model E. It provides split-beam photometry—during centrifugation, at wavelengths selectable at will from 440 mμ down to 236 mμ. You can see what is happening in the cell as it happens because you get an immediate written record, and both integral and derivative curves are recorded simultaneously.



Recorder and controls for Photoelectric Scanner

Thus direct scanning frees you from the tedious procedures associated with the camera; provides "direct viewing" of sedimentation processes, electronic precision and discrimination in scanning the cell, and a variety of wavelengths at which to work. The precision and versatility that this new tool brings to biochemical research will inevitably open new areas of study. Already two investigators working with a scanner have been able to distinguish the catalytic and regulatory protein subunits of an enzyme in an association-dissociation study that augurs well for exciting work ahead.

What that work will be, what more will be accomplished in the era of direct scanning, only time and the ingenuity of investigators will tell.

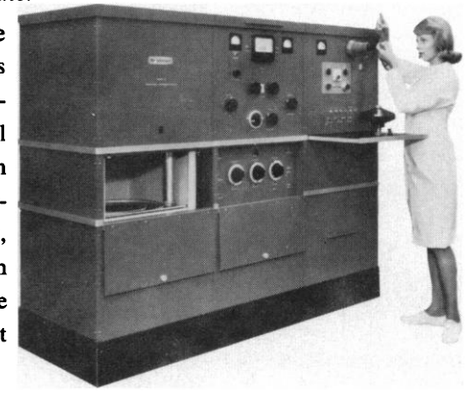
Inherent advantages of the Scanner

• Because the Scanner utilizes the split-beam principle, two samples in a double sector cell can be subjected to identical experimental conditions—an important factor in studying extremely small differences in sedimentation coefficients, for example. Or sample solution and solvent can be used in the double sector cell, with solvent reading automatically subtracted from the sample solution.

• With the Scanner classical sedimentation equilibrium measurements at extremely low concentrations in the UV are significantly easier to make. And they are more accurate because calibration steps are recorded before each scan.

• Having both curves simultaneously is a real advantage. For example: the derivative curve can show the presence of secondary components not readily recognizable from the integral curve; the integral curve can show heterogeneous material not revealed by the derivative curve.

For more information about the Photoelectric Scanner, write to Spinco Division at the address below.



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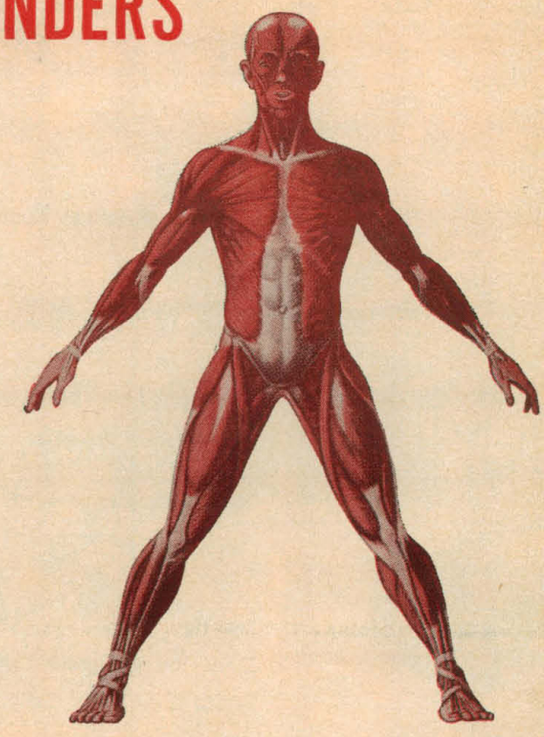

Gardner & Osburn: *In Press Now!*

STRUCTURE OF THE HUMAN BODY

by WESTON D. GARDNER, M.D., *Marquette University,* and WILLIAM A. OSBURN, M.M.A., *W. B. Saunders Company.*

This basic anatomy text pioneers a new scheme of verbal-visual presentation designed to reinforce the learning process. Each illustration depicts a single concept or a few related facts and is placed where it can be "read" with the text. To fit this plan, more than 625 drawings were made especially for this book. Eight pages of plates are shown in full color. The muscles, nerves, and blood vessels are presented in newly-designed tables with integral illustrations. The emphasis throughout is on living, normal anatomy, and the relationship of structure to function is stressed. Developmental and microscopic anatomy are included where they aid the understanding of basic structure. The selection of material, its organization, and the unique presentation make this an unrivalled textbook for any college-level course in anatomy.

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by CLAUDE A. VILLEE, Ph.D., *Harvard University*

With nearly half a million copies in print, Villee's *Biology* is well established as a leading introductory college text. In the *New (5th) Edition*, the chapters on genetics, evolution, and cell metabolism are entirely new, as are the discussions of biosynthetic processes and the utilization and conservation of energy. The rest of the text has been thoroughly updated and many new illustrations have been added. Dr. Villee maintains just the right balance between the organismic, molecular, and ecological levels; between plants and animals; between generalization and detail. As in previous editions, he emphasizes the comparative, evolutionary, and biochemical aspects of biology.

730 pages, 804 illustrations. $8.25. Published March, 1967.

Washton: *A New Book!*

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430 pages, illustrated. $7.50. Published February, 1967.

Schonberger: *New (2nd) Edition!*

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by CLINTON F. SCHONBERGER, *San Bernardino Valley College, Calif.*

This widely-used manual contains 32 experiments and 13 optional projects designed to teach biological principles with a maximum of discovery by the student and a minimum of direction by the instructor. Although it parallels the Villee text (left) it can be used with any general biology text.

375 pages, illustrated. $4.50. Published April, 1967.

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In this text for elementary school teachers, Dr. Copeland explains the relationship between the "new math" and mathematical theory. He shows how mathematics can and should be taught as a science, rather than by rote. He explains the use of sets, number theory, place value, and number line, and how to present them to a class, and gives the teacher essential background on more advanced subjects such as trigonometric functions, methods for the study of geometric ideas, and addition of integers by use of vectors. Both subject matter and teaching methods are clearly presented, making this text valuable for the teacher in service and the interested parent, as well as for the student of education.

355 pages, illustrated. $6.50. Published July, 1966.

Textbooks Gladly Sent to Teachers on Approval

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SCIENCE

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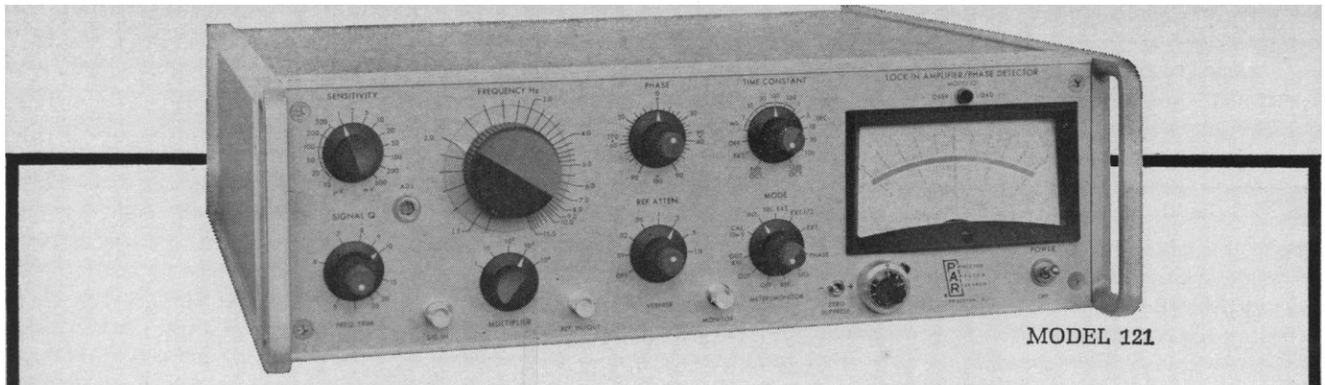
AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

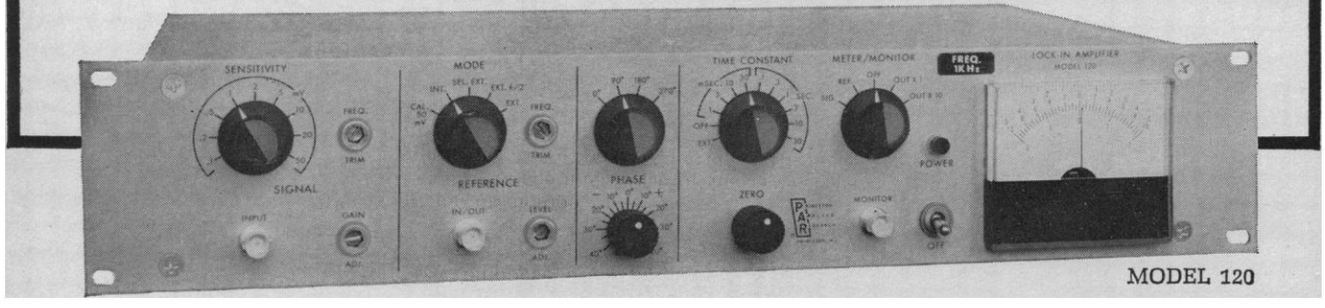
COVER

Precipitate particle formed in stainless steel containing 0.2 percent titanium. The steel was heated to 1100°C after neutron irradiation. The size of the "tree-like" particle is 2.5×10^{-3} by 2×10^{-4} centimeter (electron microscope, about × 11,000). See page 1689. [C. K. H. DuBose, Oak Ridge National Laboratory]



MODEL 121

New PAR Lock-In Amplifiers Recover Low-Level Signals from Noise



MODEL 120

Model 120 is a fixed frequency unit which allows the benefits of phase sensitive detection to be achieved at an economical price. Representative specifications are:

FREQUENCY RANGE: 5 Hz to 150 kHz. Frequency is determined by two plug-in circuit boards, each of which contains two or four (depending upon frequency) resistors and two capacitors. Plug-in frequency determining boards for any particular frequency in the above range can be ordered from PAR or the user can change frequency by changing the resistors and capacitors on the two plug-in circuit boards. A front panel vernier adjustment functions as a fine frequency control.

SIGNAL INPUT CHARACTERISTICS: Single-ended input of 10 Megohms shunted by 30 pF. Selectivity characteristic is that of a parallel resonant circuit with a Q of approximately 10.

SENSITIVITY: 100 μV to 50 mV rms full scale in a 1, 2, 5 sequence. Output X10 monitor position increases meter sensitivity by factor of 10 on any range.

FILTER TIME CONSTANT: 1 mS to 30 seconds in a 1, 3, 10 sequence and EXT position. 6 dB/octave roll-off rate.

OUTPUT: $\pm$ 10 volts full scale, single-ended with respect to ground.

PRICE: $765.00.

Export Prices approximately 5% higher, (except Canada).

Model 121 is continuously tunable throughout its entire operating frequency range. It provides the versatility required for use in many sophisticated research applications. Illustrative specifications are:

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SENSITIVITY: 10 μV to 500 mV in 1, 2, 5 sequence. Output X10 monitor position increases meter sensitivity by factor of ten on any range.

FILTER TIME CONSTANTS: 1 mS to 100 sec. in 1, 3, 10 sequence and EXT. position. 6 or 12 dB per octave roll-off.

OUTPUT: $\pm$ 10 volts full scale, single-ended with respect to ground.

VOLTMETER MODE: Internal demodulator reference signal derived from signal to be measured. Unit operates as average responding AC voltmeter with overall sensitivity unchanged.

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For additional information write to Princeton Applied Research Corporation, Dept. G, P.O. Box 565, Princeton, New Jersey 08540. Telephone: (609) 924-6835.

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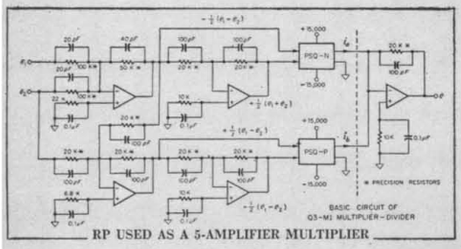
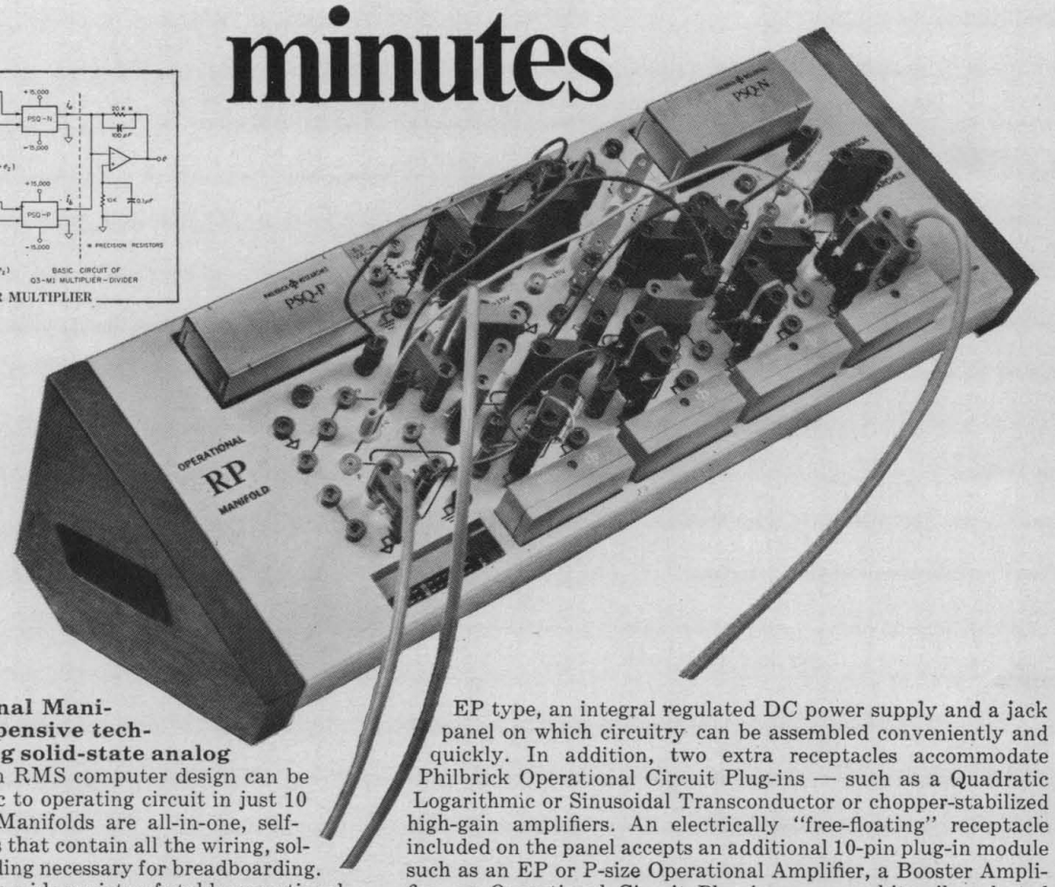


RP USED AS A 5-AMPLIFIER MULTIPLIER



Philbrick RP Operational Manifolds offer a new, inexpensive technique for breadboarding solid-state analog circuitry. For example, an RMS computer design can be transformed from schematic to operating circuit in just 10 minutes. RP Operational Manifolds are all-in-one, self-powered analog instruments that contain all the wiring, soldering, shielding and grounding necessary for breadboarding. They make it easy to build a wide variety of stable operational amplifier circuits that are free of "bugs", "strays" and other parasitic happenings. Essentially all of the 125 circuits described in Philbrick's Applications Manual for Operational Amplifiers can be assembled quickly and easily on the manifold.

RP is much more than a breadboard. Because it is rack-mountable, its use is not limited to temporary experimental circuits, but also includes permanent or semi-permanent circuits that must be built to seemingly impossible schedules.

Model RP simplifies experimentation, simulation and instruction in the practical application of feedback techniques. It is useful in industrial process control, physics and electronic laboratories, educational institutions and in-line analog data processing applications.

The Model RP Operational Manifold has five receptacles for plug-in solid-state Operational Amplifiers of the Philbrick P or EP type, an integral regulated DC power supply and a jack panel on which circuitry can be assembled conveniently and quickly. In addition, two extra receptacles accommodate Philbrick Operational Circuit Plug-ins — such as a Quadratic Logarithmic or Sinusoidal Transconductor or chopper-stabilized high-gain amplifiers. An electrically "free-floating" receptacle included on the panel accepts an additional 10-pin plug-in module such as an EP or P-size Operational Amplifier, a Booster Amplifier, an Operational Circuit Plug-in or any arbitrarily selected set of circuit elements preassembled on an OP-O Uncommitted Plug-in unit.

Mounted on the front panel of the RP Operational Manifold are 106 tip jacks, spaced ¾″ apart in a pattern of equilateral triangles. They accommodate standard twin-tip plugs and are used for mounting passive components, shorting bars and as terminations for shielded input and output cables. Jacks are color-coded. Functional interconnections are printed on the panel. RP is available either for rack-mounting or (with attractive hardwood ends) for bench use.

For more information, consult your nearest Philbrick engineering representative or write Philbrick Researches (A Teledyne Company), 25-J Allied Drive, at Route 128, Dedham, Massachusetts 02026. Phone (617) 329-1600, TWX: 617 326-5754, Telex: 094-6576.

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Technology and Control of Crime

Projecting a statistical trend may not tell us where we will be some years hence, but it does tell which way we are heading and warns us to start steering a different course if we do not like the apparent destination. Projections of current crime statistics give clear warning of the need for some vigorous steering. The peak age of arrests for nontraffic offenses is now 16. The frequency of arrest at each age has been increasing, with the largest increases at the lower ages. Even without further increase above 1965 age-specific arrest rates, "at least 40 percent of the male children living in the United States today will be arrested for a nontraffic offense sometime in their lives. For boys living in cities, the figure is in the order of 60 percent." More complete reporting than in earlier years accounts for some increase in crime rates, and so probably do changes in definition; the boy who got a whipping for stealing apples from a neighbor's tree has a son who gets a police record for stealing a neighbor's automobile. Even so, the anonymity of the city and the mobility of the automobile make crime easier, and the deterring influences of family, church, and moral climate seem to have weakened.

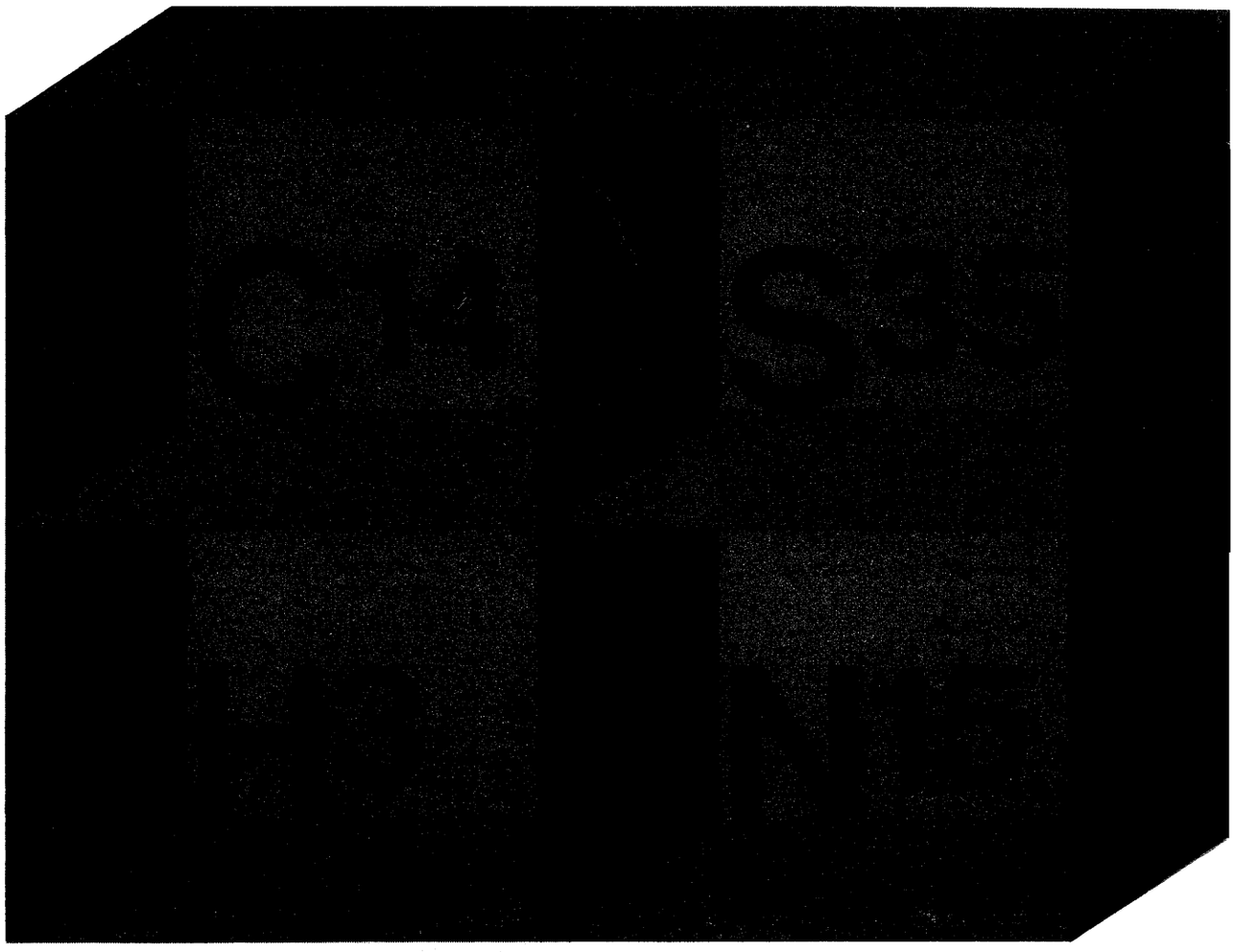
The quotation given above is from a report of the Institute for Defense Analyses to the President's Commission on Law Enforcement and Administration of Justice* (see *Science*, 23 June, page 1579). The authors recognize that a complete analysis of the problem of reducing crime would involve much that lies in the area of sociology and the behavioral sciences, but in this report they concentrate on improvements to deterrence and apprehension that could be made relatively quickly by the use of known technology and physical science.

Some of the proposals deal with items of equipment, such as improved radios, a semiautomatic system for fingerprint identification, a locator system for patrol cars, and more nearly theft-proof automobile locks (such as are now required, and apparently are quite effective, in West Germany). A police command and control system would shorten police response time when a crime is reported and would make for more efficient use of resources. A systems analysis of police operations and court procedures is thought likely to lead to better use of personnel and faster processing through police and court channels. The possibility that a national information system for criminal justice agencies might be misused is recognized, but such a system would have many advantages; cost estimates and system characteristics are described in the report.

Many of the suggestions are tentative because much of the information necessary for more definitive recommendations is not available. The strongest recommendations are for more systematic data collection and for a substantial research and development program on equipment and methods. These recommendations are supported by some persuasive calculations indicating that the payoff from properly directed research might be quite substantial in terms of reduced operating costs or greater effectiveness. The President's Science Advisory Committee has endorsed the research recommendations.

If it seems a bit strange to find the Institute for Defense Analyses working on problems of domestic crime, it should not seem so in the future. Why should an agency with a developed competence in systems analysis and innovation not turn to new tasks? One of the problems of government is the maintenance of special-purpose laboratories at maximum utility as conditions change. Use of IDA to study crime is a good example of organized flexibility.—DAEL WOLFLE

* *Task Force Report: Science and Technology. A Report to the President's Commission on Law Enforcement and Administration of Justice* (Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402, $1.25).



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