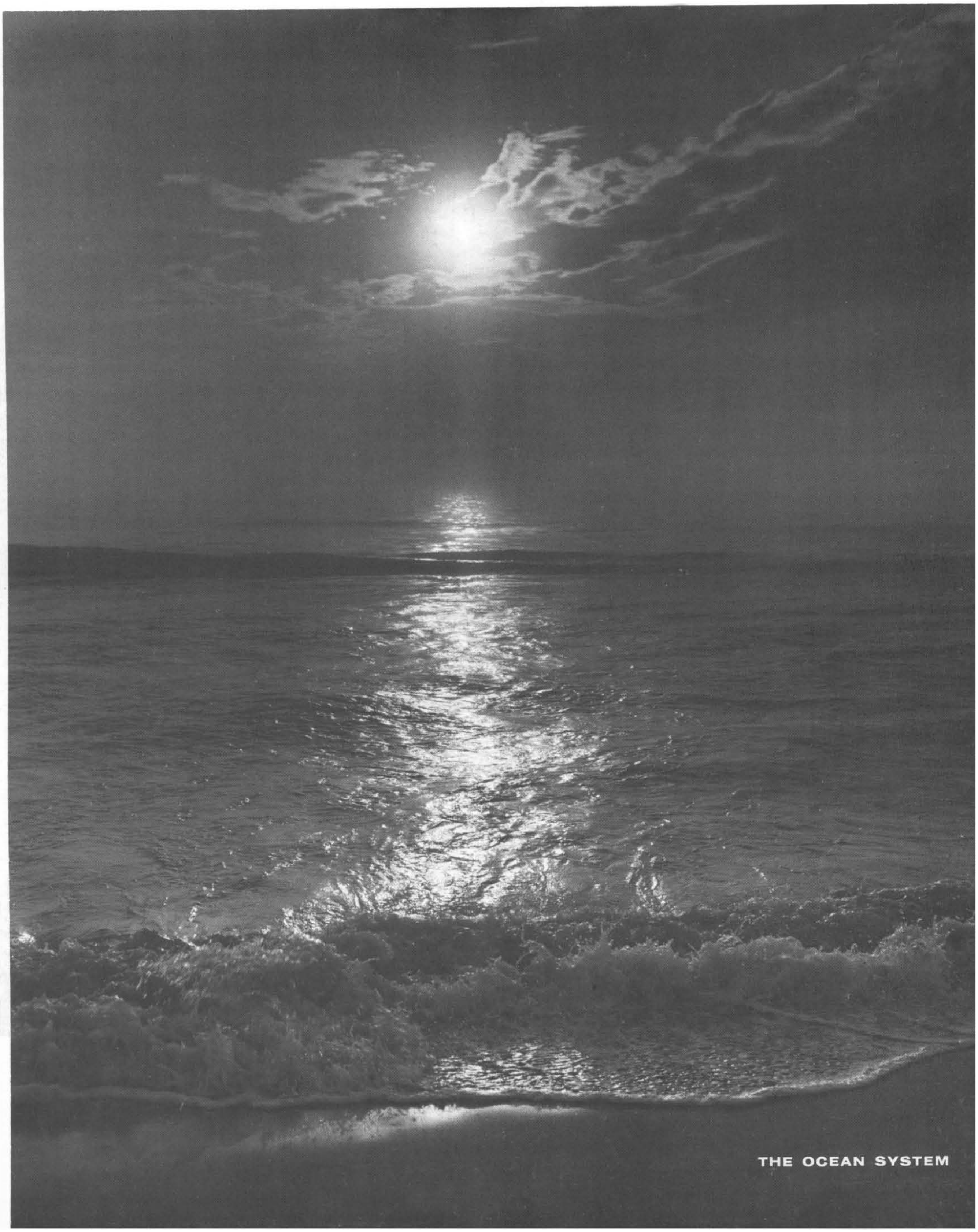
SCIENCE

2 June 1967

Vol. 156, No. 3779

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE



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COVER

The interaction of Sun, atmosphere, and oceans is a first step in a geochemical process which brings many substances to the sea. These interact with the components already in the ocean. Some salts remain in solution. Other materials, including clays, are precipitated. For a discussion of the chemical equilibria involved, see page 1189. [B. J. Nixon, Virginia Beach, Virginia]


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The hope of doing each other some good prompts these advertisements

For the infrared file

Do you know Jack Stolp? You probably do if you have ever had to look seriously into the matter of a suitable, insoluble material for transmitting or refracting infrared radiation, particularly if you had thought you'd be better off without cold flow or cleavage planes. If you anticipate a concern with the subject, please clip or photocopy the following table and *put it where you can find it* so that when you do get in touch with Jack, you two can get down to cases right away without floundering around:

KODAK Infrared Optical Material

	IRTRAN 1 Polycrystalline Magnesium Fluoride	IRTRAN 2 Polycrystalline Zinc Sulfide	IRTRAN 3 Polycrystalline Calcium Fluoride	IRTRAN 4 Polycrystalline Zinc Selenide	IRTRAN 5 Polycrystalline Magnesium Oxide	IRTRAN 6 Polycrystalline Cadmium Telluride
Transmittance >50% at 2 mm thickness	1-8μ	1-13.5μ	0.4-10μ	1-19μ	0.7-7.5μ	2-28μ
Refractive index at 25 C	1.378 at 1μ to 1.263 at 8μ	2.291 at 1μ to 2.151 at 13μ	1.432 at 0.6μ to 1.300 at 10μ	2.485 at 1.0μ to 2.310 at 20μ	1.746 at 0.5μ to 1.482 at 8μ	2.734 at 1.5μ to 2.672 at 10.0μ
Hardness	576 Knoop	354 Knoop	200 Knoop	150 Knoop	640* Knoop	45† Knoop
Water solubility	Insoluble	Insoluble	Practically insoluble	Insoluble	Insoluble	Insoluble
Maximum diameter (circular flats)	8 inches	8 inches	6 inches	7 inches	6 inches	3 inches
Maximum thickness (circular flats)	1 inch	1 inch	½ inch	½ inch	¼ inch	½ inch
Dome or lens capability (diameter)	9-inch hemispherical dome	9-inch hemispherical dome	Maximum-size lens or dome that can be made from maximum-size flat disk.			
Relative prices	Low	Low	Moderate	Moderate	Moderate	High

IRTRAN 2 Lenses of 1, 2, and 3-inch focal length are stocked *About as hard as a steel file †About as hard as hard coal

Details from W. J. Stolp, Eastman Kodak Company, Apparatus and Optical Division, Rochester, N. Y. 14650, phone 716-325-2000, ext. 5166

An alignment jig for NMR

Over about a 45° temperature range 4,4′-Bis(hexyloxy)azoxybenzene (EASTMAN 10120) is aligned in one dimension and randomly arranged in the other two dimensions, a state termed nematic and recognized long ago as fraught with possibilities. One such now flickering into prominence is use of EASTMAN 10120 for aligning other molecules with the magnetic field of a nuclear magnetic resonance machine.

Let's say your solute is benzene. No longer (it is reported in *Journal of the American Chemical Society* 86:5023) is one hydrogen nucleus indistinguishable from another on the benzene ring. No longer, therefore, does the NMR spectrum of benzene consist of a single narrow line. Now our nematic product seizes upon the flatness of the benzene molecule, while the magnetic field seizes upon its π-clouds. Each of the hitherto indistinguishable protons now "sees" a "para," two "ortho," and two "meta" neighbors. Each affects the other's magnetic environment, both directly and through electrons. The interactions transform the one-line NMR spectrum into about 50 lines, all predictable on the assumption that benzene is a regular hexagon. Very neat. Lends further, if no longer necessary, confirmation to the picture of the benzene molecule that awoke Herr Kekulé from his legendary, troubled, and prescient snooze by the fireplace in 1865.

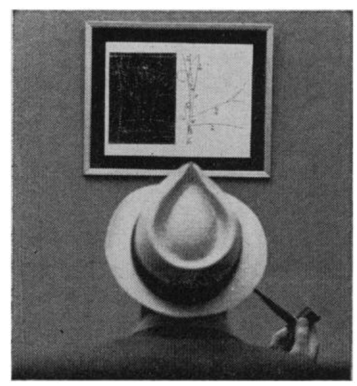
For the convenience of those concerned with molecules where confirmation of postulated shape is still necessary, Distillation Products Industries, Rochester, N. Y. 14603 (Division of Eastman Kodak Company) offers 4,4′-Bis(hexyloxy)azoxybenzene at $9.10 for 5 grams; $17.05 for 10 grams. It is, indeed, convenient to introduce some orientation without freezing the magnetic nuclei into a full-fledged three-dimensional crystal, where a virtual infinity of couplings smears the spectrum into a continuum. The EASTMAN *Organic Chemicals catalog is full of many other conveniences.*

Prices subject to change without notice.

A service for the bubble-chamber trade

Kodak is now thinking in terms of two basic bubble-chamber films for high-energy physics: bright-field and dark-field. The two films need be nothing more than points of departure for further adaptation to special requirements, as necessary. A reorganized and growing force of Kodak men is busy working out details with the designers and operators of bubble chambers. Their mission is to hold and extend a position of leadership in this branch of photographic technology. This can be accomplished only through the physical results delivered. It is a hard route, without alternatives. Newcomers to the dialogue make contact by addressing Instrumentation Products, Eastman Kodak Company, Rochester, N. Y. 14650.

There is a lot of money in high-energy physics, which fact creates severe problems for the physicists and justifies Kodak's interest in it under terms of Kodak's charter. Because goings-on in the subnuclear zoo have large denominators in their probabilities, bubble chambers consume film by the ton. Millions of pictures of tracks of bubbles are screened at public expense by large numbers of ladies to find which ones are worth submitting to further scrutiny by computers in hopes that a few of the pictures will shake out as possible evidence for or against hypotheses tentatively put forth by a few theoreticians and tentatively questioned by a few others. The cost of the film and the wages of the ladies represent, of course, only a small fraction of the bill that the physicists have to explain, somehow. When ladies sit packing sardines into cans instead of looking at pictures of bubbles, no explanation is required.



This man likes sardine sandwiches. He also votes in congressional elections. We are not sure whether he drives a cab in Manhattan or tries to grow a little tobacco in Kentucky. In either case, life has not been easy. He hopes his son will do better. Bright kid, doing real well in college, where he has a scholarship and where in the physics department is displayed the bubble-track picture from Brookhaven National Laboratory that established the existence of the omega-minus particle.

The what?

The kid wants to go on for a doctor's degree in physics. He probably has to know what things like that mean.

We are of two minds about that man's son. On the one hand, we'd like to see him use his time in physics lab toward an engineering career. We simply cannot understand why more kids aren't going into engineering. Maybe they don't know what an engineer does, how he determines the most efficient way to get things done, whether it's getting sardines into a can with less labor or manufacturing photographic film or hunting intermediate vector bosons or saying how much photographic quality is worth in the boson hunt. Engineers find money convenient, particularly for the measurement of efficiency, and we can understand that.

On the other hand, if the kid thinks he wants to understand more than that, maybe he ought to make himself into one of those hypothesizing theoreticians who keep the film-consuming bubble chambers busy.

Kodak

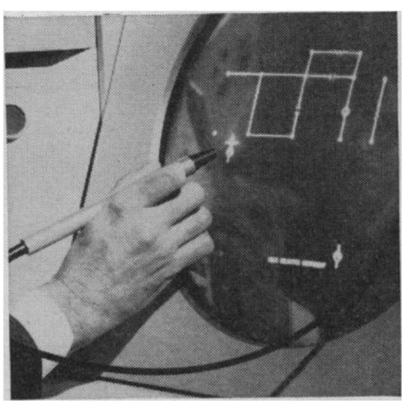
Report from

BELL LABORATORIES

Programming Complex Problems Simply

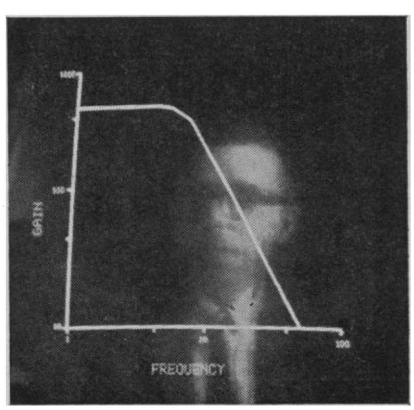
1. A program for GRAPHIC I lets engineer W. H. Ninke draw a circuit diagram on a cathode ray tube, using familiar component symbols.

2. In describing a circuit problem to the computer, he guides nodes (circuit junction points) into place with a light pen.

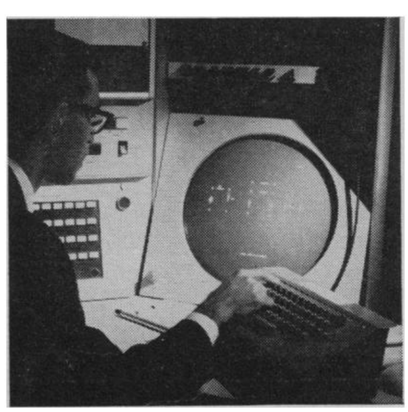


3. He next guides components into place. Where necessary, he can mark certain ones "variable" by placing a slant arrow across each.

4. With a keyboard, which resembles a typewriter, he inserts the values of the various components and the operating conditions of the circuit.



5. He asks the central computer to use this information to calculate and display a curve of gain vs. frequency response for the circuit.



6. Seeing the curve, he may modify the circuit, insert new values for variable components, request the computer to recalculate performance.

Scientists at Bell Telephone Laboratories have improved communications between engineers studying circuits and the computer that helps them. The key is an experimental console on which the engineer works with familiar graphics: component symbols, performance curves, and so on.

The engineer composes a circuit on a cathode-ray tube, inserts component values, makes certain components variable, as required. The display equipment responds immediately to his commands. As he proceeds, the console displays appropriate operating instructions. At his request, the computer calculates and displays circuit performance. He may adjust the variable components or revise the circuit and call for performance calculation again.

This sophisticated tool is not needed in routine circuit design. Its principal use will be where well established, highly automated design procedures do not exist—for example, when investigating effects of temperature, component tolerances, and stray coupling. The "conversational" ability promises to make this hardware-software system a valuable laboratory tool.

The console itself is GRAPHIC I, a man/machine computer terminal developed at Bell Laboratories. It includes a cathode-ray display, a keyboard for inserting letters or numbers, a light pen for selecting and positioning symbols on the tube, and a small display-control computer. Network analysis is handled by a separate large digital computer on a shared-time basis.

The circuit-analysis program is only one of several compiled for GRAPHIC I at Bell Laboratories. Others help generate integrated-circuit masks, design wiring patterns for magnetic-core logic devices, or retrieve documents. A special compiler (program for making programs) has been developed for GRAPHIC I. It is GRIN—for GRaphic INput.

Based on GRAPHIC I, a new generation of graphic terminals will be installed as part of an overall computer facility at Bell Laboratories.

Bell Telephone Laboratories
Research and Development Unit of the Bell System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Much for Your
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Investment . . .
and then some with
MSE

count for the election of Bronk. Efforts to vitalize the Academy into the effective organization that it has become under the leadership of Bronk and Seitz began 2 years before the nomination of Conant, and had acquired sufficient momentum by April 1950 to override a nomination that to the majority meant a return of the Academy to the functions of "electing members and writing obituaries." It is pure journalese to ascribe the election of Bronk to a "seething vendetta."

JOEL H. HILDEBRAND
Department of Chemistry, University of California, Berkeley 94720

L'Accademia Nazionale dei Lincei

The issue of 11 March 1966 contained an excellent article, by Stillman Drake, on the Accademia dei Lincei. The article was mainly devoted to the early history of the academy and its connection with Galileo. The purpose of this letter is to draw attention to another recent publication, *L'Accademia Nazionale dei Lincei* (ed. 2, 1966, quarto, 68 pages), by Mauro Picone, the eminent mathematician who is now academician-administrator of the academy. The book contains a short history of the academy, with a list of some of the great men of the past who were members of this illustrious body; some details about the numerous publications of the academy; and a list of the recipients of its periodic prizes, which are awarded on a worldwide basis to scientists, writers, and artists who make outstanding contributions to the world's knowledge and culture. (Some of the awards are in monetary value equal to or superior to the Nobel Prizes. Among the several American recipients are Wallace O. Fenn and Albert Bruce Sabin, who received prizes in medicine in 1964.)

The book contains a reproduction of the academy's constitution with the signatures of its earliest members, including Galileo, and 17 large photographs of the two beautiful and historic palaces, Palazzo Corsini and Villa Farnesina, occupied by the academy. It may be ordered for 3500 lire ($5.80) from the Office of Publications, L'Accademia Nazionale dei Lincei, Via della Lungara 10, Rome.

A. WEINSTEIN
9300 Piney Branch Road, Silver Spring, Maryland

Fish Meal: Food of the Ancients

At last the FDA has approved the use of fish meal as a food additive for human consumption (News in Brief, 3 Mar., p. 1087). May I quote from Arrian's account of the voyage of Nearchus along the eastern shore of the Persian Gulf in the year 325 B.C. (*1*). And may I call this quotation especially to the attention of my friend, Ed Muskie, who has worked so hard to promote this addition to the industries of Maine.

> Below the Gadrosians . . . dwell the people called "The Fish Eaters." . . . Thinking here to seize corn by force Nearchus attacked the town, but the natives showed freely their flour, ground down from dried fish; but only a small quantity of corn and barley. . . . Only a few of them fish, for few have proper boats or any skill; for the most part it is the receding tide which leaves fish in pools which provide their catch. The more tender ones they eat raw, the larger and tougher ones they dry in the sun until quite sere and then pound them and make flour and a bread of them. . . . Even their flocks are fed on dried fish so that the mutton has a fishy taste like the flesh of sea birds.

While I trust the modern product is more palatable than that found by Nearchus, I commend to the reader the patience of the Ichthyophagae who, after 2292 years, have at last succeeded in selling their idea to the government of the United States.

PHILIP R. WHITE
Anatolia College, Thessaloniki, Greece

Reference

1. Condensed from *Arrian*, "History of Alexander and Indica," Robson, trans. (Harvard Univ. Press, Cambridge, Mass., 1933), vol. 2, pp. 383, 393.

Ph.D.'s and the Mother Tongue

The retention of Ph.D. foreign language requirements by a university is justified only if foreign languages are needed in a particular field of study. If so, those languages should be *used* during the graduate student's education with readings assigned for seminars or classes. Papers and research projects should refer to literature in those languages, not merely as a linguistic exercise but because the literature is essential to the field. If a graduate student can get his doctorate with no exposure to foreign languages beyond being tested in them, then the requirements are unneeded.

What requirement then might be a useful substitute? Many ideas come to mind, including a broadening in those subjects suggested by Hartman (Letters, 24 Mar.). I would like to suggest another—a proficiency requirement in the graduate student's own language—English. Much just criticism is made of Ph.D. candidates' common inability to express their ideas lucidly in writing. I suggest that they be required to pass a test in literary criticism and report composition, including a judgment of the organization and clarity of an average paper in the student's own field. Such a test would be difficult to evaluate objectively, but the requirement in general would go far to improve American scholarship.

TOMAS FEININGER
*Apartado Aéreo 980,
Medellín, Colombia*

Sluggish Process of Purification

Rainey's estimates of the flushing times for removal of pollution from the Great Lakes ("Natural displacement of pollution from the Great Lakes," 10 Mar., p. 1242) are decidedly underestimates, even allowing for his simplifying assumptions. Increased eutrophication causes an increase of pelagic and benthic biomass which acts as a trap for nutrient elements and energy, which in turn permits recycling within each basin. Such systems are most dramatically evident in estuaries possessing two-layered, countercurrent flow, and which are automatically self-enriching. It is entirely likely that even open systems such as the Great Lakes, once enriched, will be "permanently" changed. A "major disaster for which there is no apparent solution" has already occurred in the lower lakes, since it is unlikely that the present rate of eutrophication will decrease in the next few decades. It is absolutely imperative that all available measures be taken to prevent the addition of phosphorus, in particular, to closed or semiclosed basins and to reduce the input of this element into open systems if any headway is to be made, whether in the next decades or centuries, toward controlling disastrous changes in freshwater ecosystems.

HERBERT C. CURL, JR.
Department of Oceanography, Oregon State University, Corvallis 97331

ANALOG MONOLOGUE

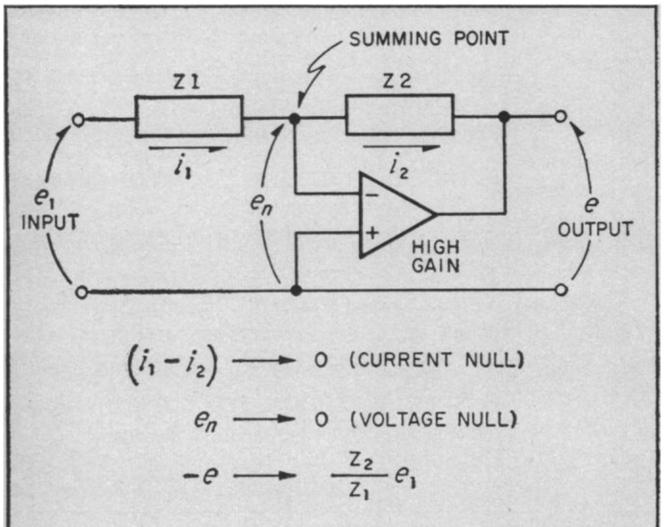
On Means for Modelling, Measuring, Manipulating, & Much Else

Volume 1, No. 5

THE SEARCH FOR CERTAINTY . . . *or* MUCH TO DO ABOUT NOTHING: PART I — WHY & WHAT

Classical philosophy was chiefly occupied by an unremitting quest for the Absolute . . . the Essence. Modern "scientific" philosophers spurn the hunger for certainty, calling it immature, unworthy of their finely-wrought intellects, and (perhaps more to the point) demonstrably hopeless. OK — or perhaps we should say *certainly*.

Nevertheless, in at least one important phenomenological field — feedback — we can enjoy the confidence inspired by one Absolute thing: Absolute Zero, or Null. This condition of null is not to be confused with the Oriental Nirvana, or Nothingness; nor is it like Lord Kelvin's Absolute Zero of temperature. It is, rather, the balance point in a continuum of values that stretches from very positive to very negative. Think of it as a perfect equilibrium between pairs of equal and opposite forces. In Analog Electronics (the busiest arena of feedback) our ambitions have a Classical flavor. We know what perfection is — it is Null Zero. We know what must be done to approach it. We also know that we shall never attain it — which should console the Modernists.



Consider the fundamental circuit shown . . . by now quite familiar to faithful readers of this series. It is essentially a demonstration of how amplification (gain) may be used to activate a passive network (Z1 and Z2) so as to achieve the desired input/output relationship, with a fidelity that is virtually independent of the exact magnitude of the gain of the amplifier. If the gain is very high, it *forces* e_n toward a null. (Perfect null requires infinite gain.) To establish the null, the amplifier causes e to approach a value satisfying the equilibrium:

$$-\frac{e_1}{Z_1} = \frac{e}{Z_2}$$

The performance required of many practical feedback circuits dictates a state of null perfection that is unknown and unachievable in any discipline other than electronics. For example, in some 100-Volt circuits, the "null uncertainty" must not exceed a few microvolts . . . or a few parts in 100 million. How may we achieve a null that is so very nearly zero? And how may we know when we have it?

Perhaps the primary requirement in achieving a good null (other than very high gain) is the absence of extraneous forces. Is the null achieved by balancing only *two* opposing forces, or are there other, perhaps anomalous, forces acting on the summing point? Unfortunately, there always are. Even the most perfect amplifier is unable to present a completely passive input circuit to the summing point. Tiny voltages and currents are generated in the amplifier, tending to "offset" the null, and much of our day-to-day activity for the past twenty years has been devoted to reducing the magnitude and effects of these *voltage and current offsets.*

The most obvious remedy is to introduce into the summing point an equal and opposite voltage or current so as to cancel (offset?) the offset . . . if it is known or calculable. This remedy does not provide a complete cure, if applied as a simple, static correction, because the offset currents and voltages produced by a practical amplifier are *not* perfectly constant, but vary with both time and temperature. One might eliminate most of the temperature effects by placing the amplifier in a nearly isothermal environment, but time variations are another matter. (Even a latter-day Classicist hesitates to tamper with time.)

To give you some feeling for what can be done, in practical run-of-the-bench low-uncertainty amplifiers, consider the SP2B parametric Operational Amplifier pictured here. At an output voltage (e) of 10 Volts, and a load of 10 milliamperes (i.e., 0.1 watt), the equivalent null errors at constant temperature will be less than 10 μV and 0.1 picoampere (i.e., 1 attowatt).

We plan to discuss ways and means of reducing null uncertainty in feedback circuits in Part II. Meanwhile, we invite you to send for a file on our search for Null Certainty . . . consisting of technical data on some of our highly practical "near misses." You may share our null-seeking frustrations and ambitions without any obligation . . . even to sympathize. Address Philbrick Researches, Inc., 25 Allied Drive at Route 128, Dedham, Massachusetts 02026.

PHILBRICK
A TELEDYNE COMPANY

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SCIENCE

EDITORIAL CORRESPONDENCE: 1515 Massachusetts Ave., NW, Washington, D.C. 20005. Phone: 202-387-7171. Cable: Advancesci, Washington. Copies of "Instructions for Contributors" can be obtained from the editorial office. ADVERTISING CORRESPONDENCE: Rm. 1740, 11 W. 42 St., New York, N.Y. 10036. Phone: 212-PE 6-1858.

Readers' Judgment

Periodically, we ask a sample of readers to react to selected features or policies of *Science*. In response to past questionnaires, readers have consistently said they consider the lead articles to be of greater interest or professional value than any of the other sections of the magazine. This preference was confirmed in the most recent study, in which we asked for readers' judgment in three different ways: In what order do you turn to the major features of *Science*? In what order do you rank them in terms of interest to you? How would you reallocate available space among the several sections? Of course the answers varied. Some readers go through an issue systematically from front to back. Others turn first to whichever section they usually find of greatest interest. Some prefer one section; others prefer another. Some wanted to expand and others to contract each section. Nevertheless, majority judgments were unequivocal.

On the basis of all the rankings of each respondent, the several sections fall into the following order of preference: lead articles are in first place by a substantial margin (two-thirds of the readers ranked the lead articles as first or second choice); research reports and the News and Comment section are about tied for second place (between 40 and 50 percent gave each of these sections first or second rank); letters, the editorial, and book reviews are bunched; and the section of meeting reports trails.

Science is written for scientists. It is therefore encouraging, even if not surprising, to find the scientific content highly regarded. But *Science* is more than a scientific journal. Sometimes in lead articles and often in letters, editorials, and News and Comment, *Science* publishes a substantial amount of material on social policy, government actions, university trends, and other matters affecting science education. Publication of such material is consistent with the Board of Directors' intent that the magazine serve as a forum for the discussion of problems of concern to scientists. Rarely does the Association take a position on a controversial issue; each individual scientist can reach his own judgment on matters that interest him. *Science* can help by serving as a forum for discussion of current problems and controversial issues. Sometimes the presentation is balanced, analytical, historical, or interpretive. At other times it is frankly partisan, and when it is, a rebuttal or an expression of another point of view by a different author frequently follows in a later issue.

In the most recent questionnaire, readers were asked how well they thought we have succeeded in providing a forum for all shades of responsible opinion on matters especially relevant to the scientific community. Ninety-five percent said they thought we have succeeded reasonably well, and 5 percent disagreed.

We also asked if the material appearing in *Science* has seemed too conservative, about right, or too radical. The replies indicated that 10 percent thought the magazine too conservative, 88 percent thought it about right, and 2 percent considered it too radical.

In a similar question, readers were asked whether the material in *Science* was too controversial. Two percent thought it was; 80 percent considered it about right; and 18 percent said it was not controversial enough.

The thoughtful judgments of readers, whether expressed in response to questionnaires or through individual letters, serve as valuable guides to all who share responsibility for planning and managing *Science*. The results summarized here may also be of interest to readers who wish to compare their own judgments with those of the majority.—DAEL WOLFLE

ology, Univ. of Chicago, 950 E. 59 St., Chicago, Ill. 60637)

15–18. American **Therapeutic** Soc., mtg., Atlantic City, N.J. (A. F. Kreglow, 1801 Eye St., NW, Washington, D.C.)

15–19. American College of **Chest Physicians**, Atlantic City, N.J. (M. Kornfeld, 112 E. Chestnut St., Chicago, Ill. 60611)

16–17. American **Geriatrics** Soc., Atlantic City, N.J. (E. Henderson, Executive Director, The Society, 10 Columbus Circle, Room 1495, New York 10019)

17. Academy of **Tuberculosis Physicians**, Atlantic City, N.J. (G. P. Bailey, 1295 Clermont, Denver, Colo.)

17–18. Academy of **Psychosomatic Medicine**, 4th symp. on anxiety and depression, Atlantic City, N.J. (E. Dunlop, 150 Emory St., Attleboro, Mass. 02703)

17–18. American **Diabetes** Assoc., Atlantic City, N.J. (J. R. Connelly, The Associaton, 18 E. 48 St., New York 10017)

17–18. Society for **Surgery of the Alimentary Tract**, Atlantic City, N.J. (J. Van Prohaska, The Society, 950 E. 59 St., Chicago, Ill. 60637)

17–19. **Reliability and Maintainability**, 6th annual conf., Cocoa Beach, Fla. (Meetings Dept., American Inst. of Aeronautics and Astronautics, 1290 Sixth Ave., New York 10019)

18–21. **Botanical** Soc. of America, Northeastern Section, summer field mtg., Tuxedo, N.Y. (R. K. Zuck, Dept. of Botany, Drew Univ., Madsion, N.J.)

18–22. American **Medical** Assoc., 116th annual conv., Atlantic City, N.J. (The Association, 535 N. Dearborn St., Chicago, Ill. 60610)

18–22. **Health Physics** Soc., 12th annual mtg., Washington, D.C. (J. C. Villforth, Radiological Health Lab., 1901 Chapman Blvd., Rockville, Md.)

18–22. Society for **Investigative Dermatology**, Atlantic City, N.J. (G. W. Hambrick, Jr., The Society, Johns Hopkins Hospital, 601 N. Broadway, Baltimore, Md. 21205)

18–23. American Soc. of **Ichthyologists and Herpetologists**, annual mtg., San Francisco, Calif. (W. I. Follett, California Acad. of Sciences, Golden Gate Park, San Francisco 94118)

18–30. **Electron Microscopy**, workshop, Northeastern Univ., Boston, Mass. (C. Youse, Continuing Education, Northeastern Univ., 360 Huntington Ave., Boston)

19. **Scombroid Phylogeny**: Ideas and Approaches, symp. of American Soc. of Ichthyologists and Herpetologists, San Francisco, Calif. (B. J. Rothschild, Tuna Ecology Program, Bureau of Commercial Fisheries, P.O. Box 3830, Honolulu, Hawaii 96812)

19–21. Automatic **Data Processing Systems in Local Government**, 3rd annual conf., New York, N.Y. (H. Sellin, School of Continuing Education, New York Univ., New York 10003)

19–21. **Colloid**, 41st natl. symp., Buffalo, N.Y. (P. Becher, Chemical Research Dept., Atlas Chemical Industries, Wilmington, Del. 19899)

19–21. **Heat Transfer** and **Fluid Mechanics** Inst., La Jolla, Calif. (D. B. Olfe, Dept. of Aerospace and Mechanical Engineering Sciences, Univ. of California at San Diego, La Jolla)