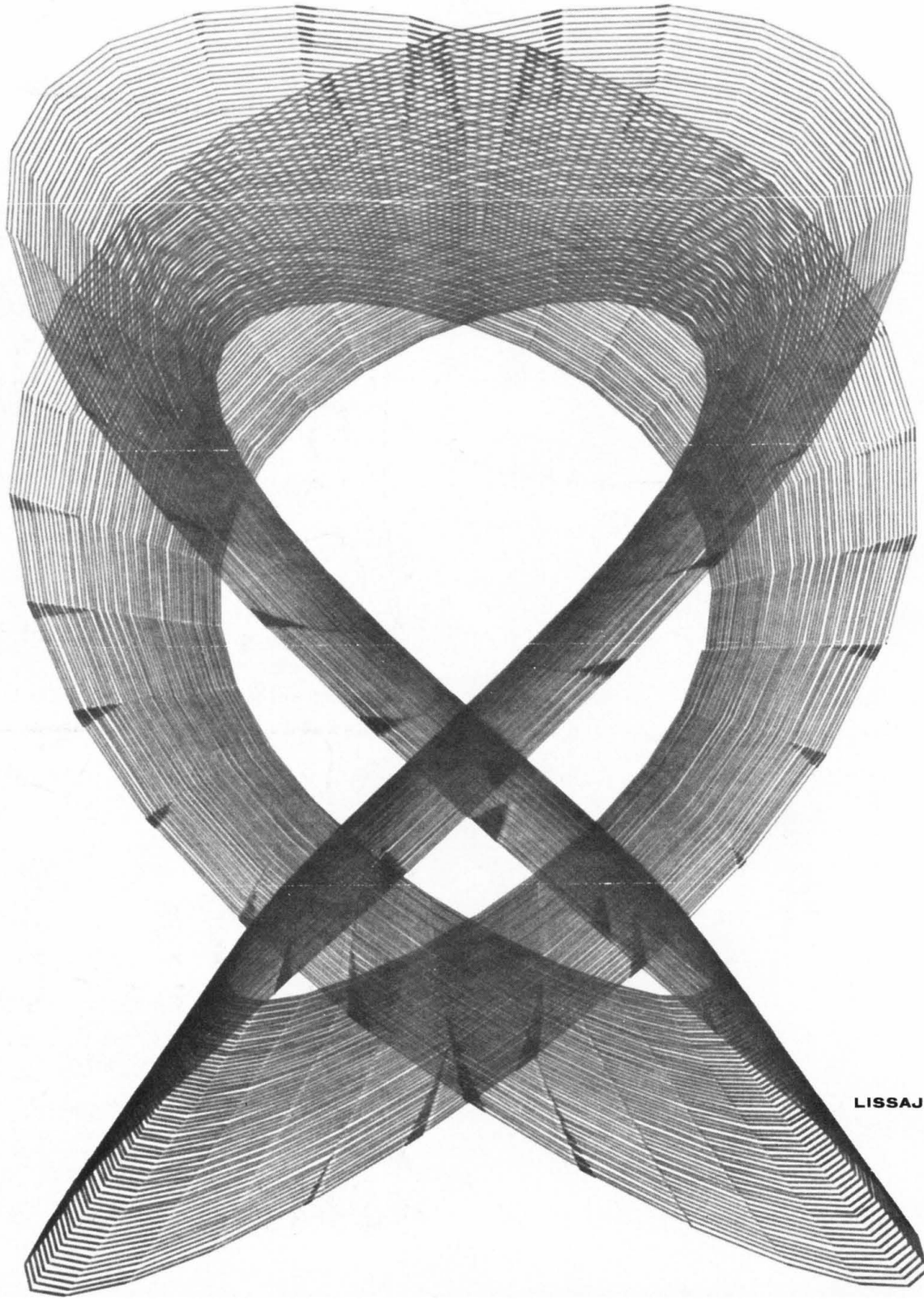
SCIENCE

18 June 1965
Vol. 148, No. 3677

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE



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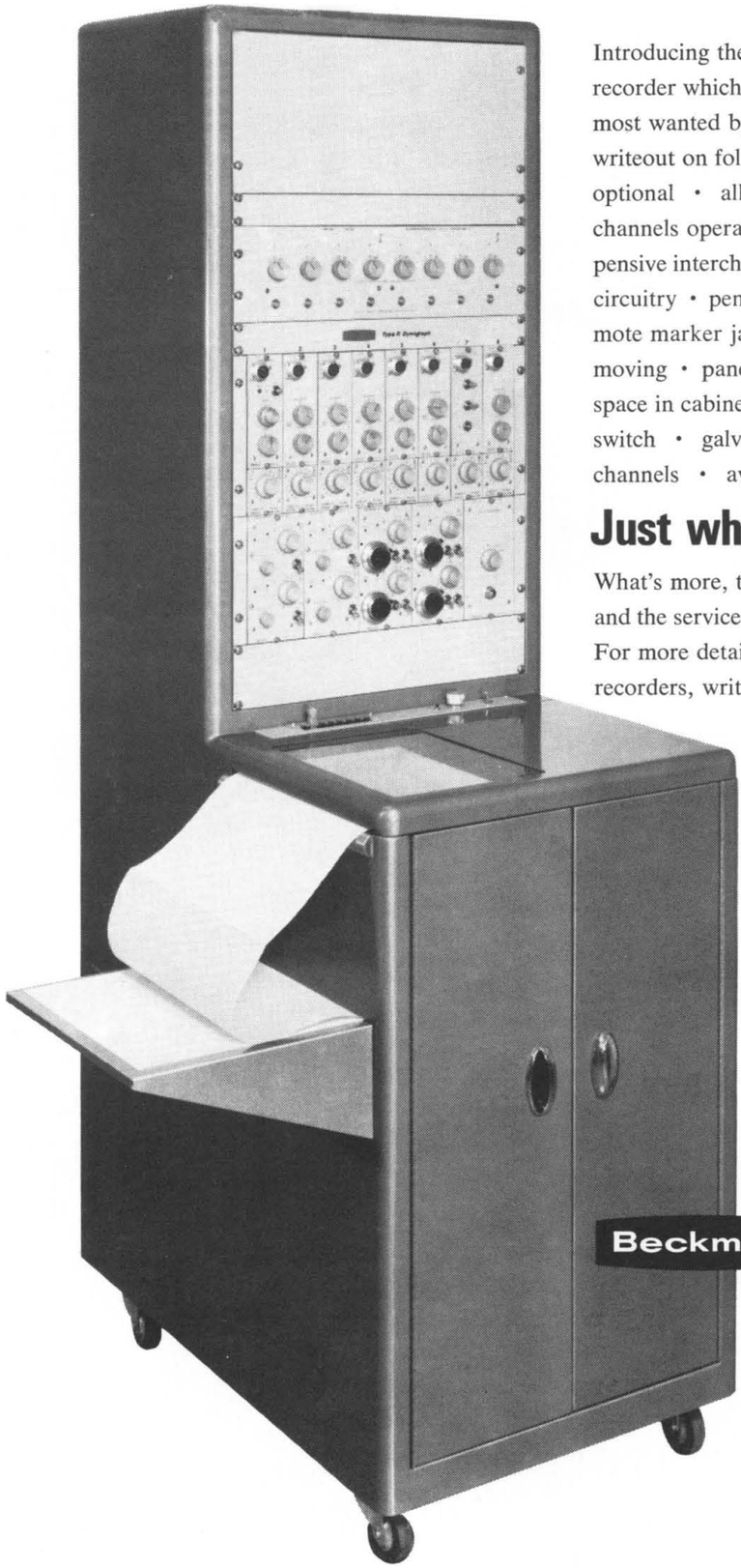

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	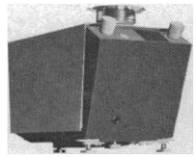	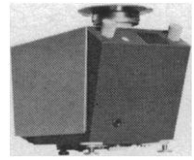	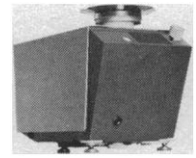	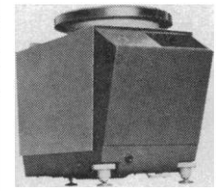	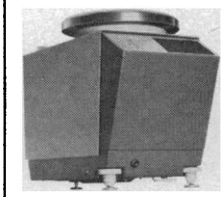
weigh unknowns to...	120 g +10 g tare	1200 g +100 g tare	1000 g +300 g tare	3000 g +2500 g tare	10 kg +3 kg tare
with precision better than...	±0.5 mg	±0.005 g	±0.05 g	±0.05 g	±0.5 g
precision/ capacity relationship of...	1 part in 250,000	1 part in 250,000	1 part in 25,000	1 part in 100,000	1 part in 25,000
checkweigh directly to over-under values from...	+60 mg to −60 mg of target weight	+0.6 g to −0.6 g of target weight	+5 g to −5 g of target weight	+11 g to −11 g of target weight	+50 g to −50 g of target weight
weigh-in to... (Including container)	130 g	1300 g	1300 g	5500 g	13 kg
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18 June 1965
Vol. 148, No. 3677

SCIENCE

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AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

COVER

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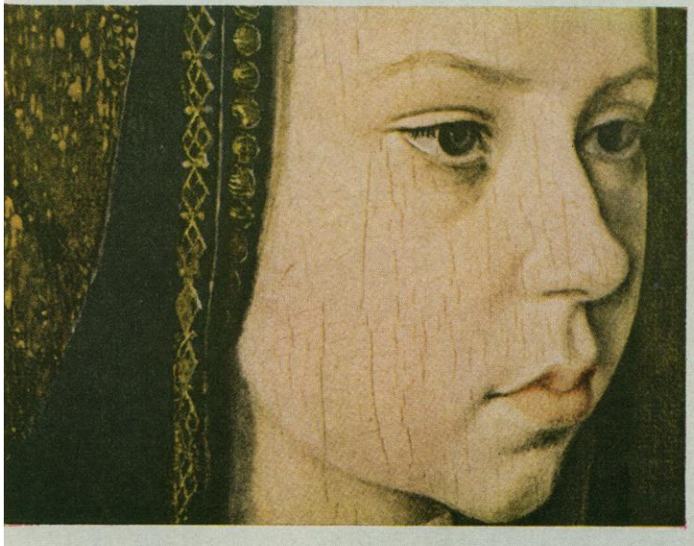
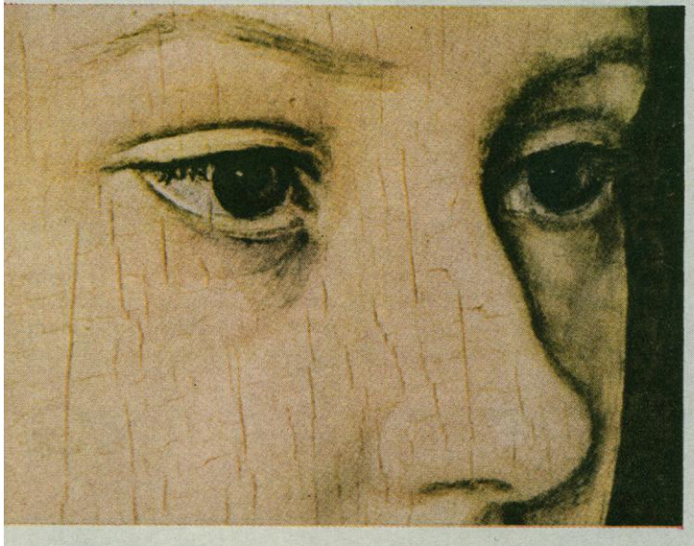


Life-size



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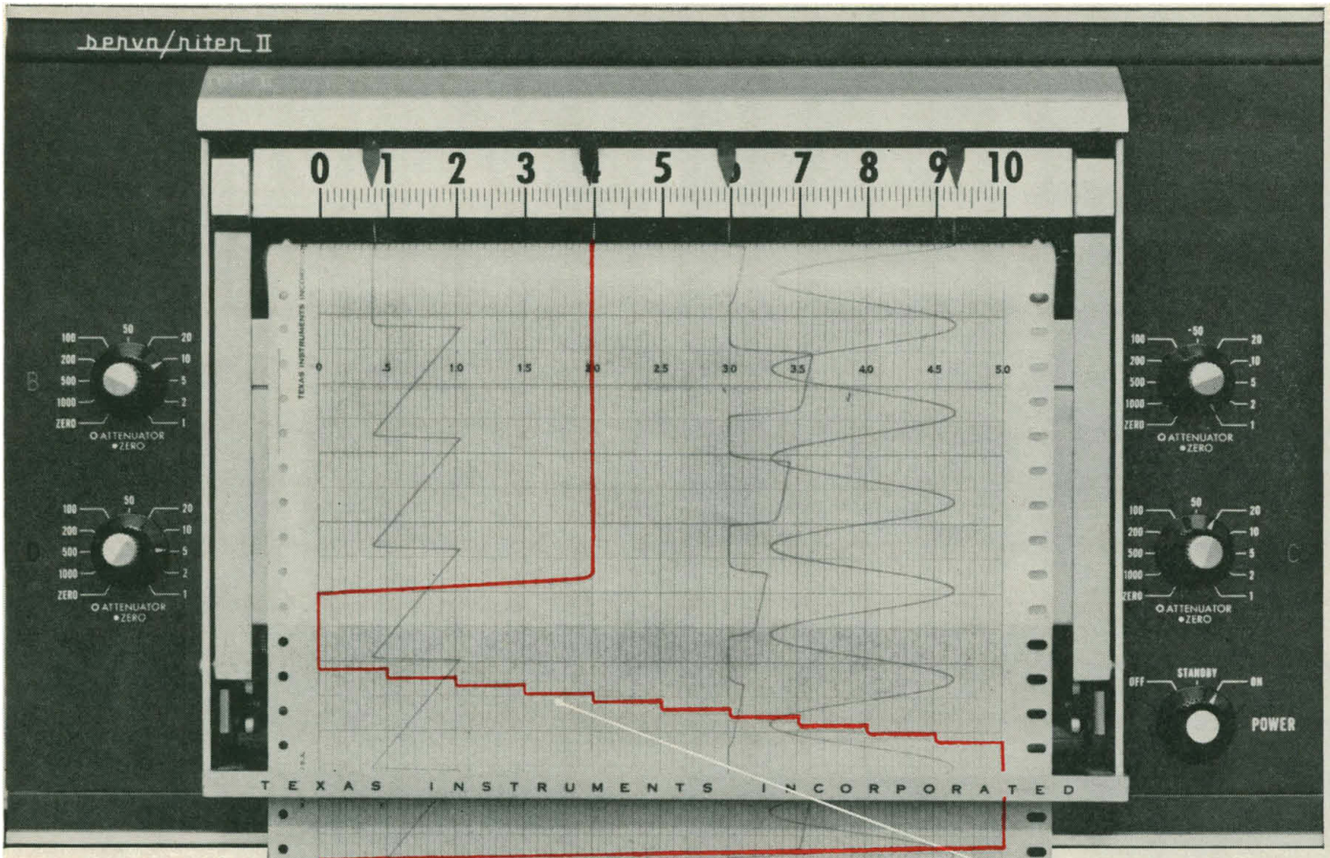

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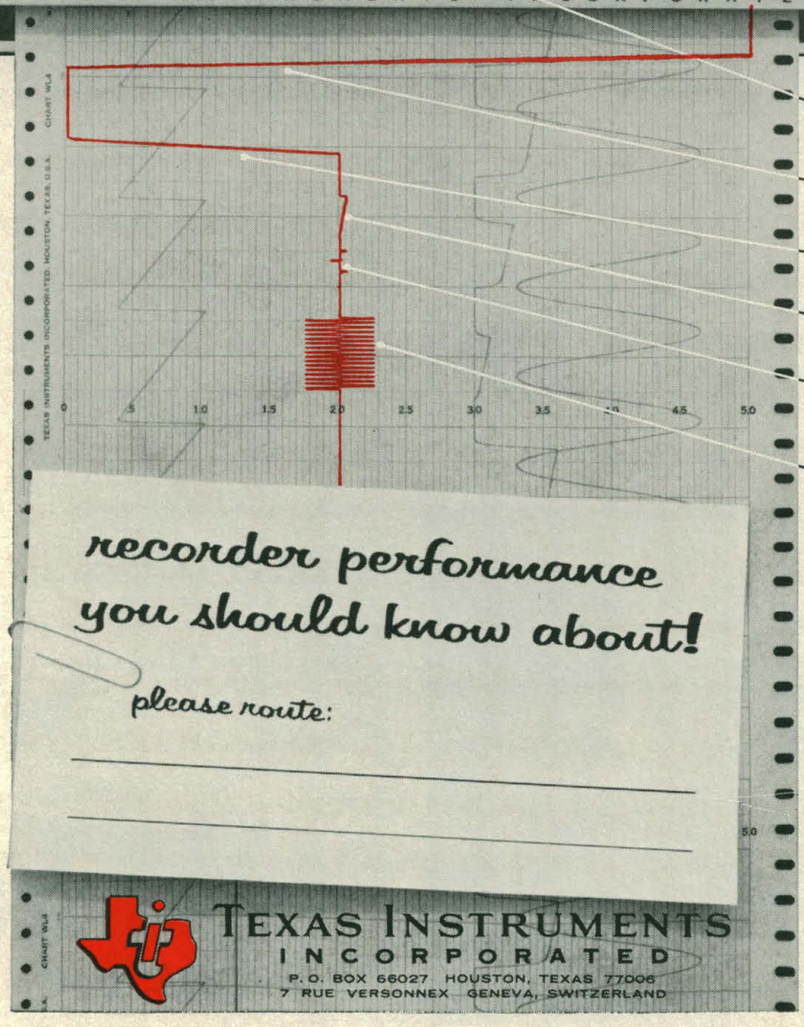

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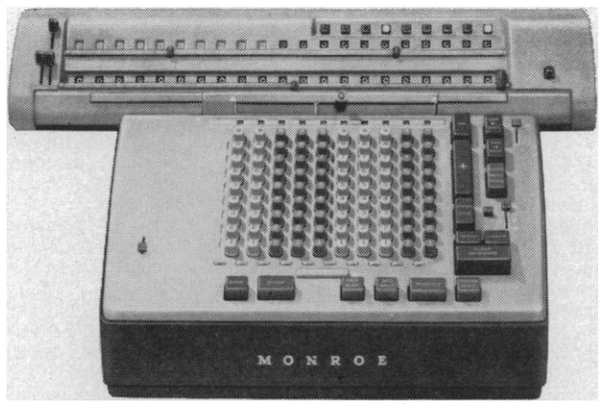

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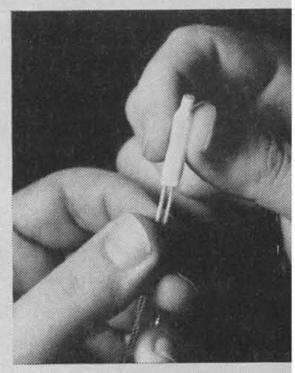

Western Electric
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18 June 1965, Volume 148, Number 3677

SCIENCE

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What Are Professors For?

The character of undergraduate education in this country has changed. Large classes and the use of television, films, and programmed instruction have tended to make teaching impersonal and mechanical. This trend has been accompanied by increases in enrollments and decreases in faculty teaching loads. In 1940 college enrollments totaled 1.4 million; in 1964 they totaled 5.0 million and were still increasing. In 1940 teaching loads of 12 hours a week were common; today a 6-hour load is not unusual. Faculties have not increased sufficiently to compensate for these developments.

Undergraduate education has changed for another reason. In 1940 most professors considered teaching their most important function. Today they often look upon research, administration, public service, or private professional practice as paramount. As a consequence of these developments, undergraduates have fewer personal contacts with professors, who at the same time have less of themselves to give when such contacts occur.

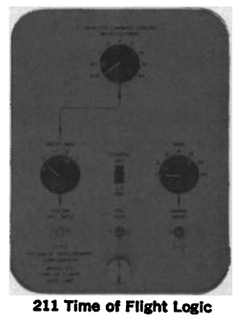
The time has come to ask, "What are professors for?" The professor's primary activities should be teaching and research, with the priority in that order, but with research a close second. His primary role should not be administration, public service, or private professional practice; if anything must be jettisoned, those functions should be the first to go.

The professor's principal function is more than lecturing. If transfer of information were enough, society could dispense with most professors, and education could be almost completely mechanized. The professor's most important role is to provide various forms of guidance for the students. As a result of his university experience, a student should be motivated to pursue continuing scholarship throughout his life; he should acquire a sound value system and the capacity for independent thought. We know that motivation and taste can be fostered by close association of professors with students. There is no evidence that television and programmed instruction are adequate substitutes for human contact.

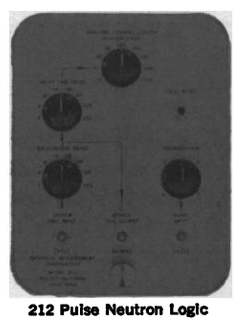
The present-day tendency is to delay the opportunity for meaningful interaction between professors and students until the student reaches the graduate level. This is a bad mistake. The crucial formative years for most students are the last year of high school and the first 2 years of university. If a student has not become motivated before he reaches graduate school he is unlikely ever to become so. Failure to become motivated early lessens the effectiveness of the learning process. When a student does not know what he is in school for, he is half-hearted in his studying and easily distracted. Moreover, he is deprived of what should be a wonderful experience.

The realities of the present make it impractical for us to return to the "good old days." Television and programmed instruction are here to stay. We must discover and utilize better means of providing guidance and motivation for the undergraduates. The problem is not insoluble. Many students require stimulus from only one professor to change their outlook. Even a few excellent lectures can provide the spark. A very important idea to convey is that the faculty cares and that the undergraduates are important people worthy of the best.—PHILIP H. ABELSON

210B Pulse Height Logic



211 Time of Flight Logic



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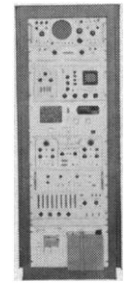

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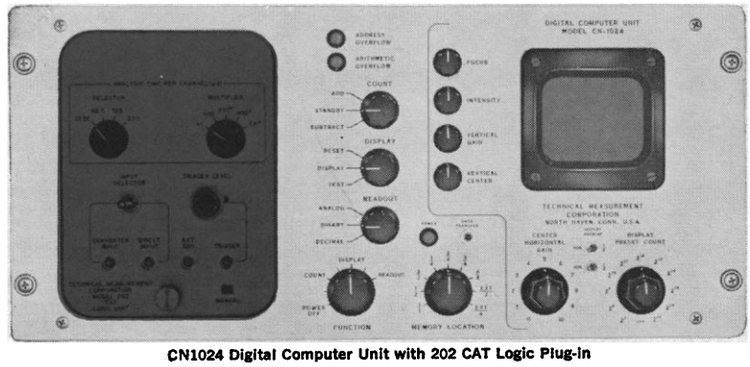

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27–30. Canadian **Pediatric** Soc., annual, Ottawa, Ont. (CPS, 14 Green Ave., St. Lambert, Quebec)

27–2. American **Crystallographic** Assoc., Gatlinburg, Tenn. (W. L. Kehl, Gulf Research and Development Co., P.O. Box 2038, Pittsburgh, Pa.)

27–2. **Mineralogical** Soc. of America, Gatlinburg, Tenn. (G. Switzer, U.S. Natl. Museum, Washington, D.C.)

27–2. **New Industrial Technologies**, engineering seminar, Pennsylvania State University, University Park. (Continuing Education Conference Center, Pennsylvania State University, University Park 16802)

28–29. **Hepatology**, 4th intern. symp., Chianciano Terme, Italy. (Secretariat, via Nicolò Porpora 9, Rome)

28–30. **Genetics of Congenital Norformations**, symp., Bratislava, Czechoslovakia. (F. Hrabal, Foreign Relations Dept., Czechoslovak Acad. of Sciences, Národní tr. 3, Prague 1)

28–30. **Electromagnetic Compatibility**, 7th annual symp., New York, N.Y. (Inst. of Electrical and Electronics Engineers, Electromagnetic Compatibility Group, Box A, Lenox Hill Station, New York 10021)

28–30. **Electromagnetic Scattering**, conf., Univ. of Massachusetts, Amherst. (R. S. Stein, Polymer Research Inst., Univ. of Massachusetts, Amherst)

28–30. **Relaxation Techniques in Chemical Kinetics**, symp., State Univ. of New York, Buffalo. (Mrs. E. E. Schmidt, 193 Hayes Hall, State Univ. of New York, Buffalo 14214)

28–30. Physics of **Quantum Electronics**, conf., San Juan, P.R. (P. L. Kelley, M.I.T. Lincoln Laboratory, Lexington, Mass. 02173)

28–1. **High Temperatures**, intern. symp., Paris, France. (Prof. Flahaut, Faculté de Pharmacie, 4, avenue de l'Observatoire, Paris 6e)

28–1. American **Orthopaedic** Assoc., Hot Springs, Va. (L. R. Straub, 535 E. 70 St., New York 10021)

28–2. **Vacuum**, 3rd intern. congr., Stuttgart, Germany. (H. Adam, 5 Köln-Bayental, Postfach 195, West Germany)

28–3. **Insect Biochemistry**, U.S.–Japan Cooperative Science Program seminar, Chiba, Japan (invitation only). (Office of Intern. Science Activities, Natl. Science Foundation, Washington, D.C.)

29. National Council of **Teachers of Mathematics**, New York, N.Y. (J. D. Gates, NCTM, 1201 16th St., NW, Washington, D.C. 20036)

29–1. **Mutant Mice with Neurological Diseases**, conf., Jackson Laboratory, Bar Harbor, Maine. (J. L. Fuller, Jackson Laboratory, Bar Harbor)

29–2. **Data Processing Management** Assoc., intern. conf., Philadelphia, Pa. (Conference Registrar, Data Processing Management Assoc., P. O. Box 1079, Philadelphia 19105)

30–2. **Microwave Applications of Semiconductors**, symp., University College, London, England. (Symposium Secretary, Inst. of Electronic and Radio Engineers, 8-9 Bedford Square, London, W.C.1)

30–3. National Soc. of **Professional Engineers**, annual, Albuquerque, N.M. (NSPE, 2029 K St., NW, Washington, D.C.)

July

1–4. **Astronomical** League, Miami, Fla. (A. P. Smith, Jr., 1601 S.W. 10th St., Miami)

1–10. General **Relativity and Gravitation**, intern. conf., London, England. (H. Bondi, Dept. of Mathematics, King's College, London, W.C.2)

1–1 August. **Theoretical Biology and Theoretical Biophysics**, Colorado State Univ. colloquium, Fort Collins. (H. J. Morowitz, Dept. of Molecular Biology and Biophysics, Box 2166, Yale Station, New Haven, Conn.)

2–3. British Soc. for **Immunology**, summer meeting, Glasgow, Scotland. (I. Roitt, Courtauld Inst., Middlesex Hospital, London W.1, England)

2–4. **Astronomical League**, Milwaukee, Wis. (W. M. DuVall, 518 Emmertsen Rd., Racine, Wis. 53406)

2–5. **Meteorological Data Processing**, Uccle and Brussels, Belgium. (World Meteorological Organization, 41, avenue Giuseppe Motta, Geneva, Switzerland)

2–9. International Union of **Pure and Applied Chemistry**, 23rd conf. Paris, France. (R. Morf, c/o F. Hoffman-La Roche, Ltd., Grenzacherstr. 124, Basel, Switzerland)

4–10. American **Library** Assoc., annual, Detroit, Mich. (D. H. Clift, American Library Assoc., 50 E. Huron St., Chicago, Ill.)

5–6. Low-Level **Radioactivity Measurements**, symp., London, England. (N. G. Trott, Physics Dept., Royal Marsden Hospital, Surrey Branch, Downs Rd., Sutton, Surrey, England)

5–7. **Astrophysical**, intern. symp., Liege, Belgium. (P. Swings, Inst. D'Astrophysique, Cointe-Sclessin, Belgium)

5–7. American Soc. of **Heating, Refrigerating, and Air-Conditioning Engineers**, Portland, Ore. (R. C. Cross, 345 E. 47 St., New York 10017)

5–10. French Soc. for the **Advancement of Science**, 84th annual congr., Tours. (The Association, 28 rue Serpente, Paris 6^{e}, France)

5–6. Aug. American **Mathematical** Soc., summer inst. on algebraic groups and discontinuous subgroups, Boulder, Colo. (G. L. Walker, 190 Hope St., Providence, R.I. 02906)

6–8. **Water Resources Research**, western conf., Colorado State University, Fort Collins. (Office of Conference Services, 204 Administration Bldg., Colorado State Univ., Fort Collins 80521)

6–9. American **Dental** Soc. of Europe, annual, Florence, Italy. (A. Sturridge, 35 Harley St., London W.1, England)

6–9. **Miscroscopy**, 12th intern. symp., Sheffield, England. (MICRO-65, McCrone Research Inst., 451 E. 31 St., Chicago, Ill.)

6–10. **Plant Viruses,** 5th intern. conf., Wageningen, Netherlands. (State Agricultural Univ. of Wageningen, Laboratory of Virology, Salverdaplein 10, Wageningen)

7–9. **Molecular Relaxation Processes**, symp., Aberystwyth, Wales. (General Secretary, Chemical Soc., Burlington House, London W.1, England)

7–11. Society for the Study of **Fertility**, annual, Edinburgh, Scotland. (C. A. Simmons, 129 Harley St., London, W.1)

8–16. British **Medical** Assoc., annual, Swansea, England. (D. Gullick, BMA, Tavistock Sq., London, W.C.1)

9–11. **Heat Flow below 100°K**, and Its Technological Applications, Grenoble, France. (J. Wilks, Commission 1, Intern. Inst. of Refrigeration, c/o Clarendon Laboratory, Parks Rd., Oxford, England)

10–17. **Education and Health**, intern. conf., Madrid, Spain. (L. P. Aujoulat, 1 rue de Tilsit, Paris 8e)

11–15. **Psychoanalysis**, 2nd intern. forum, Zurich, Switzerland. (G. Chrzanowski, 4 E. 95 St., New York 10028)

11–15. American **Veterinary Medical** Assoc., annual, Portland, Ore. (AVMA, Dept. of Public Information, 600 S. Michigan Ave., Chicago 5, Ill.)

12–14. **Biological Sciences** Symp., 16th annual, Univ. of Michigan, Ann Arbor. (L. B. Mellett, Dept. of Pharmacology, Univ. of Michigan Medical School, Ann Arbor)

12–14. Physiology and Biochemistry of **Muscle as a Food**, symp., University of Wisconsin, Madison. (E. J. Briskey, College of Agriculture, Univ. of Wisconsin, Madison 53706)

12–15. Japan Soc. of **Constitutional and Diathetic Medicine**, congr., Kyoto, Japan. (The Society, Dept. of Pathology, Kyoto Univ., Kyoto)

12–15. **Nuclear and Space Radiation Effects**, annual conf., Univ. of Michigan, Ann Arbor. (S. C. Rogers, Radiation Effects Dept., 5312, Sandia Corp., Albuquerque, N.M.)

12–17. **Spectroscopy**, 12th intern. colloquium, University of Exeter, Exeter, England. (C. E. Arregger, 1 Lowther Gardens, Prince Consort Rd., London, S.W.7, England)

12–18. **Pure and Applied Chemistry**, 20th intern. congr., Moscow, U.S.S.R. (N. A. Kleimenov, Inst. of Chemical Physics, Acad. of Sciences, Vorobyevskoye chaussee 2-b, Moscow)

13–15. **Aerospace Vehicle Flight Control**, Soc. of Automotive Engineers/NASA conf., Los Angeles, Calif. (SAE, 485 Lexington Ave., New York 10017)

13–16. Royal **Medico-Psychological** Assoc., annual, Glasgow, Scotland. (RMPA, 11 Chandos St., London W.1, England)

14–15. **Reinforced Plastics**, regional conf., Soc. of Plastics Engineers, Seattle, Wash. (J. B. Meyer, RETEC Registration, c/o J. B. Meyer Co., P.O. Box 6664, Seattle)

15–16. **Water Quality Management** in River and Reservoir Systems, seminar, Vanderbilt Univ., Nashville, Tenn. (W. H. Wisely, American Soc. of Civil Engineers, 345 East 47 St., New York 17)

15–18. Properties and Applications of **Low Temperature Plasma**, symp., Moscow, U.S.S.R. (E. S. Starkman, College of Engineering, Univ. of California, Berkeley)

15–21. **Education of Professional Physicists**, intern. conf., London, England. (Miss P. N. Boston, Inst. of Physics and the Physical Soc., 47 Belgrave Sq., London, S.W.1)

18–24. **Dental**, 2nd intern. congr., Rio de Janeiro, Brazil. (P. F. Reis Filho, Associacao Brasileira de Odontologia, Rua da Baia 570, 5.º Andar, C. Postal 2357, Minas Gerais, Brazil)

18–24. International **Ophthalmic-Optical** Congr., Dublin, Ireland. [E. Pemberton, Assoc. of Ophthalmic Opticians (Ireland), 11 Harrington St., Dublin]

19–21. **Surgery of the Hand,** 1st intern. congr., Rio de Janeiro, Brazil. (Sociedade Brazileira de Mão, Rio de Janeiro)

19–21. **Swine in Biomedical Research**, intern. symp., Richland, Wash. (L. K. Bustad, Biology Dept., Battelle-Northwest, P.O. Box 999, Richland 99352)

19–22. Association of **Food and Drug Officials** of the U.S., 69th annual, New York, N.Y. (The Association, P.O. Box 9095, Austin, Tex.)

19–22. **Space**, 5th European symp., Munich, Germany. (Executive Secretary, British Interplanetary Soc., 12, Bessborough Gardens, London, S.W.1, England)

19–23. Study of **Nuclear Structure** with Neutrons, intern. conf., Antwerp, Belgium. (M. Neve de Mevergnies, Neutron Physics Dept., CEN-CSK, Mol, Belgium)

19–23. Society for **Analytical Chemistry**, conf., Nottingham, England. (C. A. Johnson, 14 Belgrave Sq., London, S.W.1, England)

20–23. American **Malacological** Union, Wagner College, New York, N.Y. (J. J. Parodiz, Carnegie Museum, Pittsburgh, Pa.)

21–31. **Mental Health**, 5th Caribbean conf., Fort-de-France, Martinique, French West Indies. (Caribbean Federation for Mental Health, Mme. Charles Saint-Cyr, Ravine Vilaine, Fort-de-France)

22–24. International Assoc. for **Dental Research**, 43rd general meeting, Toronto, Ont., Canada. (G. H. Rovelstad, U.S. Navy Dental School, Natl. Naval Medical Center, Bethesda, Md.)

22–26. **Rorschach and Projective Methods**, 6th intern. congr., Paris, France. (A. Morali-Daninos, 7 avenue Trudaine, Paris 9e)

22–27. Thermodynamics of **Nuclear Materials and Atomic Transport in Solids**, Vienna, Austria. (C. E. Holley, Jr., Div. of Research and Laboratories, Intern. Atomic Energy Agency, Kärntnerring 11, Vienna 1)

24–4. Sept. **Organism-Sediment Interrelationship**, NSF seminar, Bermuda Biological Station. (K. E. Chave, Marine Science Center, Lehigh Univ., Bethlehem, Pa. 18015)

25–28. American Assoc. of **Dental Schools**, Toronto, Canada. (C. V. Rault, Georgetown Univ., Washington, D.C.)

25–29. Pacific **Dermatologic** Assoc., Portland, Ore. (G. MacDonald, 4294 Orange St., Riverside, Calif.)

25–30. **Neurochemical**, intern. conf., Oxford, England. (J. N. Cummings, Dept. of Chemical Pathology, Natl. Hospital, Queen Sq., London, W.C.1, England)

25–30. International **Psycho-Analytical** Assoc., 24th congr., Amsterdam, Netherlands. (R. P. McKnight, Austin Riggs Center, Stockbridge, Mass.)

26–29. American Inst. of **Aeronautics and Astronautics**, 2nd annual, San Francisco, Calif. (D. L. Raymond, 1290 Sixth Ave., New York 10019)

26–30. Interpretation and Therapy of **Cardiac Arrhythmias**, conf., Hahnemann Medical College and Hospital, Philadelphia 2, Pa. (L. S. Dreifus, Dept. of Med-

icine, Hahnemann Medical College and Hospital, 230 North Broad St., Philadelphia)

27–29. **Positron Annihilation**, conf., Wayne State Univ., Detroit, Mich. (A. T. Stewart, Physics Dept., Univ. of North Carolina, Chapel Hill)

27–29. **Research Program Effectiveness**, Washington, D.C. (Secretary, Research Conf. Committee, Room 808, Old Post Office Bldg., 12th St. and Pennsylvania Ave., NW, Washington, D.C. 20368)

28–30. **Library Science**, symp., Syracuse Univ., Syracuse, N.Y. (D. Bergen, School of Library Science, Syracuse Univ., Syracuse 13210)

28–30. **Reactor Operating Experience**, Jackson Lake Lodge, Wyo. (F. Schroeder, Phillips Petroleum, Idaho Falls, Idaho)

28–30. **Reliability and Maintainability**, 4th annual conf., Los Angeles, Calif. (J. de S. Coutinho, 32 Dartmouth St., Garden City, N.Y.)

28–31. Spanish **Biochemists**, 3rd meeting, Oviedo, Spain. (J. R. Villanueva, Centro de Investigaciones Biológicas, Velázquez 138, Madrid 6, Spain)

29–2. **Microcalorimetry**, intern. symp., Marseille, France. [E. Calvert, Institut de Microcalorimétrie et de Thermogénèse, 26, rue du 1414 RIA (3e), Marseille]

29–5. **Protozoology**, 2nd intern. conf., London, England. (R. S. Bray, London School of Hygiene and Tropical Medicine, Keppel St., London, W.C.1)

30–31. **Animal Reproduction**, 7th biennial symp., Michigan State Univ., East Lansing. (W. Hansel, Dept. of Animal Husbandry, Cornell Univ., Ithaca, N.Y.)

August

1–5. American Soc. of **Animal Science**, Michigan State Univ., East Lansing. (J. E. Oldfield, Dept. of Animal Science, Oregon State Univ., Corvallis)

1–8. **Chemistry**, 9th Latin American congr., San Juan, P.R. (Secretary, 9th Latin American Chemical Congr., Box 2647, Rio Piedras, P.R.)

2–4. Society for **Cryobiology**, 2nd annual, Madison, Wis. (G. Rapatz, American Foundation of Biological Research, RFD 1, Madison 53716)

2–5. **Comparative Endocrinologists**, 3rd European conf., Copenhagen, Denmark. (C. Barker-Jørgensen, Universitets Zoofysiologiske Laboratorium Juliane Maries Vej 32, Copenhagen Ø)

2–6. **High Pressure**, intern. conf., Saône et Loire, France. (B. Vodar, Centre National de la Recherche Scientifique, B.P. 30, Bellevue, Seine et Oise, France)

2–6. **Instrumentation Science**, 2nd research conf., Instrument Soc. of America, Geneva, N.Y. (K. B. Schnelle, Jr., ISA, 539 William Penn Pl., Pittsburgh, Pa.)

3–7. **Acta Endocrinologica**, 5th congr., Hamburg, Germany. (A. Jores, 2 Medizinische Klinik, Eppendorfer Krankenhaus, Hamburg 20)

3–7. **Poultry Science** Assoc., Univ. of Georgia, Athens. (C. B. Ryan, Texas A&M Univ., College Station 77843)

4–6. **Space and Ballistic Missile Technology**, 10th symp., U.S. Naval Training Center, San Diego, Calif. (C. T. Morrow, Aerospace Corp., Box 95085, Los Angeles, Calif. 90045)