

Φ *The*
Reflector

FEBRUARY 1964
VOLUME 12, No. 6

PUBLISHED BY THE BOSTON SECTION OF THE INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS

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DC-TO-50 MC, 10 MV/CM Solid-State Oscilloscope

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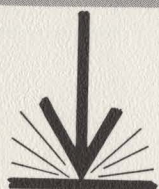
The type 647 Oscilloscope and plug-in units add new convenience to display and measurement of high sensitivity, wide-band, dual trace applications.

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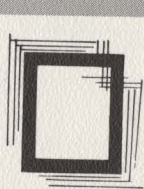
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The Reflector

FEBRUARY 1964

Volume XII, No. 6

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Engineering & High Schools

RONALD E. SCOTT
Chairman — Boston Section

RUSSIA and Red China now produce four times as many engineers per year as the United States. In a world where national strength depends almost entirely on technology, we are headed for trouble.

Some of you may wonder if you can do anything personally to remedy the situation, and you can. Engineering is unique among the major professions in operating at the undergraduate level. It must, therefore, recruit its members from relatively unsophisticated high school students, and it is poorly prepared to do so. A high school senior has been exposed to humanities, social sciences, and physical sciences, but never to engineering. He has met enthusiastic and inspiring teachers in all of these areas, but he may never have met an engineer.

The New England School Science Advisory Council (NESSAC) operates in New England to remedy this situation. NESSAC tries to make the resources of professional societies, of engineering companies, and of professional people available to the high schools in the local area. It has six committees. The School Liaison Committee supplies an engineer to act as a permanent liaison man for each high school in the area. The Speakers Committee supplies a list of topics and speakers which are available to high schools. The Equipment Committee collects equipment from companies and makes it

available to high school science teachers for projects. The Plant Tours Committee lists plant tours which can be taken by high school students. The Career Information Committee makes career data available to the high schools, and the Newsletter Committee publishes an information sheet which is distributed to the high schools.

In addition, NESSAC is sponsoring the JETS program in this area. JETS is the national Junior Engineering Technical Society for high school students. There are about 1000 JETS chapters in the 22000 high schools in the United States. Each chapter is sponsored by a local science teacher (the JET pilot), and is devoted to carrying out projects of an engineering or a scientific nature. The national organization contributes literature, club pins, and a charter, and local companies supply the materials necessary for the projects. An annual project contest is held each year at Michigan State University (where JETS began in 1950), and national prizes are given.

If any members of IEEE are interested in contributing to any aspect of NESSAC, please write to:

Mr. Les Weed
1165 Massachusetts Avenue
Dorchester 25, Massachusetts
Tel: HI 2-9000, Ext. 380

Subjects on which you feel competent to talk to high school students are particularly welcome.

IEEE Group Flight to London

THE Section is continuing with its plans to arrange a group flight to London at the time of the International Conference on Magnetic Recording, which is being held during the week of July 6th (see announcement in January Reflector). Unfortunately, IEEE seems to be able to plan farther in advance than the International Air Travel Association, which has yet to reach firm agreement on travel regula-

tions for the coming Summer. Therefore it has been necessary to make certain changes in the plans that were announced last month.

The dates have been changed. Departure from Boston will be June 22nd, with the return from London three weeks later. This allows two weeks for vacation or other business in Europe before the Conference opens on July 6th. Second, the group fares have been

raised slightly, \$318 round trip, but this is still far below the regular economy class fares.

All IEEE members, as well as members of their immediate families, are eligible. The group will travel on a regularly scheduled jet flight. Please call Miss Whitcher at the Boston Section IEEE office (527-5151) without delay if you wish to reserve a place. The number of places is limited.



Inching Toward the Meter

Editor
BRUCE B. BARROW

THE question of U. S. adoption of the metric system of weights and measures has been discussed perennially for well over a century. John Quincy Adams made a major report on the question; while he praised the elegance of the "French system," he concluded that our newborn nation should not convert until the new system had become firmly established elsewhere. By now there is no question that the metric system is firmly established, yet it is one of the paradoxes of our technological twentieth century that as our interest in the metric system increases, so also does our investment in industrial equipment, such as machine tools, that is compatible only with the foot-pound-second (fps) system.

The shortcomings of the fps system are well known. Most obvious is the complicated, non-decimal set of conversion factors necessary to go from one unit to another. One can calculate the number of inches in a mile, but who remembers the number of square feet in an acre, or the number of grains in an ounce (either troy or avoirdupois)? Important units differ in the U. S. and the U. K. The English ton is long; and the American one, short. The U. S. fluid ounce is four per cent larger than the U. K. fluid ounce, but in England there are twenty ounces in a pint, which doubtless accounts for the fact that English pubs are notably cheerier places than American bars.

It has been argued that the fps system is intrinsically quite as powerful as the metric, and all that is needed is to decimalize the inch and the pound and to make a few adjustments here and there. Perhaps if the foot and the pound had been decimalized a century ago, and if the English and Americans had really worked together to rationalize their system of weights and measures, the metric system would never have taken hold. But now it is clearly too late, for by world-wide agreement the units used in electricity and magnetism — the watt, volt, ampere, ohm, and all the rest — are metric units.

There remains the fundamental question as to whether the two systems will continue to coexist indefinitely. Despite the various absurdities of the fps system, it is at present indisputable that the greatest contributions in commerce, technology, and applied science, both individually and collectively, have been made by nations that are *not* on the metric system. On the other hand, the emerging nations of Africa, the developing nations such as Japan, and the giant industrial complexes of the Soviet Union and the European Economic Community are all using the metric system, and it is imperative that we examine our probable future position to determine whether the fps system may

not prove to be an increasingly expensive burden, one even more expensive than the alternative of a very dear conversion to the metric system.

In 1958 the American Association for the Advancement of Science sponsored a symposium on the national and international aspects of systems of units,* and a number of papers treated the question of conversion to the metric system. A clear and potentially very important pattern emerged. It became obvious that practical adoption of the metric system could be accomplished in stages, and that in fact such a process was going on in both the U. S. and the U. K. In England the weather forecasts are now given in degrees Celsius (centigrade) as well as in degrees Fahrenheit, and soon the latter will be dropped. In America the pharmaceutical industry is already converted in principle, and at least one major house, Eli Lilly and Co., has made the complete conversion in practice. Lilly purchases its commodities, mixes its batches, and keeps its inventories in terms of kilograms, and reports surprisingly little difficulty in obtaining cooperation from suppliers. In the U. S. and U. K., wherever international communication is important, the use of the metric system has become automatic. Thus the major international experiments such as those being carried out in Antarctica, and those of the International Geophysical Year and of the Years of the Quiet Sun, have all involved prior agreements to make observations in metric-system units. Already a number of American scientific publications are requiring their authors to publish data in the metric system, and it may be assumed that the IEEE will shortly adopt this policy.

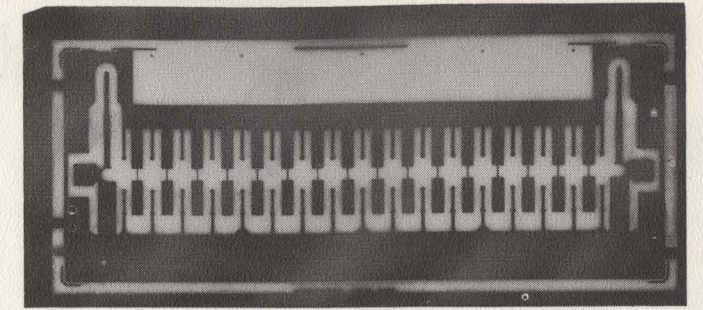
Indications of future trends should be watched for in two places. The first is England, which is now taking a very hard look at its relations with Europe and the rest of the world. For a long time it had been assumed that England would not "go metric" unless the United States agreed to come along. This no longer seems to be a safe assumption. Responsible voices in English industry are now, even after the rejected bid to enter the common market, expressing the opinion that conversion is inevitable and that England should not wait for the United States.

The second indicator is the U. S. Government, particularly the Defense Department. It must be recalled that the metric system is legal in this country, and that no new legislation is required to permit the Government to use it. The U. S. Army and Marine Corps plan to shift to the

*Carl F. Kayan, ed., *Systems of Units*, publication No. 57 of the American Association for the Advancement of Science, Washington, D. C.

metric system for all linear measures by 1 January 1966 (military maps have long used kilometer grids), and there will be continuing pressure in ordnance and other military areas toward the metric system as long as the U. S. has allies that use it. Pressure may also begin to be felt in space research, especially if the announced policy of seeking international cooperation in space research is implemented. Last September Dr. Blagonravov, of the Soviet Academy of Sciences, suggested cooperation on the lunar effort. The suggestion was quickly rebuffed by Dr. Gilruth, Director of the U. S. Manned Spacecraft Center, who specifically cited the different systems of units used by the two countries as a critical technical barrier. Several days later President Kennedy made his now famous statement in favor of cooperation, and it may be that ways around the various technical barriers, including the fps system, will now be sought.

The biggest obstacle to adoption of the metric system in the U. S. has long been the expense of the conversion — one recent study estimated the cost at \$11 billion. In our complex technological age it begins to seem as if the cost of non-conversion may be even greater. The question of conversion deserves extremely careful study, for the answer ought to be a matter of national policy. If the metric system is to be adopted, let its adoption be by decision, not by drift.



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PTG

RELIABILITY

New Developments in System Effectiveness Concepts

H. DEAN VOEGTLEN
Hughes Aircraft Corp.

IRVING BOSINOFF
Sylvania Electronic Systems

MR. Voegtlen will describe the need for development of systems effectiveness concepts. He will review past work in reliability, maintainability, and related disciplines as these have influenced the formulation of an effectiveness concept. A relationship of effectiveness elements to cost, schedules, and other constraints will be suggested in preparation for a more detailed discussion of a mathematical model that will be presented by Mr. Bosinoff.

Mr. Voegtlen directs the Product Effectiveness Laboratory in the Mobile Mid-Range Ballistic Missile Division. He did his undergraduate work at the University of Michigan in mechanical-industrial engineering, and has done graduate work in engineering statistics and business admin-

istration at Rutgers University and the University of California. Mr. Voegtlen has had 14 years experience in the reliability and quality control fields.

Mr. Bosinoff is project engineer on the study program "Mathematical Simulation for Reliability Prediction" at Sylvania's Reliability Engineering Department. He received his BS in electronics from Northeastern University in 1948 and his MS in electronics from the University of Pennsylvania in 1955. Mr. Bosinoff has extensive experience in the fields of probability theory and statistics; he has applied this theory to the design of electronic circuits and has developed probabilistic techniques to complement the conventional deterministic circuit design procedures.

THURSDAY, FEBRUARY 6
Non-Commissioned Officers Club, Hanscom Field, Bedford
Meeting — 7:30pm Dinner — 6:30pm

Reservations are required for dinner and must be honored unless canceled on or before Feb. 3. Make checks for \$2.50 payable to IEEE-PTGR, Boston Section. Call Ray Barnes, Sylvania, Woburn — WELLS 3-3500, ext. 354.

NEREM-63 — Photo Report...



At NEREM 63 ribbon-cutting ceremony, left to right: Commerce Commissioner John T. Burke; conference chairman, James E. Shepherd and IEEE executive consultant, George W. Bailey.



A. T. Kornfield presenting NEREM 63 student prize award to J. C. Houk, Jr. of the Harvard Medical School.



Dr. and Mrs. Ernst Weber receiving a copy of the rotogravure supplement published in tribute to NEREM 63. Looking on left to right: NEREM general manager K. C. Black and Walter Brooks of the BOSTON GLOBE.



Franklin W. Phillips, Director, North Eastern Office, NASA, at opening ceremony luncheon.



At NEREM 63 opening ceremony luncheon, Curtis Guild Hall, Commonwealth Armory.



Boston Section chairman, Ronald E. Scott, commenting on section activities at the NEREM 63 opening ceremony luncheon.

Registered Attendance 17246 (Reflecting 5% Growth)



General chairman, James E. Shepherd, introducing guests at the annual banquet.



Large Ring Exhibits Area at 12:00 Noon on Tuesday.



NEREM - 63 Banquet.



Large Ring Exhibits Area at 12:00 Noon on Tuesday.



Registration at the Armory.



Large Ring Exhibits Area at 12:00 Noon on Tuesday.

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Temp: continuous full load at 50° C.
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HY-W1-30-0.6	0-30 VDC	0.6 amp	1 MV	\$129.00
HY-W1-60-0.3	0-60 VDC	0.3 amp	1 MV	\$149.00
HY-Z1-16-1.5	0-16 VDC	0-1.5 amps	1 MV	\$179.00
HY-Z1-16-4.5	0-16 VDC	0-4.5 amps	1 MV	\$219.00
HY-Z1-16-7.5	0-16 VDC	0-7.5 amps	2 MV	\$279.00
HY-Z1-32-1.0	0-32 VDC	0-1 amp	1 MV	\$189.00
HY-Z1-32-2.5	0-32 VDC	0-2.5 amps	1 MV	\$229.00
HY-Z1-32-5.0	0-32 VDC	0-5 amps	2 MV	\$289.00
HY-Z1-60-0.5	0-60 VDC	0-0.5 amp	1 MV	\$199.00
HY-Z1-60-1.0	0-60 VDC	0-1 amp	1 MV	\$239.00
HY-Z1-60-2.0	0-60 VDC	0-2 amps	2 MV	\$299.00

*Prices are F.O.B. Watertown, Massachusetts

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PTG ENGINEERING MANAGEMENT

Corporate Growth — Expansion from Within or Through Acquisitions?

THE speaker will analyze the pros and cons of various corporate growth techniques including expansion from within and selective acquisitions. Particular emphasis will be given in both cases on the relative probability of success and the eventual cost in time and money. Case histories will be used that will have a familiar ring to many local electronics engineers. An attempt will be made to draw definite conclusions and make recommendations

Mr. Atchley received his BS from Harvard University in 1939 and attended Cruft School of Engineering at Harvard from 1939-40.



D. W. ATCHLEY
Microwave Assoc.

His experience includes engineering and management positions at Sylvania, Hygrade, U. S. Navy (during World War II), Tracerlab, and United Paramount Theatres, Inc. He was responsible for the technical activities of the latter prior to its purchase of an interest in Microwave Associates in January, 1952.

Mr. Atchley has been president of Microwave Associates, Inc. since early 1952. He is a director of Trans-Sonics, Inc.

MONDAY, FEBRUARY 10

Dinner — Charterhouse Motel, Waltham — 6:00pm
Meeting — 8:00pm — Sylvania, 100 First Ave., Waltham

MERRIMACK VALLEY SUBSECTION

Signals and Noise In Auditory Theory

DR. Siebert will discuss some aspects of the application of science and technology to biology and the life sciences. With a few simple demonstrations and some analyses in the language of communication theory, he will illustrate how the electrical engineer might be interested in this field and what he might be able to contribute.

Dr. Siebert is Professor of Electrical Engineering at MIT and is particularly concerned with the fields of statistical communication theory and linear circuit theory, and the applications of

these disciplines to biophysics. He received his SB and ScD in Electrical Engineering from MIT and has just been made a Fellow of the IEEE.

Professor Siebert has published several technical papers concerned primarily with signal theory and its application to radar problems.



W. M. SIEBERT
MIT

MONDAY, FEBRUARY 10

Dinner — 5:45pm — Butcher Boy Restaurant
Rte 125, North Andover

Meeting — 7:30pm — Merrimack College
Student Union Building

Junctions 114 and 125, North Andover

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Electronic Industrial Automatic Control Systems

L. M. FAULKNER
General Electric Company

THE use of solid-state electronic control systems in industry has increased rapidly in recent years. Electric utility-boiler control systems, steel-mill blast furnace controls, cement-making process controls are a few examples of applications of solid state industrial controls in industry today.

Mr. Faulkner will describe a new solid state control and how it is applied in typical control systems. Modern solid state instrument systems consist of standardized transmitters, recorders, controllers, analog computing devices, and accessory devices that can be combined

to perform a wide variety of control functions. The talk will be illustrated by slides and samples of typical systems components.

Mr. Faulkner is Manager of Industrial and Utility System Sales at the Instrument Department of General Electric Company at Lynn, Mass. A graduate of Bates College, BS in Physics, Mr. Faulkner has had extensive experience in the application of electronic control equipment, particularly in the electric utility and steel industries over the last 10 years.

TUESDAY, FEBRUARY 11

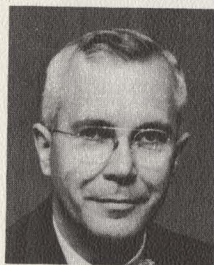
Meeting — 8:00pm — Measurements Laboratory Auditorium
General Electric Co., 40 Federal St., Lynn, Mass. — Western Avenue Entrance

JOINT
PTG

ELECTROMAGNETIC COMPATIBILITY
AND MILITARY ELECTRONICS

Exploratory Development for System Development

THE relationship between exploratory development and system development will be discussed, with particular emphasis on RADC support to the Electronic Systems Division.



J. S. BURGESS
Rome A.D.C.

Specific examples will be covered. A system will be analyzed to demonstrate the contributions of a forward-looking exploratory development program in making new systems possible.

The requirements of command and control functions suggest many areas for exploratory development.

Mr. Burgess is currently assigned to

the Rome Air Development Center, Griffiss Air Force Base, N. Y., as Chief Scientist.

Mr. Burgess received the BS in Mathematics at St. Lawrence University in 1940, the MS in Physics at the University of Notre Dame in 1942, and the PhD in Physics at Ohio State University in 1949.

From 1940 to February 1951, Dr. Burgess was employed for four years in industry as a Research Assistant for the General Electric Company; and, during the remainder of that time, was engaged in research and teaching at the University of Notre Dame, Ohio State University, and St. Lawrence University.

WEDNESDAY, FEBRUARY 12

Meeting — 8:00pm — Officers' Club, L. G. Hanscom Field, Bedford

What Sort of Logical Machines Are Real Brains?

J. Y. LETTVIN — MIT

THE logic for real brains has not yet been invented. In support of this contention, Dr. Lettvin recommends a reading of John von Neumann's paper, "The General and Logical Theory of Automata" before his talk. This paper appears in *The World of Mathematics*, volume IV, page 2070. This book is edited by J. von Neumann and was published in 1956 by Simon and Schuster, New York.

Dr. Lettvin is a staff member of the Research Laboratory of Electronics, MIT and is associated with the Neurophysiology Group. Prior to coming to MIT in 1951, he was Senior Psychiatrist at Manteno State Hospital, Illinois. He holds the BS and MD degrees from the University of Illinois Medical School.

THURSDAY, FEBRUARY 13

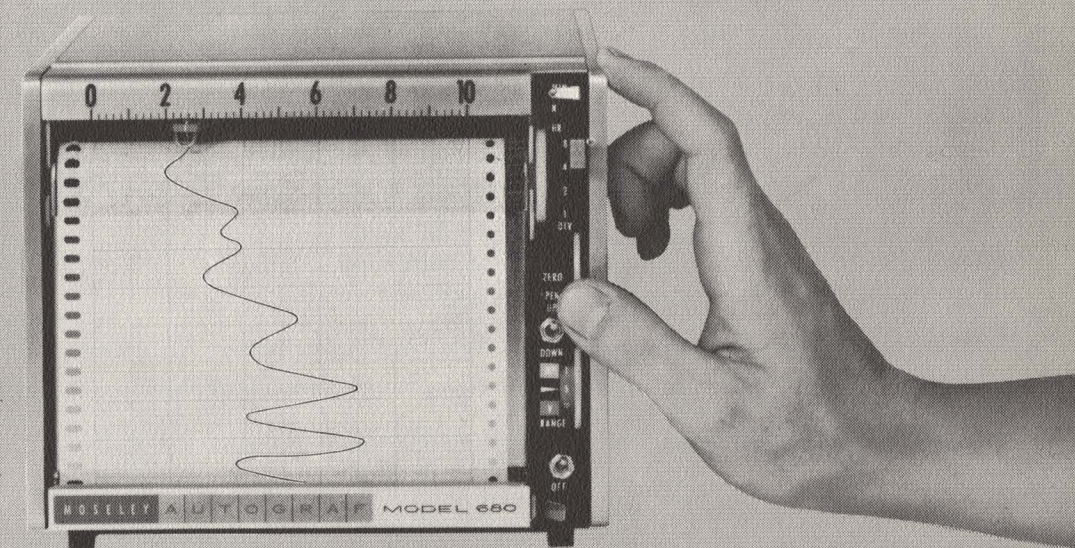
Dinner — 6:00pm — MIT Faculty Club
Meeting — 8:00pm — MIT, Room 4-231

Willenbrock Elected

DEAN F. Karl Willenbrock of Harvard University has been elected to a three-year term as an IEEE Director-at-Large. His term of office begins in 1964, and he will have major responsibilities in determining IEEE policy, for he has been appointed to the IEEE Executive Comm. and to the Editorial Board.

Dean Willenbrock was Chairman of the Boston Section (IRE) in 1959, IRE Director in 1962, and IEEE Director in 1963. He has long insisted that the publications of the Institute represent the most important of its many professional activities, and that therefore nothing that would compromise the quality of the Institute's publications can be permitted. The next years will be critical ones for the new IEEE, and Director Willenbrock will have the opportunity to make a significant contribution.

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Drives output-potentiometers, limit switches, digitizers

Any mounting—rack, table; or industrial panel in sealed, rugged, locked case

Also thermocouple, milliammeter, single range dual-speed models, 1 mv full scale models

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Accuracy	0.2% full scale
Power	10 watts
Weight	10 pounds
Zero set and remote pen lift	
Input isolated 500 volts to ground	
Zener reference voltage	
All solid state circuitry	
Plug-in modular construction	

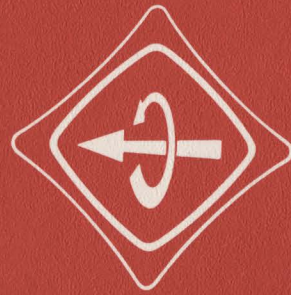
	Model	Price
Multi-Range, Multi-Speed	680	\$750
Single Range, Dual Speed	681	625
Thermocouple Recorder	682	675
Milliammeter Recorder	683	625

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February IEEE Meetings

INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS

NON-MEMBERS AS WELL AS MEMBERS INVITED — PLEASE MAKE ALL DINNER RESERVATIONS WITH MISS WHITCHER AT THE BOSTON SECTION OFFICE — LAsell 7-5151

FEBRUARY 6

Thursday, 7:30pm

Non-Commissioned Officers' Club
Hanscom Field, Bedford

RELIABILITY - See page 3

NEW DEVELOPMENTS IN SYSTEM EFFECTIVENESS CONCEPTS

H. Dean Voegtlen, Hughes Aircraft Corp.
Irving Bosinoff - Sylvania Electronic Systems
Dinner - Non-Commissioned Officers' Club - 6:30pm
Reservations are required for dinner and must be honored in full unless canceled on or before Feb. 3.
Make checks in the amount of \$2.50 payable to IEEE-PTGR, Boston Section. Call Ray Barnes, Sylvania, Woburn - WELLS 3-3500, ext. 354

FEBRUARY 10

Monday, 8:00pm

Sylvania Electronic Systems
100 First Ave., Waltham

ENGINEERING MANAGEMENT - See page 4 CORPORATE GROWTH — EXPANSION FROM WITHIN OR THROUGH ACQUISITIONS?

Dana W. Atchley, Jr., Microwave Assoc.
Dinner - Charterhouse Motel, Waltham - 6:00pm

FEBRUARY 10

Monday, 7:30pm

Merrimack College
Student Union Building
Junction Rtes. 114 & 125
North Andover

MERRIMACK VALLEY SUBSECTION - See page 7 SIGNALS AND NOISE IN AUDITORY THEORY

William M. Siebert, MIT
Dinner - Butcher Boy Restaurant, Rte. 125,
North Andover - 5:45pm

FEBRUARY 11

Tuesday, 8:00pm

Measurements Lab. Auditorium
General Electric Co.
40 Federal St., Lynn

LYNN SUBSECTION - See page 8 ELECTRONIC INDUSTRIAL AUTOMATIC CONTROL SYSTEMS

L. M. Faulkner, General Electric Co.

FEBRUARY 12

Wednesday, 8:00pm
Officers' Club
L. G. Hanscom Field
Bedford

ELECTROMAGNETIC COMPATIBILITY AND MILITARY ELECTRONICS - See page 8 EXPLORATORY DEVELOPMENT FOR SYSTEM DEVELOPMENT

John S. Burgess, Rome Air Development Center

PERMISSIONS
Thursday, 8:00pm
MIT, Room 4-231

WHAT SORT OF LOGICAL MACHINES ARE REAL BRAINS?

Jerome Y. Lettvin, MIT
Dinner - MIT Faculty Club - 6:00pm

FEBRUARY 18

Tuesday, 7:30pm

MIT, Room 10-275

UTILITY SYSTEMS - See page 13 ECONOMIC JUSTIFICATION FOR EHV TRANSMISSION

A. E. Fitzgerald, Northeastern University;
J. H. Crowley, Jackson & Moreland, Inc.,
W. H. Rowell, Jackson & Moreland, Inc.

FEBRUARY 19

Wednesday, 7:30pm

Mitre Corp. "C" Bldg.
Cafeteria - Route 62
and Middlesex Turnpike, Bedford

COMMUNICATIONS SYSTEMS - See page 13 SOME RESULTS IN DIFFERENTIAL PHASE SHIFT KEYING

Myron Leiter, Mitre Corp.

FEBRUARY 19

Wednesday, 8:00pm

Raytheon Executive Offices
Lexington

ENGINEERING WRITING AND SPEECH - See page 14 THE COMING REVOLUTION IN INFORMATION TRANSFER

Christopher Sims, William Marsden,
ArthurLaHaise, Raytheon Company
Dinner - Charterhouse Motel, Rte. 128,
Waltham - 6:00pm

FEBRUARY 20

Thursday, 8:00pm

Raytheon Executive Offices
Lexington

ELECTRONIC COMPUTERS AND AEROSPACE AND NAVIGATIONAL ELECTRONICS - See page 15 MACHINE PERCEPTION OF THREE-DIMENSIONAL SOLIDS

Lawrence G. Roberts, MIT Lincoln Lab.
Dinner - Charterhouse Motel, Waltham - 6:30pm

FEBRUARY 25

Tuesday, 7:00pm

Raytheon Executive Offices
Lexington

NUCLEAR SCIENCE

MHD POWER GENERATION

Arthur Kantrowitz, Avco Res. Labs.

FEBRUARY 27

Thursday, 8:00pm

Raytheon Executive Offices
Lexington

ELECTRON DEVICES, ANTENNAS & PROPAGATION AND MICROWAVE THEORY AND TECHNIQUES - See page 16

ATMOSPHERIC LIMITATIONS ON LASER PROPAGATION

Bernard A. Silverman, AFCLRL

OPTICAL FINISHING OF LASER MEDIA

Gordon Sweek, Raytheon Company

PRESENT STATE-OF-THE-ART FLASHTUBES FOR LASER STIMULATION

John H. Goncz, EG&G

Dinner - Raytheon Executive Offices - 6:30pm

Please make reservations by calling Miss Connolly, TW 9-8080, ext. 224 before February 26

FEBRUARY 29

Saturday, 10:00am

Salem Harbor Plant

N. E. Electric System

24 Fort Ave., Salem

LYNN SUBSECTION — See page 17

MORE POWER TO YOU — A TRIP THROUGH A MODERN STEAM-ELECTRIC PLANT

IEEE Fellows Elected as of January 1, 1964

Boston Section

Nicholas Bloembergen - Harvard

For fundamental contributions to masers and lasers.

Richard H. Bolt - MIT

For contributions to the field of acoustics through research and teaching.

Kenneth J. Germeshausen - EG&G

For contributions to the technology of gaseous discharge flash lamps and stroboscopic lighting equipment.

D. Richard Hahn - Boston University

For manned space flight programs.

Warren S. McCulloch - MIT

For researches into the information-handling processes of the nervous system.

Paul J. Pontecorvo - Raytheon, Norwood

For contributions to microwave communications systems.

Louis W. Roberts - Metcom, Salem

For contributions and administrative leadership in the field of microwave tubes.

Thomas F. Rogers - MIT

For research on scatter propagation and for contributions to military communications systems.

William M. Siebert - MIT

For contributions to the theory and application of signal detection methods.

Herbert G. Weiss - MIT

For contributions to the development of high-power radar.

Jerrold R. Zacharias - MIT

For contributions to defense systems, atomic frequency standards, and education.

Merrimack Valley Subsection

John T. Bangert - Bell Telephone, North Andover

For contributions to the advancement of network design through the use of computers.

Franklin H. Blecher - Bell Telephone, North Andover

For contributions to the design of solid state circuits and their application to communication systems.

Ellison S. Purington - Hammond Research Corp., Gloucester

For contributions to circuit design, radio control, and communication systems.

Sunday Afternoon Social Gathering

Planned with the Ladies in Mind! Bring Your Wife

Hotel 128 — MARCH 15, 4 - 7:00 P.M.

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The Applied Research Laboratory is the central research facility for Sylvania Electronic Systems, a major division of Sylvania Electric Products Inc. Basic and applied research programs encompass broad technical disciplines, and current typical research projects involve:

FADING SIMULATOR DEVELOPMENT

An experimental tool for accurate laboratory simulation of short-term fading in tropo-scatter and HF systems. Based on new design principle which provides accurate portrayal of both amplitude and phase fluctuations and multi-path selective-fading phenomena.

PATTERN RECOGNITION TECHNIQUES

Mathematical research and hardware development in character and pattern recognition and information compression.

PHYSICS OF RADIO PROPAGATION

Involves interaction of electromagnetic fields with natural and man-made environments. Studies presently emphasized involve VLF, ELF terrestrial radio propagation and the theory of LF electrical and mechanical wave motions in the upper atmosphere and near space.

ENGINEERING RESEARCH

Techniques research of coherent light applicable to problems in navigation, communication and control.

MATHEMATICAL RESEARCH

Involving error correcting codes, dynamic programming, stochastic processes and optimal control.

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STG

Economic Justification for EHV Transmission

A. E. FITZGERALD
Northeastern University

J. H. CROWLEY
Jackson & Moreland, Inc.

W. H. ROWELL
Jackson & Moreland, Inc.

THE first part of the program will deal with the broad interconnection studies forming the economic justification for EHV lines as inter-area ties and in association with mine-mouth plants. Studies carried out for the Pennsylvania-New Jersey-Maryland Interconnection will be used as examples.

The second part will consider the effects of nuclear plants on such system expansion and interconnection. The third will briefly outline the computer programs involved in these studies. There will be ample time for questions and discussion.

Mr. Fitzgerald was a member of the Electrical Engineering Department of MIT from 1931 to 1954. During most

of this time, he was also working actively on system analysis and planning problems for utilities. In 1954 he became Project Manager and, later, Chief Electrical Engineer for Jackson & Moreland. He joined the Northeastern faculty in September, 1963.

Mr. Crowley spent six years on nuclear propulsion in the Bureau of Ships submarine program and four years with General Electric's Atomic Power Equipment Department. He joined Jackson & Moreland in 1960.

Mr. Rowell has been with Jackson & Moreland since 1958. A significant portion of this period was devoted to systems planning and computer studies.

TUESDAY, FEBRUARY 18

7:30pm — MIT, Room 10-275

PTG

COMMUNICATION SYSTEMS

Some Results in Differential Phase Shift Keying

THIS talk will present some results in the study of Differential Phase Shift Keying (DPSK) systems. The major feature of such a system is that the phase of the last signal serves as reference for the succeeding signal. Communication systems of this type have been used extensively in the transmission of digital data on a phase modulated carrier.



M. LEITER
Mitre Corp.

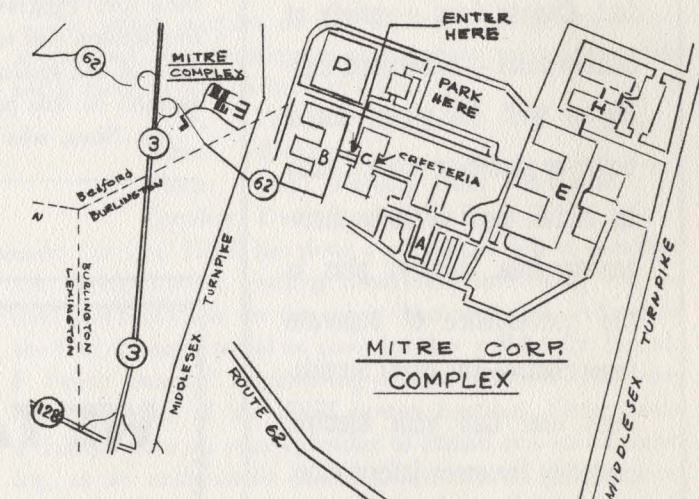
In this talk the optimum receiver for m-phase DPSK signals will be briefly discussed. The performance of an m-phase system will be expressed in terms of the probability of choosing between two phases when the transmitted phase may or may not have been one of those two. Relatively simple approximate expressions will be given for this probability. Relations will be explained for the probability of decoding the correct phase and for the probability of decoding the correct binary digit. The probability of two consecutive errors will also be considered.

Myron Leiter, who will give the talk, received the BEE from the Polytechnic Institute of Brooklyn in 1957, and the SM and EE from MIT in 1959 and 1961 respectively.

While at MIT he held a teaching assistantship. In 1961 he joined the Communications Department of the MITRE

Corporation, Bedford, Mass. Currently Mr. Leiter is attending Harvard University as a MITRE Staff Scholar.

This talk is based on work jointly done with Dr. Julian J. Bussgang of Signatron, Inc.



ACCESS ROADS
TO MITRE FACILITIES

WEDNESDAY, FEBRUARY 19

Meeting — 7:30pm — MITRE Corporation "C" Building — Cafeteria
Route 62 and Middlesex Turnpike, Bedford, Mass.



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NEW ENGLAND ELECTRIC



The Coming Revolution in Information Transfer

TODAY emphasis must be placed on the need for rapid dissemination of accurate and clear engineering information. To accomplish this requires the introduction of new communication methods. This discussion will examine specific problems and the application of new techniques in solving these particular problems. The discussion and demonstration of new dynamic communication techniques



W. MARSDEN
Raytheon Co.



A. LAHAISE
Raytheon Co.

will encompass the philosophy and application of these new systems. It will describe their advantages, disadvantages, operating costs, and resulting improvements in engineering communications to be expected through their use. Progress in engineering communication will ultimately be along the lines of the systems and techniques examined in this program.

Mr. Sims, who is a section manager

at the Raytheon Wayland Laboratory, has for three years directed a group investigating new instructional and communication techniques. He is currently in charge of a project for a major textbook publisher investigating the teaching of modern mathematics using programmed instruction. His group is also examining the effectiveness of communication techniques in technical manuals. A modern approach to information retrieval will be covered by Mr. William Marsden, manager of the Information Retrieval Section



C. SIMS
Raytheon Co.

at the Raytheon Wayland Laboratory. Mr. Marsden will exhibit a coordinate index system using noncomputer equipment for information retrieval. Audio-visual (AV) techniques will be covered by Mr. Arthur LaHaise, who has been active in technical publications work since 1946. He has also been consultant in AV to such firms as Western Electric, Westinghouse, Republic Aviation, and Sylvania, and is at present responsible for the design and application of AV in a Raytheon plant.

WEDNESDAY, FEBRUARY 19

Dinner — 6:00pm — Charterhouse Motor Hotel, Waltham
Meeting — 8:00pm — Raytheon Executive Offices, Spring St., Lexington

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Machine Perception of Three Dimensional Solids

IN order to make it possible for a computer to construct and display a three-dimensional array of solid objects from a single two-dimensional photograph, the rules and assumptions of depth perception have been carefully analyzed and mechanized. It is assumed that a photograph is a perspective projection of a set of objects which can be constructed from transformations of known three-dimensional models, and that the objects are supported by other visible objects or by a ground plane. These assumptions enable a computer to obtain a reasonable, three-dimensional description from the edge information in a photograph by means of a topological, mathematical process.



L. G. ROBERTS
MIT Lincoln Lab.

A computer program has been written which can process a photograph into a line drawing, transform the line drawing into a three-dimensional representation, and finally, display the three-dimensional structure with the hidden lines removed, from any point of view. The 2-D to 3-D construction and the 3-D to 2-D display processes are sufficiently general to handle most collections of planar-surfaced objects and provide a valuable starting point for future investigations of computer-aided three-dimensional systems.

Dr. Roberts is a full-time member of the staff at Lincoln Laboratory. In 1961, he received the SB and SM and in 1963 the PhD in Electrical Engineering from MIT.

In addition to work on pattern recognition, data processing and circuit simulation, Dr. Roberts has written the compiler for the Laboratory's TX-2 computer.

THURSDAY, FEBRUARY 20

Dinner — 6:30pm — Charterhouse Motel, Waltham
Meeting — 8:00pm — Raytheon Executive Offices, Lexington

Chit-Chat

"SUPPLY demands supply," or so they say, and true to the old adage, there has been in the past two years an increased concern among the womenfolk (namely wives) connected with the engineering field, as to when and where they would have the opportunity to communicate with their compatriots.

After some stewing and brooding and while glancing through my husband's copies of the *Waveguide* and *Data Link*, both of which are publications of other sections, the answer to our problems appeared as I proceeded to read a column called "IEEE Auxiliary" and another titled "Femme IEEE." I then turned back to my favorite REFLECTOR to doublecheck — no women's column.

Shortly thereafter it was proposed that I write this women's column. My first thought and immediate reaction was to beat our dear husbands to the moon. Reentry would pose no problem for me as I firmly intended to merely stay there. However, trying to be realistic about the whole thing, I decided to apply the old adage "not failure but low aim is crime." With this in mind, there was little left to do but attempt to convey a few constructive thoughts to you hoping somehow this would appease the men folks, appeal to you women, and console yours truly.

May I add, any new venture is always open to constructive suggestions, so allow me to stress this particular point: each and every one of you is needed to help make this column a success. Many of you have such good ideas, please don't hesitate to let me know them. I would be

more than happy to be enlightened along these lines.

Don't wait to be discovered or to have us seek you out. Simply send your suggestions to THE REFLECTOR, 313 Washington Street, Newton, Mass., in care of the Chit-Chat Column.

The prime purpose of this column is to get the wives acquainted, thus forming an active social group. Our first social meeting will be held as follows:

Date: February 20, 1964
Time: 8:00pm
Place: MIT Faculty Club Penthouse
Speaker: Dean Ronald E. Scott

In the past, IEEE has done a marvelous job of handling the Spring Socials, making them very interesting for the men and enjoyable for the wives who attended. Attending the first women's social as guest speaker will be Dr. Ronald F. Scott, Dean of Engineering at Northeastern University and Chairman of the IEEE Boston Section. Please make a definite note on your calendar to attend this social meeting, as an enthusiastic effort on your part will be most appreciated, particularly by those of us who have made the effort to organize the Boston Section's Women's Auxiliary.

With a sincere hope that you will attend, we look forward to meeting each of you as well as to an interesting and enjoyable evening.

Sincerely,
Teddy Abel
Women's Auxiliary

Atmospheric Limitations on Laser Propagation

THE effects of clear and cloudy atmospheres on the propagation of laser beams are discussed. Consideration is given to degradation of the spatial coherence of the beam by turbulence, attenuation of the beam by scattering and absorption, and beam bending and dancing by fluctuations in the atmosphere's index of refraction. Estimates of the magnitude of the various effects for different weather conditions are given.

Mr. Silverman currently is the Project Director of the

Weather Modification Project in the Cloud Physics Branch of the Meteorology Laboratory. He received his BS from City College, New York in 1953 and his MS in Meteorology from the University of Chicago in 1959. He is presently engaged in research on warm fog which includes a study of the differential attenuation of a laser light by the atmosphere.



B. A. SILVERSTEIN
AFCRL

Optical Finishing of Laser Media



GORDON SWECK — Raytheon Company

boules, optical glass, etc., the various steps that change this material into precision elements are described.

The accuracy requirements determine the production method used. Inexpensive optical elements may be produced by precision molding or a "dropping" or "sagging" process; surface accuracy ranges from 10 to 20 wavelengths.

To generate surfaces with tolerances of small fractions of a wavelength, machine and hand craftsmanship methods of grinding and polishing are used. Periods of testing and measurement are interwoven with periods of working the surface. The optical resonators used in lasers are typical examples of high-precision surface finishing.

Mr. Sweek joined Raytheon's Laser Advanced Development Center in December, 1963; he is responsible for the optical research and development program there.

Mr. Sweek received his BS in Physics from Northampton Polytechnic Institute, London, England in 1939. His activities in the engineering and manufacturing of precision optical elements dates back to 1931. Since then he has accumulated extensive experience in all phases and aspects of the fabrication of optical elements.

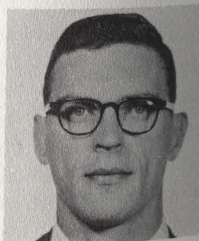
THIS paper deals with the not widely known process steps in the optical finishing of laser media. Beginning with raw material, such as ruby or calcium tungstate

Present State-of-the-Art Flashtubes for Laser Stimulation

THIS talk will include present and future xenon flashtube designs for laser pumping sources. Various configurations such as linear, helical, and anular, for high peak-power and high average-power flashtubes, will be reviewed.

Mr Goncz became associated with Edgerton, Germershausen & Grier, Inc. in 1954. He received his BS in Physics from MIT. As a group leader in the Tube Re-

search and Development Department, Mr. Goncz is engaged in work on switch devices such as triggered spark gaps, krytrons, hydrogen thyratrons, and triggered vacuum gaps. Currently, his major interest is the investigation and advancement of Xenon flashtube technology.



J. H. GONCZ
E. G. & G.

THURSDAY, FEBRUARY 27
Raytheon Executive Offices — Spring Street, Lexington, Mass.
Dinner — 6:30pm — Meeting — 8:00pm
Please make reservations by calling Miss Connolly
TW 8-8080, ext. 224 before February 26

More Power to You, a Trip Through a Modern Steam-Electric Plant

THE Lynn Sub-section IEEE will be the guests of the personnel of the Salem Harbor Plant, New England Electric System, for a tour of its facilities on Saturday morning, February 29, 1964.

On the shore of historic Salem Harbor, New England Electric operates one of the most modern steam-electric plants in the country. Built on solid rock, the station is a steel frame, brick wall structure. The original plant contained two 85000-kilowatt turbogenerators which went into operation in 1952. The third unit, completed in 1958, produces 150 000 kilowatts.

With a total capacity over 320 000 kW, the Salem Harbor plant can supply the entire electric needs of 15 cities the size of Salem. The plant has a combined normal yearly output of some 2 000 000 000 kWh.

The tour is limited to 50 members and guests (12 years and older). Tickets may be obtained by writing J. M. Brown, General Electric Co., Bldg. 5-64-x, 1100 Western Avenue, Lynn, Mass.

SATURDAY, FEBRUARY 29
Salem Harbor Plant
New England Electric System
24 Fort Avenue, Salem, Mass.
Meeting — 10:00am

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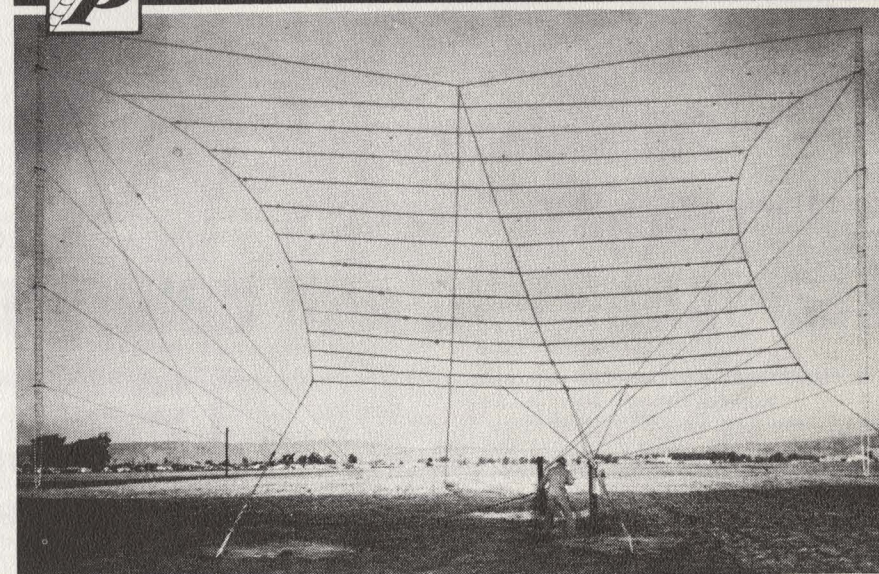
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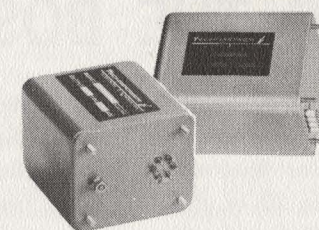
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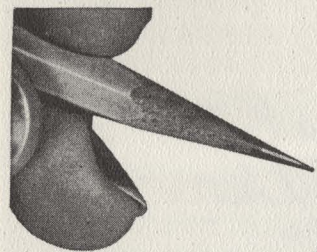


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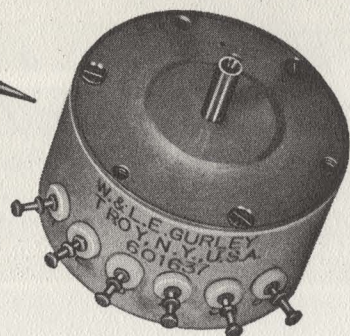
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3. As a distance measuring device, by converting linear motion to shaft motion.

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Gurley's Photoelectric Incremental Encoders

KEEP COUNTING AND COUNTING AND COUNTING



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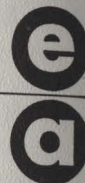
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BYLAWS FOR THE BOSTON SECTION

THE Executive Committee has drafted a set of Bylaws to govern the operation of the Boston Section and now presents them to the Section members for final approval. They may be found on pages 19 and 20 of this issue of the REFLECTOR. The Bylaws will be discussed and voted upon at the Section Awards Meeting to be held in March. Members who are unable to attend this meeting

may vote by mail, using the ballot on this page.

The Section is also governed by the IEEE Constitution for Sections, which is prepared by the Institute and which takes precedence over the Bylaws. Members wishing a copy of the Constitution may request one from Miss Shirley Whitcher, Boston Section IEEE, 313 Washington St., Newton, Mass. 02158.

BALLOT FOR BYLAWS

TO BE COUNTED, THIS BALLOT MUST BE FILLED IN COMPLETELY AND MAILED TO: BRUCE B. BARROW, SECRETARY, BOSTON SECTION IEEE c/o SYLVANIA ARL, 40 SYLVAN ROAD, WALTHAM, MASS. 02154, BEFORE 6 MARCH 1964.

ASSOCIATES, MEMBERS, SENIOR MEMBERS AND FELLOWS ARE ELIGIBLE TO VOTE

SIGNATURE
PRINT NAME
IEEE GRADE

- I vote **FOR** the Section Bylaws as given in the February 1964 Reflector.
- I vote **AGAINST** the Section Bylaws as given in the February 1964 Reflector.

BYLAWS

The Boston Section of the Institute of Electrical and Electronics Engineers, Inc. These Bylaws supplement the IEEE Constitution for Sections, the current issue of which shall be the Constitution for the Boston Section.

I. EXECUTIVE COMMITTEE AND OFFICERS

1. The Executive Committee shall consist of the officers, two elected committeemen, the chairman of each subsection, and the two most recent past chairmen of the Section who are currently members of the Section and who are willing and able to serve on the Executive Committee.

2. The Officers of the Section shall be a Chairman, a Vice Chairman, a Secretary, and a Treasurer.

3. The Section Chairman, in addition to those duties specified in the Constitution, shall serve on the NEREM Board of Directors and subject to the approval of the Executive Committee shall make such appointments to that Board as are required by the "Proposals for Future NEREM Operations" dated 23 October 1961, as amended.

4. The terms of office of all members of the Executive Committee shall begin on June 1st and shall end one year later, except that the terms of office of the Section officers and of the subsection chairmen shall in any case continue until their successors are duly elected and take office.

5. If a subsection chairman is unable to attend a meeting of the Section Executive Committee, he may appoint another member of his subsection executive committee to attend in his place. This representative shall have the right to vote.

II. ADMINISTRATIVE YEAR

The administrative year of the Section shall be the twelve-month period beginning June 1st and ending the following May 31st.

III. STANDING COMMITTEES

1. The following shall be the standing committees of the Section:

- General Program
- PTG Chapter Coördination
- Publicity
- Membership and Transfers
- Student Affairs
- Fellow and Awards
- Nominating

2. The Section Chairman shall, as soon as is reasonably possible after taking office, appoint chairmen for all the standing committees. Except as otherwise specified in the Section Constitution or in these Bylaws, the committee chairmen shall, subject to guidance and direction from the Executive Committee, appoint their committee members. Committee chairmen may organize subcommittees.

3. Appointments to standing committees shall be nominally for the duration of the current administrative year, but shall in any case extend until successor appointments have been made.

4. Except as otherwise specified in the Section Constitution or in these Bylaws, members of the Executive Committee shall be eligible to chair the standing committees. If the chairman of a standing committee is not a member of the Executive Committee, then one member of the Executive Committee shall be assigned to that standing committee and shall be responsible for liaison between it and the Executive Committee. A standing-committee chairman who is not a member of the Executive Committee may attend Executive Committee meetings in a non-voting capacity and may request the Section Secretary to place items on the agenda for an Executive Committee meeting.

5. The General Program Committee shall secure speakers and make all arrangements for the general meetings of the Section, such

as the Awards Meeting and the Annual Meeting. It shall arrange lecture series as directed by the Executive Committee. It shall provide to the Publicity Committee all information necessary for publicizing the meetings for which it is responsible, and shall keep attendance records, welcome guests and new members, and foster good fellowship at those meetings. The Chairman of the General Program Committee shall be appointed from among the members of the Executive Committee.

6. The PTG Chapter Coördination Committee shall include all chairmen of Boston PTG chapters. The chairman of this committee shall be appointed from among the members of the Executive Committee and shall be the representative of the PTG chapters in the Executive Committee. He shall instruct his committee members concerning the arrangements for and conduct of chapter-sponsored meetings. As soon as possible after the start of the administrative year he shall present the chapter budgets to the Executive Committee for approval, and he shall supervise the financial affairs of the chapters throughout his term of office. The PTG Chapter Coördination Committee shall coördinate all chapter-sponsored meetings and other activities and shall arrange the year's schedule to minimize conflicts and to encourage joint meetings whenever feasible.

7. The Publicity Committee shall prepare all publicity material and shall arrange for its dissemination by appropriate means, such as the Reflector, bulletin board notices, radio, television, and newspapers. This committee shall establish and maintain a comprehensive list of individuals in organizations within the Section territory to whom meeting notices shall regularly be distributed for posting on their bulletin boards. The Chairman of the Publicity Committee shall be appointed from among the members of the Executive Committee and shall be, *ex officio*, the editor of the Reflector.

8. The Membership and Transfers Committee shall actively promote membership in the IEEE and shall encourage members to advance to the highest grade of membership for which they are qualified. To these ends this committee shall include wide representation within the Section territory, shall maintain lists of prospects and members qualified for advancement, and shall provide information and assistance in preparing applications.

9. The Student Affairs Committee shall include among its members the IEEE Counselors at the universities, colleges, and technical institutes that lie within the Section territory. It shall be responsible for liaison with the student branches at these institutions and shall advise the Executive Committee on all other matters affecting the Student Members of the Section.

10. The Fellow and Awards Committee shall recommend qualified members of the Section for advancement to Fellow grade and for receipt of the various IEEE awards. It shall be responsible for searching out qualified candidates, for preparing the necessary written recommendations, and for assembling all required supporting documentation. It shall submit its recommendations directly to the appropriate IEEE body, normally the IEEE office in New York. While members of the Executive Committee or other members of the Section may present suggestions to the Fellow and Awards Committee, no recommendation that is forwarded to the IEEE shall bear the endorsement of the Boston Section unless it has been endorsed by the Fellow and Awards Committee. The Chairman of the Fellow and Awards Committee shall be an IEEE Fellow.

11. The Nominating Committee shall be responsible for manpower development and

shall assist in making nominations and appointments. To these ends, it shall establish and maintain an active and up-to-date file of members, who, actually or potentially, constitute the most promising group from which effective management can be drawn, both for the Section and for the Institute. It shall encourage qualified individuals to accept committee assignments or other positions of responsibility that will further their growth in, and their understanding of, the Section and the Institute. Upon request from incoming officers and committee chairmen, this committee may suggest names of qualified individuals for the positions to be filled. Prior to January 20th each year the Nominating Committee shall submit to the Section Secretary a written list containing at least one eligible candidate for each of the following elective positions:

- Chairman
- Vice Chairman
- Secretary
- Treasurer
- Two Elected Committeemen.

The Nominating Committee shall be responsible for ascertaining that its candidates are willing to serve if elected. The Nominating Committee shall consist of a Chairman and at least two other members, all of whom shall be appointed by the Section Chairman. Neither the chairman nor any other member of this committee shall be a current officer or elected Executive Committeeman of the Section. At least one member of the Nominating Committee shall be a past chairman of the Section.

IV. Ad Hoc COMMITTEES

Ad Hoc committees may be organized as needed. They shall conform to the requirements for standing committees, except that all appointments to ad hoc committees shall terminate with the dissolution of the committee or with the end of the current administrative year, whichever shall occur first.

V. INTER-SOCIETY AFFILIATIONS

The Section may affiliate with other groups provided the affiliation has been reported on favorably by a two-thirds vote of the Section Executive Committee, has been reviewed by the Regional Director, and has been approved by the Executive Committee of the IEEE.

VI. MEETINGS

1. The Section shall hold its Annual Meeting in May of each year.

2. The Section shall hold an Awards Meeting in March of each year.

3. The Section shall be responsible for the annual technical meeting and exhibit known as NEREM through the agency of the NEREM Board of Directors, in accordance with an agreement entitled, "Guiding Principles for the Future Operations of NEREM" and "Proposals for Future NEREM Operations" dated 23 October, 1961, together with subsequent amendments thereto.

4. Section business shall normally be transacted at the Annual Meeting or at the Awards Meeting. Section business may, however, be transacted at any other meeting sponsored by the Section, provided notice of such intention and of the nature of the business to be discussed is published in the Reflector not less than three weeks prior to the date of the meeting.

5. Fifty voting members shall constitute a quorum at any meeting at which Section business is transacted which requires a vote to be taken.

VII. PUBLICATIONS

1. The Section shall publish a periodical named the Reflector, which will be the major medium of communication with the Section membership. This periodical may accept advertising.

VIII. FINANCES

1. The incoming Treasurer shall be responsible for the preparation of a budget detailing the expected fiscal operation of the Section's activities for the coming administrative year. This budget shall be presented to the Executive Committee at the first meeting of the administrative year.

2. Supplementary reports indicating the Section's fiscal performance compared to the budget shall be prepared by the Treasurer and presented to the Executive Committee at the regularly scheduled meetings immediately following September 1, December 1, and March 1.

3. In addition to funds received from IEEE Headquarters, the Section may utilize funds from the operation of lecture series, publication advertising, and other Section activities for defraying its expenses.

4. All funds received by the Section shall be deposited in bank accounts at places designated by the Executive Committee. Working funds shall be kept in a checking account. Funds in excess of the minimum necessary for fiscal operating flexibility shall be designated as reserve funds and shall be kept in one or more savings accounts.

5. Withdrawal of working funds may be made as follows:

—Up to \$200 in any single check, upon the signature of the Business Manager. Records of such withdrawals shall be countersigned by either the Chairman or the Treasurer within thirty days of the time they are made.

—Up to \$3000 on any single check, upon the signature of either the Treasurer or the Chairman.

—In excess of \$3000, upon the signatures of both the Treasurer and the Chairman.

6. Withdrawal of reserve funds in any amount shall require the prior approval of the Executive Committee and the signatures of both the Treasurer and the Chairman.

7. The Executive Committee may designate additional persons who shall be authorized to execute withdrawals in the event of the unavailability of the Treasurer or Chairman.

8. No withdrawals in excess of budgeted amounts shall be made for any purposes. Should unforeseen needs arise, the Executive Committee shall first amend the budget as necessary, after which the required funds may be withdrawn.

9. It shall be the responsibility of the incoming Executive Committee of the Section to have an audit of the Section's financial affairs, including those of the subsections, conducted as soon as practicable after the beginning of the administrative year. The audit shall be made by an independent certified public accountant.

IX. ELECTION OF OFFICERS AND EXECUTIVE COMMITTEEMEN

1. The nominations submitted by the Nominating Committee shall be published in the March issue of the *Reflector* and shall be announced at the Awards Meeting.

2. Additional nominations may be made by a petition signed by at least 25 voting members of the Section and submitted to the Section Secretary on or before March 15th.

3. All nominations shall be published in the May issue of the *Reflector*.

4. In the event that there is no contest for any office, the election for that office shall take place at the Annual Meeting by voice vote.

5. In the event that there is more than one nominee for any elective position, the election for that position shall be conducted by means of a mail ballot sent to all voting members, using a voting procedure similar to that employed by the Institute in its elections. The mail ballot shall also list for information the names of the nominees for all uncontested positions. The ballot shall list together all candidates for the two positions of Elected Committeemen, and shall instruct the voter to vote for two candidates. A ballot showing a vote for only one such candidate shall not, however, be voided on that account.

6. Mail ballots, if required, shall be sent out on or before April 15th. To be counted, a ballot must be received by the Section Secretary on or before May 1st, and the ballots shall clearly indicate this requirement.

7. Mail ballots shall be counted by a committee of tellers appointed by the Section Chairman, consisting of three members of the Section who currently are neither candidates, nor members of the Nominating Committee, nor members of the Executive Committee.

8. Only votes for nominated candidates shall be counted. No write-in votes shall be counted.

9. A plurality of the votes cast shall be necessary for election of an officer. The two candidates for the positions of Elected Committeeman who receive the highest number of votes shall be the ones elected.

10. The results of the election shall be announced at the Annual Meeting.

11. During the remainder of the administrative year following the Annual Meeting, the newly elected officers and executive committeemen shall be invited to attend meetings of the Executive Committee, but in this capacity shall have no vote. They shall assume the full responsibilities of their offices at the beginning of their terms of office, as defined above.

12. Should a vacancy occur in the office of Chairman of the Section, the Vice Chairman shall take his place. A vacancy in any other office or in the positions of Elected Committeeman shall be filled through appointment by the Chairman, with the approval of the Executive Committee. Such appointee shall complete the unexpired term of the person he succeeds.

X. SUBSECTIONS AND PTG CHAPTERS

Subsections and PTG Chapters shall elect their officers for a term of office that coincides with the administrative year of the Section, but elected officers shall in any case continue in office until their successors are duly elected and take office.

XI. AMENDMENTS

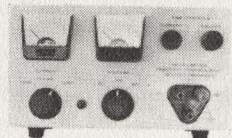
1. Amendments to these bylaws may be proposed by a two-thirds vote of the entire membership of the Executive Committee, or they may be proposed by a petition signed by at least fifty voting members of the Section. A proposed amendment shall be published in the *Reflector*, together with an announcement of the Section meeting at which a vote on the proposed amendment is to be taken. At least twenty days shall elapse between the date of mailing the *Reflector* and the date the vote is taken. Signed ballots mailed to the Secretary shall be counted, and two thirds of all votes cast shall be required to make the proposed amendment effective.

2. Amendments to the Section Constitution may be proposed to the IEEE Executive Committee by a two-thirds vote of the entire membership of the Section Executive Committee. They shall become effective only upon approval of the IEEE Executive Committee.

BENCHPAC PRACTICAL DC POWER SUPPLIES

MODEL BP-30B—All Solid State

SPECIFICATIONS:
RANGE: 0 to 30 volts, ungrounded @ 0.1 amp.
CURRENT LIMITING: 125 ma to 1 amp.
METER RANGE SWITCH
PRINTED CIRCUIT CONSTRUCTION
HUM & RIPPLE: 5 mv or less.
REGULATION: 1% or 200 mv whichever is greater.

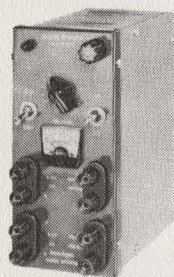


SIZE: 8" w x 5" h x 7" d.
PRICE: \$125.00



MODEL BP-30 BD
For rack mounting includes dual models mounted side-by-side.
PRICE: \$295.00

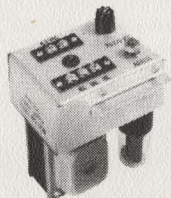
MODEL BP-200B Adjustable Power Supply



SIZE: 4" W x 8" High
SHIPPING WT: 14 lbs.
PRICE: \$98.25

REGULATION: 1% or better
HUM & RIPPLE: 1 mv or less
LO RANGE: 0 to 150 v, ungrounded. 150 ma avail. throughout. (200 ma avail. at high end of each range.)
OUTPUT HI RANGE: 150 to 300 v, ungrounded.
STANDBY POSITION: Disconnect B plus and bias voltage while leaving the filament power on.
FILAMENT VOLTAGE: 2 windings of 6.3 v at 2 amps. Can be series or parallel connected. Pilot light, on and off switch, line fuse and voltage control on panel.

MODEL APS-275B Adjustable Power Supply



PRICE: \$49.50
SHIPPING WT: 5 lbs.

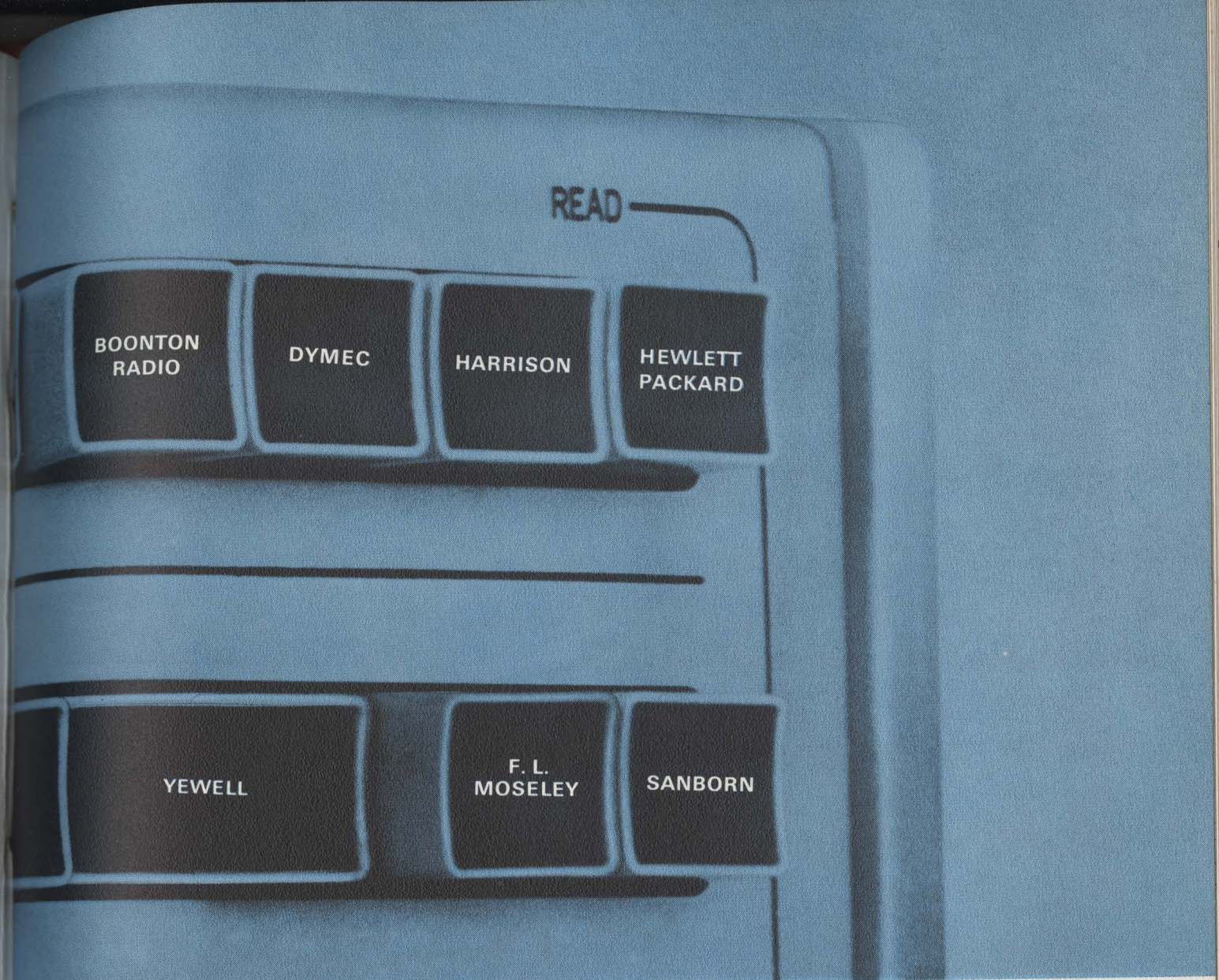
OUTPUT: Continuously variable 70-270 v, ungrounded 6.3 v. AC at 2 amps.
CURRENT: 40 ma max. at 275 v.
HUM & RIPPLE: 1 mv or less
REGULATION: 1% or better
INPUT VOLTAGES: 105-125 v AC, 50-60 cycle
CONTROLS: Voltage adjustable screw driver slot

SPECIFIC PRODUCTS

P.O. BOX 425 21051 COSTANSO ST.
WOODLAND HILLS, CALIF.
DIAMOND 0-3131 AREA CODE: 213



LOCAL REPRESENTATIVE W. M. HAGUE COMPANY, 1776 Massachusetts Ave., Lexington 73, Massachusetts

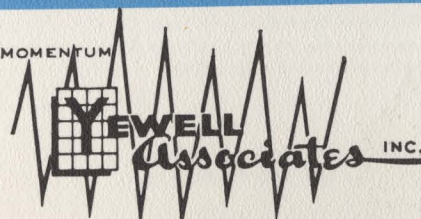


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