

NORTH JERSEY SECTION  
**IEEE FELLOW AWARD RECIPIENTS**



R. N. COHEN



T. R. FINCH



H. A. FRENCH



W. C. HITTINGER



W. Y. LANG



H. H. SMITH



D. E. THOMAS



H. E. WEPPLER



C. P. ZIMMERMAN

To be Honored at  
**ANNUAL BANQUET & DANCE**

Palsfair House, West Orange, N. J.

**Saturday, February 4, 1967 — 6:30 P.M.**

*See page 2 for reservations*



The IEEE

# Newsletter

The Magazine of the North Jersey Section

**NORTH JERSEY SECTION TOUR  
KODAK PROCESSING LABORATORY**

**JANUARY 17, 1967**

**FAIR LAWN, N. J.**

*See page 2*

## North Jersey Section Tour

### Kodak Processing Laboratory

Scheduled for Tuesday, January 17, 1967, at 7:30 P.M., the tour will cover the processing laboratory in Fair Lawn, New Jersey. The film developed here includes 8mm and 16mm Kodachrome amateur movies. Ektachrome commercial movie films and amateur Ektachrome products. The group will be limited to forty people, first come, first served. A map will be supplied with verification of reservation.

The tour will last about one hour and a half, followed by coffee and cake and an informal discussion of photographic problems.

### RESERVATION SLIP

THOMAS COMERFORD  
Public Service Co.  
80 Park Place  
Newark, N. J. 07101  
Room 249

I plan to attend the Kodak Tour on January 17, 1967. I will bring ..... guests.  
Name .....  
Address .....  
Tel. ....

## North Jersey

### Power Chapter

Since John Diercks has moved from the North Jersey area, Jack Gill was elected to take his place as chairman. Changes are noted below:

#### Chairman

JACK GILL — 622-7000  
Public Service Electric and Gas Co.  
80 Park Place  
Newark, New Jersey 07101

#### Vice-Chairman

JOSEPH SKROSKI — 539-6111  
Jersey Central Power & Light Company  
Morristown, New Jersey

#### Program Chairman

PAUL WATSON — 539-6111  
Jersey Central Power & Light Company  
Morristown, New Jersey

#### Membership Chairman

R. SMITHLEY — 624-7500  
Federal Pacific Electric Company  
50 Paris Street  
Newark, New Jersey

## North Jersey Reliability

### Dormancy and Storage Failure Data

#### Date:

Thursday, January 19, 1967

#### Place:

Newark College of Engineering —  
Alumni Center, Seminar Room

#### Time:

5:00 P.M. to 6:30 P.M.

#### Speaker:

Edwin W. Kimball

Mr. Kimball first became familiar with climatic and dynamic environment tests on military equipment when he joined the Signal Corps Engineering Laboratories in 1950. Later, after a short tour of duty with the New York Ordnance District and Western Electric Company, he transferred to the Rocketdyne Division of North American Aviation. Here he was responsible for environmental qualification testing on components of the Redstone and Atlas rocket engines. Included in the hardware were various types of liquid oxygen and fuel valves as well as turbopump subassemblies and many other mechanical items.

At Aerojet General, Kimball performed malfunction analysis studies on non-electronic components of the Titan propulsion system. At Martin Company he first headed Pershing failure analysis and more recently supervised SPRINT reliability analysis. He is presently engaged on an RADC contract to study "Dormant Operating and Storage Effects on Electronic Equipment and Part Reliability." He authored the section on malfunction and failure analysis for the Reliability Handbook now being printed by McGraw Hill and has written numerous papers on failure analysis for technical journals and symposia. Mr. Kimball received his BS degree from Columbia University.

This meeting will be the second meeting of the new section group. Members, future members and non-members are requested to comment on times, places and subjects for future meetings. Participation in the group is desirable. Comments may be directed to the Group Chairman or any of the Provisional Officers.

### New York Computer Group Evaluating Computer Hardware and Software

On Monday, January 16, the Computer Group will meet at the Brass Rail (43rd St. & 5th Ave, NYC) to hear a panel discussion on evaluating computer hardware and software. The panel will consist of a designer from GE, a consultant from Auerbach, and a user from Shell Oil.

The meeting will be held jointly with the Association for Computing Machinery and the Data Processing Manufacturers Association. The bar will be open at 5:30, dinner will start at 6:30, and the program will begin at 7:30. For reservations call Sherman Blumenthal, Union Carbide, 212 — 551-5532. Members of IEEE, ACM or DPMA: \$5, non-members: \$7.

### NORTH JERSEY SECTION

## ANNUAL BANQUET - DANCE

Saturday, February 4, 1967

Palsfair House

Eagle Rock and Prospect Avenue  
(opposite Pal's Cabin and Korvettes)  
West Orange, N. J.

6:30 P.M. — "Dutch Treat" Cocktail Hour

7:30 P.M. — Dinner

Following the dinner, Fellow Awards will be presented to the nine North Jersey Section Members who have been newly elected as Fellows. Previously elected Fellows will be introduced.

A special treat for the evening will be a talk by Henri G. Busignies, Vice-President of the International Telephone and Telegraph Co. on "A Look at the Future."

Dancing will start about 9:30 P.M.

### RESERVATION COUPON:

To: Mr. Carl Torrell  
9 Colony Court  
Summit, N. J.

Enclosed please find my check (or money order) made payable to the North Jersey Section IEEE in the amount of \$ ..... (\$7 each) for which please reserve in my name ..... tickets for the North Jersey Section's Annual Section Dinner and Dance on February 4, 1967.

Name (please print) .....

Address .....

Enclosed also is a stamped, self-addressed envelope to expedite return of the tickets to me. (If reservation coupon is received after January 20, or without stamped self-addressed envelope or payment, tickets will be held at the door.)

I would appreciate having the following member(s), who I expect to request reservations, seated at my table: .....

Thanks —

# The IEEE Newsletter

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## ABOUT ADDRESS CHANGES

REPORT ALL ADDRESS CHANGES TO:  
INSTITUTE OF ELECTRICAL AND ELECTRONICS  
ENGINEERS INC., 345 EAST 47th STREET  
NEW YORK, N. Y. 10017

It is not necessary to inform the North Jersey Section when you change your mailing address. The NEWSLETTER and other section mailings use a list provided by IEEE's national headquarters in New York. This means the Section has no need to maintain a mailing list or addressing plates. Section membership records are changed when Headquarters notifies us.

## NEWSLETTER STAFF

Editor: A. R. D'heedene  
School Affairs Editor: Gene R. O'Brien  
Associate Editor: David Wiener  
Associate Editor: Fred T. Grampp  
Advertising Manager: M. M. Perugini

## Executive Committee Meeting

at Verona Public Library  
First Wednesday of Each Month

## North Jersey Section IEEE Executive Committee 1966 - 1967

### Section Officers

Chairman ..... Stephen A. Mallard  
Vice Chairman ..... Bernard Meyer  
Secretary ..... Merle M. Irvine  
Treasurer ..... Joseph O'Grady  
Member-at-Large ..... Herbert Blaicher  
Member-at-Large ..... Barry Mindes  
Past Chairman ..... Walter L. Glomb

### Standing Committee Chairmen

Awards ..... Lawrence J. Lunas  
Education ..... John Zemkoski  
Group Coordinator ..... Robert G. Sokolski  
History and  
Procedures ..... Morris D. Hooven  
Membership ..... William Heiser  
Nominating ..... John K. Redmon  
Publications ..... Sam Petrokofsky  
Publicity ..... M. H. Nuechterlein  
Program ..... Carl Torell  
Student Affairs ..... Prof. J. W. Earle

The Newsletter, January 1967

# CALENDAR

Details  
on page

Thursday, January 12

**JOINT METROPOLITAN — ENGINEERING MANAGEMENT** ..... 6  
6:00 P.M. — "How to Become a More Effective Manager" — Workshop and Panel Discussion at Island Inn, Westbury, Long Island.

**JOINT METROPOLITAN — ELECTRON DEVICES** ..... 4  
8:00 P.M. — "Overlay Transistors for VHF and UHF Power Generation" by D. R. Carley of R.C.A. at General Telephone and Electronics Laboratories, Bayside, Long Island.

**JOINT METROPOLITAN — ENGINEERING IN  
MEDICINE AND BIOLOGY** ..... 17  
8:00 P.M. — "Analytic and Computer Techniques in medicine" by Dr. Hiram Hart of City College and Montefiore Hospital at Rockefeller University, New York City.

Monday, January 16

**NEW YORK — COMPUTER** ..... 2  
6:30 P.M. — Panel discussion on computer hardware and software at Brass Rail, 43rd Street and 5th Avenue, New York City.

Tuesday, January 17

**NORTH JERSEY SECTION** ..... 2  
6:30 P.M. — Tour of Kodak Processing Laboratories, Fair Lawn, N. J.

**NEW YORK SECTION** ..... 15  
7:00 P.M. — Visit to Anheuser-Busch Brewery.

**NEW YORK — COMTECH** ..... 16  
"Switching Systems and their Applications" — Start of a Lecture Series. The last two lectures are: February 14, S. Levine — "Electronic Central Office Systems"; February 21, R. G. Pella — "Electronic PBX Systems".

Wednesday, January 18

**NORTH JERSEY — POWER** ..... 15  
7:30 P.M. — "The Engineering of HVDC Transmission Systems" — A. J. Molnar of General Electric Co. at Jersey Central-New Jersey Power and Light Co., Morristown, New Jersey.

**PRINCETON — MAGNETIC** ..... 18  
8:00 P.M. — "The Low Temperature Effect of Oxide Surface Layer on Thin Magnetic Films" — Dr. F. E. Hagedorn of Bell Telephone Laboratories at Murray Hall, Queens Campus, Rutgers University, New Brunswick.

Thursday, January 19

**NORTH JERSEY — RELIABILITY** ..... 2  
5:00 - 6:30 P.M. — "Dormancy and Storage Failure Data" — Edwin W. Kimball of Martin Co. at Newark College of Engineering.

Tuesday, January 24

**JOINT METROPOLITAN — RELIABILITY** ..... None  
8:00 P.M. — "How to Attain Reliability with Existing Parts" — John Coutinho of Grumman Aircraft Co. at General Telephone Labs. Auditorium, Bayside, Queens.

Thursday, January 26

**JOINT METROPOLITAN — MEASUREMENTS** ..... 18  
2:00 P.M. — Inspection of electronic facilities of Lincoln Tunnel.

**NORTH JERSEY — COMTECH** ..... 18  
8:00 P.M. — "Applications of PCM in Telephone Plant" — W. L. Ross, Bell Telephone Laboratories, at Murray Hill, New Jersey.

Wednesday, February 1

**NEW YORK — BASIC SCIENCE** ..... 15  
9:00 A.M. - 5:00 P.M. — Seminar on Integrated Circuits at Stevens Institute of Technology, Hoboken, N. J.

Saturday, February 4

**NORTH JERSEY ANNUAL BANQUET - DANCE** ..... 2  
6:30 P.M. Cocktails, 7:30 P.M. Dinner, Fellows Awards, Henri Busignies will speak on "A Look at the Future" — At Palsfair House, 438 Eagle Rock Avenue, West Orange, N. J.

Thursday, February 9

**JOINT METROPOLITAN — ENGINEERING MANAGEMENT** ..... 6  
7:30 P.M. — "Management of Professional Personnel" — Symposium at ITT Federal Labs. Auditorium, Nutley, New Jersey.

Monday, February 13

**JOINT METROPOLITAN — INSTRUMENTATION  
AND MEASUREMENT** ..... 18  
7:00 P.M. — First lecture of Spring Lecture Series—"Nature of Product Variation" "Nature of Measurement Variation"; "Obtaining and Collecting of Data" at Western Union Auditorium, 190 West Broadway, New York City.

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## CHAIRMAN'S CORNER

Your Executive Committee is charged with the responsibility of representing and serving you in the IEEE. To this end it is composed of 23 members: 7 elected officers, the Chairman of 10 Standing Committees, and the Chairman of the 6 Group Chapters within the Section.

The Executive Committee funds the activities of the Group Chapters, holds Section and Joint Chapter-Section meetings, sponsors lecture series on topics of importance to the membership, nominates outstanding Section members for national IEEE awards and recognition, publishes the Newsletter to inform members of the Section's activities, and represents North Jersey IEEE members in the National organization.

One form of representation is shown in the action taken by your Executive Committee at its September meeting. At this meeting there was a thorough discussion of the major complaints of the Section's membership as known by the Executive Committee. This discussion resulted in the Committee passing four resolutions which it was felt accurately reflect the views of the Section's membership. The letter which forwarded these resolutions to Headquarters was published in the November Newsletter. The reply was received from Mr. MacAdam, Vice-President, IEEE, is reproduced on this page.

The Executive Committee exists only to serve you. You are urged to inform them of any suggestions you may have (a complete listing of addresses and telephone numbers appears on page 10 of the October Newsletter). You are also urged to attend the Executive Committee's monthly meeting which is held in the downstairs Conference Room of the Verona Public Library at 7:30 P.M. on the first Wednesday of each month (except July and August).

W. K. MacAdam  
195 Broadway  
New York, N. Y. 10007  
October 10, 1966

Dear Mr. Irvine:

Don Fink has forwarded to me your letter of September 23, transmitting the four resolutions approved by the North Jersey Section Executive Committee in view of my interest as Chairman of the Sections Committee. Don and I both appreciate the interest of the members of the North Jersey Section in making these constructive suggestions.

As you know, the Board of Directors met in August to consider the specific suggestions of the Sections, Groups and Committees for improved and expanded services made possible in conjunction with the dues increase. My letter of May 31 to all Section Chairmen requested recommendations in this regard.

## POSITIONS AVAILABLE

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In preparation for the recommendations to the Board, the Executive Committee studied in detail various alternatives including the possibility of including all or part of one Group membership in the annual dues as covered in your Resolution No. 3. The cost to the Institute in terms of reduced income proved to be prohibitive, however, since this plan would leave little or nothing for increased or expanded services after caring for the current deficit and rebuilding of our reserve. A detailed discussion of the plans ultimately recommended by the Executive Committee and approved by the Board will appear in the October SPECTRUM. I think you and your Executive Committee will find this informative and helpful. They do provide a measure of additional built-in support for the Groups and publications for the purposes which you have stated.

In connection with your Resolution No. 1, improved Section support, there is an item in the Board approved plan for approximately \$70,000 for increased support for Sections, Chapters and Student Branches. Whether the Section support will be in terms of increased "per member rebate" or "basic allowance" remains to be worked out, but the basic purposes of your Resolution will be considered favorably.

Your Resolution No. 2, I believe, has been largely cared for by the recent improved performance in the Computer. Don Fink reports that complaint letters are currently running at an all time low. However, if there are specific recent instances which need attention the staff will be glad to correct them if you will advise them.

Resolution No. 4 suggests more favorable dues treatment for recent graduates. This certainly has merit. As you know, the present bylaws make a \$10 reduction for one year after graduation. Graduate students, of course, are carried at the \$5 student rate. This year, for the first time, students graduating in June will have their Institute membership carried to December 31 without charge. Thus, they in effect will receive Institute membership for a total of 18 months after graduating at the reduced fee of \$15. In the new budget we are considering the possibility of a more prolonged reduced rate period following graduation for Regions 8, 9 and 10. It seems doubtful, however, that this can be done for Regions 1 through 7 at this time because of the excessive cost.

Thanks again for your valuable suggestions. I feel sure that the decisions reached in August, while representing numerous compromises, will go a long way in achieving the purposes underlying your recommendations.

Sincerely,  
Walter MacAdam

## North Jersey Reliability Group

Officers elected for 1966-67 are:

DR. R. P. MISRA — Chairman  
Newark College of Engineering  
High Street, Newark 2, N. J.  
201-MA 4-2424; Home: 201-CA 6-2228  
EDWARD F. MALLAHAN — Treasurer  
Bendix Corp.  
Dept. 7811, Teterboro, N. J.  
201-288-2000; Ext. 2463  
Home: 201-652-6137  
LESTER DAVIDSON — Secretary  
Bendix Corporation  
Dept. 7211, Teterboro, N. J.  
288-2000; Ext. 2760; Home: WY 2-3285  
JOHN H. GERTH — Program Chairman  
Bell Telephone Laboratories  
Whippany, N. J.  
386-4191; Home: 543-4220

Members of the Executive Committee:

JACK CLAYTON — Aircraft Radio  
PROF. S. FISHMAN — N.C.E.  
DR. E. NEU — Stevens  
GEORGE RICHARDSON — I.T.T.  
DONALD SHAW — Picatinny Arsenal

## Joint Metropolitan Chapter Electron Devices Group Overlay Transistors for VHF and UHF Power Generation

Date:

Thursday, January 12, 1967

Time:

8:00 P.M.

Place:

General Telephone and Electronics Lab.  
208-20 Willets Point Boulevard  
Bayside, Long Island, N. Y.

Speaker:

Mr. D. R. Carley, RCA

A survey of VHF and UHF power transistor design concepts including device and circuit limitations will be presented. The power/frequency capabilities of transistors employing the overlay concept will be discussed. New device designs, packaging concepts, measurement techniques and their interaction will be discussed, covering both present and future developments.

D. R. Carley has been associated with the design and development of germanium and silicon transistors at RCA for approximately ten years. He was responsible for one development of the "Overlay" transistor, for which he received RCA's highest award, the David Sarnoff Outstanding Achievement Award in Engineering for 1966. Mr. Carley is presently manager of RF Power Transistor Design at RCA, Somerville, New Jersey.

## North Jersey Section Inspection Trip Proves Popular

On November 15, the General Motors Auto Assembly Plant at Linden was toured by 378 members of the North Jersey Section and their families. They were conducted, in small groups, through the various departments. They saw how the frames, bodies, wheels and tires are brought in, prepared, and assembled in a precisely controlled flow schedule. General Motors is to be commended for the efficient and courteous manner in which they handled our large delegation.

## NEW FELLOWS OF THE IEEE NORTH JERSEY SECTION

### ROBERT M. COHEN

**"For significant contributions to the application of electron tubes and semi-conductor devices in radio and television receivers."**

Robert M. Cohen is Manager of Engineering for RCA's Commercial Receiving Tube and Semiconductor Operations at Somerville, New Jersey. He joined the RCA Receiving Tube Applications Laboratory at Harrison, New Jersey, in 1940 and has carried on development of many new types of electron tubes and transistors.

Among his patents, one covers a type of low-noise double-triode tube on which the 6BQ7 is based. He also developed a series of low noise transistors to meet the exacting requirements of auto radio applications.

Mr. Cohen presented a number of papers on his tube and transistor developments at various Institute meetings and conventions. He also lectured on these developments in 1952, 1956, 1957 and 1958. He has served on a number of Engineering Standards Committees, and is at present on JS-8- Entertainment Transistors.

He studied at the evening schools of Newark College of Engineering and Stevens Institute of Technology, receiving BS in EE and ME in 1949.

### TUDOR R. FINCH

**"For contributions in solid state circuits and for leadership in related professional activities."**

Tudor R. Finch is Head of the Digital Device Integration Department at Bell Telephone Laboratories.

Since joining Bell Laboratories in 1939, Mr. Finch has been primarily concerned with the development of circuit electronics for advanced transmission and switching systems. During World War II he participated in development of radar systems and components. After the war he turned to development of coaxial carrier systems.

In 1952, he became head of a group engaged in exploratory transistor circuit development for digital and analog computers. He was subsequently in charge of station apparatus development, data processing development and special systems development in electronic switching, particularly the development of solid state, logic and storage circuits and systems. He was appointed Head of the Component Applications Department in 1961 and assumed his present post in September, 1966.

A native of Colorado Springs, Colorado, Mr. Finch received B.S. and M.S. degrees in electrical engineering from the University of Colorado in 1938 and 1939, respectively.

Mr. Finch is a member of the Institute of Electrical and Electronics Engineers and has been an active member of the Institute's technical committees, such as Solid State Electronics; and Conferences, such as the International Solid State Circuits Conference, of which he was National Chairman in 1961. He is also a member of Eta Kappa Nu.

He has been granted three patents and is the author of a number of published technical articles.

### HEYWARD A. FRENCH

**"For the concept and development of microwave communication techniques and equipment."**

Mr. French is director of Transmission Products Design and Development at ITT Federal Laboratories, Nutley, N. J., a division of International Telephone and Telegraph Corporation. He joined ITT in 1943 and has directed many portable and fixed-station radio equipment projects for the U. S. Army, Navy, and Air Force as well as company research and development programs. He is the co-inventor of the "parallel path" transmission technique, used to provide extremely reliable radio communication.

Mr. French is presently directing development of advanced microelectronic microwave systems for military and commercial communication. He directed the engineering design and development of the U. S. Army's ET-A (European Tropo — Army) tropospheric scatter and line-of-sight microwave communication system, recently installed by ITTFL in Europe. Earlier, he participated in design and development of ground equipment used with the Army's Courier communication satellite.

Mr. French was graduated from the CCNY School of Technology in 1944 with a B.S. degree in electrical engineering. He holds several patents and is the author of numerous technical papers. He is a member and past president of the IEEE professional group on Microwave Theory and Techniques, and a member of the Professional Group on Communication Technology.

### WILLIAM C. HITTINGER

**"For his contributions and leadership in electron device research and development."**

William C. Hittinger is President of Bellcomm, Inc., Washington, D. C.

Mr. Hittinger began his Bell System career in 1946 with the Western Electric Company. After two years as production manager with the National Union Radio Corporation, he joined Bell Telephone Laboratories (1954) where he was initially engaged in exploratory and final development of semiconductor devices. He was appointed Director of development at the Allentown, Pennsylvania Laboratory in 1960, responsible for final development groups which designed advanced materials, transistors and diodes used in a variety of telephone and military systems. He became Executive Director, Semiconductor Device and Electron Tube Division in 1962, and was appointed to his present position in September, 1966.

Mr. Hittinger received the B.S. degree in metallurgical engineering from Lehigh University in 1944. He is a senior member of the Institute of Electrical and Electronics Engineers; a member of the American Institute of Mining, Metallurgical and Petroleum Engineers and Omicron Delta Kappa.

He is the author of a number of published technical articles.

### W. Y. LANG

**"For broad-ranging contributions to the development of telegraph data transmission, and teletypewriter systems."**

Mr. Lang is one of the country's foremost experts in the field of Printing Telegraphy. Until his recent retirement, he devoted the whole of his lengthy career at Bell Laboratories to advancing this technology. His inventions have gained him 22 U. S. patents and a number of the inventions have also been patented in foreign countries. He is now continuing his work on a consulting basis for Northern Electric Company of Canada, and for other concerns.

He has repeatedly been sent abroad to survey and evaluate European developments in his field, and as a result of these trips he is almost as widely known and respected on the Continent as he is in the United States and Canada. For a number of years he has been chosen to prepare and deliver an annual survey paper at the International Convention of IEEE, summarizing the current year's advances in Printing Telegraphy.

He joined the Bell System in 1920 as a Technical Assistant in the Engineering Department of the Western Electric Company in New York. He remained with the company when the organization became BTL, and was soon thereafter deeply involved in telegraph work. Except for a brief period during World War II, when he was responsible for the development and design of Sonar equipment, his attention remained centered in this field.

He has been active in committee work on standards with IEEE and with ASA, and was a BTL representative on the committees for a number of years.

### HOWARD H. SMITH

**"For pioneering work in voice-frequency signalling system transmission standards."**

Mr. Howard H. Smith is Acting Associate Director of Standards and Measurements Techniques of Communication Systems, Incorporated.

Mr. Smith has served as Transmission Engineer and Task Manager for transmission engineering programs and as an Air Force consultant on the committee to revise MIL-STD-188A, contributing heavily to the Design Objectives and Standards for Global Communication Systems Section in the resulting MIL-STD-188B. He supervised contract studies of effects of high altitude nuclear blasts on communication, preferred frequency evaluation (PFE) radio systems, digital and analog transmission principles, error control methods, and radio systems using meteor trails. He prepared the transmission section of AEROSPACECOM General Design and System Performance Specifications. He is chairman of a special committee of the American Standards Association, is reviewing DCA Circular 172-2A standards for microwave and

*Continued on Page 6*

# What's new from Technipower?

## 1. PC-80 SERIES

ultra-compact AC-DC power modules — all silicon.

25% smaller, 25% lighter, temperature rating 80° C, specifications to meet critical requirements. More than 200 models, with outputs ranging from 4.1 to 152VDC, and up to 60 watts.

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more-watts-per-dollar AC-DC power modules — all silicon.

This series will replace the former "standard" line of Technipower modules, and features 25% more power in the same volume. Improved circuitry and characteristics — for less money! More than 600 models, outputs 3 to 152VDC and up to 750 watts.

MIL Environment modules —

Series PM-95 and F/FD-115 modules were recently tested by an independent lab and proved fully qualified for MIL environment applications.

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# TECHNIPOWER

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## 3. DP-80 SERIES

compact dual output AC-DC power modules — all silicon.

Designed for operational amplifier and potentiometric applications, these doubtless will find other uses as well. Meet all applicable MIL environment specs. Models from 5.7 to 158VDC to 8 watts, each output.

## Joint Metropolitan Engineering Management

### How to Become a More Effective Manager

The fourth monthly meeting of the Metropolitan Chapter of the Engineering Management Group will be devoted to a dinner and workshop.

#### Program Format:

Cocktails and dinner will be served.

Participants will divide into five active discussion groups to each work on a possible solution to a pre-selected management case problem. A panel of five widely experienced managers will circulate amongst the discussion groups, and after the above groups report, comment on the latter's findings in a panel discussion.

#### Program Participants:

**THE WORKSHOP** — The first forty engineers, supervisors and executives to apply.

**THE PANEL** — Mr. J. A. Vaughn, Vice President-R & D, Maxson Corporation (Moderator).

Mr. B. Everitt, Vice President, G. S. Grumman and Associates (Members of New York Stock Exchange).

Mr. J. Jenness, Manager-Training and Development, Levitt & Sons.

Dr. S. S. Stephenson, Director-Graduate Management Engineering Department, C. W. Post Campus, Long Island University.

Mr. A. G. Waggoner, Director-Program Management Division, Airborne Instruments Laboratory.

#### Meeting Details:

Thursday, January 12, 1967, 6:00 P.M. The Island Inn (Cumberland Room), Westbury, L. I.

**BY RESERVATION ONLY.** \$6 includes total price of dinner and workshop ("cash and carry" bar). Please make out your check to "Met. Chapter EMG/IEEE" and mail (before January 3!) to Rene Colen, 37-41 - 77th Street, Queens, New York 11372. Please indicate if you wish Meat, Fish or Poultry for your dinner entree.

**P.S.** We recommend this session as an exciting opportunity to meet people who share your interests and to concretely add to your self-development. You are also welcome to invite guests for an additional six dollars each. Should you have any questions, please feel free to call Wayne Moyers at (516) 595-3061.

## Symposium on Management of Engineers

The Metropolitan EMG is holding a New Jersey regional meeting and will present a symposium of papers on the theme "Management of Professional Personnel." Three papers will be presented by prominent scientists and professional men. A question period will follow each paper.

The symposium will be held in the IT&T Federal Labs. Auditorium, Nutley, N. J. at 7:30 P.M. on February 9.

## North Jersey Section

### National Officers and Committees

The operation of the vast IEEE requires the active participation of many members on the National Committees. There are many opportunities for the supporters of the Institute to help by serving on one of these committees. The Nominating Committee of the North Jersey Section is now looking for suitable candidates. The wide range of possibilities is indicated by the following list of the National Committees:

Awards Board  
Admissions & Advancement Committee  
Basic Sciences Committee  
Editorial Board  
Fellow Committee  
Education Committee  
Finance Committee  
History Committee  
Intersociety Relations Committee  
Life Member Fund Committee  
Membership & Transfers Committee

New Technical Activities Committee  
Nominations & Appointments Committee  
Professional Relations Committee  
Research Committee  
Safety Committee  
Public Relations Committee  
Sections Committee  
Standards Committee  
Student Branches Committee  
Technical Activities Board  
Tellers Committee

If you can suggest any persons (including yourself) that might be recommended for one of these committees or for Section or National Office, please send the name to the Chairman of the North Jersey Section Nominating Committee:

Prof. John K. Redmon  
Department of Electrical Engineering  
Newark College of Engineering  
323 High Street, Newark, N. J. 07102

All suggestions should include address and telephone number, if known. The suggestion need not be directed as a nomination to a specific committee, but a comment on field of interest would be helpful. Prospective candidates will be contacted by the Nominating Committee, and no one will be nominated unless he agrees to serve if appointed. To allow time for processing, names must be submitted by Feb. 27, 1967, and preferably much earlier.



Power and Industrial Div.

# EDUCATIONAL PROGRAM - SPRING 1967



## REVIEW STUDY GROUPS — FOR PROFESSIONAL ENGINEER EXAMINATIONS

This program is designed to prepare candidates for Professional Engineer License examinations in New York and New Jersey. The N. Y. State Board permits graduates of approved schools to take Parts I and II and qualify for "Engineer-in-Training."

ENDORSED BY NYSSPE

### STRUCTURAL PLANNING AND DESIGN (IEEE-ASME)

### COURSE NO. 16

Review for Part I, N. Y. Exam., Part II, N. J. Exam. Planning, design, construction of buildings and similar structures in timber, steel and concrete, including beams, columns, foundations, piles, girders, riveted and welded sections. Intensive work in problem solving techniques with emphasis on the AISC and ICI codes. Printed notes available.

MONDAYS, Starting Feb. 6, 1967, 6:15-8:30 P.M., 18 Sessions  
Auditorium, 19th fl., Con Edison Co., 4 Irving Place, N. Y. C.

*Instructor:* O. ONDRA, Professor of  
Civil Engineering, Manhattan College

### BASIC ENGINEERING SCIENCES (ASME-IEEE)

### COURSE NO. 17

Review for Part II, N. Y. Exam., Part I, N. J. Exam. Practical applications of hydraulics, thermo-dynamics, mechanics, and electrical principles.

WEDNESDAYS, Starting Feb. 8, 1967, 6:30-8:30 P.M., 19 Sessions  
North Cafeteria, 19th fl., Con Edison Co., 4 Irving Place, N. Y. C.

*Instructor:* A. PAULLOW, Consolidated  
Edison Co., Inc.

### MECHANICAL ENGINEERING (ASME)

### COURSE NO. 18

Review for Mechanical Engineering Section of Part III, N. Y. Exam. Application of mechanical engineering principles to modern practice, shafts, flywheels, springs, gears and other machine elements, steel and heat treatment, internal combustion engines, air compressors, gas turbines, steam power plant cycles and equipment, refrigeration, heat transfer, air conditioning and other special subjects.

WEDNESDAYS, Starting Feb. 8, 1967, 6:30-8:30 P.M., 18 Sessions  
Rm. 240, Ebasco Bldg., 2 Rector St., N. Y. C.

*Instructor:* H. MANUEL, Lummus Co.

### ELECTRICAL ENGINEERING AND APPLICATIONS (IEEE)

### COURSE NO. 19

Review for Electrical Engineering Section of Part III, N. Y. Exam. Electrical Engineering Principles and Applications of: transformers, a-c and d-c machines, transmission lines, filters, networks, impedance matching, bridges, coupled circuits, resonance, harmonics, transients, three phase power, amplifiers, and electronic circuits. Features methods of problem solution based on examinations of past 7 years. Printed notes and past examinations available.

WEDNESDAYS, Starting Feb. 8, 1967, 6:30-8:45 P.M., 18 Sessions  
Rm. 1427, Con Edison Co., 4 Irving Place, N. Y. C.

*Instructors:* P. ZARAKAS, Consolidated  
Edison Co., Inc. and J. F. BATES,  
Gibbs & Hill, Inc.

### ENGINEERING ECONOMICS AND PRACTICE (IEEE-ASME)

### COURSE NO. 20

Review for Engineering Economics Section of Part III, N. Y. Exam. Economic comparisons, fixed and operating costs, accounting and cost analysis, valuations, contracts, etc.

THURSDAYS, Starting Feb. 9, 1967, 6:30-8:30 P.M., 18 Sessions  
Auditorium, 19th fl., Con Edison Co., 4 Irving Place, N. Y. C.

*Instructor:* F. BLACKWOOD,  
American Can Co.

## REGISTRATION INFORMATION AND FORMS ON BACK PAGE



## COURSE NO. 12

**PUMPED STORAGE GENERATION****MONDAYS, 6:30 to 8:30 p.m. Starting Mar. 6, 1967**

Ebasco Auditorium, 2 Rector Street, New York, N. Y.

Course Coordinator: **VINCENT DeVINCENZO**,  
*Consolidated Edison Co.*  
Tel. (212) 460-3578

A comprehensive survey of pumped storage peaking power generation including history, development, economic and long range planning, design features, specific projects and future prospects.

**1. Mar. 6 Introduction**

Peaking power necessity, methods of supply, pumped storage principles, history and development.

*Speaker: G. S. VASSELL,*  
*American Electric Power Corp.*

**2. Mar. 13 Pumped Storage Generation Planning**

Economic and operating factors, general planning criteria and licensing.

*Speaker: J. M. MULLEN, C. T. Main, Inc.*

**3. Mar. 20 Mechanical Design Factors**

Equipment requirements, for flow and head variation, capacity, life, reliability.

*Speaker: From General Electric Co.*

**4. Mar. 27 Muddy Run Pumped Hydro Plant Planned Operation and Economic Consideration**

Development, capabilities, planned and coordinated operation and economics.

*Speaker: FREDERICK H. LIGHT,*  
*Philadelphia Electric Co.*

**5. Apr. 3 Smith Mountain Multiple-Use Pumped Storage Project**

Planning, design, construction, operating practices and experience, similar projects.

*Speaker: A. F. GABRIELLE,*  
*American Electric Power Corp.*

**6. Apr. 10 Taum Sauk Recirculation Pumped Storage Project**

Planning, design, construction, operating practices and experience, similar projects.

*Speaker: From Union Electric Co.*

**7. Apr. 17 Yards Creek Recirculation Project and Kittatinny Mountain Development**

Planning, design, construction, operating practices and experience.

*Speaker: From Jersey Central P & I Co.*

**8. Apr. 24 Prospects for Future Pumped Storage Developments**

Planned and contemplated projects. Place of pumped storage generation in future power systems.

*Speaker: B. M. ZAMBOTTI, C. T. Main, Inc.*

## COURSE NO. 13

**PROBABILITY & STATISTICS  
FOR ENGINEERS****TUESDAYS, 6:30 to 8:30 p.m. Starting Mar. 7, 1967**Brooklyn Union Gas Co. Auditorium, 195 Montague Street,  
Brooklyn, New York.Course Coordinator: **DAVID HAWKINS**, *Consolidated Edison Co.*  
Tel. (212) 460-6166

This course provides a broad view of probability and statistical application techniques to load forecasting, system planning, equipment outages, quality control, reliability and life testing and operations research.

**1. Mar. 7 Introduction**

Review of probability theory and statistical methods.

*Speaker: DR. R. J. RINGLEE, General Electric Co.*

**2. Mar. 14 Curve Fitting and Regression Techniques**

Method of least squares, curvilinear regression, multiple regression and correlation.

*Speaker: GORDON CARTER, General Electric Co.*

**3. Mar. 21 Statistical Techniques for Load Forecasting**

Analysis of weather and loads, projection of load growth.

*Speaker: From Westinghouse Corp.*

**4. Mar. 28 Probability of Outage of Power Plants and Other System Equipments**

Availability, forced outage rates, probability states and sample selection.

*Speaker: JAMES W. KLEIN,*  
*Public Service Electric & Gas*

**5. Apr. 4 Probability Application in System Capacity and Pool Interconnection Studies**

Use of probabilities in system capacity studies and in power pool interconnection contracts.

*Speaker: From Westinghouse Corp.*

**6. Apr. 11 Monte Carlo and Simulation Techniques**

Gaming Technique applications to engineering problems.

*Speaker: From Westinghouse Corp.*

**7. Apr. 18 Statistical Quality Control — Part I**

Control charts for measurements tolerance limits and specifications.

*Speaker: L. PASTEELNICK, American Chickie Co.*

**8. Apr. 25 Statistical Quality Control — Part II**

Control charts for attributes and acceptance sampling.

*Speaker: L. PASTEELNICK, American Chickie Co.*

**9. May 2 Application to Reliability and Life Testing**

Failure-time distributions, the exponential model in reliability and life testing, and the Weibull model in life testing.

*Speaker: DR. MARTIN SHOUMAN,*  
*Polytechnic Institute of Brooklyn*

**10. May 9 Role of Probability and Statistics in Operations Research**

*Speaker: RALPH ORAVEC, Price Waterhouse & Co.*

The Institute of Electrical and Electronics Engineers, Inc.

North Jersey Section

SPRING 1967

LECTURE SERIES

# APPLICATION OF MICROELECTRONICS TO MODERN DESIGN

(Detailed description on next page)

A Series of Seven Lectures

Starting on Thursday, February 9 and

Ending on Thursday, March 23

TIME — 6:30 - 8:30 P.M.

LOCATION — N. J. Bell Telephone Company — Vail Hall

540 Broad Street, Newark, New Jersey

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## REGISTRATION FORM

(At least one week in advance)

Name ..... Job Title .....

Business Address .....

..... Phone .....

Technical Society Affiliation .....

Check enclosed — (Member \$20) ..... (Non-Member \$30) .....

Please make checks payable to: North Jersey Section I.E.E.E.

# APPLICATION OF MICROELECTRONICS TO MODERN DESIGN

This course is designed to introduce the subject of microelectronics. Sufficient theory is presented to enable the attendee to understand the fundamental problems but the major emphasis is on the use of microelectronics in practical design. The lecturers represent researchers, manufacturers, and users. No previous knowledge of microelectronics is required.

February 9 .....	<b>Fundamentals of Solid State Electronics</b>
February 16 .....	<b>Fabrication of Microelectronic Devices</b> — Mask preparation, diffusion, testing, and circuit design restrictions.
February 23 .....	<b>Interconnections and Packaging</b> — Techniques available; physical, electrical and economic limitations.
March 2 .....	<b>Linear Applications</b> — Video amplifiers, RF and IF amplifiers, oscillators, differential amplifiers.
March 9 .....	<b>Digital Applications</b> — Logic gates, flip-flops, drivers-characteristics and limitations.
March 16 .....	<b>Field Effect Devices</b> — Differences from current mode circuits, advantages and disadvantages, applications as switches, choppers, and amplifiers.
March 23 .....	<b>Hybrid Techniques</b> — Thin and thick film circuits, deposited diodes and transistors, pellet type components, interconnection means, applications.

**Place** — N. J. Bell Telephone Co., Vail Hall, 540 Broad St., Newark

**Time** — 6:30 P.M. to 8:30 P.M. — Thursday Evenings — Feb. 9 - March 23, 1967

**Fee** — \$25.00 Members, \$35.00 Non-members. \$5.00 discount for registrations received at least 1 week before the first session.

**Limitation:** Registration will be limited to the first 120 applicants.

**Send Registration Forms to:** Mr. Alex Richardson  
I.T.T. Federal Laboratories  
P.O. Box 413, Paramus, N. J. 07652  
Phone: 262-8800, Extension 577

**The American Society of Mechanical Engineers**  
**and**  
**The Institute of Electrical and Electronics Engineers, Inc.**  
**North Jersey Section**

**SPRING 1967**

**LECTURE SERIES**

# **INTRODUCTION TO NUCLEAR POWER**

(Detailed description on next page)

**A Series of Eleven Lectures**

**Starting on Monday, February 27 and**  
**Ending on Monday, May 8**

**TIME — 6:30 - 8:30 P.M.**

**LOCATION — Newark, New Jersey**

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## **REGISTRATION FORM**

**(At least one week in advance)**

Name ..... Job Title .....

Business Address .....

..... Phone .....

Technical Society Affiliation .....

Check enclosed — (Member \$20) ..... (Non-Member \$30) .....

Please make checks payable to: North Jersey Section I.E.E.E.

# INTRODUCTION TO NUCLEAR POWER

## JOINT ASME-IEEE LECTURE SERIES

This lecture series is designed as a basic course to acquaint the engineer with the principles of nuclear reactors.

February 27 .....	<b>Foundations of Atomic and Nuclear Theory</b> — Introduction to atomic physics covering history, nuclear particles, basic theory of a nuclear chain reaction.
March 6 .....	<b>Reactor Principles</b> — A review of the physics of a nuclear power reactor core and development of engineering factors which must be considered in the design of that core.
March 13 .....	<b>Power Reactor General</b> — A review of the rationale for the development of nuclear power plants covering the total fuel reserves picture, the current cost status, and the effect on electrical generating systems.
March 20 .....	<b>Light Water Reactions</b> — A discussion of the current viable reactor systems, namely — the Pressurized Water Reactor (PWR) and the Boiling Water Reactor (BWR).
March 27 .....	<b>Nuclear Fuel Cycle</b> — A review of the nuclear fuel cycle, including mining, enrichment, fuel fabrication, reprocessing and waste disposal.
April 3 .....	<b>Economics of Nuclear Power</b> — A summary of the total economics of nuclear generating stations, developing not only current plant status, but, in addition, reviewing their lifetime economic considerations.
April 10 .....	<b>Health Physics and Radiation Protection</b> — A review of the biological effects of radiation, as well as the basis for establishing protection limits.
April 17 .....	<b>Nuclear Safety and Licensing</b> — The application of radiation protection criteria to nuclear power facilities will be reviewed, and the safety provision of a plant and the analysis of their operation will be discussed.
April 24 .....	<b>Fast Breeder and Advanced Concepts</b> — Future development trends anticipated in advanced types of reactors and their application in a changing economic environment will be discussed.
May 1 .....	<b>Radioisotopes Production and Utilization</b> — The application of non-power forms of nuclear radiation such as utilization of isotopes in medicine, research, and food preservation will be covered.
May 8 .....	<b>Nuclear Futures</b> — Other non-central power station applications of nuclear energy, including nuclear excavation, desalination, propulsion system and fusion, as well as a review of the total lecture series content will be given.

**Place** — Newark, N. J.

**Time** — 6:30 P.M. - 8:30 P.M.

**Fee** — Members \$25.00, Non-members \$35.00. There will be a \$5.00 discount for registrations received at least 1 week before the first session.

**Limitation:** Registration will be limited to the first 120 applications.

**Send Registration Forms to:** Mr. Clifford G. Engstrom  
Public Service Electric and Gas Company  
90 Park Place, Newark, N. J. 07101  
Phone: 622-7000, Extension 2603

# — Special Study Groups



SPRING - 1967

## COURSE NO. 14

### SOLID STATE AND MODERN RELAYING

**WEDNESDAYS, 6:30 to 8:30 p.m. Starting Mar. 1, 1967**  
Consolidated Edison Co., Room 1701S, 4 Irving Pl., N. Y., N. Y.

Course Coordinator: JAMES E. WALSH,  
*Long Island Lighting Co.*  
Tel. (516) WE 1-6300, Ext. 680

This course is designed to review the latest techniques in the application, utilization and service of transistorized circuits for protective, regulating, auxiliary and verification relaying.

#### 1. Mar. 1 General Introduction to Protective Relaying

Role of protective relaying in power system design and operation. Fundamental principles, characteristics and evaluation.

*Speaker: J. L. BLACKBURN, Westinghouse Elec. Corp.*

#### 2. Mar. 8 Fault Current Calculations

Phasors, per unit and polarity review, symmetrical components, sequence networks and short circuit current calculations.

*Speaker: ROBERT W. PASHLEY,  
Long Island Lighting Co.*

#### 3. Mar. 15 Solid State Protective Relays

Basic philosophy and principles, review of relays and systems available.

*Speaker: KENNETH WINICK, General Electric Co.*

#### 4. Mar. 22 Protective Relay Applications I

Protection of generator and motors.

*Speaker: FRANK VON ROESCHLAUB,  
Ebasco Services, Inc.*

#### 5. Mar. 29 Protective Relay Applications II

Protection of transformers and buses.

*Speaker: WAYNE M. MOODY, Gibbs & Hill, Inc.*

#### 6. Apr. 5 Protective Relay Applications III

Protection of distribution systems including networks.

*Speaker: From General Electric Corp.*

#### 7. Apr. 12 Protection of Transmission Lines I

Review of protection available, discussion of solid state distance relays, pilot wire relaying.

*Speaker: HERBERT G. ERDMAN,  
Public Service Electric & Gas*

#### 8. Apr. 19 Protection of Transmission Lines II

EHV pilot relay schemes utilizing microwave channels, power line carrier, and audio tone. Transferred tripping in line and transformer protection.

*Speaker: HERBERT G. ERDMAN,  
Public Service Electric & Gas*

#### 9. Apr. 26 System Stability and Load Saving

Influence of system stability on relaying, out of step protection, principles of load saving.

*Speaker: ROBERT J. FELTON,  
Public Service Electric & Gas*

#### 10. May 3 Trends and Future of Protective Relaying

Evaluation of solid state relaying, trends for the future and test and maintenance.

*Speaker: J. L. BLACKBURN, Westinghouse Elec. Corp.*

## COURSE NO. 15

### MODERN DESIGN OF ELECTRICAL SYSTEMS IN BUILDINGS AND PLANTS

**THURSDAYS, 6:30 to 8:30 p.m. Starting Mar. 2, 1967**

Consolidated Edison Company, Room 1701S, 4 Irving Place, New York, New York.

Course Coordinator: MORTON ISSACS, *Ammann & Whitney,*  
Tel. (212) WA 4-8282

This course covers modern engineering principles and practices in the design of electrical systems for commercial and industrial buildings. Emphasis is placed on new methods and trends and equipment.

#### 1. Mar. 2 General Design Considerations

Acquiring data, preparing cost estimates, comparisons and recommendation; coordinating and scheduling design and construction.

*Speaker: HENRY WENSON, Port of N. Y. Authority*

#### 2. Mar. 9 System Design I

Loads, demand factors, power factor, selection of distribution and utilization voltages; voltage spread and drop limitations.

*Speaker: CLARENCE TSUNG, Syska & Hennessy*

#### 3. Mar. 16 System Design II

Fault currents, selection and application of switchgear.

*Speaker: HERMAN REICHENSTEIN,  
Port of N. Y. Authority*

#### 4. Mar. 23 System Design III

Incoming service, coordination and interface with utility. Sub-stations, utility furnished; owner furnished.

*Speaker: D. C. NOLAN, III, Consolidated Edison Co.*

#### 5. Mar. 30 Conductors

Selection and application of conductors for power and lighting; conductor materials, insulation, shielding and jacketing; standards, specifications and test requirements.

*Speaker: R. KEITH, Kaiser Aluminum*

#### 6. Apr. 6 Codes, National and Local

Scope, applications, recent changes; potential revisions.

*Speaker: CARLTON E. SHAAD,  
N. Y. Board of Fire Underwriters*

#### 7. Apr. 13 Lighting

Calculations for interior general illumination. Equipment, lamps, accessories; industry standards for contract specifications.

*Speaker: B. C. COOPER,  
Electrical Construction & Maintenance*

#### 8. Apr. 20 Electric Heating

Space, industrial heating, snow melting. Equipment control, standards and cost data. Heating calculation methods.

*Speaker: ANTHONY E. FASOLINO,  
Nelson Electric Mfg. Co.*

#### 9. Apr. 27 Signal and Communications Systems

Systems and equipment applications for status indication and voice communication.

*Speaker: L. T. CHANDLER, Edwards Co.*

#### 10. May 4 Airline Terminals Building

Electrical systems planning and design.

*Speaker: NORMAN BUTLER, Burns & McDonnell*



Power and Industrial Div.

# EDUCATIONAL PROGRAM - SPRING 1967



## INDIVIDUAL IMPROVEMENT STUDY GROUP

COURSE NO. 21

### SPEED READING FOR ENGINEERS

**THURSDAYS, 6:30-8:30 p.m. — Starting Feb. 23, 1967 — Room 503 Con Edison Co., 4 Irving Place; Instructor: E. E. COING**  
*Assistant to Director of Educational Work, Public Service Electric & Gas Co. Former member of NYU School of Commerce faculty. Has over 30 years experience teaching courses for business and industry.*

This course is designed to help engineers to keep abreast of the literature in their fields, and of their general reading. It improves reading speed and retention through skills taught and practiced. It releases reading power held back by inefficient habits and attitudes. Engineers may expect improved speed in their reading, greater comprehension and retention of information, and an insight into the process of reading which will foster continuing individual growth.

#### 1. Feb. 23 Introduction to Speeded Reading

Objectives of the course; variables relative to rate, materials, and comprehension; Test for diagnosis of individual rate, comprehension, and vocabulary.

#### 2. Mar. 2 The First Step

Individual analysis; using different methods to find the structural patterns of written materials.

#### 3. Mar. 9. Mechanics of Reading

Role of the eyes and eyespan; using verbal and printed clues to structure.

#### 4. Mar. 16. Paragraph Patterns and Functions

Using paragraph functions and patterns to identify organization and structure in materials.

#### 5. Mar. 23. Adjusting Rate

Using paragraph functions as an aid to achieving optimal rate.

#### 6. Mar. 30. Article Patterns

Using the author's organization to get ideas more quickly.

#### 7. Apr. 6. Article Patterns

Using the author's organization to organize ideas into useful sequences and patterns for greater retention.

#### 8. Apr. 13. Summarizing

Reducing ideas to basic components for more rapid and greater retention.

#### 9. Apr. 20. Broadening Horizons

Reading to "keep up" and "get ahead." Evaluation and planning for continued improvement.

#### 10. Apr. 27. Evaluation and Planning for Continued Improvement

## REGISTRATION

**FEES:** For all courses except course No. 21

\$20 — to members of I.E.E.E., A.S.M.E., A.S.C.E., A.I.Ch.E., A.I.I.E., A.I.M.E., N.Y.S.S.P.E.

\$30 — to all others.

For course No. 21

\$30 — to members (as above). \$40 — to all others.

**FOR ADVANCED REGISTRATION (MAILED ONE WEEK BEFORE 1st SESSION) DEDUCT \$5.00 FROM FEE.**

#### Registration:

Fill out ONE form for EACH course attended & mail with payment to the following:

For courses No. 12 through 15

make checks or money order payable to:

**"POWER & IND. GROUP, N.Y. SECT., I.E.E.E."**

and mail to: Frank J. Wells, Vice Chairman, Educational Committee, I.E.E.E. Long Island Lighting Co., 175 E. Old

## INFORMATION

Country Road, Hicksville, N. Y. 11801, Tel. (516) WE 1-6300, Ext. 2036.

For courses No. 16, 19, 20 & 21

make checks or money orders payable to:

**"POWER & IND. GROUP, N.Y. SECT., I.E.E.E."**

and mail to: I. Marvin Berger, Vice Chairman, Educational Committee, I.E.E.E., N.Y.C. Transit Authority, 3311 Giles Place, Bronx, N. Y. 10463, Tel. 852-5000, Ext. B 4496.

For courses No. 17 & 18

make checks or money orders payable to:

**"ASME METROPOLITAN SECTION"**

and mail to: George Evans, Educational Committee, A.S.M.E., Metropolitan Section, Zurn Industries, P.O. Box 1099, Mountainside, N. J. (212) DI 9-0569 or (201) 233-8435.

### ADVANCE-REGISTRATION FORM

Name (printed) .....

Firm ..... Position .....

Business Address .....

Phone No. ....

Home Address .....

Course No. & Study Group .....

Member of:

☐ IEEE ☐ AIME

☐ ASME ☐ ASCE

☐ OTHER

☐ NON-MEMBER

I intend to apply for membership in .....

(Do Not Write In This Space)

Admission Card No. ....

Refund Certificate No. ....

Fee Paid \$..... (Cash, Check, M.O.)

Date ..... By .....

### ADVANCE-REGISTRATION FORM

Name (printed) .....

Firm ..... Position .....

Business Address .....

Phone No. ....

Home Address .....

Course No. & Study Group .....

Member of:

☐ IEEE ☐ AIME

☐ ASME ☐ ASCE

☐ OTHER

☐ NON-MEMBER

I intend to apply for membership in .....

(Do Not Write In This Space)

Admission Card No. ....

Refund Certificate No. ....

Fee Paid \$..... (Cash, Check, M.O.)

Date ..... By .....

**New York Section  
Visit to Anheuser - Busch Brewery  
January 17, 1967**

North Jersey Section members are invited to Join the New York Section at the Anheuser-Busch Brewery at 7:00 P.M. Location is two miles south of N. J. Turnpike Exit #14. Since attendance is limited to one hundred, application must be made promptly to F. R. Postman, The Okonite Company, 1144 Clifton Avenue, Clifton, N. J. 07013, accompanied with self-addressed stamped envelope.

**New York Section  
Basic Science Committee**

**1967 Integrated Circuits Seminar  
Co-Sponsored by Stevens  
Institute of Technology**

On Wednesday, February 1, 1967 from 9:00 A.M. to 5:00 P.M. at Stevens Institute of Technology, Hoboken, New Jersey.

**Co-Chairmen:**

- J. J. Golembeski — Bell Telephone Laboratories, Murray Hill, New Jersey.  
K. H. Fischer — U. S. Army Electronics Command, Fort Monmouth, New Jersey.

**Arrangements:**

- P. M. Chirlian — Stevens Institute of Technology, Hoboken, New Jersey.  
G. J. Herskowitz — Stevens Institute of Technology, Hoboken, New Jersey.  
J. J. Padalino — Newark College of Engineering, Newark, New Jersey.  
R. W. Wyndrum, Jr. — Bell Telephone Laboratories, Murray Hill, New Jersey.

**Schedule of Invited Papers**

**Keynote Address:**

"Integrated Electronics, A Perspective"

J. D. Meindl  
Chief, Integrated Electronics  
Division, USAEC  
Fort Monmouth, New Jersey

"Integrated Microwave Circuits and Their Combination Into Subsystems"

R. Blight, A. Botka, C. Howell  
Microwave Associated, Inc.,  
Boston, Massachusetts

"Evolution of Integrated Circuit Broadband Amplifiers"

J. Bogusz, J. Ekiss  
Philco-Ford Corporation, Blue Bell,  
Pennsylvania

"Application of Power Gated Linear Integrated Circuits"

D. Breuer  
TRW Systems, Redondo Beach,  
California

"Computer Designed Transversal Filters Using Thin Film RC Distributed Networks"

W. I. H. Chen  
Columbia University, New York  
R. C. Levine  
Bell Telephone Laboratories,  
Murray Hill, New Jersey

"Complementary MOS Integrated Circuits"

P. D. Gardner, R. W. Ahrons  
Radio Corporation of America,  
Somerville, New Jersey

"The Use of MOS Transistors in Large Scale Integration"

H. vanBeek  
Westinghouse Electric Corporation,  
Elkridge, Maryland

**North Jersey  
Power Group  
The Engineering of HVDC  
Transmission System**

The Power Group held a meeting in Newark on November 16 at which over 60 members and guests were present. Messrs. R. J. Ringlee of the General Electric Company, H. G. Houser of the Westinghouse Electric Corporation, and F. E. Montmeat of Public Service Electric and Gas Company discussed techniques of evaluating system and component reliability for power systems. A social period and refreshments followed the program.

The next meeting of the power group will be a follow-up to a similar highly successful program held last year. The details are as follows:

**Date:**

Wednesday, January 18.

**Time:**

7:30 P.M.

**Place:**

Punch Bowl Room  
Jersey Central-New Jersey Power & Light Co., Madison Avenue at Punch Bowl Road, Morristown, New Jersey.

**Topic:**

The Engineering of HVDC  
Transmission System

Mr. A. J. Molnar of the General Electric Company will present a description of the 825-mile Pacific HVDC Intertie Project which is being installed to carry 1440 MW of power. He will present the principles of operation, the engineering approach taken, the development and design of terminal equipment and an analysis of the system operation. In addition, Mr. Molnar will discuss the economic factors involved in HVDC system considerations and outline the current efforts that are being made to reduce costs and improve equipment in this field.

A social period will follow the program at which time refreshments will be served.

**Registration Information**

PROCEEDINGS of the Seminar will be sent to each registrant. Cost of PROCEEDINGS and luncheon are included in registration fee.

Send fee with this coupon or facsimile.

1967 Integrated  
Circuits Seminar  
February 1, 1967

Dr. J. J. Golembeski  
Bell Telephone Laboratories  
Room 2D-211  
Murray Hill, New Jersey 07971

- ☐ IEEE Member Registration fee (includes PROCEEDINGS and Luncheon) — \$12.  
☐ Non-Member Registration Fee (includes PROCEEDINGS and Luncheon) — \$18.  
☐ PROCEEDINGS only (no attendance) — \$5.

Late Registration at the door—\$3 additional.  
Make all checks payable to IEEE BASIC SCIENCES COMMITTEE.

Please print or use typewriter

Name .....

Address .....

City .....

State ..... Zip .....

# Engineers

Giannini Controls Corporation, New Jersey Division, a dynamic engineer-managed growth division with modern well-equipped facilities devoted to the design, development and manufacture of precision airborne computing, control & recording electronics systems.

*Our expansion plans have created current openings for:*

**PROJECT MANAGER**

for ADVANCED SOLID STATE PROJECTS

Which have airborne computer applications. Supervise & direct engineering programs, prepare proposals, assist sales, marketing & manufacturing efforts performed by other depts. Expd. in the design & development of solid state analog & digital computer circuits. Minimum requirements: BSEE plus 10 years experience in airborne solid state electronics; some working background in application of micro-electronic integrated circuits desirable.

**ELECTRONIC ENGINEERS**

for ADVANCED SOLID STATE PROJECTS

Which have airborne computer applications. Will design and develop solid state analog and digital computer circuits. Minimum requirements: BSEE plus 3-5 years experience in airborne solid state electronics; some working background in application of micro-electronic integrated circuits desirable.

**PRODUCTION ENGINEER**

BSEE or ME degree preferred; 2-3 years experience in servos and electro-mechanical systems required. Digital logic experience desirable. Will work on air data computers and recorders, and troubleshoot production problems.

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## NEW FELLOWS

*Continued from Page 5*

troposcatter systems, and is Task Manager for transmission portions of DCA CIR 175-2A. He served in various engineering positions with ITT System companies, Automatic Electric Co., Utah Radio Products Co., and the AT&T Long Lines Department. During World War II, he was a communications staff officer in the U. S. Army Signal Corps. He holds seven patents in telephony and communication transmission. He has published five papers on communications, several of which were presented at AIEE and IRE meetings. Mr. Smith is a member of the IEEE, and was a Consultant Member for eleven years of the Communication Section, Association of American Railroads. He is a member of EIA Committee TR-30 (Data Transmission Equipment), and Chairman of EIA Subcommittee TR-30.1 (Digital Signal Quality), and a member of ASA Subcommittee X3.3 (Data Transmission), and was a member of U. S. delegations to meetings of the International Electrotechnical Commission TC53B Subcommittee (Data Transmission), at West Berlin (1965), and Stockholm (1966).

### D. E. THOMAS

**"For contributions to communication devices and systems."**

Donald E. Thomas, who died on July 9, 1966, was a member of the technical staff of the Optical Electronics Research Department at Bell Telephone Laboratories.

Mr. Thomas joined Bell Laboratories in 1929 and engaged in submarine telephone cable system research. He later turned to the development of sea and airborne radar until 1942 when he left for military service. While in the U. S. Army, he administered an air and ground force research and development program in radio countermeasures. He also served as a member of the Joint and Combined Chiefs of Staff Committees on Radio Countermeasures.

He returned to Bell Labs in 1946 and was active in the development and installation of the first deep sea repeatered submarine telephone cable system — between Key West and Havana — which went into service in 1950. He later participated in research and development work in characterization of semiconductor devices from the point contact transistor through the diffusion transistor to the tunnel diode.

From 1960 until his death, Mr. Thomas had engaged in the design of electronic systems for physical research experiments. He had been granted 12 patents and was the author of a number of published technical articles.

A native of Pennsylvania, Mr. Thomas received a B.S. degree in electrical engineering from Pennsylvania State University in 1929 and an M.A. degree in physics from Columbia University in 1932.

He was a senior member of the Institute of Electrical and Electronics Engineers and a member of Phi Kappa Phi and Tau Beta Pi.

## HENRY EDWARD WEPPLER

**"For his contributions to radio communications and communication satellite systems."**

After graduation from Purdue University with a BSEE degree in 1937, Mr. Weppeler joined the Michigan Bell Telephone Co. in Detroit, where he worked in the Plant and Engineering Departments from 1937 to 1950, except for three years of military service during World War II. In 1950 he accepted a position in the American Telephone and Telegraph Co. in New York where he served in various capacities in Transmission Engineering and Systems Planning until he became Acting Radio Engineer in 1959, Radio Engineer in 1960 and Engineering Director—Radio and Guided Waves — in 1966, the position he presently holds.

Mr. Weppeler has made noteworthy contributions in the use of microwave radio for both long-haul and short-haul communication services including participation in the development of low cost equipment and methods of using it with maximum economy for domestic telephone and television services. He also assisted in the development of new and improved microwave long-haul equipment which will provide greater economy in the use of the frequency spectrum, increased circuit handling capacity and improved transmission performance.

Mr. Weppeler's work has also been directly concerned with the use of man-made satellites for communication purposes and has contributed much to the development of this new use of microwave radio. He contributed directly in this work through participation as a member of the U. S. Delegation to the meeting of the International Radio Consulting Committee (CCIR) held at Geneva, Switzerland in January - February, 1963. He served subsequently as an advisor to the United States representatives in discussions with the European Telephone Administrations in efforts to persuade them to join the United States in the development of a worldwide satellite communication system.

### CARL P. ZIMMERMAN

**"For his outstanding contributions to the development of high voltage power systems and equipment."**

Carl P. Zimmerman is vice president - construction of the American Electric Power Service Corporation, New York, N. Y., responsible for the construction of all electrical and mechanical facilities for the seven-state American Electric Power System. He received his BSEE degree from Purdue University in 1935 just prior to joining AEP.

In his 31 years with AEP, Mr. Zimmerman has performed engineering work in a number of fields, including metering, distribution, relay and control, high-voltage station and power plant design. He has held several engineering management positions: head, Meter & Service Section; head, Plant & Station Section; head, Electrical Engineering Division; chief engineer (with responsibility

for the Electrical Engineering, Mechanical Engineering, Civil Engineering, System Planning, System Operating, Air Conditioning & Heating, and Canton (Ohio) Engineering Divisions); and, as of March 1966, vice president - construction.

During these three decades, he has developed, directed or participated in numerous advances in electric power technology, particularly in high-voltage transmission and including many developments that have been generally adopted throughout the world. Such advances have included: the first 345-kv system station arrangements; the breaker-and-a-half switching scheme and the ground-mounted bus for use with an integrated power system of major size; operation of power transformers and other high-voltage equipment at reduced insulation levels; field testing of 775-kv transmission; the first 2-cycle, high-voltage circuit breaker and necessary high-speed, static-element protective relays; barehand maintenance of lines up to 1,000 kv; microwave communication; digital and analog computer control of system generation loading; and many others.

Mr. Zimmerman has been the author or co-author of a number of technical papers and articles; he is a professional engineer in New York, Virginia, Ohio and Indiana; and has been active since 1940 in the IEEE, including membership on three of the committees: Switchgear (including chairmanship of the subcommittee on switches, fuses and insulators), Transmission Substation, and Rotating Machinery. He was also chairman of the AEIC Committee on Electric Switching and Switchgear and has been a member of various committees of the EEI, ASA and IEC.

He and his wife are the parents of two children and reside at 219 Pawnee Road, Cranford, New Jersey.

## N. Y. COMTEC Group

### Switching Systems and Their Applications

The lectures for the last two dates of the Education Committee's winter series of "Switching Systems and Their Applications" have been rearranged. The six part winter series starts on January 17, 1967.

Mr. S. Levine will discuss "Electronic Central Office Systems" on February 14, 1967. Mr. Levine graduated from CCNY in 1952.

Mr. R. G. Palla will lecture on Electronic PBX Systems on February 21, 1967. Mr. Palla graduated from the Union College in Schenectady with a BSEE in 1947.

The first four lectures on Application of System Building Blocks, Memory, Electronic System Elements and Programs will be presented by Professor R. A. Anderson of the Newark College of Engineering. For Professor Anderson's biographical sketch, see the October issue of Monitor.

Anyone desiring further information on the Education Committee series please write Mr. K. I. Iler, General Telephone and Electronics Service Corporation, 730 Third Avenue, New York, New York 10017.

**Joint Metropolitan  
Engineering in Medicine  
and Biology  
Analytic and Computer Techniques  
in Medicine**

Dr. Hiram Hart will discuss modern techniques in multicompartment analysis at 8:00 P.M. on Thursday, January 12, 1967 at The Rockefeller University, South Laboratory Building, 66th Street and York Avenue, New York City. Dr. Hart is Associate Professor of Biochemistry, City College of the New York City University, and Head of Medical Physics Laboratory, Montefiore Hospital and Medical Center.

**North Jersey  
Section**

In the case of a number of the IEEE Groups, the North Jersey Section has joined other Sections in the area to form a joint metropolitan chapter. These joint chapters and their current chairmen are listed below:

G6 Vehicular Communications  
FRANK HOLLISTER  
American Electric Power Service Corp.  
2 Broadway  
New York, N. Y. 10008  
212 - HA 2-4800  
G9 Instrumentation and Measurement  
HOWARD E. LUSTIG  
Radio Receptor Div.  
General Instruments Corp.  
100 Andrews Road  
Hicksville, N. Y. 11802  
516 - 681-4300, Ext. 240  
G10 Aerospace and Electronic Systems  
J. LANE WARE  
ITT Labs  
Nutley, N. J.  
201 - 284-3782

G12 Information Theory  
PROF. J. K. WOLF  
Polytechnic Institute of Brooklyn  
333 Jay Street  
Brooklyn, N. Y.  
212 - 643-3843

G14 Engineering Management  
L. KATZ  
New York Telephone Co.  
140 West Street, Room 1300  
New York, N. Y. 10007  
212 - 394-2558

G15 Electron Devices  
ROBERT W. MCMURROUGH  
RCA

1000 South Second Street  
Harrison, N. J.  
201 - HU 5-3900, Ext. TF 301

G18 Engineering in Medicine and Biology  
JAMES J. SMITH, M.D.  
New York Polyclinic Hospital  
Dept of Nuclear Medicine  
345 West 50th Street  
New York, N. Y. 10019  
212 - CO 5-8000

G21 Parts, Materials and Packaging  
WAYNE D. MOYERS  
Airborne Instruments Lab.  
Deer Park, L. I., N. Y.  
516 - 595-3061

G27 Electromagnetic Compatibility  
DAVID FIDELMAN  
Electro-Magnetic Measurements Co.  
50 Baiting Place Road  
Farmingdale, L. I., N. Y.  
516 - MY 4-6510

# Ballantine Announces a New Solid State DC Digital Voltmeter



**Gives you fast, accurate readings to 0.02%  
± 0.01% f.s. and at a low cost of just \$490**

Ballantine's new Model 353 enables you to speed up dc measurements materially over those made on multi-knob differential voltmeters. And with laboratory accuracy from 0 to 1000 volts dc.

It requires just two steps: (1) Set knob to NORMAL mode and read voltage; (2) dial in the first digit in EXPAND mode and read voltage to four places with over-range to five; and, in addition, interpolate to another digit.

The NORMAL mode error becomes submerged by more than ten to one, and the operation is fast and accurate to 0.02% of reading ±0.01% f.s. If the input signal is varying, the last digit may be followed visually, thus providing the advantage of analog display.

Note these other interesting features of the new 353: a left-to-right digital readout; an automatic display of "mV" or "V"; proper placement of the decimal point; 10 megohms input resistance; an automatic disabling of the motor during the "expand" dialing; a red light to indicate overrange or wrong polarity; and provision for a foot-operated switch for a "read" or "hold" function.

Step 1.  
NORMAL  
Mode  
8.342 V



Step 2.  
EXPAND  
Mode  
8.3420 V



Example of  
"Overrange"  
presentation  
108.340 V



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## Joint Metropolitan Chapter Instrumentation and Measurement

### SPRING LECTURE SERIES Statistics, Probability and Measurement Reliability for Engineers

#### Date:

Monday evenings, starting February 13,  
1967 at 7:00 P.M.

#### Place:

Western Union Auditorium at 190 West  
Broadway, New York, New York.

February 13, 1967

Nature of Product Variation  
Nature of Measurement Variation  
Obtaining and Collating of Data

February 20, 1967

Measures of Central Tendency  
Measures of Dispersion  
Assumption of Normal Distribution

February 27, 1967

#### Probability Concepts

- A. Permutations and Combinations
- B. Rules for using Probability

March 6, 1967

- Data Distributions
- A. Binomial
- B. Hypergeometric
- C. Poisson

March 13, 1967

- Sampling Risks and Types of Sampling
- A. Operating Characteristics Curve
- B. Measures of Risk
- C. Single, Double, and Multiple Samplings

March 20, 1967

#### Testing Error

- A. Precision and Accuracy
- B. Analysis of Error
  - 1. Pattern of Variation
  - 2. Statistical Techniques

March 27, 1967

#### Measurement Reliability

- A. Confidence of Data Accuracy
- B. Reduction of Test Error
  - 1. Replication of Data
  - 2. Matched Pairs

April 3, 1967

#### Equipment Reliability

- A. Calibration
- B. Standards
- C. Design

The eight lectures, supplemented by a text book which is included in the course fee, will be given by Mr. Charles G. Weiss who is Quality Control Manager, Norwalk Facility, Burndy Corporation. During the past years, Mr. Weiss has taught various statistical courses at the University of Toledo and at Rutgers Extension Division in Newark, N. J.,

as well as Reliability courses at the University of Bridgeport, Connecticut. He also served as Co-Chairman of the Government Industry Seminar on Government Quality System Requirements held in Toledo, Ohio.

#### Registration Fee:

\$35.00 (which includes text book) for members and non-members.

#### Advance Registration Fee:

\$30.00 (which includes text book). Must arrive by February 3, 1966.

For information and advance registration, please contact H. Oltzman, Westinghouse Electric Corp., 95 Orange Street, Newark, N. J., telephone (201) 465-2285, or H. E. Lustig, General Instrument Corp., 100 Andrews Road, Hicksville, N. Y. 11802, telephone (516) 681-4300. Please make checks payable to N. Y. Joint Chapter, I&M, IEEE.

## Princeton Chapter Magnetics Group

### Low Temperature Effect of Oxide Surface Layer on Thin Magnetic Films

#### Date:

Wednesday, January 18, 1967

#### Time:

8:00 P.M.

#### Speaker:

Dr. F. E. Hagedorn, Bell Telephone Labs.

#### Place:

Murray Hall, Room 217,  
Queens Campus, Rutgers University,  
New Brunswick

#### Pre-Meeting Dinner:

6:00 P.M. at Alumni-Faculty Club

For dinner reservations, call Mrs. Helen Yefko, Rutgers University, 201 CH 7-1766, Ext. 6325.

For information on the new Princeton Chapter of the IEEE Magnetics Group contact Dr. Ronald Moskowitz or Dr. Edward DellaTorre, Department of EE, Murray Hall, Queens Campus, Rutgers State University, New Brunswick.

## Joint Metropolitan Chapter Measurements

### Port Authority Electronic Facilities

Arrangements have been completed with Dr. Leslie Eddie, Research Laboratory, Port of New York Authority, for members of the IEEE Joint Chapter Measurements Group to inspect the electronic facilities of the Lincoln Tunnel on Thursday, January 26, at 2 P.M.

Some of the highlights of the tour will be inspection of the new traffic control surveillance system, the new photocell measurement system, a prototype to be used at all tunnel facilities, and the "flow control" analog computer that makes the flow decision of traffic into each tunnel.

Other things to be observed will be: ventilation controls, carbon monoxide monitoring, and the closed circuit television monitors for meter reading the speed of cars going through the tunnel.

The group will be limited to 25 people. Those interested in participating should write or telephone Walter Knoop, c/o Gawler-Knoop Company, 14 Beaufort Avenue, Roseland, N. J. 07068 (telephone: (201) 226-4545).

## North Jersey Comtec

### "Application of PCM in Telephone Plant"

#### Speaker:

W. L. Ross, Head, Facilities Planning at  
Bell Telephone Laboratories.

#### Date:

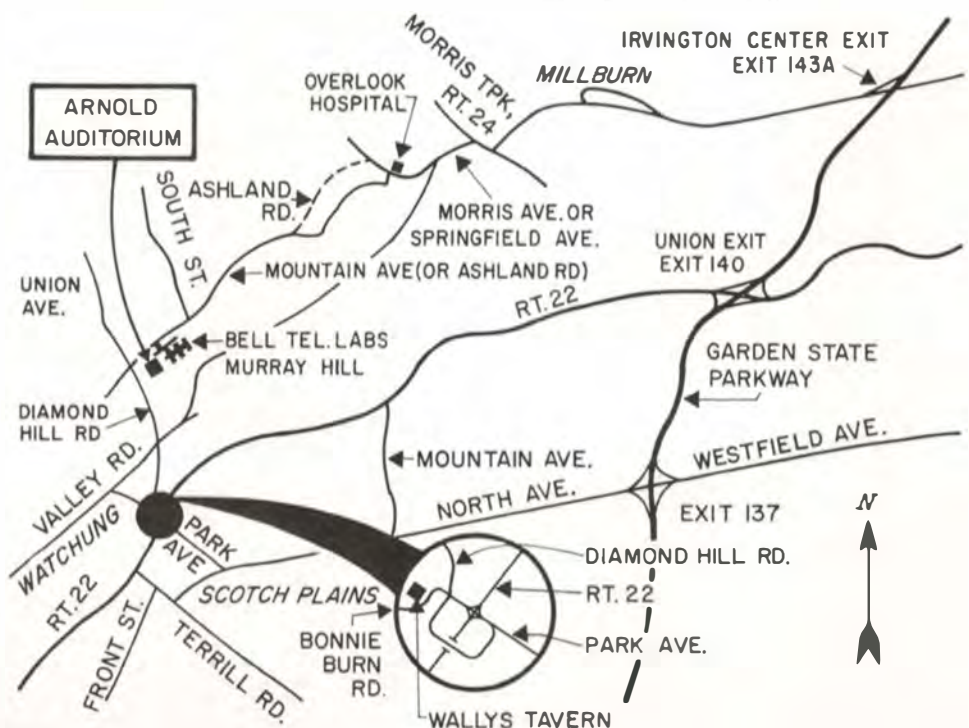
Thursday, January 26, 1967

#### Time:

8:00 P.M.

#### Place:

Arnold Auditorium  
Bell Telephone Laboratories  
Murray Hill, New Jersey



# Tektronix is building spectrum analyzers

it's the new Type 491  
10 MHz - to - 40 GHz

You can judge its performance by these features . . . internal phase lock for stable displays even at 1 kHz/div dispersion . . . resolution range of 1 kHz to 100 kHz coupled to calibrated dispersion for operational simplicity . . . dispersion range of 10 kHz (1 kHz/div) to 100 MHz (10 MHz/div) for direct readings of relative frequency from the display . . . CW sensitivity of  $-110$  to  $-70$  dBm depending on frequency . . . and display flatness of  $\pm 1.5$  dB over 100 MHz dispersion.

With oscilloscope-type triggering and sweep circuitry, you can trigger from internal, external or line sources, and have wide choice of sweep rates from 0.5 s/div to 10  $\mu$ s/div in a 1-2-5 sequence. Other features include EMI (RFI) suppression . . . trace intensification of high speed segments of the waveform . . . camera compatibility with the Tektronix Type C-30 for easy, high quality photographs . . . bright display, small spot size, long persistence (P-7) phosphor on a new 4-inch rectangular CRT with 8x10 div (1 div equals 0.8 cm) display . . . and DC-coupled recorder output.

The Type 491 is only 7" high by 12" wide and 22" deep, weighs less than 40 pounds and requires only 55 watts. Yet it has the broad frequency range and high performance you need for most applications. And setup is easy even at waveguide frequencies—just mount one of the external waveguide mixers to your source and couple it to the Type 491 with a flexible cable.

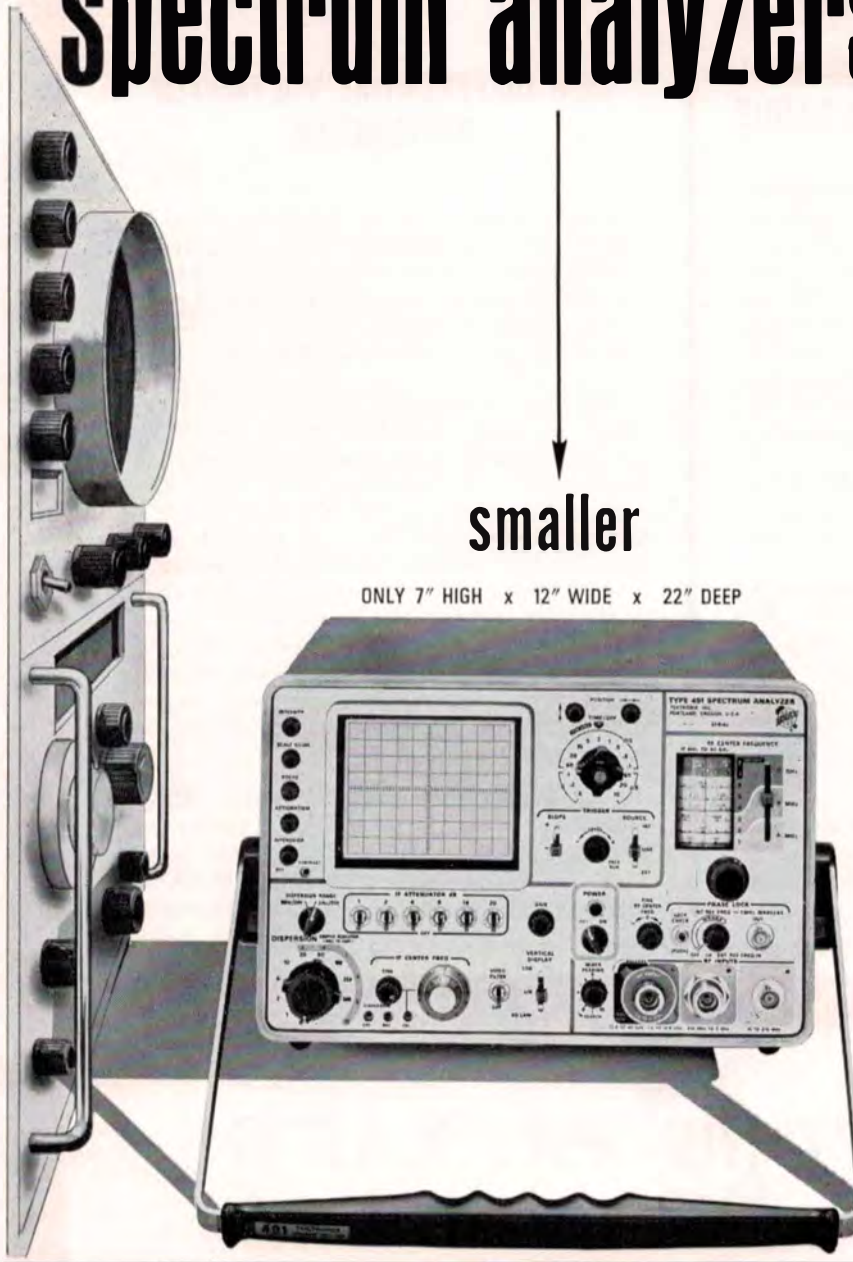
As shown, the carrying handle adjusts for various tilt positions and provides a sturdy support stand. The front panel cover serves as a storage case for the included accessories such as adapters, cables, waveguide mixers and coax attenuators. And the rugged construction of the Type 491 lets you carry laboratory performance to the job.

Type 491 (with accessories) . . . \$4200

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## **SWEEP GENERATOR PLUG-IN COVERS 100KHz to 110MHz RANGE**

A new plug-in for the hp Model 8690A Sweep Oscillator brings the speed, precision and convenient operating features of microwave sweep oscillators to RF measurements. All of the performance features, such as flexible sweep functions, wide range of sweep rates, continuously-tuned markers, leveled output, and many others designed into the Sweep Oscillator for microwave use, are retained with the new radio-frequency plug-in.

The sweep linearity is less than 0.5% from the straight-line function. Frequency accuracy of the start and stop points is 1%. Output power is calibrated in 10-dB steps from +10 to -110 dBm with vernier adjustment between steps. Maximum output is +20 dBm (100 mW) into a 50-ohm load. A built-in leveling circuit holds the output flat within  $\pm 0.25$  dB. Start and stop sweep points are continuously adjustable and calibrated over the full range to provide a flexibility not usually found in rf sweep oscillators.

Price of the hp Model Low Frequency Sweeper Plug-In is \$950 (the hp Model 8690A Sweep Oscillator main frame is \$1550).



## **NEW DIFFERENTIAL VOLTMETER RATIOMETER**

A new differential dc voltmeter and dc ratiometer from Hewlett-Packard carries a 0.002% accuracy spec, with stability of 1 part per million per hour (of range), and 5 ppm per day (also of range). Null meter resolution is 0.2 ppm of range, on all ranges.

The new instrument comes in two versions: hp Model 3420A is for ac line only; hp Model 3420B is for line or self-contained battery-powered operation. Both carry the same basic specifications. To make 0.002% accuracy meaningful, the hp Models 3420A/B have six digit decade dividers, plus the usual last-digit meter, and  $\pm 10\mu\text{V}$  full-scale sensitivity. Ratio capability is a further exclusive feature. The ratio of two applied dc voltages can be determined to six significant figures, with four ranges available. The divider accuracy of a resistance divider may be measured with similar precision.

The new Hewlett-Packard Model 3420A Differential Voltmeter/Ratiometer is priced at \$1175. Model 3420B (battery-powered) is \$1300. For complete information on all instruments, call your local hp Engineer.

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