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American Institute of  
Electrical Engineers



WINTER  
GENERAL  
MEETING

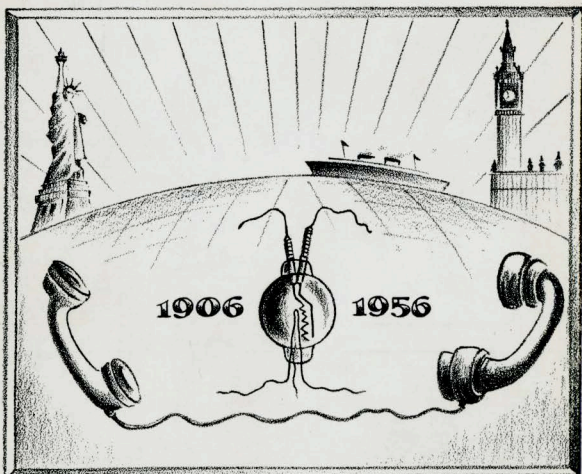
Program

*Please retain for use during  
entire meeting*

NEW YORK, N. Y.  
JANUARY 21 - JANUARY 25  
1957

*Meeting Headquarters*

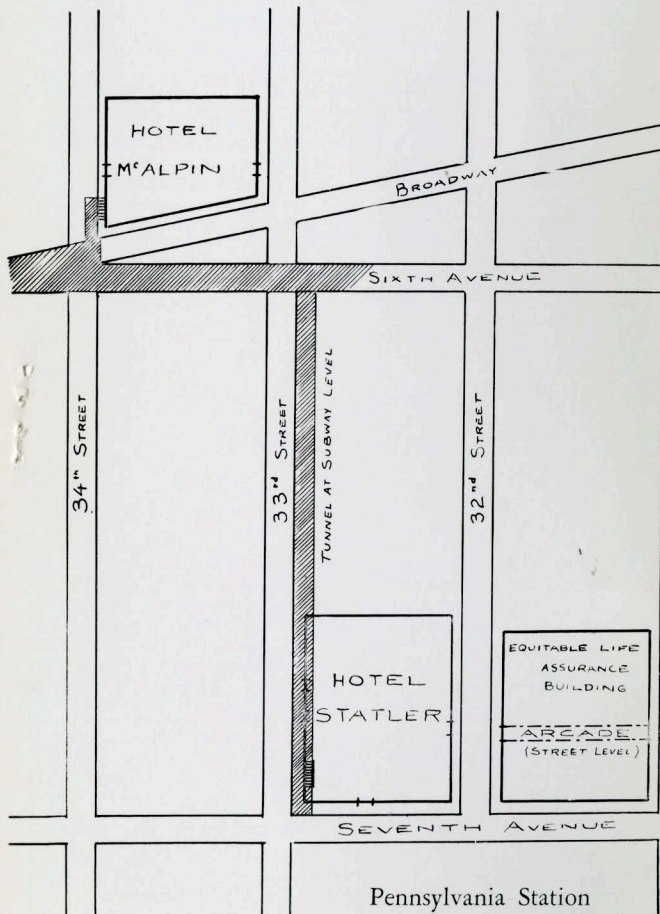
HOTEL STATLER



Transatlantic Telephone Cable opened  
in year 1956 — the Fiftieth Anniversary  
year of DeForrest's invention of the audion

### Sheraton-McAlpin Hotel

Room	Location
Ballroom .....	24th Floor
Colonial Room .....	3rd Floor
Red Room .....	1st Mezzanine
East Room .....	1st Mezzanine
El Patio .....	2nd Mezzanine
Parlors B, C, D, E and F .....	2nd Mezzanine



## GENERAL INFORMATION

Our Winter General Meeting this year features one of the largest technical programs ever organized for an Institute meeting. A group of inspection trips has also been arranged closely allied with the technical sessions. On the social side, there will be the Eta Kappa Nu Dinner, a dinner-dance, a smoker, theatre tickets and special entertainment for the ladies.

Mr. Frederick R. Kappel, President of the American Telephone and Telegraph Company, will deliver the principal address at the General Session to be held at 2 P.M., Monday, January 21st, 1957. At this session also, the Edison Medal will be presented to Dr. Comfort A. Adams, a Past President of the Institute. The Institute Paper Prizes will also be awarded and President M. S. Coover will address the Members assembled.

In determining the technical sessions and committee meetings you wish to attend, please note that several have been assigned to the Sheraton-McAlpin Hotel, Broadway and 34th Street.

*Note:* In fairness to all concerned and due to the lack of display space, only Institute notices will be permitted during the meeting. This will prohibit the posting of any advertising or position opportunity notices.

**REGISTRATION FEES REQUIRED.** In accordance with the policy as set up by the Board of Directors, a registration fee of \$5.00 has been established for members and a fee of \$8.00 for nonmembers. This is to help make the meeting self-supporting. Student members and the immediate families of members will not be required to pay any fee.

**INFORMATION** on all features may be obtained at the registration desk. Efforts will be made to deliver telegrams and messages promptly. Members who expect to receive mail are asked to inquire frequently at the mail and registration desk.

**BROADCAST TICKETS** have been obtained for many of the principal broadcasts in various evenings during the week. These are available at the entertainment desk. Some prior reservations and theatre tickets are still available.

**TECHNICAL SESSIONS AND DISCUSSIONS** are covered by the "Technical Sessions Guide" at the discretion of the presiding officers. Usually 10 minutes will be allowed for the presentation of each paper and 5 minutes for each discussion. To receive consideration for publication, discussion on TRANSACTIONS Papers in duplicate must be left with the chairman and/or sent to Edward C. Day, Assistant Secretary, Committee on Technical Operations, AIEE, 33 West 39th Street, New York 18, New York, before February 8, 1957. Discussions received later may not be included, depending upon the printing schedule of the paper to which the discussion is directed. The original typewritten double-spaced copy, together with original illustrations as photographs or inked tracings should be submitted.

**ADVANCE COPIES OF PAPERS** may be purchased by members at the technical papers desk at the uniform price of \$.40 each (\$.80 each to nonmembers). Only numbered papers are available. Mail orders, particularly from out-of-town members, are advisable inasmuch as an adequate supply of each paper at the meeting cannot be assured. Coupon Books in \$10.00 denominations are available for those who wish to avoid remittance by check or otherwise. Mail orders should be addressed to the AIEE Order Department, 33 West 39th Street, New York 18, New York. The TRANSACTIONS Papers will also be published in the Bimonthly Publications. *Note:* Unnumbered Conference Papers (CP.\*) may be available for sale at or after the meeting, if copies are provided by the author. They are not intended for publication in the TRANSACTIONS and are not presently scheduled for reproduction in any form by the Institute.



SCHEDULE OF EVENTS  
For Entertainment, Inspection Trips and Points of Interest, See Separate Folder

MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY
<p><b>10:00 A.M.</b> Substations <i>Ballroom*</i></p> <p>Insulated Conductors <i>Skytop</i></p> <p>Relays <i>Georgian Room</i></p> <p>Analog Techniques <i>Penn Top South</i></p> <p>Nucleonics <i>El Patio*</i></p> <p>Land Transportation <i>Keystone Room</i></p> <p>Domestic and Commercial Applications <i>Penn Top North</i></p> <p>Special Instruments and Auxiliary Apparatus <i>West Room</i></p> <p>Communication Theory <i>East Room</i></p> <p>Industrial Power Systems <i>Colonial Room*</i></p> <p>Telegraph Systems <i>Red Room*</i></p>	<p><b>9:30 A.M.</b> <i>Penn Top North</i></p> <p>Section Representatives <i>Ballroom</i></p> <p>Transmission &amp; Distribution <i>Ballroom</i></p> <p>Rotating Machinery <i>East Room</i></p> <p>Transformers <i>Ballroom*</i></p> <p>Power System Communications <i>Skytop</i></p> <p>Electrostatic Processes <i>El Patio*</i></p> <p>Symposium on Polyethylene <i>Georgian Room</i></p> <p>Land Transportation <i>Keystone Room</i></p> <p>Applied Mathematics <i>East Room*</i></p> <p>Chemical Processes <i>West Room</i></p> <p>Indicating &amp; Integrating Instruments <i>Colonial Room*</i></p> <p>Digital Computer <i>Penn Top South</i></p>	<p><b>9:30 A.M.</b> <i>Ballroom*</i></p> <p>Transmission &amp; Distribution <i>Ballroom*</i></p> <p>Machinery—Synchronous <i>Penn Top North</i></p> <p>Transformers <i>Georgian Room</i></p> <p>Electronic Circuitry <i>El Patio*</i></p> <p>Symposium on Gaseous Dielectrics <i>Skytop</i></p> <p>Magnetic Amplifiers <i>Penn Top South</i></p> <p>Research <i>Ballroom</i></p> <p>Petroleum Industry <i>Keystone Room</i></p> <p>Wire Communications <i>East Room</i></p> <p>Production &amp; Application of Light <i>Colonial Room*</i></p> <p>Recording &amp; Controlling Instruments <i>West Room</i></p>	<p><b>9:30 A.M.</b> <i>Georgian Room</i></p> <p>Transmission &amp; Distribution <i>East Room</i></p> <p>Machinery—Induction <i>East Room</i></p> <p>Switchgear <i>Penn Top North</i></p> <p>Satellite Communications <i>Penn Top South</i></p> <p>Symposium on Liquid Dielectrics <i>Keystone Room</i></p> <p>Magnetic Amplifiers <i>Skytop</i></p> <p>Research <i>Ballroom</i></p> <p>System Engineering &amp; Power Generation <i>Ballroom*</i></p> <p>Semi-Conductors <i>Colonial Room*</i></p> <p>Computing Devices &amp; Education <i>West Room</i></p> <p>Industrial Control <i>Red Room*</i></p> <p>Electrochemical Processes <i>El Patio*</i></p>	<p><b>9:30 A.M.</b></p> <p>Switchgear <i>East Room</i></p> <p>Protective Devices <i>Keystone Room</i></p> <p>System Engineering <i>Ballroom</i></p> <p>Power &amp; High Frequency Tubes <i>Colonial Room*</i></p> <p>Dielectrics <i>Ballroom*</i></p> <p>Computing Devices <i>Penn Top North</i></p> <p>Feedback Control Systems <i>Skytop</i></p> <p>Applications in the Steel Industry <i>West Room</i></p> <p>Power Generation <i>Penn Top South</i></p> <p>TV &amp; Aural Broadcasting Systems <i>Georgian Room</i></p>

\* Located in the Hotel Sheraton McAlpin, Broadway, 33rd to 34th Streets

<p><b>2:00 P.M.</b> <i>Ballroom</i></p> <p>General Session</p>	<p><b>2:00 P.M.</b> <i>Penn Top North</i></p> <p>Section Representatives <i>Ballroom</i></p> <p>Transmission &amp; Distribution <i>Ballroom</i></p> <p>Rotating Machinery—Insulation <i>East Room</i></p> <p>Transformers <i>Ballroom*</i></p> <p>Relays &amp; Power System Communications <i>Skytop</i></p> <p>Education in Electronics <i>West Room</i></p> <p>Symposium on Polyethylene Wire &amp; Cable Insulation <i>Georgian Room</i></p> <p>Magnetics <i>Penn Top South</i></p> <p>Land Transportation &amp; Industrial Power Rectifiers <i>Keystone Room</i></p> <p>Safety <i>El Patio*</i></p> <p>Indicating &amp; Integrating Instruments <i>Colonial Room*</i></p> <p>Radio Communication System <i>East Room*</i></p>	<p><b>2:00 P.M.</b> <i>Ballroom*</i></p> <p>Transmission &amp; Distribution <i>Ballroom*</i></p> <p>Rotating Machinery—Synchronous <i>Georgian Room</i></p> <p>Electronic Circuitry <i>Penn Top North</i></p> <p>Symposium on Radiation Effects <i>Skytop</i></p> <p>Magnetic Amplifiers <i>Penn Top South</i></p> <p>Catholic Protection <i>West Room</i></p> <p>Wire Communications <i>East Room</i></p> <p>Education <i>Colonial Room*</i></p> <p>Management <i>Ballroom</i></p> <p>Petroleum Industry <i>Keystone Room</i></p>	<p><b>2:00 P.M.</b> <i>Georgian Room</i></p> <p>Transmission &amp; Distribution, <i>Georgian Room</i></p> <p>Switchgear <i>Penn Top North</i></p> <p>Optical-Electronic Tubes <i>East Room</i></p> <p>Symposium on Thermal Aging <i>Keystone Room</i></p> <p>Transatlantic Telephone Cable <i>Ballroom</i></p> <p>System Engineering, Computing Devices, &amp; Transmission &amp; Distribution <i>Ballroom*</i></p> <p>Industrial Control <i>Red Room*</i></p> <p>Satellite Telemetering <i>Penn Top South</i></p> <p>Solid State Dielectric Devices <i>Skytop</i></p> <p>Ethics <i>West Room</i></p> <p>Industrial Power Systems <i>Colonial Room*</i></p> <p>Safety Precautions for Electrochemical Plants <i>El Patio*</i></p>	<p><b>2:00 P.M.</b> <i>West Room</i></p> <p>Electrical Techniques in Medicine &amp; Biology <i>West Room</i></p> <p>Computing Devices <i>Penn Top North</i></p> <p>Feedback Control Systems <i>Skytop</i></p> <p>Television Equipment <i>Georgian Room</i></p> <p>Communication Switching Systems <i>East Room</i></p>
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\* Located in the Hotel Sheraton McAlpin, Broadway, 33rd to 34th Streets



# Monday, January 21

## 10:00 a.m.—Substations

*Substations Committee*  
Sheraton-McAlpin Ballroom  
W. S. SCHEERING, Presiding

- CP57-49. Energized Insulator Washing in Substations. J. M. Mabe, Central Power and Light Company.
- CP57-69. Substation Design Standards and Shortcuts Save Manpower. R. F. Stevens, U. S. Dept. of the Interior.
- 57-53. Supervisory Control of Transmission Terminals at Generating Stations. M. C. Hedges, Commonwealth Edison Company.
- 57-70. Operational Record of Supervisory Equipments on the Southern California Edison Company System. J. D. Cleary, Southern California Edison Company.

## 10:00 a.m.—Insulated Conductors

*Insulated Conductor Committee*  
Skytop  
L. E. FOGG, Presiding

- CP.\* Compression Forces Influencing Pipe Type Cables. E. J. Merrell and A. L. McKean, Phelps-Dodge Copper Products Co.
- 57-66. Soil Factors Affecting Buried Pipe Cable Temperatures. C. A. Bauer and Robert J. Nease, Commonwealth Edison Company.
- CP57-67. Aluminum Alloy Armour Wire for Submarine Cables. E. D. Bent and W. J. Pardy, Northern Electric Company, Ltd.
- CP57-68. The Effect of the Frequency of Bending Cycles on the Fatigue Life of Cable Sheathing. C. E. Betzer, Commonwealth Edison Company.
- CP.\* A Pioneer 230 KV Pipe Cable Installation. W. A. DelMar and E. J. Merrell, Phelps-Dodge Copper Products Co. and J. H. Nicholas, G. & W. Electric Specialty Co.

## 10:00 a.m.—Relays and Transformers

*Relays and Transformers Committee*  
Georgian Room  
W. K. SONNEMANN, Presiding

- 57-21. Detection of Faults in Power Transformers. E. A. Klingshirn, III Youngstown University, and H. R. Moore and E. C. Wentz, Westinghouse Electric Corp.
- 57-18. A New Line of Protective Relays and Cases. J. L. Blackburn, III and W. E. Glassburn, Westinghouse Electric Corp.
- CP57-71. Interim Report on Revisions to Relay Standards. Relay Standards Subcommittee of the AIEE Committee on Relays.
- 57-72. Bibliography of Relay Literature. Subcommittee on Bibliography of Relay Literature of the AIEE Relays Committee.

## 10:00 a.m.—Analog Techniques

*Computing Devices Committee*  
Penn Top South  
H. HAMER, Presiding

- CP57-193. A Differentiator for A-C Computers. W. X. Johnson, Radio Corporation of America.
- CP.\* A New Method for Generating a Function of Two Independent Variables. L. G. Polimerou, Convair.
- CP.\* Bi-Variable Function Generation. J. Levitt, General Electric Co.
- CP.\* The Operational Amplifier as a Laboratory Tool. P. E. Pfeiffer, Rice Institute.
- CP.\* Coordinated Use of Digital and Analog Computers. E. M. Piper and K. B. Tuttle, Northrop Aircraft Company.

## 10:00 a.m.—Nucleonics

*Nucleonics Committee*  
Sheraton-McAlpin El Patio  
J. G. HUTTON, Presiding

- CP.\* Bias Systems for Resonance Transformer Million Volt Electron Beam Generators. W. F. Westendorp, General Electric Co.

## MONDAY (continued)

- CP.\* Dynamics and Control of Nuclear Power Plants. T. S. Gray, Massachusetts Institute of Technology.
- CP.\* Analog Computer Study of the Transient Performance of a Dual Cycle Boiling Water Reactor Nuclear Power Plant. D. W. Leiby, General Electric Co.
- CP.\* Application of a Mechanical Rectifier to a Cyclotron. Jack Warren, Singmaster & Breyer.

## 10:00 a.m.—Land Transportation

*Land Transportation Committee*  
Keystone Room  
E. A. FOSTER and H. F. BROWN, Presiding

- CP57-29. Development and Use of the Gas Turbine Locomotive. F. D. Gowans and A. H. Morey, General Electric Company.
- 57-28. An 8500-Horsepower Gas Turbine-Electric Locomotive. R. M. Smith, General Electric Company.
- 57-16. The Case for a Standard System of Railroad Electrification II for the American Railroads. T. F. Perkinson, General Electric Company.

## 10:00 a.m.—Domestic and Commercial Applications

*Domestic and Commercial Applications Committee*  
Penn Top North  
H. F. HOEBEL, Presiding

- CP.\* Four Inch Diameter Motors for Submersible Water Well Systems. M. J. Carroccio, General Electric Company.
- CP57-26. Motor-operated Switch for Space Heating Control. J. C. Beckett, Wesix Electric Heater Company.
- 57-12. Load and Economic Aspects of the Residential Heat Pump II on Electric Utility Systems. C. W. Bary, Philadelphia Electric Co.
- 57-6. Single Phase Versus Three Phase Service for Residential Air Conditioning. A. S. Anderson and Chase Hutchinson, Ebasco Services, Inc.
- 57-27. Some Problems and Design Factors Concerning Noise in II Motor Driven Home Appliances. E. R. Cunningham and G. L. Wolfert, General Electric Company.

## 10:00 a.m.—Special Instruments and Auxiliary Apparatus

*Special Instruments and Auxiliary Apparatus Committee*  
West Room  
J. H. HAGENGUTH, Presiding

- 57-214. A New Voltage-Time Recorder for Transient Measurements by C. M. Foust and B. V. Bhimani, General Electric Co.
- 57-20. Factors Influencing the Sparkover Voltage of Asymmetrical Sphere Gaps by H. E. Fiegel and W. A. Keen, Jr. General Electric Co.
- CP57-215. Sphere-Gap Volt-Time Curves—Reference Standards for Steep Front Measurements by J. H. Park and H. N. Cones, National Bureau of Standards.
- CP.\* The Response of Resistance Dividers to Steep Front Impulse Waves by A. F. Rohlfs, J. S. Kresge and F. A. Fisher, General Electric Co.

## 10:00 a.m.—Communication Theory

*Communication Theory Committee*  
Hotel Statler East Room  
L. G. ABRAHAM, Presiding

- CP.\* Information Theory Impact on Modern Communication Theory. P. Mertz, Bell Telephone Laboratories, Inc.
- CP.\* Binary Codes for Combating Noise. D. Slepian, Bell Telephone Laboratories, Inc.
- CP.\* Speech Bandwidth Compression. W. E. Kock, Bendix Aviation Corp.
- 57-136. What Use is Delta Modulation to the Transmission Engineer? I F. K. Bowers, Bell Telephone Laboratories, Inc. Re-presented for discussion.



MONDAY (continued)

56-963. Moment Detection and Coding. J. J. Slade, Jr., S. Fich, L. F. Nanni and D. A. Molony, Rutgers University. Re-presented for discussion.

**10:00 a.m.—Industrial Power Systems**  
*Industrial Power Systems Committee*  
 Sheraton-McAlpin Colonial Room  
 J. W. ST. ANDRE, Presiding

CP57-120. Experience in Operating 240 and 480 Volt Industrial Distribution Systems Ungrounded. J. A. Gienger, Eastman Kodak Company.

57-1. Analysis of Irregular Current and Voltage Wave Shapes  
 II Found in Industrial Power Engineering. R. H. Kaufmann, General Electric Company.

CP57-121. Electrical Surveys for Industrial Plants. W. B. Rollins, Anderson-Nichols and Company.

CP.\*. Plant's Power Distribution System has Face Lifting. E. H. Howard, General Electric Company.

**10:00 a.m.—Telegraph Systems**  
*Telegraph Systems Committee*  
 Sheraton-McAlpin Red Room  
 R. B. SHANCK, Presiding

57-64. Multiplex Telegraph Equipment for Radio and Submarine  
 I Cable Circuits. B. S. Diamond, American Cable and Radio Corporation.

57-65. A Predicted Wave Signalling Phase-Shift Telegraph System.  
 I E. T. Heald and R. G. Clabaugh, Collins Radio Company.

CP.\* A Flat-Bed Scanner of the Rotary-Mirror Type. H. Stricholm and Edward Lincoln, Times Facsimile Corporation.

CP.\* Facsimile Recording Techniques in Hydrographic Service. Bernard Luskin, Times Facsimile Corporation.

CP.\* Advancements in the Facsimile Art During 1956. W. H. Bliss, RCA Laboratories.

**2:00 p.m.—General Session**  
 Ballroom  
 D. M. QUICK, General Chairman, Presiding

**"Address" President M. S. Coover**  
**Presentation of the Institute Paper Prizes**

Communication Division:  
 1st Prize Paper by: L. S. Schwartz  
 2nd Prize Paper by: L. A. Weber

Power Division:  
 1st Prize Paper by: L. C. Barthold, I. B. Johnson and A. J. Schultz  
 2nd Prize Paper by: J. S. Tompkins, L. I. Merrill and B. L. Jones

Science and Electronics Division:  
 1st Prize Paper by: C. L. Moore, W. T. Dubic, and P. A. Zaphyr  
 2nd Prize Paper by: A. S. Hoagland

Student Division:  
 1st Prize Paper by: W. B. Bridges  
 2nd Prize Paper by: G. D. Green and L. M. Hill

**Presentation of the Edison Medal to C. A. Adams**  
 Establishment of the Edison Medal, E. P. Yerkes, Chairman, Edison Medal Committee

Career of the Medalist, R. J. Wiseman  
 Presentation of the Medal and Certificate. President M. S. Coover

Response of the Medalist, C. A. Adams

**Nominating Committee Report**  
**"Address" Mr. Frederick R. Kappel, President, American Telephone and Telegraph Co.**

**Tuesday, January 22**

**9:30 a.m.—Section Representatives**  
*Sections Committee*  
 Penn Top North  
 DIXON LEWIS, Presiding

**9:30 a.m.—Transmission and Distribution**  
*Transmission and Distribution Committee*  
 Hotel Statler Ballroom  
 E. L. KANOUSE, Presiding

57-153. New Method for Computing Bearing Capacity of Block Foundations in Transmission Lines. O. D. Zetterholm and B. O. Pramborg, Swedish State Power Board.

57-154. A 230 KV Spar Arm H-Frame Transmission Line Design and Tests. C. C. Dodge, Stone and Webster Engineering Corp.

55-263. A Field Study of ACSR Cable in Severe Marine and Industrial Environment. E. W. Greenfield and E. W. Everhart, Kaiser Aluminum and Chemical Corp. Re-presented for discussion.

CP57-155. Appraisal—30 Year Old Wood Transmission Structures. F. W. Smith, Virginia Electric and Power Company.

CP.\* The Corrosion of Malleable Iron. O. R. Huggins, Malleable Iron Fittings Co.

**9:30 a.m.—Rotating Machinery**  
*Rotating Machinery*  
 Hotel Statler East Room  
 M. A. BAKER, Presiding

CP57-122. Divergence Analysis of DC Machine Commutation. S. J. Roumanis, General Electric Company.

57-123. An Analysis of D-C Machine Commutation. J. R. M. Alger and D. T. Bewley, General Electric Company.

57-124. Carbon Brush Friction and Chatter. E. I. Shobert II, Stackpole Carbon Company.

**9:30 a.m.—Transformers**  
*Transformers Committee*  
 Sheraton-McAlpin Ballroom  
 D. L. LEVINE, Presiding

57-115. Loading of Sealed Dry-Type Transformers. L. C. Whitman, III General Electric Company.

57-116. Protection of Series Capacitors Used With Distribution Transformers. G. G. Auer, N. M. Neagle and L. W. Robbins, General Electric Company.

CP57-117. Transformer Noise Problem—Performance of Acoustic Treatments and Vibration Isolators. A. T. Edwards, The Hydro-Electric Power Commission of Ontario.

CP.\* Low Sound Transformers. G. K. Kallenbach, Niagara Mohawk Power Corp. M. W. Schulz, Jr., and T. J. Twomey, General Electric Company.

**9:30 a.m.—Power System Communications**  
*Power System Communications Committee*  
 Skytop  
 G. E. FARMER, Presiding

57-57. A New Approach to Power Line Carrier System Optimization. III W. H. Freeman, Motorola, Inc.

57-23. Carrier Relaying Frequency Assignments Reduced to Numbers. F. C. Krings, General Electric Company.

CP.\* Evaluation of Operating Principles with Microwave Relaying. J. Berdy, H. J. Fiedler, F. C. Krings and A. J. McConnell, General Electric Co.



TUESDAY (continued)

9:30 a.m.—Electrostatic Processes

*Electronics Committee*  
Sheraton-McAlpin El Patio  
H. J. WHITE, Presiding

- CP57-87. Some Measurements of Abnormal Corona. G. W. Penney, Carnegie Institute of Technology, and J. G. Hewitt, International Business Machines Corp.
- CP57-46. Polarity and Temperature Effects in Corona for Charging Aerosols. W. T. Sproull, Western Precipitation Corporation.
- CP57-88. Power Supplies and Control for Electrostatic Precipitators. J. W. Farr, J. T. Jamison and R. E. Treffeisen, General Electric Company.
- CP.\* Automatic Control of Electrical Precipitation Rectifier Equipment. H. E. Van Hoesen, H. J. Hall and H. J. White, Research-Cottrell, Inc.
- CP.\* A Further Theoretical Analysis of the Charging of Fine Particles in a Corona Discharge. A. T. Murphy, F. Adler and G. W. Penney, Carnegie Institute of Technology.
- 57-89. Measurements of Charge Imparted to Fine Particles by a  
I Corona Discharge. G. W. Penney, Carnegie Institute of Technology, and R. D. Lynch, Westinghouse Electric Corp. Re-presented for discussion.
- CP57-90. The Charging of Small Particles for Electrostatic Precipitation. G. W. Hewitt, Westinghouse Electric Corp. Re-presented for discussion.

9:30 a.m.—Symposium on Polyethylene Wire and Cable Insulation

*Dielectrics Committee*  
Georgian Room  
J. R. PERKINS, Presiding

- CP.\* New Developments and Trends in Polyethylene Wire and Cable Insulation. Alex E. Javitz, Electrical Manufacturing Magazine.
- CP.\* Thermal Embrittlement of the More Crystalline Polyethylene. R. H. Carey, J. A. Snyder, H. C. Vakos, Bakelite Corp.
- CP\*. Polyethylene in Wire and Cable Use, Effects of Molecular Structures on Properties. W. W. Spohn, H. J. Frey, Jr., E. I. du Pont de Nemours & Co.
- CP.\* Irrathene Irradiated Polyethylene, A New Insulating Material for Wire and Cable. K. J. Mackenzie, General Electric Company.
- CP57-36. Impulse Breakdown of Electrically Prestressed Polyethylene. S. R. Vail, Duke University, W. F. Gauster, North Carolina State College.

9:30 a.m.—Land Transportation

*Land Transportation Committee*  
Keystone Room

P. G. LESSMAN and R. E. STILLWAGON, Presiding

- CP57-216. Electrical Equipment of the New Haven Speed Merchant Locomotives. R. M. Henderson, Fairbanks-Morse Co. and T. T. Means, General Electric Co.
- CP57-63. Electrical Aspects of High Speed Self-Propelled Train for the New Haven. J. E. Burton, The Budd Company.
- 57-30. Diesel Locomotives with Mechydro Hydraulic Transmission for Lightweight Passenger Trains. S. F. Steinbrook, Baldwin-Lima-Hamilton Corporation.
- 57-15. Design and Analysis of the Motor-Alternator Speed Regulator  
II for the New Haven Speed Merchant Locomotive. S. W. McElhenny, General Electric Company.

9:30 a.m.—Applied Mathematics

*Basic Sciences Committee*  
Sheraton-McAlpin East Room  
H. SOHON, Presiding

- 57-104. The Development of a New Method of Circuit Analysis in  
I Ladder Networks. L. F. Coker, Texas Technological College.

TUESDAY (continued)

- 57-107. A Describing Function Representation for the Multiple Non-linearities of Electrohydraulic Control Valves. John Zaborsky, H. J. Harrington, McDonnell Aircraft Corporation.
- 57-108. Generalized Charts of the Effects of Nonlinearities in Electrohydraulic Control Valves. John Zaborsky and H. J. Harrington, McDonnell Aircraft Corporation.
- 57-109. Forces and Stresses in an Electromagnetic Field. T. H. Lee,  
I General Electric Company.

9:30 a.m.—Chemical Processes Subcommittee

*Chemical Industry Committee*  
West Room  
R. W. SCOTT, Presiding

- CP.\* The Use and Performance of Polyethylene Power Cable in Chemical Plants. J. C. Norton and G. O. Wardrop, Carbide and Carbon Chemicals Co.
- CP.\* New Electrical Construction Approach for Ammonium Nitrate Facilities. R. G. Rudrow, Atlas Powder Company.
- CP.\* Use of Water Sprays for Outdoor Substation Structures. W. W. Merkel, Davison Chemical Co.

9:30 a.m.—Indicating and Integrating Instruments

*Indicating and Integrating Instruments Committee*  
Sheraton-McAlpin Colonial Room  
F. K. HARRIS, Presiding

- 57-111. An Inductronic Double Bridge. J. H. Miller, Weston Electrical Instrument Corporation. Re-presented for discussion.
- CP.\* Phase Angle Measurements in the Audio Range. David Alper, Bendix Aviation Corp.
- CP.\* Principles and Practices for Standardizing Laboratories. Dr. F. B. Silsbee, U. S. Bureau of Standards.
- 57-114. The Clamp-Type Alternating-Current Microammeter. G. F.  
I Montgomery and Carroll Stansbury, National Bureau of Standards.

9:30 a.m.—Digital Computer Techniques for Electrical Engineering Problems

*Computing Devices Committee*  
Penn Top South  
F. J. MAGINNISS, Presiding

- CP.\* Application of Computers to the Analysis of Sudden Short-Circuit Oscillograms. D. B. Harrington, J. I. Whittlesey, General Electric Company.
- CP.\* Numerical Techniques Used in the Application of Digital Computers to Power Systems Problems. G. W. Stagg, American Gas & Electric Co.
- CP.\* Numerical Analysis of Physical Systems Using Digital Computers. R. W. Ferguson, P. A. Zaphyr and E. L. Harder, Westinghouse Electric Corp.
- CP57-194. Some Practical Mathematical Techniques. G. K. Carter, General Electric Co.

2:00 p.m.—Section Representatives

*Sections Committee*  
Penn Top North  
DIXON LEWIS, Presiding

2:00 p.m.—Transmission and Distribution

*Transmission and Distribution Committee*  
Hotel Statler Ballroom  
J. K. DILLARD, Presiding

- 57-156. Conductor Economics on High-Voltage Transmission Systems. J. M. Henderson and A. J. Wood, General Electric Company.
- CP57-157. The Economics of Subtransmission Planning. D. N. Reps, Westinghouse Electric Corp.
- 57-158. 345 KV Transmission—A Progress Report. H. P. St. Clair, American Gas and Electric Service Corp.
- 57-159. Representation of Induction Motor Loads During Power System Stability Studies. D. S. Brereton, D. G. Lewis and C. C. Young, General Electric Co.



### TUESDAY (continued)

CP.\* Performance Charts for Three-Phase Transmission Circuits Under Balance Operation. K. J. Cox and Edith Clarke, University of Texas.

57-160. Fault Location Methods for Overhead Lines. R. F. Stevens, III D. J. Marihart and T. W. Stringfield, Bonneville Power Administration.

### 2:00 p.m.—Rotating Machinery—Insulation

*Rotating Machinery Committee*  
Hotel Statler East Room  
C. E. ASBURY, Presiding

57-125. D-C Testing Experience on Rotating Machine Insulation. J. S. Johnson and A. W. Zwiener, Westinghouse Electric Corp.

57-126. Destructive Breakdown Tests on a Large Turbine Generator Stator Winding. A. M. Nemetz, Consumers Power Company, and M. S. Kirwen, Commonwealth Associates, Inc., and J. S. Johnson, Westinghouse Electric Corp.

CP.\* A High Voltage Surge Test for Detecting Faults Between Turns of Rotating Machinery. J. S. Johnson and R. E. Kelly, Westinghouse Electric Corp.

CP.\* Heat Flow in D-C Motor Field Coils as a Function of Insulation Deterioration. G. P. Gibson and J. C. Schwarckops.

### 2:00 p.m.—Transformers

*Transformer Committee*  
Sheraton-McAlpin Ballroom  
C. W. MILLER, Presiding

57-48. Short Circuit Capability Tests of Load Tap Changer Mechanisms. O. P. McCarty and W. M. Johnson, General Electric Company.

57-118. Electrode Area Effect for the Impulse Breakdown of Transformer Oil. H. S. Endicott and K. H. Weber, General Electric Company.

CP.\* Transformer Oil Preservation. J. R. Meador and N. E. Dillow, General Electric Company.

CP57-119. Cascade Potential Transformers. G. Camilli, General Electric Company; H. R. Lucas, Canadian General Electric Company; and L. W. Marks and C. H. Tuttle, General Electric Company.

### 2:00 p.m.—Relays and Power System Communications

*Relay and Power System Communications Committees*  
Skytop  
L. G. EATON, Presiding

57-13. An Approach to Microwave Relaying and System Design by J. R. Linders and V. A. Nosko, Cleveland Electric Illuminating Company.

57-209. Field Tests of Microwave Relaying Equipment by E. W. Downer, Cleveland Electric Illuminating Company.

57-208. A Microwave System for Protective Relaying—Boston Edison Company by John J. Egan, Kenneth O. Sten and John E. Hurley, Boston Edison Company.

57-207. Field Tests and Operating Experience with Carrier Transfer Trip Relaying for Line Protection by A. W. Adams, Bonneville Power Administration.

### 2:00 p.m.—Education in Electronics

*Electronics Committee*  
West Room

TOPIC: Technicians can be trained to work as Junior Engineers.

THEME: The need is well recognized, to suitably utilize available manpower, and to provide on-the-job education to improve the status of laboratory technicians, within their companies. The purpose of this panel discussion is to bring together viewpoints from Industry, University, Technical Institute and Professional Engineering, possibly to develop a standardized program, to increase the number of engineers available to the industry.

### TUESDAY (continued)

#### PARTICIPANTS:

**Moderator:** John Russell, General Electric Company

**Industry:** Thor Trolsen, General Electric Company

**University:** Eric Walker, Pennsylvania State University

**Technical Institute:** K. O. Werwath, Milwaukee School of Engineering.

**Professional Engineering:** Newell L. Freeman, New York State Board of Examiners of Professional Engineers and Land Surveyors

**A Proposed Solution:** C. F. Spitzer, General Electric Company

### 2:00 p.m.—Symposium on Polyethylene Wire and Cable Insulation

*Dielectrics Committee*  
Georgian Room

JOSEPH STICHER, Presiding

CP.\* Applications of Polyethylene in the Wire and Cable Industry. E. J. Merrill, Phelps Dodge Copper Products.

CP.\* The Polyethylenes for Higher Voltage Cables. R. C. Graham, Rome Cable Company.

CP.\* Use of Polyethylene Covered Conductor in the Niagara Mohawk System. G. P. Adams and C. T. Nicholson, Niagara Mohawk Power Company.

CP.\* Four Years of Experience with High Voltage Polyethylene Power Cables. G. Martin, P. Flouck and B. Schmidt, S. A. des Cabeleries et Trifileires, Switzerland. To be delivered by P. J. Croft, Canada Wire and Cable Corp.

CP.\* Resilient Shielding, A New Construction in Polyethylene Power Cable. E. D. Eich, Anaconda Wire and Cable Company.

### 2:00 p.m.—Magnetics

*Basic Sciences Committee*  
Penn Top South

J. E. GOLDMAN, Presiding

CP.\* Visit to Russian Conference on Magnetism. R. M. Bozorth, Bell Telephone Labs.

CP.\* Highlights of the 1956 AIEE Magnetic Conference. C. P. Bean, General Electric Co.

CP.\* Fine-Particle Permanent Magnets—A Survey. T. O. Paine, L. I. Mendelsohn and F. E. Luborsky, General Electric Co.

CP.\* Micromave Applications of Magnetic Materials, Recent Advances. John Pippins, Harvard University.

### 2:00 p.m.—Land Transportation and Industrial Power Rectifiers

*Land Transportation and Industrial Rectifiers Committees*  
Keystone Room

J. C. PRICE and G. M. ZINS, Presiding

CP.\* Rectifier Locomotives for the Virginian Railway. J. C. Fox, Virginian Railway Company, J. P. Wiles, General Electric Company.

57-32. The Electric System of the Rectifier-Type Locomotives for the Virginian Railway. J. C. Brown, General Electric Company.

CP57-33. Design of Ignitron Tubes for Rectifier Locomotives. B. E. Belnap, J. L. Zehner and H. E. Zuvers, General Electric Co.

CP.\* Design Considerations for Rectifiers for Railway Locomotives. C. C. Herskind, J. E. Hudson, and W. R. Kettenring, General Electric Company.

CP.\* Report on Progress and Trends in European Electrification. E. H. Brown, C. B. Lewis and D. R. MacLeod, General Electric Company.

### 2:00 p.m.—Safety

*Safety Committee*  
Sheraton-McAlpin El Patio  
ROBIN BEACH, Presiding

CP57-62. Lead-acid Storage Batteries for Emergency Lighting and Power. E. A. Hoxie, The Electric Storage Battery Company.



TUESDAY (continued)

- CP.\* A Branch-Circuit Wiring System Used at the National Bureau of Standards. R. L. Lloyd, National Bureau of Standards.
- CP.\* Resuscitation from Electric Shock—Motion pictures of heart fibrillation. Dr. W. B. Kouwenhoven, The Johns Hopkins University.
- 57-35. Field Treatment of Electric Shock Cases I. W. B. Kouwenhoven and W. R. Milnor, The Johns Hopkins University.
- 2:00 p.m.—Indicating and Integrating Instruments**  
*Indicating and Integrating Instruments Committee*  
Sheraton-McAlpin Colonial Room  
L. J. LUNAS, Presiding
- 57-43. Compensation for Instrument Losses in Circuits Containing a Wattmeter, Voltmeter and Ammeter. N. M. Vrana, Cornell University. Re-presented for discussion.
- CP.\* A Stable Platform for Galvanometer Mounting. Dr. F. K. Harris,
- 57-113. Mass Flowmeter with Retarding Disk Integration. R. G. Ballard and J. R. Macintyre, General Electric Company.
- CP57-112. A Dynamic Torquemeter Utilizing the Reciprocal Wiedemann Effects. M. J. O'Neill, Perkin-Elmer Company.
- CP.\* Measurement and Control of Minute Frequency Variations in Supply Systems, and Survey of the Present State of the Art, R. Leonhardt, Rohde and Schwarz. Presented by R. Feldt, Federal Telephone and Radio Co.

**2:00 p.m.—Radio Communications System**  
*Radio-Communications Systems Committee*  
Sheraton-McAlpin East Room  
DAVID TALLEY, Presiding

- 57-58. A Narrow Band Experimental FM Mobiletelephone System. I W. A. Miller, The Pacific Telephone & Telegraph Company.
- CP.\* RCA Multiplex/ARQ System. A. Kahn and A. Liguori
- CP57-103. Modern Approach to Communication Systems Planning and Engineering. V. J. Nixon, Microwave Services, Inc.
- 57-59. Noise Considerations on Toll Telephone Microwave Radio Systems. T. A. Combellick and M. E. Ferguson, Lenkurt Electric Company.
- CP57-60. Design Factors for the Optimization of Multichannel Radio Systems. C. A. Parry, White Plains, New York.
- CP57-61. Signal-to-Noise Ratios in Strong-Carrier FM Systems. Harry Urkowitz, Philco Corporation Research Division.
- 56-1001. Some Results with Frequency Diversity in a Microwave I Radio System. F. H. Willis, Bell Telephone Laboratories, Inc. (Re-presented for discussion.)

Wednesday, January 23

**9:30 a.m.—Transmission and Distribution**  
*Transmission and Distribution Committee*  
Sheraton-McAlpin Ballroom  
I. B. JOHNSON, Presiding

The following three papers are printed in one booklet at 80¢ to members and \$1.60 to nonmembers.

- 57-161. Colorado High Altitude Corona Tests Conductors, Towers and Footings. L. M. Robertson, Public Service Company of Colorado; H. M. Walton, O. H. Huggins and P. T. Coffin, Aluminum Company of America; R. G. Yerck, Hughes Bros., Inc. and N. E. Desenberg, Ohio Edison Company.
- 57-161. Colorado High Altitude Corona Tests—Insulators and Associated Hardware. L. M. Robertson, Public Service Co. of Colorado, and A. D. Lantz, Jr., The Ohio Brass Co.
- 57-161. Colorado High-Altitude Corona Tests Scope, Tests, and Instrumentation. L. M. Robertson, Public Service Co. of Colorado, and C. F. Wagner and T. J. Bliss, Westinghouse Electric Corp.

WEDNESDAY (continued)

- CP.\* Radio Noise Measurement on Denver-Shoshone Line of Public Service Company of Colorado. L. M. Robertson, Public Service Co. of Colorado. G. E. Adams, N. R. Schultz, H. A. Gauper and T. W. Liao, General Electric Co.

**9:30 a.m.—Rotating Machinery—Synchronous**  
*Rotating Machinery Committee*  
Penn Top North  
M. R. LORY, Presiding

- CP57-205. Stability Limits of a Synchronous Motor. F. C. Tormollan, University of Texas.
- 57-127. Eddy Currents in the End Portion of Turbine-Generator Stator Windings. G. W. Staats, Allis-Chalmers Manufacturing Company.
- 57-128. Harmonics of the Salient Pole Synchronous Machine and Their Effects Part II—Synchronous Torques. M. M. Liw-schitz-Garik, Polytechnic Institute of Brooklyn.
- 56-1010. Calculation of Windage Noise Power Level in Large Induction Motors. M. E. Talaat, Elliott Company. Re-presented for discussion.

**9:30 a.m.—Transformers**  
*Transformers Committee*  
Georgian Room  
J. R. MEADOR, Presiding

- CP.\* Corona Measurements on Oil-Insulated Transformers. E. J. Adolphson and F. J. Vogel, Allis-Chalmers Manufacturing Company.
- 57-40. Induced Losses in Steel Plates in the Presence of an Alternating Current. W. G. Deuring, General Electric Company.
- 57-14. A Semi-Automatic Test for Measuring the Loss in Transformer Core Laminations. S. C. Leonard and R. L. TenBroeck, General Electric Company.
- 57-24. Stray Current Losses in Stranded Windings of Transformers. III H. J. Kaul, Westinghouse Electric Corporation.

**9:30 a.m.—Electronic Circuitry**  
*Electronics Committee*  
Sheraton-McAlpin El Patio  
L. T. BOURLAND, Presiding

- 57-31. Transistorized Phase Discriminators. A. N. DeSautels, Minneapolis-Honeywell Regulator Company.
- 57-74. Upper Limits of Output Power in Vacuum Tube and Transistor A-C Amplifiers. I L. M. Vallese, Polytechnic Institute of Brooklyn.
- CP57-76. An Amplitude-Stabilized Bridged-T Oscillator. Kurt Enlein, University of Rochester.
- CP.\* The Measurement and Use of Equivalent Noise Parameters for R-F Amplifiers. Christoph Metelmann, General Electric Company.
- 57-77. Simultaneous Pulled Oscillations in a Triode Oscillator Incorporating Two Oscillator Circuits. I A. E. Mostafa, Alexandria University, Alexandria, Egypt.

**9:30 a.m.—Symposium on Gaseous Dielectrics**  
*Dielectrics Committee*  
Skytop  
T. W. LIAO, Presiding

- CP.\* Considerations of the Toxicity of Gases. Dr. D. Lester, Yale University.
- CP57-82. The Use of Sulfur Hexafluoride in Waveguides. Tore Anderson and A. L. Reeves, Airtron, Inc., W. H. Mears and S. R. Orfeo, General Chemical Research Labs.
- CP57-83. Electrical Discharge Characteristics of the Plane Parallel Gap Bounded by Insulating Surfaces. J. C. Devins, General Electric Company.
- CP.\* The Influence of Space-Charge on the Electric Breakdown of Sulfur Hexafluoride. Daniel Berg and Carroll N. Works, Westinghouse Research Laboratories.



WEDNESDAY (continued)

CP.\* Corona Measurement and Interpretation. T. W. Dakin, Westinghouse Research Laboratories.

9:30 a.m.—Magnetic Amplifiers

*Magnetic Amplifiers Committee*  
Penn Top South  
H. F. STORM, Presiding

57-5. On the Input Power of the Half-Wave Magnetic Amplifier Circuit. T. Kikuchi, Microwave Research Institute of Polytechnic Institute of Brooklyn, and K. Murakami, Tohoku University, Japan.

57-91. Magnetic Frequency Multipliers and Their Rating Part II—Frequency Sextuplers. William McMurray, General Electric Company.

57-92. Self-Balancing Magnetic Amplifiers of the Differential Feedback Type. William A. Geyger, U. S. Naval Ordnance Laboratory.

57-93. Speed Control of a D-C Motor Using a Magnetic Amplifier. I. W. Leonhard, Westinghouse Electric Corp.

CP57-94. Dynamic Operation of Magnetic Amplifiers with Real Core and Rectifier Functions. H. C. Bourne, Jr., and D. Nitzan, University of California.

9:30 a.m.—Research

*Education, Student Branches and Research Committees*  
Hotel Statler Ballroom  
J. E. HOBSON, Presiding

CP.\* What Electrical Engineering Seniors Think About Jobs. M. S. Oldacre, Stanford Research Institute. J. D. Ryder, Michigan State University, S. Reid Warren, Jr., University of Pennsylvania.

CP.\* Recruiting, Selecting, and Training Engineers—Philadelphia Electric Company Program. George R. Conover, Lewis R. Gaty, Philadelphia Electric Company.

CP.\* Engineering Work—The Human Resource. Clarence H. Linder, General Electric Company.

CP.\* Engineers and Energy. Robert E. Wilson, Standard Oil Company (Indiana).

9:30 a.m.—Petroleum Industry

*Petroleum Industry Committee*  
Keystone Room  
R. S. CANNON, Presiding

CP.\* Purchased Electric Service for A Modern Petroleum Plant. R. W. Mills, The Standard Oil Co. of Ohio and W. R. Ankrum, Ohio Power Co.

CP.\* Designing for Locations Having Group 'B' Gases. E. R. Hoyle and R. P. Northrup.

CP.\* Modern Requirements for Oil Well Pumping. J. K. Howell and S. S. Browne, Westinghouse Electric Corporation.

9:30 a.m.—Wire Communications

*Wire Communications Systems Committee*  
Hotel Statler East Room  
W. K. MacADAM, Presiding

57-137. General Aspects of Hands-Free Telephony. J. W. Emling, I Bell Telephone Laboratories.

CP.\* Type 88 Loudspeaking Telephone. E. S. Peterson, Automatic Electric Co.

57-138. The Hands-Free Telephone. V. Rodek, Stromberg-Carlson Co. I

57-139. The Bell System Speakerphone. W. F. Clemency and F. F. Romanow, Bell Telephone Laboratories, and A. F. Rose, American Telephone and Telegraph Company.

9:30 a.m.—Production and Application of Light

*Production and Application of Light Committee*  
Sheraton-McAlpin Colonial Room  
DANA ROWTEN, Presiding

CP.\* Development and Application of High Frequency Fluorescent Lighting. J. H. Campbell and Q. D. Dobras, General Electric Co.

WEDNESDAY (continued)

CP57-34. 840 Cycle Fluorescent Lighting. R. H. Burnham, The Wakefield Company.

CP57-203. High Frequency Power and Distribution. V. C. Geckler, General Motors Corp.

CP.\* High Frequency Fluorescent vs. Standard Fluorescent Lighting Systems. W. H. Johnson and J. Winpisinger, Westinghouse Electric Corp.

9:30 a.m.—Recording and Controlling Instruments

*Recording and Controlling Instruments Committee*  
West Room  
A. W. JACOBSON, Presiding

57-220. Improved Direct-Acting Electrical Recording Instruments. I E. W. Clark and H. E. Albright, General Electric Company.

57-17. Dynamics of Electronic Self-Balancing Systems. G. R. I Jacob, Minneapolis-Honeywell Regulator Company.

57-222. The BTU Computer—An Advanced Data System for Industry. F. W. Hannula, Foxboro Company.

57-221. Advanced Data System in the Power Industry. G. M. Keyser I and J. R. Leslie, Hydro-Electric Power Commission of Ontario.

CP57-11. A Continuous Multi-Receiver D. C. Potentiometer Recorder. H. H. Koppel, Bailey Meter Company.

2:00 p.m.—Transmission and Distribution

*Transmission and Distribution Committee*  
Sheraton-McAlpin Ballroom  
J. T. LUSIGNAN, Presiding

57-164. Investigation of Radio Noise from Existing Lines and Equipment to Aid in the Design of Future Extra-High Voltage Lines. F. L. Taylor, C. J. Crockford and R. V. Nicolson, The Detroit Edison Company.

57-165. The Calculation of Radio and Corona Characteristics of III Transmission Line Conductors. C. J. Miller, Jr., The Ohio Brass Company.

CP57-166. Radio Interference from High-Voltage Transmission Lines as Influenced by the Line Design. G. E. Adams, General Electric Company.

57-167. Relationship Between Corona and Radio Noise on Transmission Lines, Laboratory Studies Part I—Point and Conductor Corona. T. W. Liao, W. A. Keen, Jr. and D. R. Powell, General Electric Company.

CP.\* Relationship Between Corona and Radio Noise on Transmission Lines—Laboratory Studies, Part II—Insulator, Hardware and Conductor Corona. T. W. Liao, General Electric Company.

2:00 p.m.—Rotating Machinery—Synchronous

*Rotating Machinery Committee*  
Georgian Room  
F. M. PORTER, Presiding

CP57-129. Effect of Clearing Time on Synchronous Machine Transient Stability. G. Shackshaft and A. S. Aldred, The University of Liverpool.

CP57-130. A New Stator Coil Transposition for Large Machines. W. L. Ringland and L. T. Rosenberg, Allis-Chalmers Mfg. Co.

57-131. Gland Seal Systems for Modern Hydrogen-Cooled Turbine Generators. R. A. Baudry and L. P. Curtis, Westinghouse Electric Corporation.

2:00 p.m.—Electronic Circuitry

*Electronics Committee*  
Penn Top North  
A. P. STERN, Presiding

57-78. Elimination of the Ballast Resistor in D-C Power Supplies. I Stewart Krakauer, The United States Time Corp.

57-79. Economics of Multimillion Joule Inductive Energy Storage. I H. C. Early and R. C. Walker, University of Michigan.



WEDNESDAY (continued)

- CP57-80. A Combined Mean and Sidereal Frequency Divider. H. F. Hastings, Naval Research Laboratory.
- 57-81. Transient Analysis of Second Order Flip-Flops. L. M. Vallese. Polytechnic Institute of Brooklyn.
- 56-759. Synchronization Accuracy Obtainable with Multiplier Phototubes. Leo Levi, Fairchild Controls Corp. Re-presented for discussion.
- 56-757. Magnetically Keyed, Phase-Sensitive Demodulators. R. B. Mark, P. R. Johannessen and W. X. Johnson, Massachusetts Institute of Technology. Re-presented for discussion.

2:00 p.m.—Symposium on Radiation Effects

*Dielectrics Committee*

*Skytop*

P. H. KLEIN, Presiding

- CP.\* The Effects of Radiation on Mylar. E. L. Brancato, Naval Research Laboratories.
- CP.\* The Effect of Rate of Irradiation on the Breakdown Strength for Kel-F. J. Goodman, Radiation Research Corporation.
- CP.\* The Effect of Temperature and Gamma Radiation on the Mechanical Properties of Some Wire Enamels and a Silicone. E. L. Mincher, General Electric Company.
- CP.\* The Effects of Radiation on the Properties of Dielectric Materials. P. H. Klein, General Electric Company.

2:00 p.m.—Magnetic Amplifiers

*Magnetic Amplifiers Committee*

*Penn Top South*

R. W. ROBERTS, Presiding

- 57-95. Core-Reset Functions in Magnetic Amplifier Analysis, Part I —A Core-Reset Function. G. C. Feth, General Electric Co.
- CP57-96. Steady-State Operation of the Push-Pull Saturable-Core Transformer with Resistive Load. R. E. Anderson, General Electric Company.
- 57-97. Analysis of the Full-Wave Magnetic Amplifier Circuits Considering the Change of the Width of Dynamic Hysteresis Loop. Tadashi Kikuchi, Polytechnic Institute of Brooklyn.
- CP57-3. The Dynamically and Statically Controlled Magnetic Amplifier as a Multi-Purpose Relay. John Baude, Allis-Chalmers Mfg. Company.
- CP57-98. Progress Report of the Standards Subcommittee of the AIEE Magnetic Amplifier Committee.

2:00 p.m.—Cathodic Protection

*Chemical Industry Committee*

*West Room*

J. P. OLIVER, PRESIDING

- CP.\* The Use of Pipe-to-Soil Potential Measurements in Determining the Corrosion of Underground Pipe Lines by Bernard Husock, Harco Corporation.
- CP.\* The Value of Fused Electrical Connections in Cathodic Protection Circuits by H. R. Leuth, Erico Products, Inc.
- CP.\* The Use of Magnesium Anodes for Cathodic Protection of Gas Distribution Systems by Peter R. Skule, East Ohio Gas Company.

2:00 p.m.—Wire Communications

*Wire Communications Systems Committee*

*East Room*

J. R. HYNEMAN, Presiding

- 57-10. Development in Communications in the Lower St. Lawrence Valley. F. C. Doak and J. R. Tennet, Quebec Telephone Company. Re-presented for discussion.
- CP.\* A Transistorized Repeater for 45 BN Carrier. R. H. Fish and V. Babin, Lenkurt Electric Company.
- CP.\* A Miniaturized Negative Impedance Voice Repeater Employing Transistors. A. S. Howell, Stromberg-Carlson Company.
- 57-140. Buried Telephone Distribution Systems. G. L. Chilberg, I American Telephone and Telegraph Company.

WEDNESDAY (continued)

2:00 p.m.—Education

*Education Committee*

*Sheraton-McAlpin Colonial Room*

FERDINAND HAMBURGER, JR., Presiding

- CP57-211. A Philosophy for Electrical Engineering Education by J. Stuart Johnson, Purdue University.
- CP57-210. The Dimensions of an Electrical Engineering Curriculum, by O. D. McCann and F. C. Lindvall, California Institute of Technology.
- CP.\* An Electrical Engineering Curriculum with a Systems Philosophy by W. A. Lynch, Polytechnic Institute of Brooklyn.
- CP57-212. Circuits and Signals in a Fundamental Electrical Engineering Course, by F. H. Middleton, The Johns Hopkins University.

2:00 p.m.—Management

*Management Committee*

*Hotel Statler Ballroom*

L. R. GATY, Presiding

- CP.\* Individual and Company Responsibilities for Development of the Engineer. H. B. Kiphuth
- CP.\* Effective Appraisal of Engineers. J. A. Newman, Booz, Allen and Hamilton.

2:00 p.m.—Petroleum Industry

*Petroleum Industry Committee*

*Keystone Room*

M. A. HYDE, Presiding

- CP57-37. Diesel-Electric Oil Well Drilling Equipment. O. J. Graham and Hillert Vitt, General Electric Company.
- 57-38. Digital Telemetering and Print Out of Pipe Line Information. Max T. Nigh, Service Pipe Line Company.
- CP57-39. Electronic Protective Devices for Pumping Units. Haskell Ginns, Indikon Co. and William W. Holt, Jr., Plantation Pipe Line Co.
- CP.\* Magnetic Core Event Counter for Earth Satellite Memory by D. H. Schaefer, Naval Research Lab.

7:30 p.m.—Forum of Technical Committee Chairmen

*Georgian Room*

W. R. CLARK, Presiding

- Welcome to Forum—President M. S. Coover.
- The I.R.E. Professional Group—I. S. Coggeshall.
- Need for Closer Cooperation Between the Technical Committees of the Institute and the Technical Groups of the Section—J. C. Strasbourger.
- Organization of Technical Groups and Their Activities—Dixon Lewis.
- Organization of T.O.D. and Their Activities—L. F. Hickernell.
- Summary of Reports of the T.O.D. Representatives—Hendley Blackmon.
- The Proposed AIEE Technical Division—W. R. Clark.
- The Publication Problem—W. Scott Hill and J. D. Tebo.

Thursday, January 24

9:30 a.m.—Transmission and Distribution

*Transmission and Distribution Committee*

*Georgian Room*

H. L. DAVIS, JR., Presiding

- 57-168. Distribution System Load Characteristics and Their Use in III Planning and Design. R. H. Sarikas, Illinois Power Co., and H. B. Thacker, Westinghouse Electric Corp.



THURSDAY (continued)

- 57-169. Economic Analysis of Residential Secondary Distribution Systems. H. E. Campbell and H. E. Sinnott, General Electric Company.
- CP57-170. High Speed Magnetic Air Breaker for Distribution Circuits. H. P. Sleeper, Public Service Electric and Gas Co., and J. D. Findley, Westinghouse Electric Corp.
- CP\*. Switching Surges on Switching A Line and Transformer as a Unit. L. O. Barthold, I. B. Johnson and A. J. Schultz, General Electric Co.
- 57-171. Switching Surges Due to De-Energization of Capacitive Circuits. Working Group on Switching Surges. Re-presented for discussion.

9:30 a.m.—Rotating Machinery—Induction

*Rotating Machinery Committee*  
Hotel Statler East Room  
W. J. MARTINY, JR., Presiding

- 57-132. Stopping Time and Energy Loss of A. C. Motors with D. C. III Braking. O. I. Butler, University of Sheffield.
- 57-133. Low Inertia Induction Motors. Maurice Apstein and Lester III Blum, Ordnance Corps, Diamond Ordnance Fuze Laboratories.
- 57-134. The Calculation of Can Losses in Canned Motors. R. C. III Robinson, I. Rowe and L. E. Donelan, Westinghouse Electric Corp.
- 57-135. Induction Motor Speed-Torque-Current Curves with a Constant Rotor Temperature. R. F. Horrell and W. E. Wood, Electric Machinery Mfg. Company.
- CP57-8. Circuit Constants of High Starting Torque Induction Motors From Tests. J. F. H. Douglas, Engineering Consultant, Milwaukee, Wisconsin.

9:30 a.m.—Switchgear

*Switchgear Committee*  
Penn Top North  
J. C. WOODS, Presiding

- 57-174. A New Compressed Air Dead Tank Circuit Breaker for Interrupting 10,000,000 KVA at 138 KV. J. E. Schrameck and R. E. Kane, Westinghouse Electric Corp.
- 57-54. A New 138 Kv, 10,000 Mva Air Blast Circuit Breaker. R. B. III Shores and J. W. Beatty, General Electric Company.
- 57-175. Design Features in a New Line of Outdoor Oil Circuit III Breakers Rated 14.4 to 69 KV. F. B. Johnson and G. B. Cushing, Westinghouse Electric Corp.
- CP57-176. Low Voltage Testing for Oil Circuit Reclosers. T. M. Urban and E. J. Field, I-T-E Circuit Breaker Company.

9:30 a.m.—Satellite Communications

*Data Communications Committee*  
Penn Top South  
A. E. FROST, Presiding

- CP57-213. Scientific Instrumentation in IGY Satellites by Dr. H. Friedman of the Naval Research Laboratory.
- CP.\* Telemetry in Earth Satellites by N. W. Mathews of the Naval Research Laboratory.
- CP.\* Radio Tracking the Earth Satellite by J. T. Mengel of the Naval Research Laboratory.

9:30 a.m.—Symposium on Liquid Dielectrics

*Dielectrics Committee*  
Keystone Room  
F. M. CLARK, Presiding

- CP57-84. The Effect of Composition on the Oxidation Stability of Electrical Oils. J. L. Jezl, A. P. Stuart and E. S. Ross, Sun Oil Company.
- CP.\* Effects of Arcs on Silicone Liquid Dielectrics. C. G. Currin and J. F. Dexter, Dow Corning Corporation.
- CP.\* The D. C. Conductivity of Simple Chlorinated Hydrocarbons. J. Hart and A. G. Mungall, National Research Council of Canada.

THURSDAY (continued)

- CP.\* The Gassing of Liquid Dielectrics Under Electric Stress—The Influence of Voltage and Pressure. H. Basseches and Mrs. M. W. Barnes, Bell Telephone Laboratories.
- 57-2. Phenomena Accompanying Transient Low-Voltage Discharges in Liquid Dielectrics II. Cathode Phenomenas at Low Currents. E. M. Williams and R. E. Smith, Carnegie Institute of Technology.

9:30 a.m.—Magnetic Amplifiers

*Magnetic Amplifiers Committee*  
Skytop  
P. L. SCHMIDT, Presiding

- 57-99. Circuit for a Magnetic Subharmonic Pulsar. K. C. Hu, Minneapolis-Honeywell Regulator Company, and Y. H. Ku, University of Pennsylvania.
- 57-206. Proposed Size Standards for Toroidal Magnetic Tape-Wound Cores. Report of Magnetic Amplifiers Material Subcommittee.
- CP57-100. Magnetic Amplifier Analog Computation Techniques. H. W. Patton, Airpax Products Company.
- CP57-101. A New Static Magnetic Switching Circuit Using Combined "And" and "Or" Functions. R. E. Morgan, General Electric Company.
- CP57-102. Static Control with Magnetic Amplifier Logic Elements. J. Sheets, General Electric Company.

9:30 a.m.—Research

*Research Committee*  
Hotel Statler Ballroom  
W. G. DOW, Presiding

- CP.\* Commemoration of 50th Anniversary of Dr. Lee deForest's patent on the electron tube. J. V. Hogan, Hogan Laboratories.
- CP.\* Technical and Economic Investigations In the Field of the German Electricity Supply. Franz Lauster and George Hameister, Verbandes Deutscher Elektrotechniker.
- CP.\* Research Needed on Transmission Limitations. Frank E. Sanford, Commonwealth Associates, Incorporated.
- CP.\* Research in Europe for American Industry. J. E. Hobson.

9:30 a.m.—System Engineering and Power Generation

*Power Generation and System Engineering Committees*  
Sheraton-McAlpin Ballroom  
CLARK NICHOLAS, Presiding

- 57-142. Effect of Speed Governor Dead Band on Tie-Line Power and III Frequency Control Performance. C. Concordia and L. K. Kirchmayer, General Electric Company, and E. A. Szymanski, Wayne University.
- 57-143. Automatic Economic Dispatching and Load Control—Ohio III Edison System. R. H. Travers, Ohio Edison Company.
- CP57-144. Economic Aspects of General Electric Automatic Dispatching System at Kansas City. D. H. Cameron and E. L. Mueller, Kansas City Power and Light Company.
- 57-145. Forced Outage Rates of High Pressure Steam Turbines and III Boilers. Reported by the AIEE Joint Subcommittee on Application of Probability Methods to Power System Problems of the AIEE Power Generation and System Engineering Committees.

9:30 a.m.—Semi-Conductors

*Solid State Devices Committee*  
Sheraton-McAlpin Colonial Room  
S. J. ANGELLO, Presiding

- CP.\* The First Decade of Transistors—1948-1958. Harry L. Owens, Texas Instruments Corporation.
- CP.\* Germanium and Silicon Rectifiers—Present and Future. Raymond A. York, General Electric Company.
- CP.\* Properties and Applications of Transistor Switches. E. N. Ross, Bell Telephone Laboratories.
- CP.\* Present Status of Electroluminescence. Manuel Aven, General Electric Company.



## THURSDAY (continued)

**9:30 a.m.—University Curricula In Applications of Digital Computers***Computing Devices and Education Committees  
West Room*

MORRIS RUBINOFF and R. W. HOUSE, Presiding

- CP.\* Requirements for Trained Personnel in the Data Processing Fields. S. N. Alexander, National Bureau of Standards, and L. W. Cohen, National Science Foundation.
- CP.\* The University of Michigan Curriculum Computer Applications. N. R. Scott, University of Michigan.
- CP.\* A Curriculum in Computer Applications at the Moore School. S. Gorn, A. Matz, G. W. Patterson, Moore School of Electrical Engineering.
- CP.\* The Role of Digital Computers in Engineering Education. A. J. Perlis, Carnegie Institute of Technology.
- CP.\* The University of Illinois Curriculum in Digital Computers. A. H. Taub, University of Illinois.
- CP56-957. The Application of a Digital Computer in Design Engineering. J. C. White, General Electric Company.

**9:30 a.m.—Industrial Control***Industrial Control Committee  
Sheraton-McAlpin Red Room  
L. H. MATTHIAS, Presiding*

- CP.\* Static Switching Systems for Industrial Applications. J. C. McMahon and B. P. Chausse, General Electric Company.
- CP57-188. Static Digital Control of a 6-way Milling and Drilling Machine Tool. H. D. Stuart, Westinghouse Electric Corp., and T. J. Becker, Michigan Drill Head Company.
- CP57-189. Static Control in Automatic Warehousing. L. L. Bosch and A. J. Fanthorp, Bosch and LaTour, and J. W. Stuart, Westinghouse Electric Corp.
- CP57-190. Cypak Computing Circuits. J. J. McNeill, Westinghouse Electric Corp.

**9:30 a.m.—Electrochemical Processes Subcommittee***Chemical Industry Committee  
Sheraton-McAlpin El Patio  
C. S. HAGUE, Presiding*

- CP.\* D-C Metering of Large Electrolytic Potlines. M. E. Reagan, Westinghouse Electric Corp.
- CP.\* Considerations for a Modernization Program for Large Rectifier Substation Installations. J. N. Fogg, Ethyl Corp.
- CP.\* Rectifier Cooling Systems Using Aluminum Materials. L. J. Harris, and R. N. Wagner, Aluminum Company of America.
- CP.\* Economics of Mechanical Rectifiers Serving Electrochemical Cell Lines. L. Keltz, I-T-E Circuit Breaker Company.

**2:00 p.m.—Electrochemical Processes Subcommittee***Chemical Industry Committee  
Sheraton-McAlpin El Patio  
R. N. WAGNER, Presiding*

- CP.\* Characteristics of Mercury Cells. W. C. Gardiner, A. J. Holmes, and C. R. Staker. Olin Mathieson Chemical Corp.
- CP.\* The Hooker Large Diaphragm Type Chlorine Cells. J. E. Currey, Hooker Electrochemical Company.
- CP.\* Symposium: Safety Precautions for Electrochemical Plants.

**2:00 p.m.—Satellite Telemetering***Telemetering Committee  
Georgian Room  
J. MAYO-WELLS, Presiding*

- CP.\* Earth Satellite Instrumentation Program by N. W. Matthews, Naval Research Lab.
- CP.\* Earth Satellite Telemetry Coding System Using Transistors and Magnetic Cores by R. W. Rochelle, Naval Research Lab.

## THURSDAY (continued)

- CP.\* Communication and Non-destructive Readout of Magnetic Memory Cores in Earth Satellite by R. L. Van Allen and C. B. House, Naval Research Lab.

**2:00 p.m.—Transmission and Distribution, Protective Devices and Transformer***Protective Devices, Transformer and Transmission and Distribution Committees**Georgian Room  
T. J. BROSANAN, Presiding*

- 57-172. A Quarter Century of Experience in Insulation Coordination: Basic Philosophy, Application, and Operating Experience on the American Gas & Elec. Co. System. Philip Sporn and I. W. Gross, American Gas and Electric Service Corp.
- 57-25. Operating Experience on AG&E 132 KV System with Transformer Insulation Reduced Two Classes. P. S. Pugh and C. P. Zimmerman, American Gas & Electric Service Corp.
- CP.\* Transformers Designed for Operating Conditions. F. J. Vogel and G. W. Lengnick, Allis-Chalmers Manufacturing Company.
- 57-19. Reduced Transformer Insulation. E. M. Hunter, J. R. Meador and W. J. Rudge, General Electric Company.
- 57-173. Insulation Coordination as Affected by New Arrester Characteristics. A. M. Opsahl, Westinghouse Electric Corp.

**2:00 p.m.—Switchgear***Switchgear Committee  
Penn Top North  
J. C. WOODS, Presiding*

- 57-177. Current Density and Temperature of High-Current Arcs. III T. H. Lee, W. R. Wilson and J. C. Sofianek, General Electric Company.
- CP57-178. New Line of High Power Interrupters for Breakers Rated 69 KV and Above. A. W. Hill and R. E. Friedrich, Westinghouse Electric Corp.
- CP.\* A New Approach to Automatic High Speed Grounding. C. W. Upton and F. G. Goldner.
- CP57-50. A New Concept of Control Panels for Automatic Switching of Power System Feeders. M. C. Harman, S. & C. Electric Company.

**2:00 p.m.—Optical-Electronic Tubes and Microwave Noise Source***Electronics Committee  
Hotel Statler East Room  
D. W. EPSTEIN, Presiding*

- 57-7. Characteristics and Applications of the Iation Storage Tube. W. D. Davis, Farnsworth Electronics Co.
- CP.\* Miniaturization in Multiplier Phototubes. F. W. Schenkel, Allen B. DuMont Laboratories.
- CP.\* Electrostatic Shutter Image Converter Tubes. B. R. Linden, Allen B. DuMont Laboratories, Inc.
- CP.\* A Half-Tone Display Storage Tube with Magnetic Deflection. M. E. Craig, Radio Corporation of America.
- CP.\* Multicolor Storage Tube. C. D. Berntema, S. T. Smith and L. L. Van Hull, Hughes Research Laboratories.
- CP.\* New Noise Sources for Monitoring the Performance of Microwave Systems. R. H. Geiger,

**2:00 p.m.—Symposium on Thermal Aging***Dielectrics Committee  
Keystone Room  
J. F. DEXTER, Presiding*

- CP.\* Statistical Methods Applied to Thermal Evaluation of Insulating Materials. Working Group Report.
- CP.\* Heat Aging of Class B Varnish Wire Enamel Systems. Heat Resistance of Insulating Varnishes. J. R. Learn, General Electric Company.



THURSDAY (continued)

- CP.\* Heat Aging of Glass Cloth Laminates. C. D. Doyle, H. T. Plant and L. S. Lazar, General Electric Company.
- CP57-85. Progress Report-Development of Test Methods for Thermal Stability of Varnished (Coated) Fabric Electrical Insulating Materials—Prepared by Task Force, Section F, Subcommittee VII, ASTM Committee D-9. L. E. Sieffert, Bureau of Ships, H. K. Graves, N. Y. Naval Shipyard.
- CP.\* Thermal Stability of Flexible Sheet Insulation Using Wrapped Bar Method. R. L. Griffith, Mica Insulator Company.

1:45 p.m.—Transatlantic Telephone Cable  
*Communications Division Committee*  
 Hotel Statler Ballroom  
 President, M. S. COOVER, Presiding

This session will be a joint meeting of AIEE in New York, Institution of Electrical Engineers in London, and the Engineering Institute of Canada in Montreal, using the new transatlantic submarine telephone cable system to tie the three sessions together. Discussions of the unique features of the new system will take place over the cable, and the audiences in all three cities will be able to hear the discussions.

Prominent engineers and scientists in the three cities will take part. The presidents of the societies will preside at their respective meetings.

2:00 p.m.—System Engineering, Computing Devices, and Transmission and Distribution  
*Computing Devices, System Engineering and Transmission and Distribution Committees*  
 Sheraton-McAlpin Ballroom  
 L. B. LeVESCONTE, Presiding

- 57-146. Digital Computation of Driving Point and Transfer Impedances. H. W. Hale and J. B. Ward, Purdue University.
- 57-147. Digital Solutions for Large Power Networks. R. J. Brown and W. F. Tinney, U. S. Dept. of the Interior.
- CP57-148. Tests and Experiences in the Use of Pulse-Type Electronic Fault Analyzer on Transmission Lines. H. E. McCormack, Appalachian Electric Power Co.
- 57-149. Some Features and Performance of Type C Transmission III Line Fault Locators. Y. Miyoshi and S. Saba, Tokyo Shibaura Electric Co., Ltd.
- 57-150. Analog Computer Representation of Alternators for Parallel Operations. Luiz Boffi, Massachusetts Institute of Technology and V. B. Haas, Jr., The University of Connecticut.

2:00 p.m.—Industrial Control  
*Industrial Control Committee*  
 Sheraton-McAlpin Red Room  
 L. H. MATTHIAS, Presiding

- 57-191. An Ignitron Contactor for Direct Press Drives. D. L. Pettit II and R. Montross, Square D Company.
- CP.\* A Dual Circuit Electronic Regulator. J. J. Dailey, Jr., Reliance Electric and Mfg. Co.
- 57-4. Design and Calculation of Induction Heating Coils. R. M. II Baker, Westinghouse Electric Corp.
- CP57-192. Heat Conduction in the Coils of an Industrial Controller a Factor in Temperature Rise. J. F. H. Douglas, Marquette University.

2:00 p.m.—Solid State Dielectric Devices  
*AIEE-IRE Dielectric Devices Subcommittee*  
 Skytop  
 H. EPSTEIN, Presiding

- CP.\* Introduction: C. A. Rosen, General Electric Co.
- CP.\* Ferroelectric Devices: R. B. Delano, International Business Machines. O. E. Mattiat, Clevite-Brush Development Co. E. A. Sack, Westinghouse Electric Corp.
- CP.\* Electrophoto-Transducers: E. E. Loebner, RCA.

THURSDAY (continued)

- CP.\* Electrostatic Recording and Reproducing Devices: H. Epstein, Burroughs Corp. and G. R. Mott, Haloid Corp.

2:00 p.m.—Ethics  
*Professional Conduct Committee*  
 West Room  
 P. L. ALGER, Presiding

- CP.\* The ECPD Program in the Field of Professional Ethics. C. T. Chave, Stone and Webster Engineering Corp.
- CP.\* The NSPE Program in the Field of Professional Ethics. Ezra K. Nicholson, Bryn Mawr, Pennsylvania.
- CP.\* Attitudes and Ethical Values of Present-Day Electrical Engineering Students. D. S. Babb, M. S. Helm. University of Illinois.

2:00 p.m.—Industrial Power Systems  
*Industrial Power Systems Committee*  
 Sheraton-McAlpin Colonial Room  
 J. J. O'CONNOR, Presiding

- CP.\* Load Dispatching in a Large Industrial Plant. J. R. Eckert and J. M. Petruska, Curtis-Wright Corporation.
- CP.\* Arrestor and Capacitor Location on Industrial Power Systems. A. Knable and D. Dalasta. Allis-Chalmers Manufacturing Company.
- CP.\* Operating Characteristics of High Capacity Air-Break Contactors on Industrial Power Systems. S. R. Durand and Thad Bellinger, Allis-Chalmers Mfg. Co.

Friday, January 25

9:30 a.m.—Switchgear  
*Switchgear Committee*  
 Hotel Statler East Room  
 C. A. WOODROW, Presiding

- 57-180. New 13.8 KV, 750-MVA Metal-Clad Switchgear with Magnetic-Type Power Circuit Breakers. J. G. Torbit and E. M. Troischt, General Electric Co.
- CP.\* A New "De-Ion" Air Breaker for 750 Mva, 13.8 Kv. Russell Frink and J. M. Kozlovic.
- 57-181. A Motor-Powered Stored-Energy Operating Mechanism for III Magnetic-Type Power Circuit Breakers in Metal-Clad Switchgear. E. T. McCurry and J. A. Favre, General Electric Co.
- CP.\* A New 4.16-KV, 75-MVA Air-Magnetic-Type Power Circuit Breaker in Metal-Clad Switchgear. A. W. Simpson and L. D. Shaw, General Electric Company.

9:30 a.m.—Protective Devices  
*Protective Devices Committee*  
 Keystone Room  
 E. M. HUNTER, Presiding

- CP57-22. Report on Lightning Arrester Applications for Stations and Substations. A Report Prepared by a Working Group of the Lightning Protective Devices Subcommittee of the AIEE Protective Devices Committee.
- 57-52. Lightning Protection Practices at 220-KV and 66-KV Switching Structure of the Southern California Edison Company. C. L. Sidway and B. R. Loxley, Southern California Edison Company.
- 57-42. Experience Revises Substation Lightning Protection. E. H. Gehrig and R. S. Gens, U. S. Dept. of Interior, Bonneville Power Administration.
- CP57-110. Lightning Protection Practices of High Voltage Switching Structures on the Virginia Electric and Power Company System. J. A. Rawls, Virginia Electric and Power Company.
- CP.\* Lighting Protection Practices Used at 138 kv Switching Structures. H. A. Cornelius, Public Service Co. of Northern Illinois.

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FRIDAY (continued)

9:30 a.m.—System Engineering

*System Engineering Committee*  
Hotel Statler Ballroom  
C. N. METCALF, Presiding

- 57-45. The Effect of Interconnections on Economic Generation Expansion Patterns. L. K. Kirchmayer, A. G. Mellor and H. O. Simmons, Jr., General Electric Company.
- 57-151. Operations Research Determination of Generation Reserves. III E. L. Arnoff and J. C. Chambers, Case Institute of Technology.
- 57-152. Some New Mathematical Aspects of Fixed Charges. C. W. Bary and W. T. Brown, Philadelphia Electric Company.
- CP57-202. A New Approach to Loss Minimization in Electrical Power Systems. J. F. Calvert and T. W. Sze, The University of Pittsburgh.
- 57-9. Survey of Arc Furnace Installations on Power Systems and Resulting Lamp Flicker. System Planning Subcommittee of the System Engineering Committee.

9:30 a.m.—Power and High Frequency Tubes

*Electronics Committee*  
Sheraton-McAlpin Colonial Room  
E. M. BOONE, Presiding

- 56-518. Rectilinearity of Electron Beam Focusing Fields from Transverse Component Determinations. P. P. Cioffi, Bell Telephone Labs., Re-presented for Discussion.
- CP.\* Trends in Power Electron Tube Design Techniques. V. J. De Santis, General Electric Company.
- CP57-86. A Series of Power Triodes Using Coaxial Terminal Construction. C. V. Weden, Machlett Laboratories, Inc.
- CP.\* Design of a Medium Power Ceramic Tetrode. J. W. Kendall, Jr., Eitel-McCullough, Inc.
- CP.\* A Barkhausen Oscillator of the Resonant Cavity Type. D. T. Davis and E. M. Boone, Ohio State University.
- CP.\* Development of a Thirty Ampere Thyatron. C. R. Wetter and A. M. Wohlert, National Electronic, Inc.

9:30 a.m.—Thermal and Corona Degradation

*Dielectric Committee*  
Sheraton-McAlpin Ballroom  
K. N. MATHES, Presiding

- CP.\* Thermal Aging of Elongated Enameled Wire. Dean Westervelt and E. J. Croop, Westinghouse Electric Corp.
- CP.\* End Points in the Thermal Aging of Magnet Wire. W. W. Pendelton, Anaconda Wire & Cable Company.
- CP.\* Effect of Wire Material on Thermal Life of Enameled Magnet Wire. J. Thomas, J. F. Dexter, Dow Corning Corp.
- CP.\* Corona and Thermal Degradation on Magnet Wire. M. C. Halleck, General Electric Company.
- CP57-141. Thermal Stability of Laminated Thermosetting Plastics. I. W. B. Kouwenhoven, and G. G. Knickerbocker, The Johns Hopkins University, Kenneth Wechsler, Mica Insulator Co.

9:30 a.m.—Computing Devices

*Computing Devices and Industrial Control Committees*  
Penn Top North  
J. A. O'BRIEN, Presiding

- CP57-195. The Transistor Nor Circuit. W. D. Rowe, Westinghouse Electric Corp.
- 57-196. The Transistor Nor Circuit Design. W. D. Rowe and G. H. Royer, Westinghouse Electric Corp.
- CP.\* The Transistor Nor Circuit Logic and Applications. L. F. Stringer and W. D. Rowe, Westinghouse Electric Corp.
- CP.\* The Nordic Computer. W. D. Rowe, Westinghouse Electric Corp.
- CP.\* The Arithmetic Design of the Nordic Computer. T. A. Jeeves and W. D. Rowe, Westinghouse Electric Corp.

FRIDAY (continued)

9:30 a.m.—Feedback Control Systems

*Feedback Control Systems Committee*  
Skytop  
H. CHESTNUT, Presiding

- 57-204. A Study of the Transfer Function of Contact-Modulated II Amplifiers. F. H. Krantz, Burroughs Corp. and O. M. Salati and R. S. Berkowitz, The Moore School of Electrical Engineering
- 57-182. A Quick Method for Estimating Closed-Loop Poles of Control Systems. Kan Chen, Westinghouse Electric Corp.
- CP57-183. The Response of Relay Amplifiers with Feedback. J. E. Gibson and F. B. Tuteur, Yale University.
- 57-201. Evaluation of Feedback Control Systems Subjected to Large II Signals. V. B. Haas, Jr., University of Connecticut.
- 57-184. A Two-Dimensional Feedback Control System. Philip Sarachik and J. R. Ragazzini, Columbia University.
- CP.\* Adaptive Servomechanisms. R. F. Drenick and E. A. Shalhender, RCA.

9:30 a.m.—Applications in the Steel Industry

*Mining and Metal Industry Committee*  
West Room  
W. E. MILLER, Presiding

- CP.\* Magnetic Amplifier Arc Furnace Regulator. E. J. Borrebach, Westinghouse Electric Corporation.
- 57-55. Arc Furnace Corrective Equipment Using a High Value of Buffer Reactance. H. W. Harper, Northeastern Steel Corp.; T. R. Macon, General Electric Company and A. F. Sedgwick, United Illuminating Company.
- 57-56. Selection of Buffer Reactors and Synchronous Condensers on II Power Systems Supplying Arc Furnace Loads. C. Concordia and L. G. Levoy, General Electric Company; and C. H. Thomas, University of Kansas.
- CP.\* Static Switching Systems for the Steel Industry. R. E. Manko, General Electric Company.
- 56-875. Modern Computer Analysis for the Design of Steel Mill II Control Systems. J. E. Reider and Philip Spergel, Industrial Nucleonics Corp. Re-presented for discussion.

9:30 a.m.—TV and Aural Broadcasting Systems

*Television and Aural Broadcasting Committee*  
Georgian Room  
D. W. B. REED, JR., Presiding

- CP.\* Color Television Switching Systems. Edward Pores, National Broadcasting Company.
- CP.\* Color Television Recording Employing Lenticular Film. R. D. Kell, Radio Corporation of America.
- CP.\* Color Television Picture Reproducers. Peter C. Goldmark, Columbia Broadcasting Systems Laboratories.

9:30 a.m.—Power Generation

*Power Generation Committee*  
Penn Top South  
J. H. KINGHORN, Presiding

- 57-179. Electrical Features of Eastlake Generating Station Units I, III 2, and 3 by C. F. Paulus, Cleveland Electric Illuminating Co.
- 57-51. New Problems in Auxiliary System Design—Supercritical III Pressure and Nuclear Plants by A. R. Jones and C. J. Baldwin, Jr., Westinghouse Electric Corp.
- CP57-217. Turbine-Generator Rotor Preheating by W. J. Gilson, Jr. and M. Temoshok, General Electric Co.
- 57-218. Thermal Plants for Firming Up Hydro by Vernon W. Ruskin, III B. C. Engineering Co., Ltd.
- CP57-219. Dynamic Balancing of Hydroelectric Units in the Field by H. N. Hill, R. S. Barker and J. B. Murtland, Aluminum Company of America.



FRIDAY (continued)

2:00 p.m.—Computing Devices

*Computing Devices Committee*

Penn Top North

E. L. HARDER, Presiding

- CP57-197. The A-C Network Analyzer is an Asset in Teaching "Power" Courses. P. E. Shields, The Pennsylvania State University.
- CP.\* Automatic Addressing for Random Access Memories. W. W. Peterson, University of Florida.
- CP.\* Shift Register Decimal Counter. J. A. O'Brien, Bell Telephone Laboratories.
- CP.\* The Transient Solution of Non-Linear Circuits on a Digital Computer. J. C. Morgan, International Business Machines Corp.
- CP57-198. Biquinary Arithmetic. Walter Brooks, Ivan Flores and Gregory Laserson, Nuclear Development Corp. of America.
- 57-199. Shifting Counters. C. Eldert, H. J. Gray, Jr., H. M. Gurk and M. Rubinoff, University of Pennsylvania, Moore School of Electrical Engineering. Re-presented for discussion.
- 57-200. The Logical Design of a Digital Computer for a Large-Scale Real-Time Application. M. M. Astrahan, B. Housman, International Business Machines Corp.; J. F. Jacobs, R. P. Mayer, Mass. Institute of Technology; and W. H. Thomas, International Business Machines Corp.

2:00 p.m.—Electrical Techniques in Medicine and Biology

*Electrical Techniques in Medicine and Biology Committee*

West Room

T. H. ROGERS, Presiding

- 57-73. The Control of Air Ionization and Its Biological Effects. I W. W. Hicks and J. C. Beckett, Wesix Electric Heater Co.
- CP.\* Standards for Measurement of Brightness Intensification in Fluoroscopic Image Intensifiers. Walter S. Lusby, Westinghouse Electric Corp.
- CP.\* Remote Stimulation of Cortical Areas in Primates. G. C. Riggle and George I. Johnston, National Institute of Health.

2:00 p.m.—Feedback Control Systems

*Feedback Control Systems Committee*

Skytop

J. R. RAGAZZINI, Presiding

- 57-185. A New Stability Criterion of Linear Servomechanisms by a Graphical Method. Toshio Numakura and T. Miura, Hitachi, Central Research Laboratory.
- 57-186. Transfer Matrix Stability Criterion Applied to an Amplidyne II Servo Network. P. M. Honnell, Washington University, and D. Wolfenstein, Washington University.
- 57-41. Non-Interacting Controls in Linear Multi-Variable Systems. II R. J. Kavanagh, University of Toronto.
- 57-44. A Synthesis Method for Multipole Control Systems. H. Freeman, Sperry Gyroscope Company.
- 57-187. Compensation of an Error-Sampled System by a Multi-Rate II Controller. G. M. Kranc, Columbia University.

2:00 p.m.—Television Equipment Developments

*Television and Aural Broadcasting Committee*

Georgian Room

J. B. COLEMAN, Presiding

- CP.\* Television Translators and Satellites. Benjamin Adler, Adler Communications Laboratories.
- CP.\* Transistorized Television Cameras Using the Miniature Vidicon. Leslie E. Flory, Radio Corporation of America Laboratories.

FRIDAY (continued)

- CP.\* Control of Radiation from FM and TV Receivers. Richard J. Farber, Hazeltine Research Corporation.
- CP.\* Automatic Program Control for Television Broadcasting. A. C. Angus, General Electric Company.

2:00 p.m.—Communication Switching Systems

*Communication Switching Systems Committee*

Hotel Statler East Room

W. KEISTER, Presiding

- 57-47. The Automatic Line Concentrator and Subscriber Telephone Applications. H. G. Evers and J. R. Wylie, Leich Electric Company.
- CP.\* Optimal Utilization and Expansion of Interoffice Trunking Facilities. R. E. Kalaba and M. L. Juncosa, The Rand Corp.
- 57-105. A New Family of Transistor Switching Circuits. Morris Rubinoff, University of Pennsylvania.
- 57-106. Transistor Two-Terminal Switches. Abraham Har'el, University of Pennsylvania.

Special Notice to Presiding Officers:

In the event physical arrangements are not satisfactory for the technical sessions, presiding officers are directed to telephone Mr. Fred McMillan at the Hotel Statler on Extension H.125.

Note: Unnumbered Conference Papers (CP.\*) may be available at or after the meeting, if copies are provided by the author. They are not intended for publication in the Transactions and are not presently scheduled for reproduction in any form by the Institute.

Note: The TRANSACTIONS papers will be printed in the bimonthly publications as follows:

- I COMMUNICATIONS AND ELECTRONICS.  
 II APPLICATIONS AND INDUSTRY.  
 III POWER APPARATUS AND SYSTEMS.



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H. B. Snow, *Chairman*

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J. Bleiweis	Dick Holland
W. W. Cannan	H. A. Mehrtens
C. J. Davis	F. B. Morgan
D. Gigante	D. S. Papanou
	A. W. Steil

**COMMITTEE MEETINGS**

**Sunday, January 20**

- 3:00 p.m.—Professional Development and Recognition Department ..... Boston Room
- 3:00 p.m.—High Voltage DC Maintenance Testing W. G., R.M. Insulation Sub. .... Empire Suite I

**Monday, January 21**

- 9:00 a.m.—AIEE Standard #43 Revision W. G., R.M. Insulation Subcommittee ..... Village Room
- 9:00 a.m.—Indicating and Intergrating Instruments ..... ASME Board Room\*\*
- 10:00 a.m.—P.S.C. Equipment Design Standards Subcommittee ..... Empire Suite I
- 10:00 a.m.—Nominating ..... Boston Room
- 10:00 a.m.—Multi-Line Station Protection W.G. .... Schuyler Room
- 10:00 a.m.—Sections ..... Town Room
- 12:00 noon—Luncheon—Nucleonics ..... Dartmouth Room
- 12:00 noon—Luncheon—Sections ..... Town Room
- 12:00 noon—Luncheon—Domestic and Commercial Applications ..... Cornell Room
- 12:00 noon—Luncheon—General Session ..... Pennsylvania Room
- 4:00 p.m.—Relays ..... Boston Room
- 4:00 p.m.—Impedance Bridge Measurements W.G... Empire Suite II
- 4:00 p.m.—Communication Theory ..... Town Room
- 4:00 p.m.—Radio Communications Systems ..... Empire Suite I
- 4:00 p.m.—Effects of Radiation on Materials Subcommittee ..... Schuyler Room
- 4:00 p.m.—Power Systems Communications Executive ..... Buffalo Room
- 4:00 p.m.—Land Transportation ..... Village Room
- 5:00 p.m.—Sections Get-together.. Pennsylvania and Cornell Rooms

**Tuesday, January 22**

- 8:00 a.m.—Canadian Breakfast..... Cornell and Dartmouth Rooms
- 9:00 a.m.—ASA-C 34 Standard W.G. ... ASCE Conference Room\*\*
- 9:00 a.m.—Power Division ..... Pennsylvania Room
- 9:00 a.m.—Lightning and Insulator Subcommittee..... Parlor C\*
- 9:30 a.m.—Magnetic Amplifier Materials Subcommittee ..... Buffalo Room
- 9:30 a.m.—Surge Transfer Through Power Transformers W.G. 1 ..... Parlor B\*
- 9:30 a.m.—Safety ..... Village Room
- 9:30 a.m.—Mercury Arc Converter Subcommittee ..... Parlor D\*
- 9:30 a.m.—Dielectric Measurements Subcommittee .... Town Room
- 9:30 a.m.—Lamme Medal ..... Empire Suite I
- 9:30 a.m.—Management ..... Empire Suite II
- 9:30 a.m.—General Industry Applications ..... Boston Room
- 9:30 a.m.—Industrial Power Systems Executive ..... Hudson Room



## American Institute of Electrical Engineers

- 9:30 a.m.—Communications Division .....Schuyler Room  
9:30 a.m.—Section Representatives .....Penn Top North  
12:00 noon—Luncheon—Industrial Power Systems....Cornell Room  
12:00 noon—Luncheon—Communications Division ...Schuyler Room  
12:00 noon—Luncheon—D.C. Machinery  
Subcommittee .....Dartmouth Room  
12:00 noon—Luncheon—General Applications Division..Town Room  
12:00 noon—Luncheon—Magnetics Subcommittee ..Empire Suite II  
12:00 noon—Luncheon—Special Instruments and  
Auxiliary Apparatus .....Village Room  
2:00 p.m.—Science and Electronics Division ...Pennsylvania Room  
2:00 p.m.—Theory Subcommittee of Magnetic Amplifiers..Parlor F\*  
2:00 p.m.—Chemical Processes Subcommittee .....Empire Suite I  
2:00 p.m.—Section Representatives .....Penn Top North  
2:00 p.m.—Research .....Empire Suite II  
2:00 p.m.—Publications .....Cornell Room  
2:00 p.m.—Automatic and Supervisory Control  
Subcommittee .....Parlor B\*  
2:00 p.m.—Conversion Substation Subcommittee .....Parlor C\*  
2:00 p.m.—Distribution Substation Subcommittee .....Parlor D\*  
2:00 p.m.—Transmission Substation Subcommittee .....Parlor E\*  
2:00 p.m.—Feedback Control Systems .....Boston Room  
2:00 p.m.—Data Communications .....Buffalo Room  
2:00 p.m.—Power Generation Administrative .....Hudson Room  
3:00 p.m.—VI-F-2 Subcommittee .....Parlor B\*  
4:00 p.m.—Gaseous Dielectrics Subcommittee .....Parlor C\*  
4:00 p.m.—Rotating Machinery Insulation  
Subcommittee .....Parlor D\*

### Wednesday, January 23

- 9:00 a.m.—Fault Limiting Devices Subcommittee .....Town Room  
9:00 a.m.—Power System Communications .....Buffalo Room  
9:00 a.m.—Joint Subcommittee on Applications of  
Probability Methods .....Parlor E\*  
9:00 a.m.—Members-for-Life Fund .....Hudson Room  
9:00 a.m.—Telegraph Systems .....Parlor B\*  
9:00 a.m.—Industry Division .....Cornell Room  
9:00 a.m.—Germanium & Silicon Rectifying  
Device Subcommittee .....Parlor D\*  
9:00 a.m.—Lightning Protective Devices  
Subcommittee .....Village Room  
9:00 a.m.—Student Branches .....Pennsylvania Room  
9:00 a.m.—Admission and Advancement  
Department .....Empire Suite I

## Winter General Meeting

- 9:00 a.m.—Computing Devices .....Parlor F\*  
9:00 a.m.—Power Generation Subcommittees .....Boston Room  
9:30 a.m.—Spectroscopy Subcommittee .....Parlor C\*  
9:30 a.m.—Substation Executive Subcommittee ...Schuyler Room  
9:30 a.m.—Electronic and High Frequency  
Instruments .....Dartmouth Room  
9:30 a.m.—Cathodic Protection .....Empire Suite II  
12:00 noon—Luncheon—ASA Sectional C57 .....Dartmouth Room  
12:00 noon—Luncheon—Public Relations .....Town Room  
12:00 noon—Luncheon—Instrumental Division .....Village Room  
12:00 noon—Luncheon—Induction Machinery  
Subcommittee .....Schuyler Room  
12:00 noon—Luncheon—Production and Application  
of Light .....Parlor B\*  
12:00 noon—Luncheon—Registration of Engineers..Empire Suite II  
12:00 noon—Luncheon—Industrial Power Rectifiers...Cornell Room  
12:00 noon—Luncheon—Electrostatic Processes  
Subcommittee .....Parlor E\*  
12:00 noon—Luncheon—Technical Operations  
Department .....Empire Suite I  
2:00 p.m.—Student Branches .....Pennsylvania Room  
2:00 p.m.—Power Generation .....Parlor F\*  
2:00 p.m.—Printing Telegraph Subcommittee .....Parlor D\*  
2:00 p.m.—System Economics Subcommittee.....Empire Suite I  
2:00 p.m.—Protective Devices .....Hudson Room  
2:00 p.m.—System Engineering Computer  
Subcommittee .....Boston Room  
2:00 p.m.—Substations .....Buffalo Room  
2:00 p.m.—Industrial Control .....Parlor C\*  
2:30 p.m.—System Operations Subcommittee .....Boston Room  
2:30 p.m.—Administration Department .....Town Room  
3:00 p.m.—System Planning Subcommittee .....Boston Room  
4:00 p.m.—Magnetic Amplifiers Standards  
Subcommittee .....Parlor E\*  
4:00 p.m.—System Engineering .....Boston Road  
4:00 p.m.—Basis Sciences .....Schuyler Room  
4:00 p.m.—Dielectrics .....Cornell Room  
4:00 p.m.—Synchronous Machinery Subcommittee...Empire Suite I  
7:30 p.m.—Forum of Technical Committee  
Chairmen .....Georgian Room

### Thursday, January 24

- 8:00 a.m.—Breakfast—Electrical Systems for  
Commercial Buildings .....Empire Suite II  
9:00 a.m.—Planning and Coordination .....Dartmouth Room  
9:00 a.m.—Towers, Poles and Conductors  
Subcommittee .....Hudson Room  
9:00 a.m.—Metallic Rectifiers .....Parlor F\*  
9:00 a.m.—Conference of Vice-Presidents .....Cornell Room  
9:00 a.m.—Diesel Electric Insulation Resistance  
Testing Subcommittee .....Room 1001\*\*  
9:00 a.m.—Chemical Industry .....Buffalo Room  
9:00 a.m.—Feedback Control Systems  
Components Subcommittee .....Parlor C\*



9:00 a.m.—Electrical Standards Panel .....Parlor B\*

9:00 a.m.—Joint Division on Automation .....Boston Room

9:30 a.m.—Membership .....Village Room

9:30 a.m.—General Systems Subcommittee .....Parlor E\*

9:30 a.m.—AIEE Standard #4 .....Pennsylvania Room

9:30 a.m.—Professional Conduct Committee .....Town Room

10:00 a.m.—Joint AIEE-IRE Dielectric Devices  
Subcommittee .....Empire Suite I

12:00 noon—Luncheon—Nucleonics and Radiation  
Instruments Subcommittee .....Schuyler Room

12:00 noon—Luncheon—TV & Aural Broadcasting  
Systems .....Parlor D\*

12:00 noon—Luncheon—Corona Effects on Dielectrics  
Subcommittee .....Empire Suite II

12:00 noon—Luncheon—Indicating and Integrating  
Instruments .....Village Room

12:00 noon—Luncheon—R.M. Administrative  
Subcommittee .....Cornell Room

12:00 noon—Luncheon—Recording and Controlling  
Instruments .....Town Room

2:00 p.m.—Education .....Hudson Room

2:00 p.m.—Electrical Standards Panel .....Parlor B\*

2:00 p.m.—Metallic Rectifiers .....Parlor F\*

2:00 p.m.—Dry Type Transformers Working Group .....Room 1001\*\*

2:00 p.m.—Feedback Control Systems  
Components Subcommittee .....Parlor C\*

2:00 p.m.—UHF and Microwave Transmission Lines  
Devices Subcommittee .....Empire Suite I

2:00 p.m.—AIEE Standard #4 .....Pennsylvania Room

2:00 p.m.—Magnetic Amplifiers .....Dartmouth Room

4:00 p.m.—Electrochemical Processes Subcommittee..Buffalo Room

4:00 p.m.—Electronic Awards Subcommittee .....Schuyler Room

4:00 p.m.—Rotating Machinery .....Hudson Room

4:00 p.m.—Radiation Effects on Dielectrics  
Subcommittee .....Parlor E\*

4:00 p.m.—Capacitor Subcommittee .....Boston Room

4:30 p.m.—Wire Communications .....Town Room

**Friday, January 25**

9:00 a.m.—Board of Directors .....Pennsylvania Room

9:00 a.m.—Metallic Rectifier, Magnetic Amplifier  
Subcommittee .....Empire Suite II

9:00 a.m.—Industrial Power Systems  
Designation W.G. ....Empire Suite I

9:00 a.m.—Transmission and Distribution .....Buffalo Room

10:00 a.m.—Electrical Techniques in Medicine  
and Biology .....Boston Room

10:00 a.m.—Communication Switching Systems .....Town Room

12:00 noon—Luncheon—Mining and Metal  
Industry .....Empire Suite II

12:00 noon—Luncheon—Board of Directors .....Cornell Room

1:30 p.m.—Electronic Planning Subcommittee .....Boston Room

2:00 p.m.—Board of Directors .....Pennsylvania Room

2:00 p.m.—Metallic Rectifier, Magnetic  
Amplifier Subcommittee .....Empire Suite II

3:30 p.m.—Electronics .....Boston Room

\*Located in the Sheraton-McAlpin Hotel.

\*\*Located in the Engineering Societies Building.

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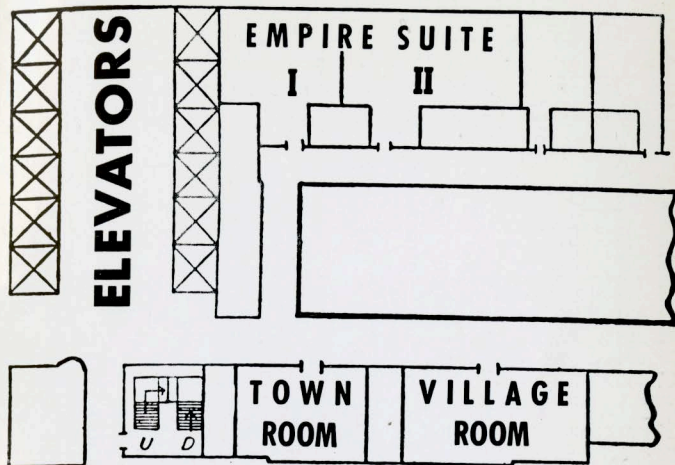
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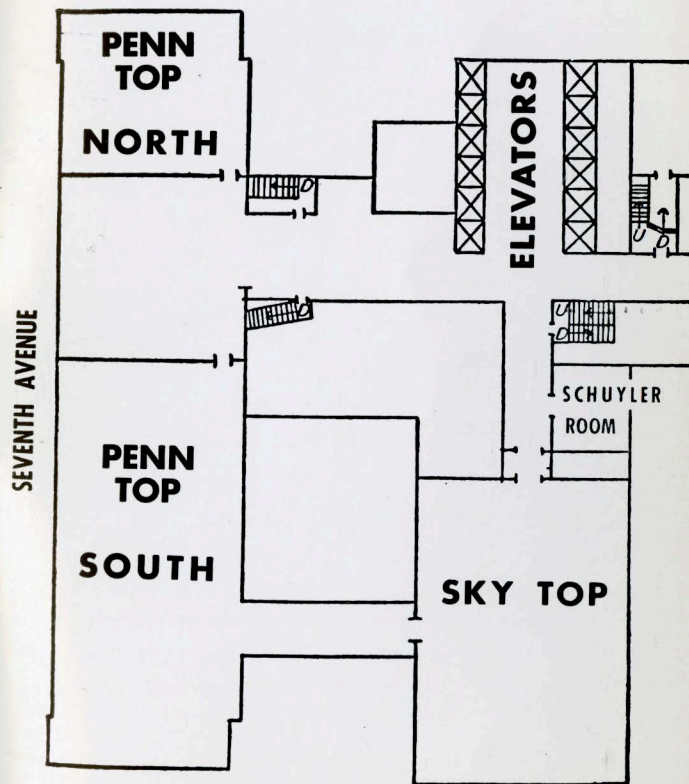
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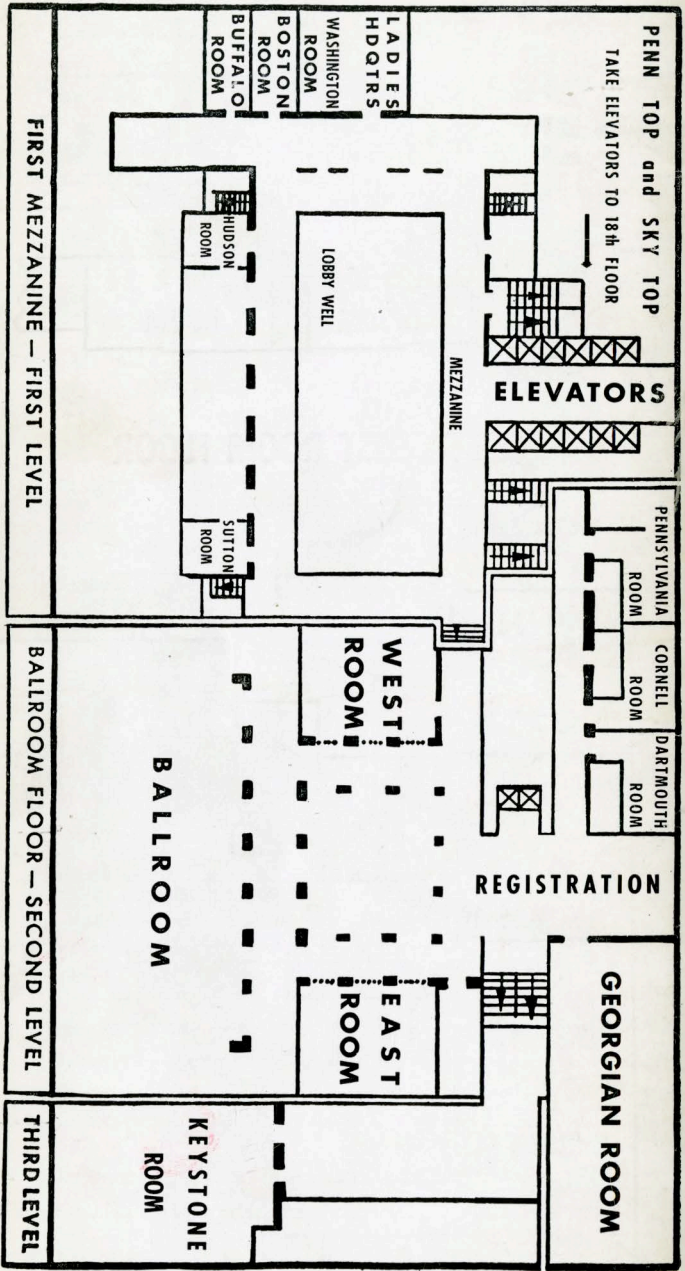
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