



# National Technical Meeting

January 25-29, 1943

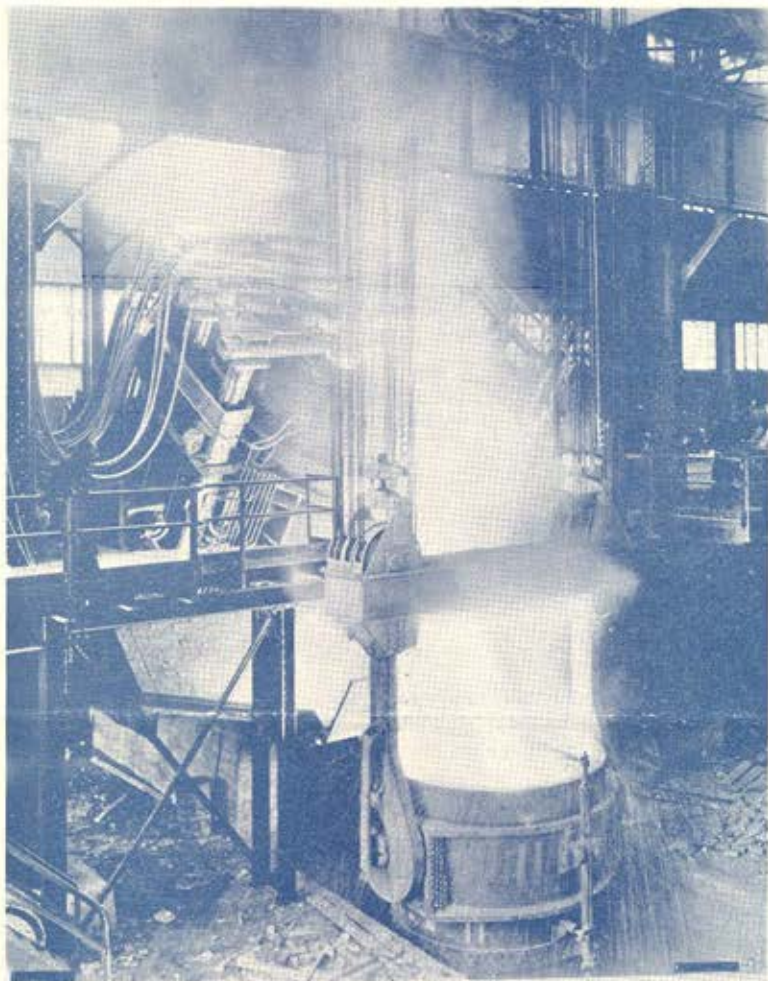


## Winter Conference

January 28, 1943

*Headquarters*

ENGINEERING SOCIETIES BUILDING  
33 West 39th Street New York, N. Y.



Electric Arc Furnaces play an important role in the war effort. Problems of their power supply using a minimum of copper and other critical materials will be discussed. (See paper No. 43-29)

**Maximum aid in the war effort is the principal objective of this meeting.** Many of the sessions deal with getting the most out of existing equipment to conserve critical materials. Proposed guides for the selection, application, and operation of equipment during the war will be presented. A Conference Symposium on Defense Lighting will present authoritative up-to-the-minute developments. "Technical Man-Power in the War Effort" will be the feature of the general session on Wednesday.

## ADVANCE COPIES OF PAPERS

Preprints of technical papers may be obtained by mail by remitting price indicated to the AIEE Order Department, 33 West 39th Street, New York, N. Y.; if purchased at AIEE headquarters or at the meeting 5c less per copy. For convenience an order form is enclosed. Only numbered papers will be available in advance-copy form. 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 \$5.00 denominations are available for those who wish to avoid remittance by check or otherwise. Most of the papers ultimately will be published in *ELECTRICAL ENGINEERING* or *TRANSACTIONS*.

### Monday, January 25

#### 9:30 a.m.—Capacitor Generators and Transformer Loading

- 43-13. Steady-State and Transient Stability Analysis of Series Capacitors in Long Transmission Lines. J. W. Butler, J. E. Paul, T. W. Schroeder, General Elec. Co. 15 cents by mail.
- 43-8. Self-Excited Oscillations of Capacitor-Compensated Long-Distance Transmission Systems. R. B. Bodine, C. Concordia, G. Kron, General Elec. Co. 15 cents by mail.
- 43-16. Mobile Capacitor Units for Emergency Loading of Transformers in Open Delta. H. B. Wolf, G. G. Mattison, Duke Power Co. 15 cents by mail.
- 43-25. Kilowatts, Kilovars, and System Investments. J. W. Butler, General Elec. Co. 15 cents by mail.
- 43-45. Open-Delta Transformer Banks—Analysis of Circuit. J. E. Clem, General Elec. Co. 20 cents by mail.
- 43-48. Shunt Capacitors. General Systems Subcommittee, Committee on Power Transmission and Distribution. 30 cents by mail.

#### 9:30 a.m.—Relaying

- 43-27. Pilot-Wire Circuits for Protective Relaying—Experience and Practice. Relay Subcommittee, Committee on Protective Devices. 15 cents by mail.
- 43-15. A New Generator Differential Relay. A. J. McConnell, General Elec. Co. 15 cents by mail.
- 43-28. The Effect of Current Transformer Residual Magnetism on Balanced-Current or Differential Relays. H. T. Seeley, General Elec. Co. 20 cents by mail.
- 43-5. Correlation of System Overvoltages and System Grounding Impedence. Working Group on Correlation of System Grounding Impedence. 15 cents by mail.

#### 9:30 a.m.—Electrical Machinery

- 43-2. A Useful Equivalent Circuit for a Five-Winding Transformer. L. C. Aicher, Jr., Allis-Chalmers Mfg. Co. 15 cents by mail.
- 43-3. A New Type of Adjustable-Speed Drive for Alternating-Current Systems. A. G. Conrad, S. T. Smith, P. F. Ordnung, Yale University. 15 cents by mail.
- 43-4. Performance Calculations on Tapped-Winding Capacitor Motors. P. H. Trickey, Diehl Mfg. Co. 15 cents by mail.

- 43-6. Analysis of Rating Methods for Intermittent Loads. R. E. Hellmund (deceased), formerly with Westinghouse Elec. & Mfg. Co. *Presentation by title.* 15 cents by mail.

- 43-47. Factors Affecting the Design of D-C Magnets. L. T. Rader, General Elec. Co. 15 cents by mail.

#### 2:00 p.m.—Transmission Lines

- 43-7. Abnormal Overvoltages Caused by Transformer Magnetizing Currents in Long Transmission Lines. H. A. Peterson, T. W. Schroeder, General Elec. Co. 15 cents by mail.
- 43-21. Wood-Pole 230-Kv Transmission Lines. O. S. Clark, War Department. 15 cents by mail.
- 43-29. Transmission-Line and System Problems in Supplying Large Electric Arc Furnaces during Wartime. B. M. Jones, Duquesne Light Co. 20 cents by mail.
- 43-22. Ampere Load Limits for Copper in Overhead Lines. A. H. Kidder, C. B. Woodward, Philadelphia Elec. Co. 15 cents by mail.
- 43-20. Intrasystem Transmission Losses. E. E. George, Ebasco Services, Inc. 30 cents by mail.

#### 2:00 p.m.—Conference on Relays

Introduction: H. F. Lindemuth

- CP.\* Acceptance Tests and Installation Tests. S. C. Leyland, Westinghouse Elec. & Mfg. Co.
- CP.\* Calibration Tests. J. C. Bowman, Public Service Elec. & Gas Co.
- CP.\* Routine Tests, Inspection, and Trouble Checks. C. A. Muller, American Gas & Elec. Service Corp.
- CP.\* Reports and Summary. J. H. Oliver, General Elec. Co.
- CP.\* Report from the Working Group on War Activities. L. F. Kennedy, General Elec. Co.

#### 2:00 p.m.—Conference on Selection of Motors and Controllers

- 43-62. Proposed Guide for the Selection of Electric Motors and Motor Controllers. Report of Committee on Electrical Machinery and Committee on Industrial Power Applications (Applies to ASA C50—Rotating Electrical Machinery and AIEE No. 15—Industrial Control Apparatus). 15 cents by mail.
- The conference session will consist of a number of prepared discussions of conference papers on various aspects of the guide. There will be opportunity for open discussion.

#### 7:30 p.m.—Conference on Emergency Loading of Transmission Systems



"The Ignitron"—one of the types of electronic tubes to be discussed in the Wednesday afternoon conference.

## Tuesday, January 26

### 9:30 a.m.—Transmission and Distribution

- 43-10. Dielectric Recovery Characteristics of Large Air Gaps. G. D. McCann and J. J. Clark, Westinghouse Elec. & Mfg. Co. 15 cents by mail.
- 43-12. Impulse and Sixty-Cycle Characteristics of Driven Grounds—III. Effect of Lead in Ground Installation. P. L. Bellaschi and R. E. Armington, Westinghouse Elec. & Mfg. Co. 20 cents by mail.
- 43-26. Harmonics and Load Balance of Multi-Phase Rectifiers. Consideration in the Selection of the Number of Rectifier Phases. R. D. Evans, Westinghouse Elec. & Mfg. Co. 15 cents by mail.
- 43-30. Pulling Loads on Single- and Multiple-Conductor Impregnated-Paper Lead-Encased Cable, Solid Type. A. P. S. Bellis, John A. Roebling's Sons Co. 30 cents by mail.
- 43-23. Electrical Stability of Electrical Insulating Oils under Limited Oxidation. J. C. Balsbaugh, A. G. Assaf, Massachusetts Institute of Technology. 30 cents by mail.
- 43-34. Metering Power on the Low-Voltage Side. A. J. Petzinger, B. E. Lenehan, Westinghouse Elec. & Mfg. Co. 20 cents by mail.

### 9:30 a.m.—Land Transportation

- CP.\* The Sorocabana Railway Electrification. Durval Muylaert, Sorocabana Railway.
- CP.\* Train Communication. L. O. Grondahl, P. N. Bossart, Union Switch & Signal Co.
- 43-33. Keep Them Rolling. J. W. Teker, General Elec. Co. 20 cents by mail.
- 43-49. Factors Involved in the Selection of Railroad Motive Power. H. C. Wilcox, Railway Mechanical Engineer; A. G. Oehler, Railway Age. 20 cents by mail.

### 9:30 a.m.—Industrial Power Applications

- 43-17. Paired-Phase Busbars for Large Polyphase Currents. L. E. Fisher, R. L. Frank, Bull Dog Elec. Products Co. 15 cents by mail.
- 43-41. The Power-Recovery System of Testing Aircraft Engines. G. E. Cassidy, W. A. Mosteller, W. L. Wright, General Elec. Co. 20 cents by mail.
- 43-31. Synchronous Motors with Controlled Excitation for Suddenly Applied Loads. W. K. Boice, B. H. Caldwell, M. N. Halberg, General Elec. Co. 25 cents by mail.

### 2:00 p.m.—Relaying of Long Transmission Lines

- 43-19. Switching Overvoltage Hazard Eliminated in High-Voltage Oil Circuit Breakers. L. F. Hunt, Southern California Edison Co., Ltd.; E. W. Boehne, H. A. Peterson, General Elec. Co. 15 cents by mail.
- 43-37. Performance Requirements for Relays on Unusually Long Transmission Lines. F. C. Poage, C. A. Streifus, D. M. MacGregor, E. E. George, Ebasco Services, Inc. 30 cents by mail.
- 43-38. Protective Relaying for Long Transmission Lines. A. R. VanC. Warrington, General Elec. Co. 20 cents by mail.
- 43-39. Staged-Fault Tests of Relaying and Stability on Kansas-Nebraska 270-Mile 154-Kv Interconnection. C. W. Minard, E. A. Swanson, Nebraska Power Co.; R. B. Gow, W. A. Wolfe, Kansas Gas & Elec. Co. 30 cents by mail.

### 2:00 p.m.—Conference Symposium on Defense Lighting

Now it should be told and the electrical fraternity as well as all business men should hear the results of the first year's operations of defense lighting. The subject of black-outs and dimouts will be presented from the following viewpoints:

- CP.\* The Relationships with the Electrical Utilities. Tom P. Walker, President, Council of Elec. Operating Companies, Washington, D. C.
  - CP. Wartime Control of Lighting for Passive Defense. Lieutenant Colonel B. W. Beers, Executive Officer, Operating and Training Division, Headquarters Second Service Command, Governors Island, New York.
  - CP.\* The Long-Range Problems and Achievements of Camouflage and Concealment. Major R. P. Breckenridge, Corps of Engineers, Camouflage Branch, United States Army, Fort Belvoir, Va.
  - CP.\* The Safety Features and Influences on Street Traffic. Richard E. Simpson, Chairman, Dimout Consulting Committee, State Defense Council, Connecticut.
- This symposium is guided by four recognized authorities in their respective fields and will summarize up to the minute the many interesting and pertinent developments of defense lighting. Opportunity will be afforded for a full and off-the-record discussion of these problems that are becoming closely interwoven into the daily lives of all citizens.

### 2:00 p.m.—Basic Sciences

- 43-11. Formulas for the Calculation of the Inductance of Linear Conductors of Structural Shape. T. J. Higgins, Illinois Institute of Technology. 15 cents by mail.

- 43-46. Field Disturbances Produced by Lightning. G. D. McCann, D. E. Morgan, Westinghouse Elec. & Mfg. Co. 30 cents by mail.
- 43-50. Generation of Electric Charges by Moving Rubber-Tired Vehicles. S. S. Mackeown, California Institute of Technology; Victor Wouk, Westinghouse Elec. & Mfg. Co. 15 cents by mail.
- 43-43. Skin Effect in Bimetallic Conductors. B. R. Teare, Jr., Josephine R. Webb, Carnegie Institute of Technology. 20 cents by mail.
- 43-9. Equivalent Circuits for Oscillating Systems and the Riemann-Christoffel Curvature Tensor. Gabriel Kron, General Elec. Co. 15 cents by mail.

**2:00 p.m.—Conference on Emergency Rating of Power Cables**

G. L. Carlisle, War Production Board  
 H. W. Collins, The Detroit Edison Company  
 H. L. Davis, Jr., Philadelphia Electric Company  
 G. E. Dean, Public Service Electric and Gas Company  
 W. A. Del Mar, Habirshaw Cable and Wire Company  
 Herman Halperin, Commonwealth Edison Company  
 C. T. Hatcher, Consolidated Edison Company of New York  
 E. W. Oesterreich, Duquesne Light Company  
 G. B. Shanklin, General Electric Company

**Wednesday, January 27**

**10:00 a.m.—General Session**

(Auditorium)

**President HAROLD S. OSBORNE, Presiding**  
 Presentation of Alfred Noble Prize to George W. Dunlap.

**Technical Man Power in the War Effort**

Brigadier General Miller G. White, Assistant Chief of Staff, War Department, General Staff

Dr. Joseph W. Barker, Special Assistant to the Secretary of the Navy

Major General Lewis B. Hershey, Director of Selective Service

The objective of the meeting is to present an up-to-the-minute picture of the technical man-power requirements of the armed services and the plans for meeting these, together with the essential industries' requirements, with suitably trained and conditioned men and women. The positions of responsibility and authority held by the scheduled speakers should make the session one of particular interest to engineers of all age groups as well as engineering students. The timeliness of the subject has been emphasized by the recent reorganization of the Government's man-power groups.

**2:00 p.m.—Conference on Wartime Engineering Education**

- CP.° Continuing Programs of Specialized Engineering Education for Military and Industrial Services, and the Allocation of the Technical Graduates. Edward C. Elliott, Chief, Professional and Technical Employment and Training Division, War Manpower Commission, and President of Purdue University.
- CP.° Accelerated Programs of Specialized Engineering Education Versus the Short Specialized Types of Training. Henry T. Heald, President, Society on Promotion of Engineering Education, and President of Illinois Institute of Technology.
- CP.° The Increasing Need of Engineering Graduates in Industry during a Prolonged War Period. Maynard M. Boring, Apparatus Design Engg. Dept., General Elec. Co.  
 Announcement: A meeting of the Committee on Education will directly follow this session.



Portable Capacitor Units play an important part in emergency operation and their application will be discussed in the first session on Monday.

**2:00 p.m.—Conference on Getting the Most Out of Electronic Tubes in Wartime**

This conference will take the form of an informal discussion on methods of operating electronic devices to improve their life and increase their usefulness under existing wartime conditions. The question of adequate rating of electronic devices to permit the obtaining of their maximum utility will also be considered. Several speakers will briefly introduce these topics, after which discussion from the floor will be in order. It is hoped to obtain a wide participation by those present.

**2:00 p.m.—Conference on Substation Designs to Meet Wartime Conditions**

**Thursday, January 28**

**9:30 a.m.—Circuit Breakers and Switches**

- 43-32. An Improved Axial Air-Blast Interrupter for Severe Operating Duty. P. L. Taylor, H. W. Martin, Allis-Chalmers Mfg. Co. 30 cents by mail.
- 43-44. A New 50,000-Kva, 5-Kv Oilless Circuit Breaker and Metal-Clad Switchgear Unit. R. C. Dickinson, B. I. Hayford, Westinghouse Elec. & Mfg. Co. 15 cents by mail.
- 43-51. A Vertical-Flow Compressed-Air Circuit Breaker and Its Application on a 132-Kv Power System. H. A. P. Langstaff, West Penn Power Co.; B. P. Baker, Westinghouse Elec. & Mfg. Co. 15 cents by mail.
- 43-52. The Auto-Blast Interrupter Switch. E. A. Williams, Jr., W. G. Harlow, General Elec. Co. 20 cents by mail.
- 43-53. A Multiorifice Interrupter for High-Voltage Oil Circuit Breakers. L. R. Ludwig, W. M. Leeds, Westinghouse Elec. & Mfg. Co. 25 cents by mail.

(Continued on middle of page 5)

## Thursday, January 28

### 9:30 a.m.—Technical Session

Radio-Frequency Operated High-Voltage Supplies for Cathode-Ray Tubes, O. H. Schade, RCA Mfg. Co.

Transmission-Line Charts. R. S. Julian, Bell Telephone Laboratories, Inc.

Polydirectional Microphones. H. F. Olson, RCA Mfg. Co.

Phosphors and the Periodic System of the Elements. H. W. Leverenz, RCA Communications Laboratory.

### 2:00 p.m.—Annual Meeting

Annual Report of the Secretary

Trends of Institute Accomplishments. Past President A. F. Van Dyck

Transference of the Gavel, as the Symbol of Office, to President L. P. Wheeler

Presentation of the Institute Medal of Honor to William Wilson

Conference of Institute Fellowships on the following:

Andrew Alford	Daniel E. Harnett
I. S. Coggeshall	Dorman Israel
Jennings B. Dow	Axel G. Jensen
Lee DuBridge	George F. Metcalf
Peter C. Goldmark	Irving Wolff

### Special Papers Symposium

Radio in Two World Wars. Lloyd Espenschied, Bell Telephone Laboratories, Inc.

Production of Radio Facilities for the Armed Services. Rear Admiral S. C. Hooper, U. S. Navy

The Army-Navy Electronics Production Agency. F. R. Lack, Director, Army-Navy Electronics Production Agency

The Function of the War Production Board in Radio. Ray Ellis, Director, Radio and Radar Division, War Production Board

Radio Standards Go to War. H. P. Westman, War Committee on Radio, American Standards Association

The Engineer's Position in the Man-Power Program. Kirk Miles, War Manpower Commission

### 8:30 p.m.—A.I.E.E.-I.R.E. Meeting

Address: "Ultrahigh Frequencies." Dr. George C. Southworth, Bell Telephone Laboratories, Inc.

**10:30 p.m.**—A nationwide hookup over the facilities of the Columbia Broadcasting System, 10:30 to 10:45 p.m., eastern war time, has been arranged to link the Washington banquet and the New York meeting. Dr. L. P. Wheeler, President, I.R.E., will broadcast a brief word of greeting from New York following an introduction by Junior Past President Arthur F. Van Dyck, while from the Washington banquet the Honorable James Laurence Fly, Chairman of the Board of War Communications will speak.

*(AIEE Program continued from page 4)*

### 9:30 a.m.—Conference on Power Generating Equipment

The objective of this conference is to correlate all possible ideas on how to get the most out of present equipment.

CP.\* Emergency Measures to Increase Output of Generating Equipment. C. M. Laffoon, Subcommittee Chairman.

CP.\* Emergency Measures to Increase Output of Generating Systems. R. P. Crippen, Subcommittee Chairman.

CP.\* Wartime Personnel Problems

The first memorandum will contain case examples of the effect of voltage, ambient temperature, hydrogen pressure, etc., on the operation of turbine and waterwheel generators. The second memorandum is being prepared from answers to a questionnaire submitted to the leading operating companies together with summation on such subjects as loading limits on equipment, maintenance, power-factor correction, interconnected operation, effect of voltage and frequency on system loads, rebuilding or rehabilitation of equipment or stations, etc. The two memoranda are intended to serve as a basis for questions and discussions from the audience, to which the major part of the conference will be devoted.

### 2:00 p.m.—Switching Equipment and Related Subjects

43-54. Oil-Impregnated Paper High-Voltage Condenser Bushings for Circuit Breakers and Transformers. H. J. Lingal, H. L. Cole, T. R. Watts, Westinghouse Elec. & Mfg. Co. 25 cents by mail.

43-35. The Cathode-Ray Oscillograph Applied to Long-Time Switching Transients. G. W. Dunlap, N. Rohats, General Elec. Co. 15 cents by mail.

43-63. Application of Lightning Protective Devices in Wartime. I. W. Gross, American Gas & Elec. Service Corp. 15 cents by mail.

43-55—AC0.† Preliminary Report on Guides for Application and Operation of Circuit Breakers and Switchgear. Subcommittee on Circuit Breakers, Switches, and Fuses. 15 cents by mail.

### 2:00 p.m.—Conference on Industrial Distribution

43-40—AC0.† A Proposed Wartime Guide for Industrial Power Distribution Systems. Interim Report of Committee on Industrial Power Applications. 70 cents by mail.

### 8:15 p.m.—Medal Presentations

Edison Medal to Major Edwin H. Armstrong  
John Fritz Medal to Dr. Willis R. Whitney  
Hoover Medal to Dr. Gerard Swope

### 8:30 p.m.—AIEE-IRE Meeting

Address: "Ultrahigh Frequencies." Dr. George C. Southworth, Bell Telephone Laboratories, Inc.

## Friday, January 29

### 9:30 a.m.—Transformer Loading

- 43-56. Cooling Power Transformers by Forced Circulation of Cooling Medium. K. K. Palucv, L. H. Burnham, General Elec. Co. 25 cents by mail.
- 43-18. Equivalent Ambient Temperatures for Loading Transformers. W. C. Sealey, Allis-Chalmers Mfg. Co. 15 cents by mail.
- 43-36. The Rating of Power Transformers As Determined by the War Emergency. R. J. Salsbury, A. F. Phillips, Duquesne Light Co. 25 cents by mail.
- 43-24. Substation Transformer Emergency Overloading Practice. L. W. Clark, The Detroit Edison Co. 20 cents by mail.

### 9:30 a.m.—Radio Measurements

- 43-14. An Electro-Mechanical Calculator for Directional Antenna Patterns. C. E. Smith, United Broadcasting Co.; E. L. Gove, No. Hollywood, Calif. 15 cents by mail.
- 43-57. Measurements Pertaining to the Co-ordination of Radio Reception with Power Apparatus and Systems. C. M. Foust, C. W. Frick, General Elec. Co. 30 cents by mail.
- 43-58. Effect of Radio Frequencies of a Power System on Radio-Receiving Systems. C. V. Aggers, Westinghouse X-Ray Co., Inc.; W. E. Pakala, Westinghouse Elec. & Mfg. Co.; W. A. Stickel, West Penn Power Co. 15 cents by mail.
- 43-1. An Instrument for the Determination of Contact Making and Breaking Time. Walther Richter, W. H. Elliot, Cutler-Hammer Inc. 15 cents by mail.
- 43-59. Insulation Testing of Electric Windings. C. M. Foust, N. Rohats, General Elec. Co. 15 cents by mail.

### 9:30 a.m.—Conference on Analysis of Military Loads and Postwar Application

- 43-60. Estimating Electric Loads for Military Training Bases, Federal Housing, and Other Wartime Projects. H. M. Potts, Bonneville Power Administration. 30 cents by mail.  
H. P. Seelye and D. K. Blake will discuss the relationship of distribution to the general problem with emphasis on conservation possibilities.
- CP\* A Method of Analyzing Wartime Loads. W. L. Tadlock, The Commonwealth and Southern Corp.
- CP\* Matters of Safety  
(1) To People  
(2) In Equipment Design. S. B. Williams  
R. B. Shepard will comment and C. F. Scott will discuss the relationship of ambient and operating temperatures to the problem of safety.
- CP\* Wartime Electric Motors and Their Postwar Applications. J. L. Hamilton, Century Elec. Co.
- 43-61. Rural Electrification Engineering and Electro-Agricultural Engineering. M. M. Samuels, Rural Electrification Administration, U. S. Dept. of Agriculture. 15 cents by mail.

### 2:00 p.m.—Transformer Loading Discussion

### 2:00 p.m.—Conference on Basic Characteristics of Varistors

This resumé will cover various nonohmic devices, nonsymmetrical, such as copper oxide and other rectifier types, as well as the symmetrical, including the more-recently developed thermistor types. It should be of considerable interest to all engineers.

Authoritative speakers will initiate the discussion by presenting up-to-date information on the various types, such as their current voltage relationships, temperature and humidity effects, maximum voltage or power limitations, polarization and frequency effects, and minimum useful voltage.

\*CP.: Conference paper; no advance copies are available; not intended for publication in TRANSACTIONS.

†ACO.: Advance copies only available; not intended for publication in TRANSACTIONS.

### General Information

In accordance with "AIEE Wartime Policies Defined" (EE, September '42, p. 477) all programmed social activities have been omitted. However, out-of-town members wishing to get together after business hours for a theatre party, radio broadcast, or dinner and dancing at one of the hotels should inquire at the registration desk. It also is hoped that there will be an opportunity for the general membership to get together during the meeting.

### Columbia Engineers' Dinner

The annual informal dinner for Columbia electrical engineers will be held Wednesday evening, January 27, at the Columbia University Club, 4 West 43rd Street. A social half hour will precede the dinner, which is scheduled for 6:30 p.m.

### Registration and Hotels

Please fill in and return promptly the enclosed *Advance Registration Card*. Upon arrival at the meeting do not fill out another card—just ask for your badge. I.R.E. members desiring to attend any A.I.E.E. sessions on any day except Thursday should register as guests of A.I.E.E. The I.R.E. will conduct a separate registration for issuance of their badges on Thursday only. A registration fee of \$2.00 will be charged all nonmembers to attend A.I.E.E. sessions, except Enrolled Students, immediate families of members, and those registered for the I.R.E. meeting.

Members and guests should make their own hotel reservations by writing directly to the hotel of their preference.

H. H. HENLINE, *National Secretary*

### National Technical Meeting Committee

C. R. Jones, Chairman

F. A. Cowan	M. D. Hooven	R. L. Webb
W. S. Hill	A. E. Knowlton	C. C. Whipple
	C. S. Purnell	

### I.R.E.-A.I.E.E. Co-operating Committee

J. S. Coggeshall	Dorman Israel	Louis Pacent
F. A. Cowan		H. A. Wheeler

*Issued by*

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