

**American Institute of
Electrical Engineers**



FALL

GENERAL

MEETING

Program

*Please retain for use during
entire meeting*

CLEVELAND, OHIO

OCTOBER 22-26

1951

Meeting Headquarters

HOTEL CLEVELAND

GENERAL INFORMATION

This meeting in Cleveland, Ohio, is the fifth of the general meetings which are held annually each fall. Both the technical program and the inspection trips were planned with the wide interests of the membership in mind.

The general session is scheduled for Tuesday morning, October 23, when we will be welcomed by the Honorable Thomas A. Burke, Mayor of the City of Cleveland. Dr. T. Keith Glennan of the Atomic Energy Commission and our president, Professor F. O. McMillan, will be the principal speakers at this meeting.

On the social side, there will be a stag banquet, a dinner-dance and a theater party as well as special entertainment for the ladies.

Registration Fees Required. In accordance with the policy as set up by the Board of Directors, a registration fee of \$3.00 has been established for members and a fee of \$5.00 for nonmembers. This is to help make the meeting self-supporting and obviate the need for raising the annual dues. Enrolled Students 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.

Technical Sessions and Discussions are covered by the "Conduct of Technical Sessions" 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, discussions in triplicate must be left with the chairman or sent to Edward C. Day, Secretary, Technical Program Committee, AIEE, 33 West 39th Street, New York 18, N. Y., before November 9, 1951. Discussions received later will be returned. The original typewritten double-spaced copy, together with original illustrations with photostats or blueprints should be submitted.

Authors and discussers should make their presentations as effective as possible. Remember your audience. Stress the salient features of the paper which are new or novel. When using slides, please turn toward the audience before speaking and raise your voice. Extemporaneous delivery is preferable to reading unless done slowly and emphasis is put in the proper places.

Advance Copies of Papers may be purchased by members at the registration desk at the uniform price of \$.30 each (\$.60 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 \$9.00 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, N. Y. Most of the papers will ultimately be published as AIEE Proceedings and in the TRANSACTIONS. Conference papers denoted by CP are intended for presentation only and are not available.

SCHEDULE OF EVENTS

(See Separate Schedule for the Ladies)

MONDAY, OCTOBER 22

- 8:00 a.m. Registration
9:30 a.m. System Engineering
Symposium on Polyethylene
Single Phase and Fractional Horsepower
Industrial Control
Material Handling
12:45 p.m. Trip to the Chevrolet Plant
2:00 p.m. System Engineering
Symposium on Polyethylene
Single Phase and Fractional Horsepower
Industrial Control
Material Handling

TUESDAY, OCTOBER 23

- 10:00 a.m. General Session
1:30 p.m. Trip to Nela Park
Trip to Reliance Electric and Clark Controller
Companies
2:00 p.m. Conference on the Selection of Circuit and Lamp
Designs to Conserve Critical Materials
Insulation and A. C. Machinery
Insulated Conductors
Management
6:00 p.m. Stag Banquet

WEDNESDAY, OCTOBER 24

- 9:30 a.m. Wire Communications Systems
Transmission and Distribution
Power Generation
D. C. Machinery
Coordinating Safety in Design with Field Operating
Conditions
1:00 p.m. Trip to Goodyear Tire and Rubber Company
1:30 p.m. Trip to Cadillac Tank Plant
2:00 p.m. Television and Aural Broadcasting Systems
Transmission and Distribution
Heart Fibrillation and Artificial Respiration
Conference on Relay Test Methods
Industrial Power Systems
6:00 p.m. Dinner Dance

THURSDAY, OCTOBER 25

- 9:30 a.m. Transformers
Basic Sciences
Recording and Controlling Instruments
Radio Communication
Steel
1:30 p.m. Trip to Republic Steel Company
Trip to Lincoln Electric Company
2:00 p.m. Feedback Control Systems
Symposium on Filter Design
Basic Instruments
Communication Switching Systems
8:00 p.m. Theater Party

FRIDAY, OCTOBER 26

- 9:30 a.m. Cathodic Protection
Gas Discharge Tubes and Phenomena
Magnetic Amplifiers
Mining

Monday, October 22

9:30 a.m.—System Engineering

Ball Room
C. W. WATCHORN, Presiding

The Growth of the Power Industry in U. S. A.
E. L. Lindseth, Cleveland Electric Illuminating Co.

CP.** Investment Costs for Use in Economic Comparison of Alternate Facilities. F. L. Lawton, Aluminum Labs., Ltd.

51-358. Annual Carrying Charges in Economic Comparisons of Alternative Facilities. P. H. Jeynes, Public Service Electric and Gas Co.

51-359. Operating and Maintenance Costs for Use in the Economic Comparison of Alternative Facilities. W. E. Slemmer, Ebasco Services, Inc.

9:30 a.m.—Symposium on Polyethylene

Red Room
R. A. SCHATZEL, Presiding

CP.** Polyethylene—Mechanical and Physical Properties. A. E. Maibauer, N. R. Smith, Union Carbide and Carbon Corp.

CP.** Polyethylene—Processing and Applications. W. J. Canavan, N. R. Smith, Union Carbide and Carbon Corp.

CP.** Physical and Electrical Characteristics of Polyethylene as Influenced by Temperature and Electrical Stress. A. J. Warner, Federal Telephone and Radio Corp.

CP.** Polyethylene for Wire and Cable. Victor Wallader, Bell Telephone Labs., Inc.

9:30 a.m.—Single Phase and Fractional Horsepower

Empire Room
C. G. VEINOTT, Presiding

51-361. Steady State and Transient Synthesis of Three-Phase Reluctance Motors (Synchronous Motors without Field Excitation). M. E. Talaat, University of Pennsylvania.

51-362. Characteristics of Reluctance Machines. Chi-Yung Lin, University of Illinois.

51-363. Equivalent Circuits of Reluctance Machines. Chi-ACO.* Yung Lin, University of Illinois.

51-364. An Analysis of Un-excited Synchronous Capacitor Motors. S. S. L. Chang, Robbins & Myers, Inc.

9:30 a.m.—Industrial Control

Rose Room
J. A. CORTELLI, Presiding

CP.** High Voltage Alternating-Current Motor Controllers. G. W. Heumann, General Electric Co.

51-376. A New 5000-Volt Air-Break Contactor for Industrial Service. L. J. Goldberg, General Electric Co.

CP.** High Voltage Air-Break Controllers. T. B. Montgomery, Allis-Chalmers Mfg. Co.

CP.** Low Current Interruptions of High-Voltage Air-Break Contactors. C. A. Lister, Electric Controller and Mfg. Co.

9:30 a.m.—Material Handling

Assembly Hall B
S. P. BLAKEMAN, Presiding

CP.** Electrical Engineering Aspects of Riverlake Belt Conveyor Line. J. J. W. Brown, General Electric Co.

CP.** The Practical Application of Modern Elevator Equipment in Industrial Buildings. E. B. Thurston, W. A. Nikazy, Haughton Elevator Co.

2:00 p.m.—System Engineering

Ball Room
C. W. WATCHORN, Presiding

51-341. Evaluation of Energy Differences in the Economic Comparison of Alternative Facilities. A. P. Fugill, The Detroit Edison Co.

51-360. Present Worth, or the Time Cost of Money, As a Factor in the Economic Comparison of Alternative Facilities. P. H. Jeynes, Public Service Electric and Gas Co.

51-379. A Universal Power Circle Diagram. R. D. Goodrich, Jr., U. S. Bureau of Reclamation.

50-172. A Simple New Resistance Type A-C Load Flow Board. W. E. Enns, Portland General Electric Co. Presentation by title only for discussion.

2:00 p.m.—Symposium on Polyethylene

Red Room
R. A. SCHATZEL, Presiding

CP.** Polyethylene—Evaluation for Field Wire and Cable. Milton Lipton, U. S. Signal Corps Laboratories.

CP.** Polyethylene—Its Use in Power Cables. W. A. Del Mar, Phelps Dodge Copper Products Corp.

CP.** Polyethylene—Application to Power and Control Cable in Canada and England. H. D. Short, Canada Wire and Cable Co.

CP.** Polyethylene—Application to Street Lighting, Line Wire, and Control Cable. J. M. Geiger, C. J. Nicholson, Niagara Mohawk Power Corp.

CP.** Polyethylene-Insulated Communication Cable. H. F. Wilson, A. L. Meyers, R. C. Mildner, Telegraph Construction and Maintenance Co., Ltd.

2:00 p.m.—Single Phase and Fractional Horsepower

Empire Room
R. F. MUNIER, Presiding

51-365. Single Phase Motor Synthesis. T. C. Lloyd, Robbins & Myers, Inc.

51-366. Two Phase A-C Servo Motor Operation for Varying Phase Angle of the Control Winding Applied Voltage. M. A. Steinhacker, Arma Corp., W. E. Meserve, Cornell University.

- CP.** Single Phase Squirrel Cage Motor Theory. Edward Bretch, Century Electric Co.
- 51-319. Application of the Two Reaction Theory to Electric Motors. E. M. Sabbagh, Purdue University.

2:00 p.m.—Industrial Control

Rose Room
J. A. CORTELLI, Presiding

- CP.** Synchronous Motor Control Design. R. C. Thompson, Electric Machinery and Mfg. Co.
- 51-377. The Selection of Field Circuit Resistance for Synchronous Motors. W. A. Thomas, Case Institute of Technology; O. D. Whitwell, The Clark Controller Company.
- CP.** D.C. Drives Applied to Deep Draw Presses. C. E. Robinson, A. P. Di Vincenzo, Reliance Electric and Mfg. Co.

2:00 p.m.—Material Handling

Assembly Hall B
S. P. BLAKEMAN, Presiding

- CP.** The Battery Powered Electric Truck in Industry. C. P. Hamilton, General Electric Co.
- CP.** Material Handling Problems in a Rayon Plant. J. B. McGinn, American Viscose Corp.
- CP.** Trends in Design of Coal-Handling Systems for Power Plants. T. S. Fetter, Philadelphia Electric Co.

Tuesday, October 23

10:00 a.m.—General Session

Ball Room
D. E. MOAT, Presiding

“Welcome to Cleveland.” Thomas A. Burke, Mayor of City of Cleveland.

“Remarks.” J. C. Strasbourger, Vice-President, District 2.

“Address”: President F. O. McMillan.

“Your Stake in Atomic Energy.” Dr. T. Keith Glennan, Atomic Energy Commission.

2:00 p.m.—Conference on the Selection of Circuit and Lamp Designs to Conserve Critical Materials

Ball Room
E. H. SALTER, Presiding

- CP.** Lamps and Auxiliaries for Material Conservation and Economical Lighting. J. H. Campbell, E. A. Lindsay, General Electric Co.
- CP.** Electric Distribution and Control for Lighting Systems. R. N. Bell, W. H. Kahler, Westinghouse Electric Corp.
- CP.** Economics, Operating and Control Experience with 480/277 Volt Lighting Systems. John Bos, John Bos and Associates.

2:00 p.m.—Insulation and A. C. Machinery

Empire Room
L. J. BERBERICH, Presiding

- 51-367. Slot Discharge Detection Between Coil Surfaces and Core of High Voltage Stator Windings. J. S. Johnson, Westinghouse Electric Corp.
- 51-368. Detection of Slot Discharges in High Voltage Stator Windings During Operation. J. S. Johnson, Westinghouse Electric Corp.; Mead Warren, Aluminum Co. of America.
- 51-369. Network Analysis of A-C Machine Conductors. D. S. Babb, J. E. Williams, University of Illinois.
- 51-372. Selection of the Electric Motors for Oil Well Beam Pumping. J. N. Poore, General Electric Co. Presentation by title only for discussion.
- 51-373. Turbo Generator for Use in Short Circuit Testing. Sterling Beckwith, Allis-Chalmers Mfg. Co. Presentation by title only for discussion.
- 51-384. Selection of Alternating Current Motors for Driving Oil Well Pumping Units. M. H. Halderson, Phillips Petroleum Co. Presentation by title only for discussion.

2:00 p.m.—Insulated Conductors

Red Room
C. T. HATCHER, Presiding

- 51-325. The Problems Involved in Designing Connectors for ACO.* Aluminum Cable. Henry Dupre, Burndy Engg. Co., Inc.
- 51-326. The Thermal Conductivity of Moist Soil. A. S. Mickley, Philadelphia Electric Co.
- 51-327. Forced-Air Cooling for Station Cables. R. W. Burrell, A. J. Falcone, W. J. Roberts, Consolidated Edison Co. of New York, Inc.

2:00 p.m.—Management

Rose Room
C. J. BELLER, Presiding

- CP.** Work Simplification. Allan H. Mogensen.

Wednesday, October 24

9:30 a.m.—Wire Communications Systems

Assembly Hall B
L. G. ABRAHAM, Presiding

- 51-328. An Improved Polar Telegraph Relay. W. D. Cannon, T. Rystedt, The Western Union Telegraph Co.
- 51-329. Public Address Systems in Generating Plants. S. C. Bartlett, American Gas and Electric Service Corp.
- 51-330. Bell System Cable Sheath Problems and Designs. F. W. Horn, R. B. Ramsey, Bell Telephone Labs., Inc.
- CP.** Engineering and Operation of Local Television Facilities. B. D. Wickline, J. E. Farley.

9:30 a.m.—Transmission and Distribution

Ball Room
F. V. SMITH, Presiding

- CP.** Shunt Resistor Requirements for the Elimination of Ferroresonance. W. J. McKune, The University of Texas.
- 51-331. Analyses of Subsequent Faults. H. K. Amchin, American Gas and Electric Service Corp.; Eric T. B. Gross, Illinois Institute of Technology.
- 51-332. The Design of Capacitor Units for Series Connection. B. O. N. Hansson, Aktiebolaget Liljeholmens Kabelfabrik. Presentation by title only for discussion.
- 51-333. Fast, Approximate Short Circuit Calculation on Secondary Networks. J. Zaborszky, C. F. Cromer, The University of Missouri.
- 51-383. Transmission Systems of the Hydro-Electric Power Commission of Ontario. J. E. Sproule, F. L. Code, The Hydro-Electric Power Comm. of Ontario. Presentation by title only for discussion.

9:30 a.m.—Power Generation

Red Room
H. R. HARRIS, Presiding

- CP.** Fire Protection in Electric Stations. H. A. Bauman, W. E. Rossnagel, Consolidated Edison Co. of New York, Inc.
- CP.** Hazards of Fire and Explosion are Reduced Through Developments in Transformer Design. W. W. Satterlee, Westinghouse Electric Corp.
- CP.** Relation of Transformer Design to Fire Protection. E. D. Treanor, General Electric Co.
- CP.** Water-Spray Fire Protection for Generating Stations. K. P. Jones, Dawson Powell, Grinnell Co., Inc.
- 51-382. Progress in the Electric Power Industry. I. E. Moulthrop, G. A. Orrok, Boston Edison Co. Presentation by title only for discussion.
- 51-385. Electrical Features of Modern Automatic Hydro Stations. C. L. Gamble, A. G. Mellor, General Electric Co. Presentation by title only for discussion.

9:30 a.m.—D-C Machinery

Empire Room
LANIER GREER, Presiding

- 51-370. Standard Temperatures of References for Efficiency Calculations. P. L. Alger, General Electric Co.
- CP.** A New Method for Measuring Temperature in Electric Machinery. W. A. Thomas, Case Institute of Technology; R. J. Horvat, Auburn Engg. Co.
- CP.** Initial Inductance and Rate of Current Rise of D-C Motors and Generators. Subcommittee on D-C Machinery.

9:30 a.m.—Coordinating Safety in Design with Field Operating Conditions

Rose Room
HENDLEY BLACKMON, Presiding

Moderator of Panel—C. E. Ganther, Cleveland Electric Illuminating Co.

Members of Discussion Panel.

Domestic and Commercial Applications
Design—T. H. Cline, Newark Stove Co.

Field Operation—F. Hamburger, Jr., The John's Hopkins University.

Heavy Industry
Design—Edward Luoma, Reliance Electric and Engg. Co.

Field Operation—H. H. Angel, Bethlehem Steel Co.

Utilities
Design—L. G. Smith, Consolidated Gas Electric Light and Power Co. of Baltimore.

Field Operation—W. C. Bryson, Duquesne Light Company.

51-320. Ignition Delay in Oil Burners. Ferdinand Hamburger, Jr., The Johns Hopkins University. Presentation by title only for discussion.

51-380. Automatic Protection of Refrigerating Machines. T. C. Johnson, G. C. Wedel, General Electric Co. Presentation by title only for discussion.

2:00 p.m.—Television and Aural Broadcasting Systems

Red Room
I. J. KAAR, Presiding

51-334. Blocking Oscillator Design Considerations in the ACO.* Television Receiver. A. F. Giordano, Allen B. DuMont Labs., Inc.

CP.** Systems and Equipment for Theater Television. R. V. Little, Radio Corp. of America.

CP.** Video Switching Problems. John Brush, Allen B. DuMont Labs., Inc.

CP.** Recent Advances in Color Television. C. J. Hirsch, Hazeltine Electronics Corp.

2:00 p.m.—Transmission and Distribution

Ball Room
S. B. CRARY, Presiding

51-335. A Network Analyzer Analog for Network Field ACO.* Relations of Overhead Lines. J. R. Eaton, H. W. Hale, H. J. Oorthuys, Purdue University.

51-336. The Mechanism of Corona on A.C. Transmission ACO.* Lines. R. Pelissier, Electricite de France.

51-337. Generalized Transmission Line Constants. R. D. ACO.* Goodrich, Jr., Bureau of Reclamation.

51-338. An Electric Analog Method for the Direct Determination of Power System Stability Swing Curves. W. B. Boast, Iowa State College; J. D. Rector, Consolidated-Vultee Aircraft Corp.

- 51-339. Transposition of High Voltage Overhead Lines and Elimination of Electrostatic Unbalance to Ground. E. T. B. Gross, Illinois Institute of Technology; A. H. Weston, Commonwealth Edison Co.

2:00 p.m.—Heart Fibrillation and Artificial Respiration

Rose Room
HENDLEY BLACKMON, Presiding

- CP.** Resuscitation in the Surgical Operating Room. C. S. Beck, M.D., Cleveland, Ohio.
- CP.** Electric Resuscitation of the Ventricular Fibrillating Heart. W. B. Kouwenhoven, The Johns Hopkins University.
- 51-378. Evaluation of Manual Methods of Resuscitation. A. S. Gordon, M.D., Max Sadove, M.D., Frank Raymon, A. C. Ivy, M.D., University of Illinois.
- CP.** The Ease of Training Personnel in a New Method of Artificial Respiration. H. B. Wright, Cleveland, Ohio.

2:00 p.m.—Conference on Relay Test Methods

Empire Room
GEORGE DANA, Presiding

- 51-371. Sensitive Ground Relaying of A. C. Generators. ACO.* E. T. B. Gross, Illinois Institute of Technology.
- CP.** The Use of a Standard Test Manual in Relay Testing. J. R. Barnwell, Tennessee Valley Authority.
- CP.** Comprehensive Testing of Relays and Associated Equipment Using the Transformer Test Set to Simulate Service Conditions. J. P. Krug, A. F. Drumpp, The Detroit Edison Co.
- CP.** Relay Testing Methods with Air Core Reactor Test Set. E. L. Jarrett, Duquesne Light Co.

2:00 p.m.—Industrial Power Systems

Assembly Hall B
H. G. BARNETT, Presiding

- 51-356. Equivalent Continuous Current for Groups of Variable Loads. W. K. Boice, General Electric Co.
- 51-357. Relay Protection of 33 Kv Tie Feeders to a Large Industrial Customer. W. H. O'Connor, Consolidated Gas Electric Light and Power Co. of Baltimore; H. D. Ruger, Bethlehem Steel Co.
- CP.** Electric Power for Jet-Engine Research. K. D. Brumbaugh, NACA Lewis Flight Propulsion Lab.
- CP.** Progress in Electrical Distribution Systems for Bulk Handling Equipment on Lake Docks. J. C. Ponstingl, Westinghouse Electric Corp.
- CP.** One Industrial Generating System Interconnected to a Public Utility. Roy Whaley, Eli Lilly and Co.

Thursday, October 25

9:30 a.m.—Transformers

Ball Room
F. J. VOGEL, Presiding

- 51-340. Overvoltages in Saturable Series Devices. A. Boyajian, G. Camilli, General Electric Co.
- 51-374. Evaluation of Butyl Insulation for Outdoor Instrument Transformers. J. A. McDonnell, H. E. Crabtree, General Electric Co.
- 51-375. The Closed Core Reactor. S. Bennon, Westinghouse Electric Corp.
- CP.** Proposed Revision of Test Code for Temperature Rise Tests on Transformers. Project Group of the Committee on Transformers.
- 51-81. Insulation Co-ordination and a New Line of Oil Insulated Potential Transformers. F. J. Vogel, Illinois Institute of Technology; D. R. Laib, Allis-Chalmers Mfg. Co. Presentation by title only for discussion.

- 51-113. Report on Transformer Magnetizing Current and Its Effect on Relaying and Air Switch Operation. Subcommittee on Magnetization Characteristics of Transformers. Presentation by title only for discussion.
- 51-386. The Effects of Coupling-Capacitor-Potential Device Transients on Protective Relay Operation. Working Group on Transient Characteristics of Capacitive Potential Devices. Presentation by title only for discussion.

9:30 a.m.—Basic Sciences

Empire Room
M. G. MALTI, Presiding

- 51-340. Overvoltages in Saturable Series Devices. A. Boyajian, G. Camilli, General Electric Co.
- 51-342. Synthesis of Paralleled Three-Terminal R-C Networks to Provide Complex Zeros in the Transfer Function. P. F. Ordnung, G. S. Axelby, H. L. Krauss, W. P. Yetter, Yale University.
- 51-343. The Magnetic Cross Valve. H. J. McCreary, Automatic Electric Co. Presentation by title only for discussion.

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

Parlors 34-36
P. A. BORDEN, Presiding

- CP.** Electronic Recorder with Range and Precision Adequate for the Platinum Resistance Thermometer. A. J. Williams, Jr., Leeds and Northrup Co.
- 51-344. The Requirements and Design for a Direct Current Null Detector. F. L. Maltby, The Bristol Co.

- CP.** Computing Circuits and Devices for Industrial Process Functions. A. J. Hornfeck, Bailey Meter Co.
- CP.** A Time-Proportioning Electronic Thermostat. F. A. Ransom, National Bureau of Standards.
- 51-345. Liquid Level Alarm Device. F. O. Wisman, W. E. ACO.* Windsor, Bendix Aviation Corp.
- 51-381. The Three Phase Oscilloscope as an Harmonic Analyzer in Power Systems. E. B. Kurtz, R. H. Burkhardt, State University of Iowa. Presentation by title only for discussion.

9:30 a.m.—Radio Communication

Assembly Hall B

C. E. SMITH, Presiding

- 51-346. A Short Haul Radio Communication Link, Channelized by Time Division. E. M. Mortensen, C. B. Young, The Western Union Telegraph Co.
- CP.** Radio Aids to Navigation on the Great Lakes. H. E. De Long.
- CP.** VHF Communication as Applied to Railroad Operation. Ellis Jones, F. H. Menagh.
- CP.** Radio Communication Speeds Ore Transfer Between Boats and Railroad Cars. R. H. Herrick, W. J. McGerry.

9:30 a.m.—Steel

Rose Room

W. R. HARRIS, Presiding

- CP.** Aluminum and Its Relationship to the Electrical Industry. H. W. Biskeborn, Kaiser Aluminum and Chemical Corp.
- CP.** Inertia Studies for Modern Mill Drives. J. F. Sellers, T. B. Montgomery, Allis-Chalmers Mfg. Co.
- 51-322. A Heavy Duty Slip Regulator for Steel Mill Service. W. Schaelchlin, G. E. Mathias, Westinghouse Electric Corp. Presentation by title only for discussion.
- CP.** Speed Regulation for Tandem Pipe Mills. F. H. Wickline, National Tube Co.
- CP.** Electric Heating of Steel Strip in Continuous Processes. A. R. Ryan, General Electric Co.

2:00 p.m.—Feedback Control Systems

Rose Room

S. W. HERWALD, Presiding

- 51-347. Transfer Function for a 2-Phase Induction Servo Motor. L. O. Brown, Jr., University of Illinois.
- 51-348. Analysis of the Drag-Cup A-C Tachometer. R. H. Frazier, Massachusetts Institute of Technology.
- 51-324. Sample-Data Control Systems Studied Through Comparison of Sampling with Amplitude Modulation. W. K. Linvill, Massachusetts Inst. of Technology.
- 51-271. An Electro-Mechanical A.C. Line Voltage Stabilizer. D. M. Murray, N. L. Kusters, National Research Council. Presentation by title only for discussion.

2:00 p.m.—Symposium on Filter Design

P. F. ORDUNG, Presiding

Empire Room

- CP.** Approximation Methods in Network Theory. J. G. Linvill, Massachusetts Inst. of Technology.
- CP.** Lumped Circuit Filter Design. F. Hallenbeck, Bell Telephone Labs., Inc.
- CP.** Coaxial Line Filters. J. J. Karakash, Lehigh University.
- CP.** Rectangular Guide Filters. M. D. Brill, Bell Telephone Labs., Inc.

2:00 p.m. Basic Instruments

Parlors 34-36

J. H. MILLER, Presiding

- CP.** A General Purpose Electronic Wattmeter. D. E. Garrett, F. G. Cole, General Electric Co.
- 51-323. A Polyphase Thermal Kva Demand Meter. A. J. Petzinger, Westinghouse Electric Corp.
- 51-349. Phase-Sensitive-Detector Characteristics. S. P. Detwiler, Haller, Raymond and Brown, Inc.
- CP.** Principles of Converter Design for High Frequency Measurements. D. A. Alsberg, Bell Telephone Labs., Inc.

2:00 p.m.—Communication Switching Systems

Assembly Hall B

J. MESZAR, Presiding

- 51-321. A New Common Control Crossbar Automatic Telephone System of the Swedish Telephone and Telegraph Administration. H. F. Rost, H. F. Rost & Soner. Presented by A. E. Joel, Bell Telephone Labs., Inc.
- 51-350. Relay Counting Chains, Codes and Translations in Dial Pulse Register Circuits. R. M. M. Oberman, The Hague, Netherlands.
- 51-351. On the Accuracy of Holding Time Measurements. Imre Molnar, Automatic Electric Co.
- 51-352. Investigation of the Selenium Rectifier for Contact Protection. H. F. Herbig, J. D. Winters, Federal Telecommunication Labs., Inc.

Friday, October 26

9:30 a.m.—Cathodic Protection

Assembly Hall B

L. W. ROUSH, Presiding

- CP.** Fundamentals of Corrosion. R. B. Mears, U. S. Steel Co.
- CP.** The Cathodic Protection of Subsurface Structures. R. F. Hadley, Susquehanna Pipeline Co.
- CP.** Low-Energy Measurement Problems in Cathodic Protection. H. N. Hayward, R. M. Wainright, University of Illinois.
- CP.** Marine Applications of Cathodic Protection Using Graphite Anodes. J. P. Oliver, The Union Carbide and Carbon Corp.
- CP.** Selenium Rectifiers as a DC Power Source for Cathodic Protection. R. J. Stambaugh, Harco Corp., L. Burton, General Electric Co.

9:30 a.m.—Gas Discharge Tubes and Phenomena

Empire Room

D. E. MARSHALL, Presiding

- 51-353. Clean-Up of Helium Gas in an Arc Discharge. M. J. Reddan, G. F. Rouse, National Bureau of Standards.
- 51-354. Basis for Dielectric Tests for Rectifier Equipment. C. C. Herskind, General Electric Co.
- 51-355. The Design of High Power Vacuum Tubes for Industrial Heating Applications. H. D. Doolittle, Machlett Labs., Inc. Presentation by title only for discussion.
- CP.** The Plasmatron, A Continuously Controllable Gas-Discharge Tube. E. O. Johnson, W. M. Webster, Radio Corp. of America.
- CP.** A Subminiature Voltage Regulator for Microampere Operation. L. R. Landrey, Sylvania Electric Products, Inc.

9:30 a.m.—Magnetic Amplifiers

Ball Room

E. L. HARDER, Presiding

- 51-387. Predetermination of Control Characteristics of Half-Wave Self-Saturated Magnetic Amplifiers. Henry Lehmann, General Electric Co.
- 51-388. Bibliography of Magnetic Amplifier Devices and the Saturable Reactor Art. J. G. Miles, Engineering Research Associates, Inc.
- 51-389. On the Control of Magnetic Amplifiers. R. A. Ramey, Naval Research Lab.
- 51-390. Steady-State and Transient Analysis of an Idealized Series-Connected Magnetic Amplifier. L. A. Pipes, University of California.
- 50-93. Magnetic Amplifiers of the Balance Detector Type. Their Basic Principles, Characteristics, and Applications. W. A. Geyger, U. S. Naval Ordnance Laboratory. Presentation by title only for discussion.

9:30 a.m.—Mining

Rose Room

R. B. MOORE, Presiding

- CP.** Design Problems of Direct Current Motors for Mining Service. J. M. Pokelsek, The Reliance Electric & Engg. Co.
- CP.** AC vs DC for Underground Mining. J. Z. Linsmeyer, A. G. Owen, Westinghouse Electric Corp.
- CP.** Underground Power Distribution. R. G. Gehlsen, Joy Mfg. Co.
- CP.** Grounding Practices on 480 Volt Portable Distribution Systems. R. B. Bennett, General Electric Co.

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.

INSPECTION TRIPS

In addition to seven scheduled inspection trips, arrangements have been made for informal inspections of other plants in the Cleveland-Lorain area by individuals or small groups. Members should check at the Inspection Trips Desk for a listing of these unscheduled trips. All scheduled trips will be held in the afternoons. Buses will load and return to the Hotel Cleveland at times indicated for the various trips. A charge of \$1.00 per person will be made to cover transportation costs to and from the inspection trip sites. Because of security regulations at several of the plants on the inspection trip listing, members expecting to make the trips should bring along proof of U. S. citizenship (birth certificate, passport, naturalization papers, etc.).

Chevrolet Plant of General Motors Company (Monday, October 22, 12:45 to 3:15 P. M.): A large portion of this plant having 30 acres of floor space is devoted to the manufacture and testing of Chevrolet's Powerglide transmission. In addition, other mechanical and pressed metal parts are manufactured here. Beside a host of applications involving the control and utilization of approximately 200,000 KWH of electrical energy per day, members will see many machines and tools for precision mass production of intricate metal parts. Following this tour, there will be a short bus trip through Cleveland's industrial West Side, including brief stops at a new Ford Motor Company plant and the NACA Laboratory.

Nela Park—General Electric Company (Tuesday, October 23, 1:30 to 4:30 P. M.): Known as the "University of Light" because of its college-campus-like appearance, and the interest of its 2,000 or more scientists and engineers in the problems of production and utilization of light, Nela Park offers a program of full interest to AIEE members. Many types of lighting equipment and lighting applications will be demonstrated. Also, development laboratories and certain pilot manufacturing operations may be observed.

Reliance Electric & Engineering Company and Clark Controller Company (Tuesday, October 23, 1:30 to 4:30 P. M.): This combination trip offers an excellent opportunity to observe the manufacture and test of heavy-duty electric motors and industrial electrical control. The Reliance plant manufactures A-C and D-C electric motors in the size range of 20 to 500 HP. Many are specially engineered for the steel, mining, paper, and machine tool industries. All phases of the motor manufacturing operation will be available for inspection. Clark Controller manufactures both general purpose and specially engineered industrial electrical control for a variety of applications. Some of the components produced are A-C and D-C motor starters, push buttons, limit switches, relays, contactors and magnetic air valves.

Goodyear Tire and Rubber Company (Wednesday, October 24, 1:00 to 6:00 P. M.): This plant is at Akron, Ohio, approximately 35 miles from downtown Cleveland. The plant's principal activity is the manufacture of rubber tires for automobiles, trucks, aircraft, and off-the-road equipment such as tractors and earth-moving machinery. In size, the pneumatic tires range from less than 1 foot in diameter and weighing only one and one-half pounds to over eight feet in diameter and weighing a ton or more. All basic processing operations on the raw rubber and the tire building operations will be seen by members making the trip.

Cadillac Tank Plant (Wednesday, October 24, 1:30 to 4:30 P. M.): This huge plant near the Cleveland Airport, used for the manufacture of bombers during World War II, is now occupied by the Cadillac Motor Car Division of General Motors Corporation for the production of tanks and heavy armoured military vehicles. Currently, the principal product is the T41E1 Walker Bulldog tank, requiring many spectacularly large and minutely precise machine tools in its manufacture. From the raw materials and parts which flow into the doors of the plant, these land battle-ships are fabricated and assembled, and roar out other doors to nearby testing grounds. Visitors must carry positive proof of U. S. citizenship to be admitted for this inspection tour.

Republic Steel Company (Thursday, October 25, 1:30 to 4:30 P. M.): All basic operations of steel making from the coke ovens and blast furnaces to finishing and rolling mills are contained in this plant. One outstanding feature will be inspection of a 98" wide strip mill which was the first of its kind. Aside from the diverse operations in the manufacture of steel, visitors will see many fine electrical installations involving large power and precise control.

Lincoln Electric Company (Thursday, October 25, 1:30 to 4:30 P. M.): This is a very recently built, ultra-modern manufacturing plant for the production of welding supplies and equipment. Some of its unique features are its windowless construction, straight production lines, visual inventory system, and employee welfare facilities. More than three years of intense planning and design experimentation for most efficient operation were carried out prior to its design and construction. This AIEE trip will be the inaugural inspection of this plant by a group.

ENTERTAINMENT PROGRAM

Sunday, October 21, 1951—Social Get-Together. A social get-together in the ballroom of the Hotel Cleveland will be held between 3 P. M. and 5 P. M. At this time, the Cleveland Committee will welcome the out-of-town guests who have arrived. Light refreshments will be served (no charge involved).

Tuesday, October 23, 1951—Stag Banquet. A stag banquet has been arranged for 6 P. M. in the ballroom. Refreshments will be available in the Red Room adjacent to the ballroom where a sociable cocktail hour can be enjoyed prior to the buffet supper at 7 P. M. After the buffet supper Bill Gordon, WHK's well-known disc jockey will M.C. the rest of the program and will introduce all the acts which have been selected to provide a full evening of entertainment. Tickets at \$7.00 each will be available at the ticket desk.

Wednesday, October 24, 1951—Dinner-Dance. The ballroom will be the scene of the dinner and dance; dinner being at 6 P. M. and dancing from 9 to 12 P. M. The Noble-Bergner 12-piece orchestra will play for the dance with a vocalist assisting on some of the numbers. A 4-piece orchestra will provide music during dinner. Tickets for the dinner-dance are \$5.00 and can be obtained at the ticket desk.

Thursday, October 25, 1951—Theater Party. The theater party has been arranged at Cleveland's nationally known Euclid-East 77th Street Playhouse where "Anne of A Thousand Days," by Maxwell Anderson, will be given. This is a unique show-house which you will enjoy. Located at Euclid and East 77th Street, it can be reached by various bus lines on Euclid Avenue, by taxicabs in 20 minutes, or by private cars for which there is plenty of parking space in the vicinity of the theater. Tickets at \$1.35 each will be obtainable at the ticket desk in the convention headquarters.

LADIES' PROGRAM

Monday, October 22. This day has been reserved for informal antique inspection parties or for a trip to the Lighting Institute of General Electric's Nela Park. Ladies desiring to participate in either of these functions should contact one of the Cleveland lady hostesses at the Registration Desk on Monday morning. The antique tours will be made in small informal parties in private cars with a Cleveland lady as hostess. The Nela Park trip to and from Hotel Cleveland will be by bus. This trip will feature, among other things, the latest applications in home lighting on display at the Institute. There will be no charge for either of these trips. For the ladies who may wish to shop, most of Cleveland's downtown stores will be open until 9:00 p.m. Monday evening.

Tuesday, October 23. A "get acquainted" tea will be held from 3 to 5 p.m. at the University Club. There will be no charge for the event. The University Club is located at Euclid Avenue and 30th Street in downtown Cleveland. It may be reached in approximately ten minutes from the Hotel Cleveland by taxicab or public transportation lines on Euclid Avenue. On Tuesday evening at 8 p.m., the ladies are invited to a Helen Slocum Production, entitled "Have You Seen the Garden of Eatin'?", a Cook's Tour. This will be held at the Hotel Cleveland.

Wednesday, October 24. Buses will leave Hotel Cleveland at 1 p.m. for a trip to the Cleveland Museum of Art, the Nationality Gardens, and the Historical Society Museum. Light refreshments will be served before returning to the Hotel. For this trip, a charge of one dollar per person will be made for transportation. Wednesday evening a Dinner-Dance will be held at Hotel Cleveland. Please refer to the Entertainment Program.

Thursday, October 25. A luncheon and style show will be held at the Canterbury Golf Club. Buses will leave Hotel Cleveland at 12:15 p.m. A charge of one dollar will be made for transportation only for this event. The ladies are reminded of the theater party, Thursday evening at the Euclid Avenue East 77th Street Playhouse for the showing of Maxwell Anderson's play, "Anne of a Thousand Days."

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J. A. Clark	J. V. Majercek
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G. G. Clark	E. Hovorka
J. W. FitzGerald	H. C. Smith

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O. Beck	R. W. Reed
J. A. Bender	J. G. Rosswog
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C. H. Burns	C. F. Schunemann
S. M. Campbell	A. E. Schwindig
G. J. Currie	W. A. Seidler
R. A. Elliott	A. L. Sebok
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Mrs. P. Hoover	Mrs. H. C. Smith
Mrs. W. C. Jenner	Mrs. L. K. Stringham
Mrs. G. H. Kimball	Mrs. J. T. Temin
Mrs. L. E. Knapp	Mrs. S. H. Troxel
Mrs. W. H. LaMond	Mrs. W. R. Uffelman

Mrs. J. R. Wickey

Monday, October 22

9:30 a.m.—District Executive Committee.....PDR #5 & 7
 12:00 noon—Luncheon—Electric Couplings Subcommittee..PDR #9
 12:00 noon—Luncheon—Induction Machinery Subcommittee
 Parlor 27
 12:00 noon—Luncheon—District Executive Committee..Parlor 29-31
 2:00 p.m.—District Executive Committee.....PDR #5 & 7

Tuesday, October 23

8:00 a.m.—Breakfast—Insulation SubcommitteePDR #5
 12:00 noon—Luncheon—D-C Machinery Subcommittee....PDR #9
 12:00 noon—Luncheon—Transmission and Distribution
 Administration SubcommitteePDR #7
 12:00 noon—Luncheon—Single Phase and Fractional
 HP SubcommitteeParlor 36
 2:00 p.m.—Power GenerationParlor 27
 2:00 p.m.—System EngineeringParlor 26
 2:30 p.m.—Joint Subcommittee on Carbon Brushes.....Parlor 24

Wednesday, October 24

8:00 a.m.—Breakfast—Members of Safety Symposium....PDR #5
 9:30 a.m.—Basic SciencesParlor 25
 9:30 a.m.—Edison Medal CommitteeParlor 24
 10:00 a.m.—Industrial ControlPDR #9
 10:00 a.m.—Subcommittee Standard Revision
 No. 4.....Parlor F (Statler)
 12:00 noon—Luncheon—Public RelationsParlor 24
 12:00 noon—Luncheon—Rotating Machinery
 Administration SubcommitteeParlor 25
 12:00 noon—Luncheon—Industrial ControlPDR #9
 2:00 p.m.—Lightning Protective Devices Subcommittee
 Parlor Conference Lounge
 2:00 p.m.—Industrial Control Test Codes Subcommittee..PDR #9
 2:30 p.m.—Power DivisionParlor 32
 3:00 p.m.—Working Group on Guide for Grounding
 Synchronous GeneratorsPDR #5
 4:30 p.m.—Wire CommunicationsPDR #7

Thursday, October 25

9:30 a.m.—SafetyParlor 30
 9:30 a.m.—Board of DirectorsPDR #9
 9:30 a.m.—Magnetic Amplifiers Test Codes Subcom....Parlor 24
 12:00 noon—Luncheon—Board of Directors.....PDR #5 & 7
 12:00 noon—Luncheon—Communications DivisionParlor 32
 2:00 p.m.—Board of DirectorsPDR #9
 2:00 p.m.—Protective DevicesParlor 25
 2:00 p.m.—Magnetic Amplifiers Materials Subcommittee..Parlor 24
 2:00 p.m.—Communications SwitchingAssembly Hall B
 3:00 p.m.—Technical AdvisoryParlor 32
 7:30 p.m.—Forum of Technical Committee Chairmen....Rose Room

Friday, October 26

10:00 a.m.—Subcommittee on Electron Tubes.....Parlor 24
 12:00 noon—Luncheon—Mining and Metal Industry.....PDR #9
 12:00 noon—Luncheon—Magnetic AmplifiersParlor 26
 2:00 p.m.—Cathodic Protection SubcommitteeParlor 31
 3:00 p.m.—Magnetic Amplifiers Definitions Subcom.....Parlor 24

