



Summer General Meeting

June 23-27, 1952

Minneapolis, Minn.

Headquarters
Hotel Nicollet



Skyline of Minneapolis as seen from Loring Lake

CELEBRATING THE 50th ANNIVERSARY OF THE MINNESOTA SECTION

Minneapolis, the Gateway of the Northwest, the host city of the vacation land, the city surrounded by the land of the 10,000 lakes, will be the location of the 1952 Summer General Meeting to be held June 23-27. Members and their families will remember the beauty of crystal-clear lakes, the excellent fishing, the numerous industries, and the western hospitality during the meeting. Arrangements have been made for an excellent technical program, many interesting inspection trips, and an unusual coverage of social events, entertainment and sports, and luncheons and a fashion show for the ladies. Thursday evening will be highlighted by a dinner dance for all. Headquarters for the meeting will be in the Nicollet Hotel.

GENERAL SESSION AND LUNCHEONS: The program for the week will open with the annual meeting at 10:00 a.m. Monday in the Main Ballroom of Hotel Nicollet, where the election of officers will be announced and President F. O. McMillan will deliver an address.

A feature of the session will be the presentation of the Lamme Medal to Mr. Arthur E. Silver of Upper Montclair, N. J. The medal is being presented to Mr. Silver "for his pioneering of rural electrification by designing the simplified farm-type transformer combined with high-voltage, long span, and common neutral line construction."

Dr. Lawrence R. Hafstad, of the Atomic Energy Commission, will speak at the Wednesday luncheon. Dr. Hafstad, a native of Minneapolis, is director of the Division of Reactor Development, a post he has held since its establishment in 1948. This division has charge of the practical application of atomic energy for generation of power for propulsion of ships and aircraft. Dr. Hafstad's subject will be "The Reactor Development Program of the Atomic Energy Commission."

On Monday, Dr. James L. Morrill, President of the University of Minnesota, will talk on "Industry, Ideas, and Ideals." Dr. Morrill, an outstanding public speaker, has been President of the University of Minnesota since July, 1945. Previously he was President of the University of Wyoming and Vice President of Ohio State University.

Institute prizes for the best technical papers in the Great Lakes District will be presented to the winners at the luncheon Tuesday noon. As chairman of the Prize Awards Committee, Mr. J. R. North, District Vice-President, will make the presentations.

An interesting discourse on "American Engineering—Its Centennial and Future" will be given Thursday noon by Mr. Titus G. LeClair, Past President of the American Institute of Electrical Engineers. The talk will cover some of the things that engineering has done to make America great. It will give a few of the reasons why the United States, with only small proportions of the world's area and population, has about half of the world's automobiles, refrigerators, and other labor-reducing and comfort-giving products. It will conclude with some of the newer problems that challenge the younger men entering the profession.

Trophies and prizes won in the various sports and prize meet contests during the week of the meeting will be awarded at the Friday luncheon. Mr. Richard G. Lynn, Chairman of the Sports and Prize Meets Committee, will present the prizes.

INSPECTION TRIPS: Sixteen inspection trips have been arranged to industries and points of interest in and around the Twin Cities. In several plants to be visited security regulations are in force, and persons expecting to take these trips should come prepared with passports, copies of birth certificates, naturalization papers, or similar evidence of citizenship. Tickets will be available at the ticket desk, and should be purchased early, as some of the trips are for limited numbers.

General Mills, Minneapolis (Monday, June 23, 2:00 to 4:00 p.m., Tickets 75 cents). One of Minneapolis' largest flour mill groups will be visited. The tour includes milling, research, and packaging facilities and a pilot plant. Products manufactured include flour, well-known breakfast cereals and baking products, animal feeds, and electrical appliances. The firm engineers and develops the packaging of its products. Using one tenth of the farm wheat crop annually, this is the largest flour milling organization in the world.

Minnesota Mining & Mfg. Co., St. Paul (Tuesday, June 24, 8:30 a.m. to 1:30 p.m., including luncheon. Restricted to citizens. Tickets \$1.25). Members will see the steps in the manufacture of tapes, from the handling and processing of raw rubber into solution through calendering, coating, and slitting operations, yielding the finished tape products. A wide variety of tapes and abrasive papers is manufactured. Familiar ones are "Scotch" cellulose tape, and

"Scotchlite" reflective sheeting used for highway and advertising signs; others are rubberized masking and electrical tapes. Magnetic sound recording tape made here will be demonstrated in the course of the trip. A stop will be made at the research laboratory, for a demonstration of recent developments of fluoro-chemical carbon compounds of importance to the electrical field.

Riverside Steam Plant of the Northern States Power Co., Minneapolis (Tuesday, June 24, 9:00 a.m. to 12:00 noon. Tickets 75 cents.) The largest generating plant on the Northern States system, this station produces an annual output of over one billion kilowatt hours. Seven turbo-generator units installed from 1915 to 1950 utilize steam, three at 225 lb. per square inch and 600°F, two at 400 lb. per square inch and 750°F, and two at 900 lb. per square inch and 900°F. Coal is the principal fuel, with gas on a standby basis. River water from the Mississippi circulated at 320,000 gallons per minute, cools the condensers. The station output is through underground cables at 13,000 volts and via overhead transmission lines at 115,000 volts.

Sightseeing Tour of the Twin Cities—Minneapolis and St. Paul Tuesday, June 24, 2:00 to 4:30 p.m. Tickets \$1.00.) More than 160 parks covering over 6000 acres grace the Twin Cities. They include nine large lakes and many more small ones, and picturesque bluffs along the banks of the Mississippi. The ride among these, through fine residential sections, and past the Minnesota State Capitol, universities, and other centers of interest will include a visit to the famous Falls of Minnehaha.

Northwest Airlines' Overhaul Base, St. Paul (Tuesday, June 24, 2:00 to 4:30 p.m. Tickets \$1.00.) This facility is situated at Holman Field in St. Paul. Visitors will be taken through the hangers where all major maintenance and overhaul work on ships of the Northwest fleet is done. These ships, DC-4's and Boeing two-deck Stratocruisers, are completely disassembled and renovated here on a periodic maintenance schedule. Engines are disassembled, rebuilt, and tested, and structural parts of the airplanes are repaired or replaced as occasion requires. The tour will give a first-hand look at what is being done to keep flying safe.

Institute of Technology, University of Minnesota, Minneapolis (Wednesday, June 25, 9:00 a.m. to 12:00 noon. Tickets 75 cents.) The ten engineering buildings located on the main campus provide facilities for engineering students. A research program is conducted, with sponsored funds totalling over \$1,600,000 in addition to funds provided directly by the university treasury. Projects underway of especial interest to electrical engineers are conformal mapping studies, research on differential equations, a computing center equipped with a Reeves analogue computer, a-c machinery and electron tube laboratories, studies of amplifier and conductor noise, and construction of a linear accelerator. Members will have opportunity to see as many of these activities as time will permit.

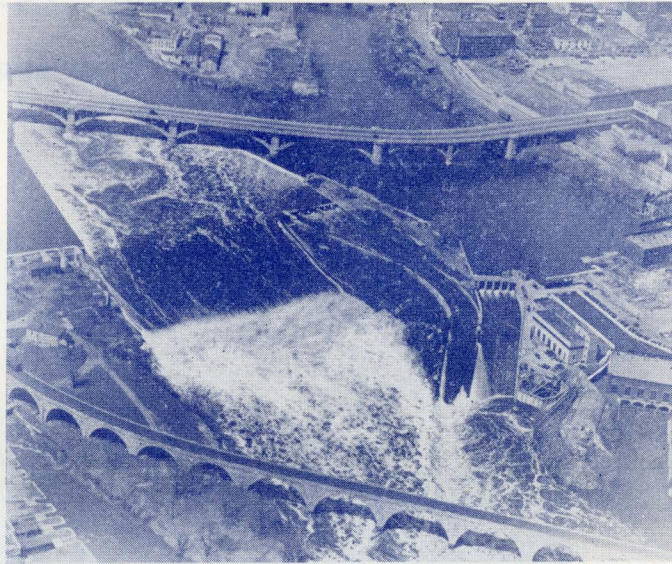
Lightning and Transients Research Institute, Minneapolis, (Wednesday, June 25, 9:00 to 11:00 a.m. Tickets 75 cents.) This is a non-profit enterprise sponsored by the armed forces and engaged in making fundamental studies of lightning with particular regard to aircraft and its protection. Visitors will be shown samples of the effects of lightning damage and demonstrations of protective methods. They will witness spectacular demonstrations of the high voltage apparatus used, which can produce lightning strokes with a crest value of 9,000,000 volts and current surges of 250,000 amperes.

KSTP Radio and Television Station, Minneapolis (Wednesday, June 25, 2:00 to 4:00 p.m. Tickets 75 cents.) Radio station KSTP is an NBC independent affiliate broadcasting station, equipped for AM, FM, and TV broadcasting. The station has mobile facilities for local news coverage via TV pick-up truck units, and is also linked to the Atlantic and Pacific Coast systems by the Bell System video circuits.

Visitors will see the film projection system, transmitter control room, and transmitting equipment for pictures and for AM and FM sound programs. The TV camera equipment will be demonstrated to the members.

Rosemount Research Center—University of Minnesota, Rosemount (Wednesday, June 25, 2:00 to 5:00 p.m. Tickets \$1.25.) Visitors to Rosemount will see a huge research center working in various fields of activity. Major work here is in the field of aeronautics. A continuous flow supersonic wind tunnel, a 36 and 15 inch free jet injector tunnel, two supersonic blow-down tunnels, and a transonic wind tunnel may be visited, and a tour taken through laboratories dealing in electronics and in problems of instrumentation.

St. Anthony Falls Hydraulic Laboratory, Minneapolis, (Thursday, June 26, 8:00 to 11:00 a.m. Tickets 75 cents.) The hydraulics laboratory is operated by the University of Minnesota. Located along



University of Minnesota Hydraulic Laboratory and Generating Stations of Northern States Power and Twin Cities Transit Companies.

the Mississippi River and adjacent to natural waterfalls, it has adequate flow and a high natural head for hydraulics testing and experimentation. Models, such as a scale model of a portion of the Mississippi River and glass-sided channels, will be seen simulating actual hydraulic operations to permit studies of erosion, turbulence, pressure fluctuations.

Aero Division, Minneapolis-Honeywell Regulator Co., Minneapolis (Thursday, June 26, 9:00 a.m. to 12:00 noon. Restricted to citizens. Tickets 75 cents.) This plant, with over 600 engineers, is devoted exclusively to the engineering and manufacture of aeronautical controls. The tour will include views of the gyro assembly room, electronic equipment assembly, test facilities for radio noise, vibration, hydraulics, and environmental testing. Technical and research laboratories, engineering quarters, and model shop, and the analogue computer room will also be seen.

Electric Machinery Mfg. Co., Minneapolis (Thursday, June 26, 1:30 to 4:30 p.m. Tickets 75 cents.) Members taking this trip will be shown the manufacture of induction motors, synchronous motors and generators, turbine generators, allied controls, and magnetic variable speed drives. These products run to large sizes at this plant, which has complete facilities for manufacturing, balancing, and testing them. An exhibit of electromagnetic coupling apparatus and a demonstration of the use of the magnetic amplifier for speed control of the magnetic drive will be seen. Enroute to the factory, the trip will stop at St. Anthony Falls dam to inspect a new outdoor waterwheel generator installation by this company.

Northwestern Bell Telephone Co., Minneapolis (Thursday, June 26, 2:00 to 4:00 p.m. Restricted to citizens. Tickets gratis) Various types of local and toll facilities will be observed here. Of interest to telephone engineers will be the recently installed terminal equipment for several major types of toll cable: the "N-1" carrier cable to Duluth, the coaxial cable to Des Moines, and the "K" carrier twin cable to the west. Visitors also will see the TV network facilities.

Toll dialing equipment cut-over in February this year will be seen on the tour. This equipment, known as the A4A toll crossbar system, connects with twelve other similar installations in the United States to permit direct dialing on long distance calls. The apparatus to be seen cost approximately \$4,000,000. It comprises panels of crossbar switches, relay "markers," operators' positions equipped with key sets, and a maintenance board panel. There is also a separate, regulated motor-generator and storage-battery power supply for the A4A installation.

Brown and Bigelow, St. Paul (Friday, June 27, 9:00 to 12:00 noon. Tickets 75 cents.) This plant prints a major portion of the calendars produced each year. In it much other specialized advertising is printed as well, and it includes one of the half-dozen playing card factories in this country.

Visitors will see scores of machines in operation, printing by offset, gravure, and by letter-press. Many are equipped to handle large production runs and to print several colors.

One of these, a giant Talio-Crome press over 100 feet long and weighing 100 tons, can print eight colors. It has 53 motors, and a photocell system that controls register to one ten-thousandth of an inch. The press cost \$600,000, and when installed with accessories the total outlay ran nearly a million dollars.

In the machine shop visitors will see repairing and rebuilding of printing equipment, and tool and die making for plastic molding and metal stamping operations. Here also the company builds new machines of its own design.

St. Croix Falls Hydroelectric Plant of the Northern States Power Co., St. Croix Falls, Wisconsin (Friday, June 27, 9:00 a.m. to 4:00 p.m., including luncheon. Tickets \$4.50.) This trip will provide a delightful all-day outing along the beautiful St. Croix River. Buses will be routed from Minneapolis via the pioneer lumbering city of Stillwater, Minnesota, thence across the St. Croix and along Wisconsin highways to Interstate Park at St. Croix Falls. The group will have lunch at the Interstate Park Pavilion.

A brief visit will be made to the Northern States Power Co.'s station at the falls, one of the largest of the early hydroelectric installations. When completed in 1907, it was a principal source of electricity for the Twin Cities, which it supplied over two 50 Kv transmission lines; now it has become one component of a large power system, to which it is connected by two 250 Kv lines. It has a generating capacity of 21,400 kilowatts.

Mesabi Iron Range and Duluth, Minnesota (Saturday, June 28. Registration for this trip must be made with the committee by Wednesday, June 25. Members may use their own transportation, or the committee will assist them to arrange for some. Those who go can make arrangements to be received on Thursday, June 26 or Friday, June 27, if they wish.) In Duluth the Arrowhead Section has arranged for members to be admitted to any of the following establishments; Aerial Lift Bridge, a unique landmark; North-western-Hanna Coal Dock, one of ten installations which handle over six million tons annually; Superior Wood Products Co., producers of hardboard from native poplar; DM & IR railway iron ore docks, up to 2200 feet long, which handled 21,000,000 tons last year; M. L. Hibbard Steam-Electric Plant, largest station of the Minnesota Power & Light Co.; American Steel & Wire Co., operating two blast furnaces and nine open hearths, blooming and billet mill, merchant mill and wire mill; Universal Atlas Cement Co., with a complete process producing 1,600,000 barrels a year; Thomson Hydro-Electric Station operating under a 364-foot head with 67,350 kw capacity.

The Range tour starts at Hibbing, Minnesota, eighty miles from Duluth. Specific directions and maps will be available for those who wish to drive. The tour can include any of the following mines and plants: Morton Mine, an open pit operation using dragline and conveyor belt; Hull Rust-Mahoning Mine, the largest open pit mine in the world, that has yielded over 500 million tons of ore; Fraser Underground Mine, where the surface facilities can be inspected; Mountain Iron Taconite Plant, a processing plant now under construction; Missabe Mountain Mine, open pit operation; Rouchleau Ore Processing Plant, for sintering and nodulizing taconite concentrates; Embarrass Mine, open pit mining of ore under a lake; Erie Taconite Pilot Plant, processing low grade ore into high grade pellets; Aurora Steam-Electric Station, under construction; Babbitt Taconite Pilot Plant, where ore is mined and processed at one location; Beaver Bay Taconite Development, a large installation under construction with 2½ million tons annual output capacity, ultimately expandable to 10 million tons.

EVENING ACTIVITIES: Social events and entertainment have been arranged for every evening except Friday. Monday evening has been set aside for reunions of the various groups at the Nicollet.

The President's Reception is in the main Ballroom of the Nicollet will start with a Smorgasbord dinner at 6:00 p.m., Tuesday evening, June 24. An evening of entertainment will follow the meal, with Institute officers as guests. Tickets will be available at the meeting at \$6.00 each.

A sailboat race on Lake Calhoun will start at 7:00 p.m. Wednesday, June 25. Each AIEE District will be represented by a 20-foot Class D boat in this contest. The race is to be run over a triangular course. The entire contest may be viewed from the park surrounding the lake, and special buses to the event will leave from the Nicollet. The bus fare is 75 cents.

A demonstration lecture by Professor A. D. Moore, of the University of Michigan is tentatively scheduled for 8:30 p.m. Wednesday



General Mills, Inc.

day evening, in the Main Ballroom of the Nicollet. Various flow patterns will be shown and the operation of the mapper in making a visible flow diagram will be demonstrated to the audience.

The principal event on the entertainment program is the dinner and dance Thursday evening, June 26. Dinner will be served at 6:30 p.m., followed by dancing from nine to twelve. Dress is optional. Tickets at \$6.00 each may be obtained at the ticket desk.

LADIES' PROGRAM: Parlor C of the Nicollet Hotel has been reserved at the Ladies' Parlor throughout the meeting. It will be open Sunday afternoon and Monday morning for establishing and renewing acquaintances among the ladies attending the meeting.

Those ladies who wish to do so may attend the annual meeting Monday morning and the noon luncheon address by Dr. Morrill.

Monday afternoon at 1:30 the women will go by bus to the main campus of the University of Minnesota. An interesting tour of the campus will include the Variety Heart Hospital, the Northrup Auditorium, the radio station KUOM, and the Museum of Natural History. The tour will be followed by tea at the Faculty Campus Club in the Coffman Memorial Union. There will be no charge for this trip. Admission is by badge.

Monday evening is reserved for shopping. Minneapolis stores are open that night until 8:45 p.m.

Tuesday a bus trip leaving the hotel at 10:30 a.m. will travel around Minneapolis and some of its lakes, and to the Automobile Country Club on the Minnesota River for luncheon at 1:00 p.m. Opportunity will be afforded for taking pictures on this trip. There will be time for a stroll through the flower and vegetable gardens at the club before returning to the hotel. Tickets at \$3.00 include bus fare and luncheon.

Wednesday the ladies will have breakfast in the Garden Room of Donaldson's Department Store at 9:00 a.m. A style show will be presented during the meal. Tickets are \$1.00.

At 11:00 a.m. buses will take the ladies from the hotel to Red Wing, Minnesota. A stop will be made for luncheon at Nybo's, an air-conditioned cafe with an interesting picture gallery. A guided tour of the Red Wing Potteries will follow at 2:00 p.m. This is an opportunity to see the Mississippi River Valley, Lake Pepin, and some unique geological formations. A stop enroute at one of the Mississippi River locks is scheduled. Tickets, including luncheon and bus fare, at \$3.50 each must be purchased by Tuesday noon.

Thursday, the Betty Crocker Test Kitchens of General Mills will be visited at 9:45 a.m. The ladies will go in small groups from the Ladies' Parlor. Tickets will be available there at no charge.

At 1:30 p.m. the ladies will go to the American-Swedish Institute in Minneapolis for a tour of the building, which houses an impressive collection of Swedish and Swedish-American art, glass, and textiles, besides pioneer and immigrant items and Swedish antiques from the 17th and 18th centuries. Tea will be served at 3:00 p.m., and buses will return to the hotel at 4:00 p.m. and 5:00 p.m. in time for the dinner-dance. Tickets for the trip are \$1.00.

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ADVANCE COPIES OF PAPERS

Members may obtain preprints of numbered pages at the uniform price of 30c each (60c each to nonmembers), by sending enclosed order form and remittance to the AIEE Order Department, 33 West 39th Street, New York 18, N. Y. 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 denominations are available for those who wish to avoid remittance by check or otherwise. Most of the papers ultimately will be published as AIEE Proceedings and in the Transactions. *Conference Papers* denoted by CP.** are intended for presentation only, and are not available.

Monday, June 23**10:00 a.m.—Annual Meeting**

1. Report of Board of Directors. H. H. Henline, Secretary.
2. Report of Treasurer. W. I. Slichter.
3. Report of Committee of Tellers on:
 - (a) Votes for nominees for AIEE offices.
 - (b) Proposed Constitutional amendments.
4. (a) Introduction of, and presentation of President's badge to D. A. Quarles.
(b) Response by Mr. Quarles.
5. Presentation of Lamme Medal to Arthur E. Silver, Retired, Ebasco Services, Inc., New York.
 - (a) The Establishment of the Medal. A. H. Kehoe, Chairman, Lamme Medal Committee.
 - (b) The Career of the Medalist. Clay C. Boswell, Vice-President and Assistant General Manager, Minnesota Power and Light Co.
 - (c) Presentation of the Medal and Certificate by President F. O. McMillan.
 - (d) Response by Mr. Silver.
6. Any other business that may be presented.
7. Address by President F. O. McMillan.

2:00 p.m.—Transmission and Distribution

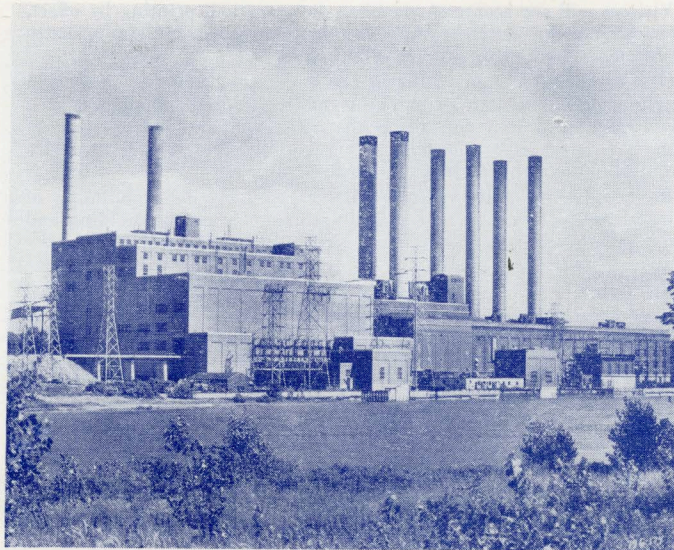
- 52-176. Transient Fault Current and Voltage Recovery Characteristics of Distribution Systems. Joint Subcommittee on Distribution Circuit Recovery Voltages.
- 52-177. A Passive Compensator for Switching Surges. P. A. Cartwright, University of Minnesota.
- 52-178. Some Observations on the Economic Benefits in Going from One System Voltage Level to a Higher System Voltage Level. D. K. Blake, General Electric Co.
- 52-175. Lightning to the Empire State Building III. J. H. Hagenguth and J. G. Anderson, General Electric Co.

2:00 p.m.—Computing Devices

- 52-179. A Contribution to the Design of Binary Counters. G. R. ACO.* Lang, L. L. Luke and D. K. Ritchie, Ferranti Electric, Ltd.
- CP.** ERA Shaft-Position Analog-to-Digital Converter. G. W. Lund, Engineering Research Associates.
- CP.** Digital-to-Analog Shaft-Position Transducers. S. J. O'Neil, Air Force Cambridge Research Center.
- 52-181. DINA, A Proposed Digital Network Analyzer. C. Leondes and M. Rubinoff, University of Pennsylvania.
- 52-162. Typical Block Diagrams for a Transistor Digital Computer. J. H. Felker, Bell Telephone Labs., Inc. Presentation by title only for discussion.

2:00 p.m.—Relays

- 52-182. Ground Fault Relay Protection of Transmission Lines. J. L. Blackburn, Westinghouse Electric Corp.
- CP.** Back-up Protection of Transmission Lines. Report of Project Committee on Transmission-Line Protection.



Riverside Station, Northern States Power Co.

- 52-183. Power Line Carrier for Relaying and Joint Usage—II. A Survey of Modern Power Line Carrier Systems. G. W. Hampe and B. W. Storer, Commonwealth Edison Co.
- CP.** Performance of Overcurrent Relays on Cold Load Restoration. O. Ramsaur, Pennsylvania Power & Light Co.
- 52-184. Selecting AC Overcurrent Protective Device Settings for Industrial Plants. F. P. Brightman, General Electric Co. Presentation by title only for discussion.

Tuesday, June 24**9:30 a.m.—Sections Forum on the Shortage of Engineers**

Carey H. Brown, Chairman, Engineering Manpower Commission.
O. W. Eshbach, Dean, Northwestern University, Technological Institute.
J. H. Foote, President, Commonwealth Associates, Inc.

9:30 a.m.—Transmission and Distribution

- 52-188. Sleet Melting Practices—Niagara Mohawk System. H. B. Smith and W. D. Wilder, Niagara Mohawk Power Corp.
- 52-189. Sleet Thawing Practices of the New England Electric System. C. P. Corey, H. R. Selfridge; New England Power Co. and H. R. Tomlinson; New England Power Service Co.
- 52-187. 42 Years' Experience Combating Sleet Accumulations. A. N. Shealey, K. L. Althouse and R. N. Youtz, Pennsylvania Water & Power Co.
- 52-186. Ice Melting and Prevention Practices on Transmission Lines. V. L. Davies and L. C. St. Pierre, Public Service Co. of Northern Illinois.
- 52-185. Sleet Melting on the American Gas and Electric System. S. C. Bartlett, C. A. Imburgia and G. H. McDaniel, American Gas & Electric Service Corp.

9:30 a.m.—Transformers

- 52-156. Relation of Transformer Design to Fire Protection. E. D. Treanor and L. C. Whitman, General Electric Co. Presentation by title only for discussion.
- 52-159. Dielectric Measurements on New Power Transformer Insulation. W. L. Teague and J. H. McWhirter, Westinghouse Electric Corp.
- 52-190. 1,100,000 KVA Short-Circuit Transformer in the New High-ACO.* Capacity Switchgear Testing Laboratory. B. A. Cogbill, General Electric Co.
- 52-196. The Production Impulse Testing of Distribution Transformers. E. D. Treanor, H. C. Stewart and J. E. Holcomb, General Electric Co.

CP.** Common Insulation Problem. G. I. Comb, Illinois Inst. of Technology; and F. J. Vogel, Allis-Chalmers Manufacturing Co.

9:30 a.m.—Instruments and Measurements

- 52-191. Computing Circuits and Devices for Industrial Process Functions. A. J. Hornfeck, Bailey Meter Company. Presentation by title only for discussion.
- 52-163. The Fundamental Accuracy of Single Phase Three-Wire Metering. E. C. Wentz and A. J. Petzinger, Westinghouse Electric Corp.
- CP.** Basic Theory and Experimental Verification of the Percent Limit Capacitance Bridge. T. J. Higgins and J. Joerger, University of Wisconsin.
- CP.** Complementary Galvanometer Deflection Constants and Steady State Solutions of the Unbalanced Bridge. P. M. Andress, Rubicon Company.
- CP.** The Key to Quality—A Comprehensive Test Department. W. H. Clausen, Minneapolis-Honeywell Regulator Co.

9:30 a.m.—Communication Switching Systems

- 52-201. Automatic Switching for Nationwide Telephone Service. A. B. Clark, Bell Telephone Labs., Inc.; and H. S. Osborne, American Tel. & Tel. Co.
- 52-202. Fundamental Plans for Toll Telephone Plant. J. J. Pilliod, American Tel. & Tel. Co.
- 52-203. Nationwide Numbering Plan. W. H. Nunn, American Tel. & Tel. Co.
- 52-204. Automatic Toll Switching Systems. F. F. Shipley, Bell Telephone Labs., Inc.

2:00 p.m.—Sections Delegates Conference**2:00 p.m.—Transmission and Distribution**

- 52-171. Power Limits of Transmission Lines. L. E. Saline, General Electric Co.
- 52-160. Accurate Computation of Two-Machine Stability. R. D. Goodrich, Jr., Bureau of Reclamation.
- 52-192. Tensorial Analysis of Integrated Transmission Systems, Part III—The "Primitive" Division. G. Kron, General Electric Co.
- 52-193. Analysis of Losses in Interconnected Systems. A. F. Glimm, L. K. Kirchmayer; General Electric Co.; and G. W. Stagg, American Gas & Electric Service Corp.

2:00 p.m.—Transformers

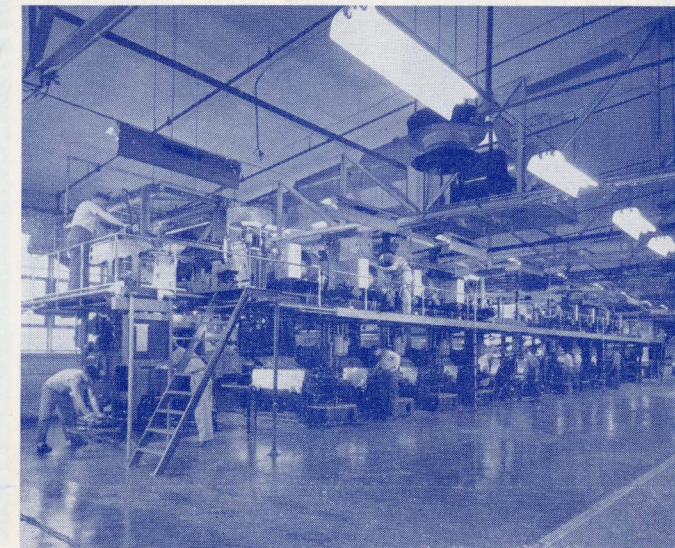
- 52-232. Standard Basic Impulse Insulation Levels, 450 Kv to 1050 ACO.* Kv Inclusive. Joint AIEE-EEI-NEMA Committee on Coordination of Insulation.
- 52-194. Impulse Testing of Power Transformers. J. H. Hagenguth and J. R. Meador, General Electric Co. Presentation by title only for discussion.
- 52-195. New Apparatus Bushing with Improved Characteristics. R. N. Anderson and D. L. Johnston, General Electric Co.
- CP.** A New Method of Obtaining Insulation Coordination of Transformers. W. C. Sealey and F. J. Vogel, Allis-Chalmers Mfg. Co.

2:00 p.m.—Instruments and Measurements

- 52-157. Electronic Recorder with Range and Precision Adequate for the Platinum Resistance Thermometer. A. J. Williams, Jr., Leeds & Northrup Co. Presentation by title only for discussion.
- CP.** Resistance Temperature Sensing Elements for Aircraft Gas Turbines. Finn Larson and Ralph Squiers, Minneapolis-Honeywell Regulator Co.
- 52-197. A Long Distance Multi Point Telemetering System Using Teletype Transmission. A. J. Hornfeck and G. R. Markow, Bailey Meter Co.
- CP.** An Electric Hydrometer of Small Dimensions. W. A. Brastad and L. F. Borchardt, General Mills, Inc.
- CP.** Home Heating Control. John Wilson, Minneapolis-Honeywell Regulator Co.
- 52-241. Aircraft Radio Interference Measurements. M. M. Newman, R. C. Schwantes, J. R. Stahmann; Lightning and Transients Research Institute.

2:00 p.m.—Non-Linearities in Feedback Control Systems

- 52-198. A Study of Amplifier Saturation and Magnetic Saturation in ACO.* a Servomechanism. Cornelius Leondes, University of Pennsylvania.



Talio-Crome Press, Brown and Bigelow.

- 52-154. Sinusoidal Analysis of Feedback-Control Systems Containing Nonlinear Elements. E. C. Johnson, Bendix Aviation Corp.
- 52-199. The Use of Non-Linear Feedback to Improve the Transient ACO.* Response of a Servomechanism. J. B. Lewis, University of Tennessee.
- 52-200. Servomechanism with Dead-Time Lag and Distributed Lag ACO.* by Root-Locus Method. Yaohan Chu, Massachusetts Inst. of Technology.

Wednesday, June 25**9:30 a.m.—Safety**

- CP.** The Electrical Engineers' Stake in Safety. H. F. Webb, West Penn Power Co.
- CP.** Safety Aspects of Grounding Portable Equipment. H. B. Whitaker, Underwriters Labs., Inc.
- CP.** Electrical Aspects of Mine Safety. V. M. Sovick, U. S. Steel Corp.
- CP.** Extinguishing Fires in Electrical Equipment. J. E. Appel, Commonwealth Edison Co.; and J. A. Bono, Underwriters' Laboratories, Inc.

9:30 a.m.—Rotating Machinery

- 52-167. Torque of Reluctance Type Magnetic Couplings. F. W. Suhr, General Electric Co. Presentation by title only for discussion.
- 52-168. Simplified Measurement of Subtransient and Negative Sequence Reactances in Salient Pole Synchronous Machines. F. K. Dalton and A. W. W. Cameron, Hydro-Electric Power Comm. of Ontario. Presentation by title only for discussion.
- 52-221. New Large Short Circuit Testing Generators. C. E. Kilbourne, General Electric Co.
- 52-222. Forces in Machine End Winding. Dean Harrington, General Electric Co.
- 52-223. A New Theory of Hunting. Gabriel Kron, General Electric Co.
- 52-224. Synchronous Machines with Rotating Permanent Magnet Fields—I. Characteristics and Mechanical Construction. M. W. Brainard, O'Keefe & Merritt Co.
- 52-225. Synchronous Machines with Rotating Permanent Magnet Fields—II. Magnetic and Electrical Design Considerations. Fritz Strauss, O'Keefe & Merritt Co.

9:30 a.m.—Insulated Conductors

- 52-152. Artificial Cooling of Power Cable. F. H. Buller, General Electric Co.
- 52-205. Weathering and Crack Resistance of Black Polyethylene ACO.* Wire and Cable Insulation. W. A. Haine, E. F. Smith and N. R. Smith, Union Carbide & Carbon Corp.

- 52-226. Guide for Temperature Correlation in the Connection of ACO.* Insulated Wires and Cables to Electrical Equipment. Project Committee on Temperature Correlation.
- 52-158. Rapid Measurement of the Thermal Resistivity of Soil. V. V. Mason and M. Kurtz, Hydro-Electric Power Comm. of Ontario. Presentation by title only for discussion.
- 52-206. Surface Discharges from Cable Sheaths and Their Relation to Electric Shock. E. W. Greenfield, Kaiser Aluminum & Chemical Corp. Presentation by title only for discussion.

9:30 a.m.—Basic Sciences

- CP.** Influence of Atmosphere Upon Contact Transients in a Simple Electric Circuit. O. E. Berg and H. E. Stauss, Naval Research Lab.
- 52-207. Subharmonics in a Series Nonlinear Circuit as Influenced by Initial Condenser Charge. W. J. McKune and M. F. Brust, University of Texas.
- 52-240. A New Property of Two-Dimensional Fields. A. D. Moore, University of Michigan.
- 52-208. Ultra-Thin Tapes of Magnetic Alloys with Rectangular Hysteresis Loops. M. F. Littmann, Armco Steel Corp. Presentation by title only for discussion.
- 52-227. Electrical and Physical Properties of IN-420—A New Chlorinated Liquid Dielectric. A. J. Warner, Federal Telecommunication Labs., Inc. Presentation by title only for discussion.

9:30 a.m.—Feedback Control Systems

- 52-161. The Analysis of Sampled Data-Systems. J. R. Ragazzini and L. A. Zadeh, Columbia University.
- 52-211. Signal Component Control. D. J. Gimpel and J. F. Calvert, ACO.* Northwestern University.
- CP.** Stability Limits for Third-Order Servomechanisms. T. J. Higgins and J. G. Levinthal, University of Wisconsin.
- CP.** Progress Report on Terminology and Nomenclature for Feedback Control Systems. Terminology and Nomenclature Subcommittee.
- 52-239. Stabilization Templates for Servomechanisms. O. J. M. Smith, University of California. Presentation by title only for discussion.

9:30 a.m.—District Branch Prize Papers

2:00 p.m.—Management of Engineering Activity Panel Discussion—W. R. Hough, Moderator

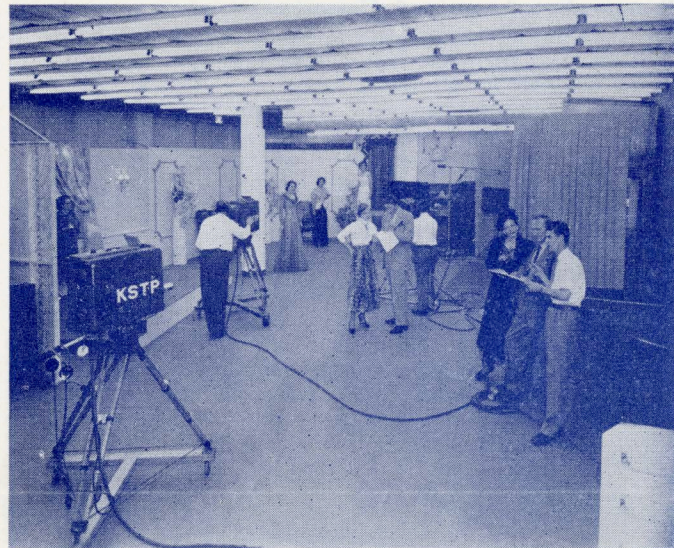
- Techniques for Managing Engineering Work. T. M. Linville, General Electric Co.
- Work Simplification as Applied to Engineering Work. C. L. Brisley, Wolverine Tube Co.
- Training for Engineering Supervisors. E. W. Seager, Cutler Hammer Corp.

2:00 p.m.—Rotating Machinery

- CP.** Repeated Surge Testing of Motor Windings. N. Rohats, General Electric Co.
- CP.** Voltage Distribution and Testing Problems During Impulse Testing of Large High Voltage Generator Windings. G. L. Moses and R. J. Alke, Westinghouse Electric Corp.
- CP.** A New Magnetic Amplifier Control for Magnetic Drives. D. W. Schlicker.
- CP.** Eddy Current Coupling Drives on the Longest Cement Kiln in the Western Hemisphere. E. H. Frederick.

2:00 p.m.—Basic Sciences

- 52-212. Design of Unequal-Q Double-Tuned Transformers. Sid Deutsch, Polytechnic Research & Development Co., Inc.
- CP.** Analysis of a Comb Filter Using Synchronously Commutated Capacitors. W. R. LePage, C. R. Cahn and J. S. Brown, Syracuse University.
- 52-213. Solution of Electrical Engineering Problems by Southwell's Relaxation Method. E. M. Grad, Associated Electrical Industries, Ltd.
- 52-214. The Current Status of Dynamic Stability Theory. F. E. Bothwell, U. S. Naval Ordnance Test Station, Inyokern. Presentation by title only for discussion.
- 52-215. Notes on the Design of Eccles-Jordan Flip-Flops. Morris Rubinoff, University of Pennsylvania. Presentation by title only for discussion.



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2:00 p.m.—Industrial Power Systems

- CP.** Electric Power Relaying is Important in Industrial Plants. S. S. Paist, Rohm-Haas.
- CP.** Philosophy of Electrical Designs for the Office Building of Tomorrow. C. C. Saunders, E. I. DuPont de Nemours & Co.
- CP.** Industry Response to Systems Neutral Grounding and Higher Voltage Lighting. S. C. Cooke, General Electric Co.

2:00 p.m.—District Branch Prize Papers

2:00 p.m.—Carrier Current

- 52-153. A Broad-Band Coupling Unit for Power Line Carrier with Associated Potential Device. J. A. Doremus, R. P. Crow and W. H. Freeman, Motorola, Inc.
- 52-217. New Method of Calculating Carrier Current Attenuation. J. A. Becker, Westinghouse Electric Corp.
- 52-218. Frequency-Shift, Carrier-Current Equipment for Telemetry and Other Control Type Functions. R. W. Beckwith, General Electric Co.
- 52-219. Application of Power Line Carrier by Analog Computer ACO.* Studies. J. D. Moynihan, Westinghouse Electric Corp.
- 52-220. The Application of Power Line Carrier Coupling Equipment to Typical Field Installations—Part I. F. B. Gunter, Westinghouse Electric Corp.

Thursday, June 26

9:30 a.m.—Insulation

- 52-209. Field Studies of Generator Windings. H. C. Marcroft, Pennsylvania Water & Power Co.
- 52-151. D-C Overpotential Testing Experience on High Voltage Generators. R. J. Alke, Westinghouse Electric Corp.
- CP.** Testing Electrical Insulation of Rotating Machinery with High Voltage D.C. G. L. Hill, Pacific Gas & Electric Co.
- 52-174. Interlaminar Insulation Test for Synchronous Machine Stators. H. R. Tomlinson, New England Power Service Co.
- 52-166. The Re-Examination of Temperature Standards for Electrical Insulation. G. L. Moses, Westinghouse Electric Corp. Presentation by title only for discussion.

9:30 a.m.—System Engineering

- CP.** Synchronous Condenser Operation. C. R. Canady and J. H. Drake, Southern California Edison Co.
- CP.** Colfax Stability Tests. Motion picture film by Duquesne Light Co.

- CP.** Pool Accounting From An Operating Standpoint. M. J. Lacopo, American Gas and Electric Service Corp.
- CP.** Emergency Dispatching Rules. E. E. George, Ebasco Services, Inc.
- CP.** System Operation Without Communication. C. P. Corey, New England Power Co.
- CP.** Centralized Control of Electric Hot Water Heaters on a R.E.A. Distribution System. Lincoln Rietow, Control Corp.; and H. A. Schimelpfenig, Minnesota Valley Electric Cooperative.

9:30 a.m.—Electrical Techniques in Medicine

- CP.** Factors Concerned with the Medical Application of Ultra Sound. R. E. De Forest, M.D., American Medical Association.
- CP.** Electrical Stimulation of Human Muscle. H. D. Bouman, M.D. and Kathryn J. Shaffer, University of Wisconsin.
- CP.** A Practical Quantitative Electrokymograph. D. A. Kohl, University of Minnesota.
- CP.** Past and Present Forms of Apparatus for Physical Medicine. F. T. Jung, M.D., American Medical Association.

9:30 a.m.—Electrothermal Processes

- CP.** Electrical Supply for Arc Furnaces. R. L. Tremaine and R. F. Lawrence, Westinghouse Electric Corp.
- CP.** Determination of Optimum Current in an Arc Furnace. D. R. Cochran, General Electric Co.
- CP.** Comparison Between European and American Electric Furnace Equipment. J.R. Lee, Pittsburgh Lectromelt Furnace Corp.
- CP.** Melting and Refining of Modern Steels. A Sound Film. Allegheny-Ludlum Steel Corporation.

9:30 a.m.—Mining Industry

- CP.** Modern Electric Equipment for Hulett Unloaders. W. C. Raube, General Electric Co.
- CP.** Electric Equipment Applications in Taconite Plants. W. H. Schwedes and A. F. Gettelman, General Electric Co.
- CP.** The Elliott Oxygen Process. Irving Roberts, H. K. Ferguson Co.
- CP.** Application of Electrical Controls and Machinery to Power Shovels. W. J. Cheronos, Harnischfeger Corporation.

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

- CP.** Electric Defibrillation of the Heart. W. B. Kouwenhoven, The John Hopkins University.
- CP.** Physiologic Effects of Microwaves. J. F. Herrick and F. H. Krusen, M.D., Mayo Clinic.
- CP.** Possible Industrial Hazards in the Use of Microwave Radiation. H. M. Hines and J. F. Randall, University of Iowa.

2:00 p.m.—Dielectrics

- CP.** Fluorine Containing Gaseous Dielectrics. G. Camilli and R. E. Plump, General Electric Co.
- CP.** Properties of Some Fluorinated Liquids for Dielectric Uses. N. M. Bashara, Minnesota Mining & Mfg. Co.
- CP.** Fluorine Containing Solids. R. D. Rowley and C. B. Leape, Westinghouse Electric Corp.
- 52-228. Impulse Dielectric Strength Characteristics of Liquid Impregnated Pressboard. T. W. Dakin and C. N. Works, Westinghouse Electric Corp. Presentation by title only for discussion.
- 52-210. The Variation at Constant Density of the Dielectric Breakdown of Paper with Air Resistance. Paul Cloke, University of Maine; and K. K. Khandelwal, Syracuse University. Presentation by title only for discussion.

2:00 p.m.—Storage Batteries.

- CP.** Motive Power Batteries. H. C. Riggs, The Electric Storage Battery Co.
- CP.** Lead Calcium Cells. J. H. Rittenhouse and H. E. Jensen, C. and D. Storage Battery Company.
- CP.** Control of Dry Disc Rectifiers for Battery Charging. C. E. Hamann, General Electric Company
- CP.** Engine Starting. E. A. Hoxie, The Electric Storage Battery Company.



TV Test Panel, Northwestern Bell Telephone Co.

2:00 p.m.—Mining Industry

- CP.** Iron Ore for the Future. E. W. Davis, Representing AIME.
- CP.** Operating Experience with Heated Screens. S. E. Erickson and M. Tanamachi, M. A. Hanna Company
- CP.** A Power Plant Suitable for a Taconite Project. H. H. McQueen, N. A. Miller, Sargent & Lundy.

Friday, June 27

9:30 a.m.—Excitation Systems

- 52-229. Development of a Modern Amplidyne Voltage Regulator for Large Turbine Generators. W. A. Hunter and M. Temoshok, General Electric Co.
- 52-164. Effect of a Modern Amplidyne Voltage Regulator on Under-excited Operation of Large Turbine Generators. W. G. Heffron, R. A. Phillips, General Electric Company.
- 52-165. Operating Experience with Shaft-Driven Exciters in Air and Hydrogen. F. M. Porter and H. B. Margolis, American Gas & Electric Service Corp.
- CP.** New Excitation Principles and Techniques. J. E. Barkle, C. E. Valentine and J. T. Carleton, Westinghouse Electric Corp.
- CP.** Exciter Response. H. W. Cory, Allis-Chalmers Mfg. Co.

9:30 a.m.—New Electronic Devices and Applications

- CP.** An Engineering Progress Report on Reliable Tubes. R. E. Moe, General Electric Co.
- CP.** A Ten-Stage Cold-Cathode Stepping Tube. D. S. Peck, Bell Telephone Labs., Inc.
- CP.** Recent Advances in Industrial Electronics. E. D. Cook, General Electric Co.

9:30 a.m.—Land Transportation

- 52-169. Fifteen Years Progress in the Design of Industrial Diesel-Electric Switchers. R. W. Barrell, General Electric Co.
- 52-172. Electrification of Holland's Railway System. A. H. Candee, Westinghouse Electric Corp.
- CP.** Get Off the Beaten Path. C. M. Hines, Westinghouse Electric Corp.

9:30 a.m.—Magnetic Amplifier Circuits

- 52-233. The Effect of Commutation on the Stability of Magnetic ACO.* Amplifiers. Mason Sakamoto, Minneapolis-Honeywell Regulator Co.
- 52-234. The Figure of Merit of Magnetic Amplifiers. J. T. Carleton, W. F. Horton, Westinghouse Electric Corp.
- 52-235. An Improved Magnetic Servo Amplifier. C. W. Lufey, A. E. Schmid, P. W. Barnhart; U. S. Naval Ordnance Lab.

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- 52-236. Saturable Reactors with Inductive D-C Load — Part I, Steady-State Operation. H. F. Storm, General Electric Co.
- 52-237. A new Type of Magnetic Servo Amplifier. W. A. Geyger, U. S. Naval Ordnance Lab.
- CP.** A New Magnetic Amplifier. José Morais, Lisboa, Portugal.
- 52-238. Dynamic Hysteresis Loop Measuring Equipment. H. W. Lord, General Electric Research Lab. Presentation by title only for discussion.
- 52-216. Types of Magnetic Amplifiers—A Survey. J. G. Miles, Engineering Research Associates, Inc. Presentation by title only for discussion.

2:00 p.m.—Hydro-Electric Systems

Round Table Discussion on Power Generation — Any discussion pertaining to Power Generation will be welcomed at this session, particularly discussion pertaining to hydro-electric systems. Prepared answers will be given to questions sent in prior to the meeting, and there will be time for questions and answers from the floor. The following is a partial list of subjects to be discussed:

1. Financing Small Hydro-Electric Generating Stations for Heads Less Than 100 Feet.
 2. Experience with Automatic and Supervisory Control for Hydro-Electric Plants and the Range of Plant Sizes to Which They Should Be Applied.
 3. Extended Use of Vertical Impulse Water Turbines.
 4. Use of Spherical Type Shutoff Valves and Their Advantages over Other Types.
 5. Pipe and Tubing Used for Inhibited Oil in Hydro-Electric Stations.
 6. Ball Bearings for Auxiliary Motors.
 7. Operating Large Generators at Leading Power Factor Loads and Stability Problems Associated Therewith.
 8. Operating Experience As to Life of Hydro-Electric Generator Stator Windings with Class B Insulation.
 9. Experience As to Cost and Value of Protective Coatings on Internal Surfaces of Penstocks.
 10. Auxiliary Power Requirements in Hydro-Electric Generating Stations.
- CP.** Holcombe Hydro Plant. H. E. Rhoades, Northern States Power Co.
- 52-155. Tables of Binomial Probability Distribution to Six Decimal Places.
Joint Subcommittee on Application of Probability Methods to Power System Problems. Presentation by title only for discussion.

2:00 p.m.—Switchgear

- 52-173. A New 14.4 Kv Indoor Compressed Air Circuit Breaker. J. E. Schrameck, Westinghouse Electric Corp.
- 52-170. Developing A Superspeed Trip Free Reclosing Circuit Breaker Mechanism. L. J. Linde and H. L. Peek, Allis-Chalmers Mfg. Co.
- 52-231. Pneumatic Operating Mechanisms for Power Circuit Breakers. R. C. Van Sickle, W. T. Parker and F. E. Florschutz, Westinghouse Electric Corp.
- 52-239. Temperature Correlation in the Connection of Insulated Wires
ACO.* and Cable to Electrical Equipment. Project Committee on Temperature Correlation.

2:00 p.m.—Electrostatic Processes

- 52-230. A Pulse Method for Supplying High-Voltage Power for Electrostatic Precipitation. H. J. White, Research Corp.
- CP.** Electrostatic Atomization and Precipitation of Coating Materials. E. P. Miller, Ransburg Electro-Coating Corp.
- CP.** Monocyclic Constant Current Control for Industrial Precipitators. H. V. Nelson, General Electric Co.

2:00 p.m.—Magnetic Amplifier Test Methods.

- CP.** Core Matching at High Frequency. D. H. Toth and L. W. Mader, Engg. Research Associates.
- CP.** Production Test Experience on Air Craft Magamps. K. H. Sueker, Westinghouse Electric Corp.
- CP.** Test Methods for Magnetic Amplifier Cores. J. R. Conrath Vickers Electric Div.
- CP.** Evaluation of Core Materials for Magnetic Amplifiers. D. C. Dieterly, Armco Steel Corp. Demonstration of test methods.



Northwest Airlines Overhaul Base, Hohman Field, St. Paul.

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.

MEETING FEATURES—Continued from page 3

REGISTRATION: The registration desk will be open Sunday afternoon, June 22, and daily thereafter from 9:00 a.m. to 5:00 p.m. for the duration of the meeting. Arrangements will be made to expedite registration of those who have sent in advance registration cards. A registration fee of three dollars will be charged all members and five dollars for non-members. Enrolled students and the immediate families of members will be registered without payment of any registration fee.

HOTEL RESERVATIONS: Hotel rooms may be reserved by writing directly to the Nicollet Hotel or to the hotel of your choice, and stating that the reservation is for the AIEE Summer General Meeting. Rooms with bath are available at the following rates:

	Single	Double	Twin Beds
Nicollet Hotel	\$5.00-10.00	\$7.50-12.50	\$7.50-12.50
Andrews Hotel	3.75- 6.00	5.25- 7.50	6.50- 9.00
Dyckman Hotel	3.25- 6.00	5.50- 8.50	6.00-11.25
Sheridan Hotel	3.25- 3.50	4.50- 6.00	7.00- 8.00
Curtis Hotel	3.50- 5.00	4.50- 6.00	6.50- 7.50
Leamington Hotel ...	4.50- 5.50	6.00- 7.50	7.50- 9.50

Information relative to motels and maps for those who plan to drive may be obtained from the Tourist Information Bureau, Minneapolis Chamber of Commerce, 1750 Hennepin Avenue, Minneapolis 3, Minn. Specific resort information will be available at meeting headquarters.

GENERAL COMMITTEE: The members of the 1952 Summer General Meeting Committee are: R. F. Herrmann, General Chairman; H. E. Hartig, Vice Chairman; H. P. Bruncke, Secretary; A. J. Hendry, Treasurer; J. R. North, Vice President District 5; D. D. Ewing, Director; G. B. Germain, Chairman Minnesota Section; R. N. Faiman, Chairman Red River Valley Division; R. B. Wiprud, Chairman Arrowhead Section; E. H. Hagensick, Entertainment; H. W. Meyer, Fiftieth Anniversary; R. H. Olson, Finance and Budget; W. H. Gille, General Sessions; L. A. Rietow, Hotel Reservations; M. I. Risley, House and Equipment; P. G. Bowman, Inspection Trips; E. A. Wold, Printing; R. M. Kalb, Publicity; E. B. Doescher, Registration; R. G. Lynn, Sports and Prize Meets; J. H. Kohlmann, Students Activities; P. A. Cartwright, Technical Program; H. E. McWethy, Transportation; Mrs. H. E. Hartig, Ladies Activities.

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33 West 39th Street, New York 18, N. Y.

PRINTED IN U.S.A.