

American Institute of Electrical Engineers

Fifty-First Annual
Summer Convention

Cornell University, Ithaca, N. Y., June 24-28, 1935



Aerial view of the Cornell University campus

1884



1935

General
Convention Program

Program of the A.I.E.E. Summer Convention at Cornell University

A PROGRAM replete with activities of interest to the profession has been arranged for the 51st annual summer convention of the Institute to be held on the campus of Cornell University, Ithaca, N. Y., June 24-28, 1935. The annual business meeting, conference of officers, delegates, and members, board of directors' meeting, 10 technical sessions, and a number of technical conferences assure a busy and profitable week for those who wish to keep pace with Institute affairs and the progress of the art. Also, sports, trips, and recreation, as well as entertainment for the visiting women, have not been overlooked. The

evenings will be devoted mainly to social functions. All these activities are offered to members and guests at a very reasonable cost, made possible by the splendid facilities which Cornell University affords in a beautiful scenic setting. A large attendance is expected.

The summarized schedule of business events and technical sessions of the A.I.E.E. convention is given below, and the entertainment features for men and women are summarized on the facing page. Details of technical sessions, technical conferences, entertainment, inspection trips, sports, and other features are given in other parts of this program.

Summarized Schedule of Business Events and Technical Sessions

[Eastern standard time is used
in Ithaca throughout the year.]

Monday, June 24

- 8:30 a.m.—Registration
- 10:00 a.m.—Opening of Convention (Moot Court Room, Myron Taylor Hall)
Address of welcome: Dr. A. R. Mann, provost, Cornell University
- Annual Business Meeting of the Institute
Annual report of board of directors, in abstract, by H. H. Henline, national secretary
Report of committee of tellers on:
(a) election of officers; (b) constitutional amendments
- Introduction of and response from president-elect
- Presentation of prizes for papers
- Presentation of Lamme medal to Henry E. Warren
President's address: J. Allen Johnson
- 11:30 a.m. Conference of Officers, Delegates, and Members (Moot Court Room, Myron Taylor Hall)
- 2:00 p.m.—Conference of Officers, Delegates, and Members (continued, same location)
- 2:00 p.m.—Technical Conferences

Tuesday, June 25

- 9:00 a.m.—Instruments and Measurements Session
Power Generation Session
- 2:00 p.m.—Conference of Officers, Delegates, and Members (continued, same location)
Technical Conferences

Wednesday, June 26

- 9:00 a.m.—Electrical Machinery Session—I
Protective Devices Session
Education Session
- 11:30 a.m.—Directors' luncheon meeting

Thursday, June 27

- 9:00 a.m.—Electrical Machinery Session—II
Applications to Iron and Steel Production Session
Selected Subjects Session
- 2:00 p.m.—Technical Conferences

Friday, June 28

- 9:00 a.m.—Electrochemistry and Electrometallurgy Session
Power Transmission Session

Technical Sessions

A number of timely technical papers which have to do with some of the most recent developments will be presented in an enlarged program comprised of 10 technical sessions. The Boulder Canyon project will be quite thoroughly described by a series of papers to be presented in the sessions on power generation, power transmission, and protective devices. The hydroelectric construction will be given in a paper by L. C. McClellan, chief electrical engineer, U.S. Bureau of Reclamation, Denver, Colo. Some general features as well as

the engineering features of the project and of the transmission system from Boulder Dam to the City of Los Angeles, will be given in 2 papers by E. F. Scattergood, Bureau of Power and Light, Los Angeles, Calif. Still another paper by D. C. Prince, General Electric Company, Philadelphia, Pa., will treat the theory, construction, and testing of the large 287 kv circuit breakers for this line. In addition, 7 other technical sessions embrace many valuable papers which will present the latest theories, designs, and researches in the following fields: instruments and measurements, electrical machinery (2 sessions), applications to iron and steel production, electrochemistry and

Summary of Entertainment Features, Exclusive of Sports

Monday	Tuesday	Wednesday	Thursday	Friday
Women Informal tour of the campus. Leave Myron Taylor Hall 11.30 a.m.	Women Drive around campus. Inspection of College of Home Economics. Leave Willard Straight Hall 9.30 a.m.	Women Inspection and social trip to Corning Glass Works. Leave Willard Straight Hall 7.00 a.m.	Women Putting contest. Ithaca Country Club 9.00 a.m.	Women Trip to Enfield Falls State Park and gorge. Leave Willard Straight Hall 9.00 a.m.
		Women Luncheon at Corning Country Club. Choice of bridge, golf, or trip to Watkins Glen in afternoon	Women Luncheon and bridge. Willard Straight Hall 12.00 noon	
Women Tea at Balch Hall 3.00-5.00 p.m.	All Outing and picnic supper at Taughannock State Park. Leave Willard Straight Hall 2.00-4.30 p.m. Supper served at Park at 5.30	Men Inspection and social trip to Corning Glass Works. Leave Willard Straight Hall, 12.00-2.30 p.m. Buffet supper for men at Corning		
All President's reception and dance. Willard Straight Hall 8.30 p.m.	All Informal musicale. Willard Straight Hall 9.00 p.m.		All Convention banquet and dance. Willard Straight Hall 7.00 p.m.	

The Cornell Chimes will be rung: Monday 9.30-9.45 a.m.; 8.15-8.30 p.m.
 Tuesday 8.45-9.00 a.m.; 8.45-9.00 p.m.
 Wednesday 8.45-9.00 a.m.; 8.00-8.15 p.m.
 Thursday 8.45-9.00 a.m.; 6.45-7.00 p.m.
 Friday 8.45-9.00 a.m.; 12.00-12.15 p.m.

Technical Program

Tuesday, June 25

9:00 a.m.—Instruments and Measurements, W. B. Kouwenhoven, *chairman*. (Room A, Goldwin Smith Hall)

PRECISE SPEED CONTROL FOR D-C MACHINES, R. H. Frazier and J. Eisler, Massachusetts Institute of Technology, and W. P. Frantz, Curtis Publishing Company. March issue, p. 307-12

DEFINITIONS OF POWER AND RELATED QUANTITIES, H. L. Curtis and F. B. Silsbee, Bureau of Standards. April issue, p. 394-404

DIRECT MEASUREMENT OF SURGE CURRENTS, C. M. Foust and J. T. Henderson, General Electric Co. April issue, p. 373-78

AN IMPROVED ELECTROTHERMIC INSTRUMENT, P. M. Lincoln, Cornell University. May issue, p. 474-81

LUBRICATION INCREASES LIFE OF METER BEARINGS, T. A. Abbott and J. H. Goss, General Electric Co. April issue, p. 428-31

9:00 a.m.—Power Generation, H. W. Leitch, *chairman*. (Main lecture room, Baker Laboratory)

ENGINEERING FEATURES OF BOULDER DAM AND POWER PLANT, L. N. McClellan, U.S. Bureau of Reclamation. June issue, p. 583-94

DESIGN AND OPERATION OF HUNTLEY STATION No. 2, H. M. Cushing, Buffalo General Electric Co. June issue, p. 632-45

REHABILITATION OF THE CONNORS CREEK POWER PLANT, R. E. Greene, Detroit Edison Co. June issue, p. 610-7

Wednesday, June 26

9:00 a.m.—Electrical Machinery—I, V. M. Montsinger, *chairman*. (Room C, Goldwin Smith Hall)

AN ANALYSIS OF THE INDUCTION MOTOR, S. J. Levine, General Electric Co. May issue, p. 526-9

CAPACITIVE EXCITATION FOR INDUCTION GENERATORS, E. D. Bassett, F. W. Sickles Co., and F. M. Potter, General Electric Co. May issue, p. 540-5

SPARKING UNDER BRUSHES OF COMMUTATOR MACHINES, R. E. Hellmund and L. R. Ludwig, Westinghouse Electric and Mfg. Co. March issue, p. 315-21

TIME-TEMPERATURE TESTS TO DETERMINE MACHINE LOSSES, M. D. Ross, Westinghouse Electric and Mfg. Co. May issue, p. 512-5

9:00 a.m.—Protective Devices, H. P. Sleeper, *chairman*. (Main lecture room, Baker Laboratory)

OIL CIRCUIT BREAKER AND VOLTAGE RECOVERY TESTS, E. J. Poitras, Ford Instrument Co., H. P. Kuehni and W. F. Skeats, General Electric Co. Feb. issue, p. 170-8

BREAKER PERFORMANCE STUDIED BY CATHODE RAY OSCILLOGRAMS, R. C. Van Sickle, Westinghouse Electric and Mfg. Co. Feb. issue, p. 178-84

CIRCUIT BREAKERS FOR BOULDER DAM LINE, D. C. Prince, General Electric Co. April issue, p. 366-72

THE DETERMINATION OF CIRCUIT RECOVERY RATES, E. W. Boehne, General Electric Co. May issue, p. 530-9

SURGE CURRENTS IN PROTECTIVE DEVICES, A. M. Opshal, Westinghouse Electric and Mfg. Co. Feb. issue, p. 200-4

FAULT AND OUT-OF-STEP PROTECTION OF LINES, H. D. Braley, The New York Edison Co., and J. L. Harvey, New York Power and Light Co. Feb. issue, p. 189-200

9:00 a.m.—Education, L. A. Doggett, *chairman*. (Room A, Goldwin Smith Hall)

AN ADVANCED COURSE IN ENGINEERING, A. R. Stevenson, Jr., and Alan Howard, General Electric Co. March issue, p. 265-8

Address: REGISTRATION OF ENGINEERS, D. B. Steinman, consulting engineer.

Technical Program

Thursday, June 27

9:00 a.m.—Electrical Machinery—II, V. M. Montsinger, *chairman*. (Room C, Goldwin Smith Hall)

A STROBOSCOPIC POWER-ANGLE RECORDER
H. E. Edgerton, Massachusetts Institute of Technology.
May issue, p. 485-8

ARMATURE LEAKAGE REACTANCE OF SYNCHRONOUS MACHINES, L. A. March and S. B. Cray, General Electric Co.
April issue, p. 378-81

TRANSIENT VOLTAGES IN ROTATING MACHINES, E. M. Hunter, General Electric Co.
June issue p. 599-603

SATURATED SYNCHRONOUS REACTANCE, Charles Kingsley, Jr., Massachusetts Institute of Technology.
March issue, p. 300-5

INSULATION FOR HIGH VOLTAGE ALTERNATORS, C. M. Laffoon and J. F. Calvert, Westinghouse Electric and Mfg. Co.
June issue, 624-31

EFFECTS OF SATURATION ON MACHINE REACTANCES, L. A. Kilgore, Westinghouse Electric and Mfg. Co.
May issue, p. 545-50

9:00 a.m.—Applications to Iron and Steel Production, R. W. Graham, *chairman*. (Main lecture room, Baker Laboratory)

D-C BRAKING OF INDUCTION MOTORS, F. E. Harrell and W. R. Hough, The Reliance Electric and Engineering Co.
May issue, p. 488-93

SPEED TRANSIENTS OF D-C ROLLING MILL MOTORS, L. A. Umansky and T. M. Linville, General Electric Co.
April issue, p. 387-4

ELECTRIC POWER EQUIPMENT FOR STEEL PLANTS, R. H. Wright, Westinghouse Electric and Mfg. Co.
May issue, p. 481-5

D-C CIRCUIT BREAKERS FOR STEEL MILL SERVICE, William Deans, I-T-E Circuit Breaker Co.
June issue, p. 594-8

AUTOMATIC CONTROL FOR A ROUGHING MILL, L. A. Watson, Clark Controller Co.
June issue, 656-60

9:00 a.m.—Selected Subjects, H. M. Turner, *chairman*. (Room A, Goldwin Smith Hall)

PROTECTIVE SIGNALING, P. M. Farmer, American District Telegraph Co.
June issue, p. 617-23

D-C CLEAN UP IN INSULATING OILS, J. B. Whitehead and S. H. Shevki, The Johns Hopkins University.
June issue, p. 603-9

THE SPARKLESS SPHERE GAP VOLTMETER, R. W. Sorensen, J. E. Hobson, and Simon Ramo, California Institute of Technology.
June issue, p. 651-6

Friday, June 28

9:00 a.m.—Electrochemistry and Electrometallurgy, N. R. Stansel, *chairman*. (Room C, Goldwin Smith Hall)

Address: THE ELECTROCHEMICAL INDUSTRIES IN JAPAN, Takeshi Takei, Tokyo University of Engineering.

STORAGE BATTERY CHARGING, J. L. Woodbridge, The Electric Storage Battery Co.
May issue, p. 516-25

CALCULATIONS FOR CORELESS INDUCTION FURNACES, H. B. Dwight, Massachusetts Institute of Technology, and M. M. Bagai, Ampere, N. J.
March issue, p. 312-5

PHOTOELECTRIC CONTROL OF RESISTANCE TYPE METAL HEATERS, E. H. Vedder, Westinghouse Electric and Mfg. Co., and M. S. Evans, American Car and Foundry Co.
June issue, p. 645-50

9:00 a.m.—Power Transmission, D. M. Simmons, *chairman*. (Main lecture room, Baker Laboratory)

SOME FEATURES OF THE BOULDER CANYON PROJECT, E. F. Scattergood, Bureau of Power and Light, City of Los Angeles.
April issue, p. 361-5

ENGINEERING FEATURES OF THE BOULDER DAM TRANSMISSION SYSTEM, E. F. Scattergood, Bureau of Power and Light, City of Los Angeles.
May issue, p. 494-512

A CRITERION OF QUALITY OF CABLE INSULATION, K. S. Wyatt and E. W. Spring, The Detroit Edison Co.
April issue, p. 417-21

electrometallurgy, education, and selected subjects.

In the technical program on the 2 preceding pages, it may be noted that for all papers, reference is given after the title to the issue and page of *ELECTRICAL ENGINEERING* publication. The availability of many of the papers considerably in advance of the convention will permit the careful preparation of discussion. Thus those who attend the sessions will be assured of hearing many pertinent discussions by engineers who are well known in their respective fields of endeavor.

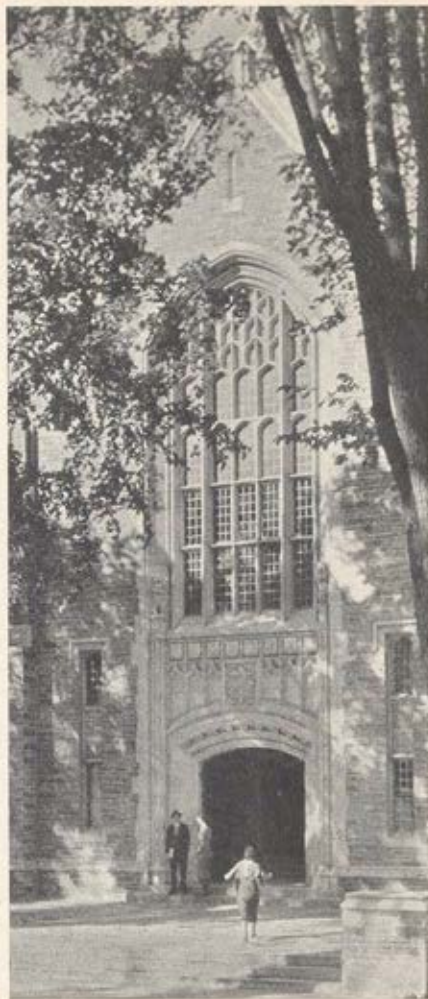
RULES ON PRESENTING AND DISCUSSING PAPERS

At some of the technical sessions, a few papers may be presented only by title. This will permit the devotion of more time to discussion. At other sessions, papers will be presented in abstract, 10 minutes being allowed for each paper unless otherwise arranged, or the presiding officer meets with the authors preceding the session to arrange the order of presentation and allotment of time for papers and discussion. Authors will be notified officially in each case about one month in advance.

Any member is free to discuss any paper when the meeting is thrown open for general discussion. Usually 5 minutes are allowed to each discussor for the discussion of a single paper or of several papers on the same general subject. When a member signifies his desire to discuss several papers not dealing with the same general subject, he may be permitted a somewhat longer time.

It is preferable that a member who wishes to discuss a paper give his name in advance to the presiding officer of the session at which the paper is to be presented. Each discussor is to step to the front of the room and announce, so that all may hear, his name and professional affiliations. Three typewritten copies of discussion prepared in advance should be left with the presiding officer.

Other discussion to be considered for publication must be submitted, typed double spaced, in triplicate to C. S. Rich, secretary of the technical program committee, A.I.E.E. headquarters, 33 West 39th St., New York, N. Y., on or before



Main entrance to Willard Straight Hall, headquarters for the A.I.E.E. 1935 summer convention. During the college year, this building serves as a social center for students and faculty. It contains dining rooms, large and small rooms for reading, conversation, and games, hotel facilities, theater, soda bar, and barber shop, and a popular-priced cafeteria

July 12, 1935. Discussion received after this date will not be accepted.

Technical Conferences

A number of technical conferences or informal round table meetings on various subjects have been scheduled for the benefit of specialists and the younger members. At some of these meetings leaders in specialized fields will speak informally pointing out the lines of future progress as they see them, after which those attending should feel free to discuss subjects on the agenda informally. It is hoped that these talks will direct some of the work of the Institute committees into new and pertinent channels. No provision will be made for printing of talks, papers, discussions, or conclusions reached at these conferences.

Schedule of Technical Conferences

All room numbers refer to Baker Laboratory

Monday, June 24, 2:00 p.m.

PROBLEMS OF THE STUDENT AND CADET ENGINEER, M. G. Malti, *chairman*. (Room 207)

D-C TEST CODE, R. W. Owens, *chairman*. (Room 177)

TRANSFORMERS, J. E. Clem, *chairman*. (Room 7)

RESEARCH ON INSULATING OILS, K. S. Wyatt, *chairman*. (Room 107)

Tuesday, June 25, 2:00 p.m.

NOISE, P. L. Alger, *chairman*. (Room 107)

MERCURY ARC RECTIFIERS, O. K. Marti, *chairman*. (Room 7)

DIELECTRIC THEORIES, H. H. Race, *chairman*. (Room 177)

CIRCUIT BREAKER STANDARDS, R. T. Henry, *chairman*. (Room 377)

REACTANCE COEFFICIENTS OF SYNCHRONOUS MACHINES, C. M. Lafoon, *chairman*. (Room 207)

Thursday, June 27, 2:00 p.m.

ELECTRICAL ENGINEERING CURRICULA AND EDUCATIONAL METHODS, H. W. Bibber, *chairman*. (Room 377)

RESEARCH IN ENGINEERING SCHOOLS, Vladimir Karapetoff, *chairman*. (Room 107)

DISTRIBUTION TRANSFORMER PROTECTION, K. B. McEachron, *chairman*. (Room 7)

TENSOR ANALYSIS, E. E. Drees, *chairman*. (Room 177)

CONDUCTOR VIBRATION, D. M. Simmons, *chairman*. (Room 207)

In some cases members are invited to submit discussions to the respective chairmen in advance of the meetings. In general, the conferences have been sponsored by the subcommittees of technical committees and they afford an opportunity for the committees to obtain assistance from individuals, not members of the committees, but interested in the particular subjects under discussion. In this way both the individuals and the committees will profit.

The objectives and agenda for several of the technical conferences follow:

PROBLEMS OF THE STUDENT AND CADET ENGINEER

Of interest to students, educators, and personnel directors is the technical conference devoted particularly to the problems of the student and cadet engineer. Professor Malti has, for the past 2 months, been sounding educational and professional opinion as to how this round table discussion may be made most beneficial to students. He promises to give those who attend a cross section of the views regarding problems of students and cadet engineers. There will be short 10 minute talks by men in the industry and in the universities as well as by the students themselves. The purpose of these talks is to stimulate discussion rather than express dogmatic opinions.

The chairman of this conference, M. G. Malti, announces the following program subject to some modifications. After opening remarks by L. A. Doggett, Pennsylvania State College, and chairman of the committee on education, Bancroft Gherardi, vice president of the American Telephone and Telegraph Company, will outline "The Future of Engineering and the Young Engineer," and Dexter S. Kimball, Cornell University, will talk on "The Cadet Engineer in This Changing World."

After a period for discussion, another group of subjects will be lead off by Alan Howard of the General Electric Co., who will discuss "The Young Engineer in Industry" and W. H. Timbie, Massachusetts Institute of Technology, will bring out "The Value of an Engineering Education in a Nontechnical or Semi-Technical Career." Then R. E. Hellmund, Westinghouse Electric and Manufacturing Com-



pany, will discuss "Qualifications of a Successful Engineer."

Following another period of discussion, Chester L. Dawes, Harvard University, will tell about "The New Graduate School of Engineering" and a statement on the Engineers' Council for Professional Development, prepared by C. F. Hirshfeld, Detroit Edison Company, will be read by A. C. Stevens of the General Electric Company, after which will be another period for discussion.

D-C TEST CODE

The meeting will be opened by the chairman who will give a brief statement as to the history and purpose of the test code. Members of the subcommittee will discuss assigned topics as follows: judging of commutation, running-light losses, shaft currents, temperature test, brush setting insulation resistance, and stray load losses.

RESEARCH ON INSULATING OILS

This conference will be under the chairmanship of Kenneth S. Wyatt, research department, The Detroit Edison Company, and its purpose is to provide an opportunity for informal discussion by those interested in the subject of insulating oils, with particular reference to the much needed re-

search in that field, indicated by the following questions:

Is it not possible, by breaking away from lubricating oil ideas, to produce oils for electrical insulating purposes, of greatly improved stability? By using new methods recently available, such as solvent refining, is it not now possible to select those constituents of crude petroleum which have maximum stability for use in transformers, high voltage cables, circuit breakers, capacitors, and other electrical equipment? What special charac-



Balch Hall, one of a group of residential halls available for housing guests at the summer convention at Ithaca



A view of Cornell University overlooking Cayuga Lake. At the left is Willard Straight Hall, which will be used as convention headquarters

teristics should an electrical insulating oil have, for transformers, for cables?

What are the chief causes of deterioration of electrical insulating oils in service? What are the factors influencing this deterioration? How can they be controlled? Before improved oils are produced, will it not be necessary, first, to discard old-time motor-oil routine tests, and to develop precision and micro-methods for detecting deterioration and for evaluating electrical stability?

What is the economic importance of the electrical insulating oil problem? How much could be saved

annually in replacements both of oil and equipment, by reduction of hazard, and by increase of factor of safety, if improved oils could be made available to the industry?

NOISE

The discussion at this meeting will bring out available information on the levels of noise now existing under different living conditions in different places and psychological data on the desirable or "comfort" levels of noise which may reasonably be sought for in the future.

The availability of improved noise meters and measurement standards now enables noise levels to be determined and described accurately. This fact, together with the growing public demand for quieter apparatus, has greatly stimulated interest among electrical engineers in the subject of noise control. From the ideas developed at this meeting, it is hoped that designers will secure an improved understanding of what will constitute satisfactory noise levels in the future, and engineers generally will learn much about the practical aspects of noise measurement.

Informal talks will be given by 4 men who are noted for their leadership in the field of acoustics and noise measurements. Dr. Donald A. Laird, of Colgate University, will speak on the psychological aspects of noise; Dr. E. E. Free, of the E. E. Free



Laboratories, New York, N. Y., will present the results of his experience in conducting over 100 noise surveys; John S. Parkinson, of the Johns-Manville Research Laboratory, will give his experiences in regard to the establishment of satisfactory levels of noise; and H. B. Marvin, of the General Electric Company, will speak on noise measurements with particular reference to electrical apparatus. Advance information may be secured by addressing the subcommittee chairman, P. L. Alger, General Electric Company, Schenectady, N. Y., or any one of the speakers.

MERCURY ARC RECTIFIERS AND INVERTERS

At this conference prominent engineers will express their views on various subjects now being actively studied regarding this type of equipment. Among the topics to be discussed are: (1) water cooling, with its attendant phenomena of corrosion, and remedies for the latter; (2) interference with communication circuits due to harmonics produced in the a-c supply circuits, and means for their suppression or elimination; (3) voltage control by means of control grids, inversion, and regeneration; (4) consideration of terms such as thyatron, ignitron, and mutator, in view of the widening field of application of grid-controlled mercury arc rectifiers as inverters, frequency changers, commutators, etc.; and (5) the proposed A.I.E.E. Standards for dielectric tests, with particular reference to the recent use of mercury arc rectifiers for high voltage applications. It is felt that such a discussion will prove of benefit to all engineers taking part in it, who are interested in this increasingly important field.

DIELECTRIC THEORIES

This conference with H. H. Race, chairman, will consider the theories of dielectric capacitance and dielectric loss in: (a) crystals; for example, ice; (b) the system, cellulose plus water; and (c) synthetic resins.

The present plan is to open the discussion by having the following speakers, Dr. E. J. Murphy, Bell Telephone Laboratories, Dr. J. B. Whitehead, The Johns Hopkins University, Dr. S. O. Morgan, Bell Tele-

phone Laboratories, and Dr. J. D. Clark, General Electric Company, each present a 10 minute summary of important data and underlying theory. The major portion of the available time will be reserved for free informal discussion during which additional data, theories, and physical concepts may be presented in accordance with the interests and wishes of those attending the discussion.

CIRCUIT BREAKER STANDARDS

This conference will consist of a discussion of the effect of recovery voltage and whether it should be included in the standard definition of interrupting rating, also a discussion of the differences between American and European circuit breaker standards.

REACTANCE COEFFICIENTS OF SYNCHRONOUS MACHINES

The discussion at this conference will cover definitions, effects of saturation, application, and methods of measuring reactances. Interested engineers are invited to submit discussions of this subject in advance of the meeting to C. M. Laffoon, chairman, synchronous machinery subcommittee, Westinghouse Electric and Manufacturing Company, E. Pittsburgh, Pa.

ELECTRICAL ENGINEERING CURRICULA AND EDUCATIONAL METHODS

The list of speakers introducing the topics to be considered at this conference will be brief, in order that those attending may have an opportunity to express their personal views. An endeavor will be made to hold the discussion within the field of curricula and methods. It is hoped that the absence of any printed papers or reports of the discussion will result in speakers omitting many of the qualifying phrases which frequently take the life out of a printed paper, so that bold and vigorous statements of views will be the rule. There has been no dearth of recent periodical literature dealing with questions of curricula and methods, and Dr. W. E. Wickenden's final report on the S.P.E.E. investigation of engineering education provides much interesting material for discussion.

RESEARCH IN ENGINEERING SCHOOLS

The purpose of this conference, under the chairmanship of Vladimir Karapetoff, school of electrical engineering, Cornell University, is to discuss the proper function of the teaching staffs of our technical schools in connection with research. It is expected that topics such as the following will be discussed: what have American schools of engineering contributed to the advancement of the art and science of electrical engineering through research and how does this record compare with European countries; research by faculty members, by graduate students and by undergraduate students; and what kinds of research problems can be undertaken by faculty members which would be most helpful to the industry and to the profession?

DISTRIBUTION TRANSFORMER PROTECTION

This conference will consider the methods of protection of distribution transformers with particular reference to those in rural service, covering such items as interconnection of primary and secondary neutrals, grounding of transformer tanks, use of protective gaps, etc.

TENSOR ANALYSIS

Those interested in new theoretical developments should find this conference of

unusual interest. Tensor analysis, as a branch of mathematics, has long been known to mathematicians. In late years this mathematical tool has been extensively employed by the physicists, particularly in dealing with relativity. Only recently has tensor analysis been applied with any vigor and success to electrical engineering. It now appears that the methods of tensor analysis give promise to the electrical engineer of simplicity of expression and generalization of heretofore divergent subjects. This theoretical contribution appears to those electrical engineers familiar with it, to be important and significant in the treatment of circuits, electrical machinery, and the electron tube. It is the purpose of this conference to sound out not only these theoretical possibilities of simplification and generalization, but also to appraise, as well as can be done at this time, the practical significance and advantages of this new analysis in electrical engineering problems.

The application of tensor analysis to electrical engineering problems has nothing to do with relativity or relativity dynamics. It has simply been discovered that when the electrical engineer attacks the electrical machine using tensor analysis as a tool, he reaches a generalized equation which is of the same *form* as the equation reached by Doctor Einstein when he attacked the problem of relativity by the use of tensor analysis. This leads those versed in the subject to



Baker chemical laboratory on the campus of Cornell University, where many of the technical sessions and round table discussions will be held

conclude that there is in the electrical machine a concrete physical analogue of the electron in motion.

Other Features

ENTERTAINMENT

The entertainment features which are of interest to all those attending the convention will consist of the President's reception and dance on Monday evening, an outing and picnic at Taughannock State Park on Tuesday afternoon, an informal musicale at Willard Straight Hall on Tuesday evening, an inspection trip to the Corning Glass Works and buffet supper at Corning on

The Great Fall of Taughannock, 215 feet high. Note the man shown standing on the rocks at the right



Wednesday, and the annual convention banquet and dance on Thursday evening. These and other entertainment features are outlined in the table appearing on page 3 of this program, and the time at which each event will be started is given therein.

Those features which are of particular interest to women are summarized in the following paragraphs:

On Monday morning, June 24, following the annual business meeting, there will be a tour of Myron Taylor Hall and other campus buildings in the vicinity of Willard Straight Hall. In the afternoon there will be a tea in the reception room of Balch Hall. On Monday evening the president's reception and dance for all members and guests will be held.

On Tuesday morning a drive around the Cornell campus with an inspection of the Home Economics College and Laboratories has been arranged, and on Tuesday afternoon there will be the outing and picnic at Taughannock State Park, with a picnic supper served along the lake front. Details of this excursion are given in a later paragraph. Return from the outing will be in time for a musicale at Willard Straight Hall in the evening.

Wednesday morning and afternoon will be the trip to Corning, N. Y., home of the Corning Glass Works. Luncheon for the women only will be held at the Corning Country Club, and there will be a bridge party for those who do not desire to go through Watkins Glen in the afternoon. There will be a buffet supper at Corning in the evening.

On Thursday morning there will be a putting contest followed by a luncheon in the Memorial Hall at Willard Straight Hall. The annual convention banquet, with dancing and other entertainment, will be held Thursday evening for all members and guests.

On Friday morning there will be an automobile trip to Enfield Glen and Falls at Enfield State Park.

It will be necessary to charge moderate fees for certain entertainment events but the total amount of the fees for all of them will not exceed \$6 per person. This will include the annual dinner, picnic at Taughannock State Park, luncheon, dance, and all other entertainment features regularly scheduled as part of the convention.

TAUGHANNOCK STATE PARK

There will be a picnic for all members of the A.I.E.E. and their guests on Tuesday afternoon, June 24. Taughannock Boulevard, skirting the western shore of Cayuga Lake, northward, 11 miles from Ithaca, leads to Taughannock State Park, where plunges Taughannock Falls, 215 feet high, the highest straight falls east of the Rocky Mountains. The park contains a bathhouse, shelter pavilion, excellent bathing beach, trails, baseball diamond, children's playground apparatus, bowling green, tennis courts, quoits, and horseshow pitching courts, camping and picnic facilities, as well as large parking areas, sight-seeing boulevards, outlooks, bridges, and other advantages. The cool breezes across Cayuga Lake constantly fan the 400 acres in the preserve.

Program

2:00-4:30 p.m.—Cars will leave campus at convenience of guests. Transportation will be provided for those who do not drive their own cars.

Entertainment at the Park—Trip through gorge to main falls; about one mile of scenic paths easy to travel. About one hour should be allowed for return trip. No guides necessary. Form your own party and take your time.

Sports on playground near the lake—Baseball (soft ball); Horseshow pitching; Bowling.

Swimming—Dressing rooms at State Park Pavilion may be used.

5:30 p.m.—Picnic supper served along lake front.

7:00-7:30 p.m.—Return to Ithaca in time for musicale at Willard Straight Hall.

CORNING GLASS WORKS

The main plants of the Corning Glass Works, the world's largest manufacturers of technical glassware, are located in Corning, N. Y., about 40 miles from Ithaca. Here was poured the famous 200 inch astronomical mirror for the California Institute of Technology, the production equipment for which may be inspected, as well as the manufacture of many products for scientific and general use. The company specializes in the manufacture of well-known brands of borosilicate and other technical glasses. Some of the products which may be in the course of manufacture during the inspection trips are: insulators; ovenware; chemical and laboratory ware; and railroad, marine

and aviation signal glassware. Processes to be witnessed include the drawing of thermometer tubing, hand and machine drawing of tubing for neon signs, electric light bulbs, automobile fuses, gage glasses, etc., and also the manufacture of miscellaneous industrial wares. Of interest to the women will be the hand production of the famous "Steuben" art glass, such as vases, goblets, bowls, etc. A showroom is maintained for the display of some of the many thousands of items manufactured by this company.

At Wellsboro, Pa., about 40 miles from Corning, is another plant which will be open for inspection, where the high speed machine production of electric light bulbs and radio tube bulbs may be observed.

Principally for the women, the trip will start at 7:00 a.m. from Willard Straight Hall on Wednesday, June 26, and transportation will be available for the men attending the sessions from 12:00 noon to 2:30 p.m. in groups of 4 or 5 persons.

SPORTS

Golf, tennis, and swimming may be enjoyed at any time during the convention.

Golf—The Ithaca Golf Course, overlooking Cayuga Lake, is located just outside the campus and is one of the best courses in the Finger Lakes region. Arrangements have been made so that all guests can use this course on the payment of green fees of \$1 per day. Other courses in this region will also be available.

The usual competition for the Mershon and Lee golf trophies will be held. The Mershon trophy is competed for on a match play handicap basis. The qualifying round for the Mershon trophy must be played on Monday, June 24; the second round, best 16, match play, will be played on Tuesday, followed by the third round on Wednesday, and the semi-final and final rounds on Thursday.

The Lee trophy is awarded annually for the lowest net score for 36 holes, of which the first 18 may be the qualifying round and the other 18 must be played not later than Thursday afternoon.

Other contests, including a putting contest for the women, will be held.

Tennis—The contests will center, as usual, about the Mershon tennis trophy



A scene on the Ithaca Golf Course, just off the Cornell University campus. This course overlooks Cayuga Lake, and is one of the best in the Finger Lakes region

which, beginning this year, is to be on a new basis. Instead of becoming the property of one who wins twice, it is to remain permanently in the possession of the Institute. The name of the winner will be engraved on it each year. The first contests in men's singles will be started on Monday, June 24.

Contests in men's doubles, women's singles, and mixed doubles will also be arranged if there is sufficient registration for them. Prizes for the winners will be awarded for these contests. There are plenty of courts available on the campus for all who desire to play whether competing for prizes or not.

Swimming—There are many natural outdoor swimming places about Ithaca, one of which is located in Fall Creek Gorge only a few minutes walk from the dormitories.

Walking and Driving—Ithaca is noted for its many gorges and beautiful walks. There are 2 gorges on the campus in which the outdoor enthusiast can spend many hours. There are also within a short driving distance many other beauty spots including: Buttermilk Falls and Gorge, 2

miles; Enfield Park and Gorge, 6 miles; Watkins Glen and Gorge, 30 miles. Directions to reach these will be available at the registration desk.

HOUSING

Living accommodations will be largely confined to the university dormitories located on the Campus. These are modern in all respects and while they do not have rooms with private baths, the accommodations are very comfortable. The rates charged at university dormitories are:

\$2.00 per day per person for first 2 days
\$1.00 per day per person after first 2 days

Dormitory reservations should be made in advance with L. A. Burckmyer, Cornell University, Ithaca, N. Y., chairman of the housing committee.

During the convention, good meals may be obtained economically in the cafeteria and dining rooms of Willard Straight Hall.

An additional note regarding housing arrangements is that at the university dormitories, members who are attending with wives or families will be housed together,

that is, they will be given double rooms or adjoining rooms. Balch Hall is arranged with 2 rooms forming a suite, with a connecting hall and laboratory for the use of occupants. Risley Hall has a number of double rooms. It is the intention to house those guests with families in Balch Hall and Risley Hall.

Although as mentioned, living accommodations will be confined largely to the university dormitories located on the campus, other facilities are available.

Private rooming houses adjoining the campus offer accommodations as follows:

\$1.00 to \$1.50 per day per person

Reservations also can be obtained at the hotels. Rates, European plan, are as follows:

Ithaca Hotel; 125 rooms, 75 with bath	
	Per Day
Single rooms without bath.....	\$2.00
Double rooms without bath.....	3.00 and \$4.00
Single rooms with bath.....	2.50 and \$3.00
Double rooms with bath.....	5.00 and \$6.00
Clinton House; 60 rooms	
	Per Day
Single room without bath.....	\$2.00
Double room without bath.....	4.00
Single room with bath.....	2.50 and \$3.00
Double room with bath.....	5.00 and \$6.00

These hotels are at the foot of the hill about one mile from campus headquarters.

Glenwood Hotel on Cayuga Lake, about 4 miles from campus headquarters, will accommodate 75 people in the hotel and cottages. There is a good road along the lake shore to Glenwood. Reasonable rates may be obtained on either the American plan or the European plan.

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

Camping facilities may be found in a number of places, but the most desirable is at Taughannock State Park about 11 miles from Ithaca, and can be reached by good roads.

REDUCED RAILROAD RATES

Fare and one-third for the round trip over the same route will be available to members and guests, provided 100 certificates are validated at the registration desk. Consult your local ticket agent regarding the territory and dates applicable. Obtain your certificate authorized by the railroad passenger associations.

CAMPUS HEADQUARTERS AND REGISTRATION

The campus headquarters will be Willard Straight Hall, which is located on Central Avenue on the Cornell campus. The Cornell campus, one of the most beautiful in America, is situated on a hill overlooking the City of Ithaca and Cayuga Lake and may be reached from the depots by street car or bus (fare 10 cents), or by taxi (fare generally 50 cents). The registration bureau will open at 8:30 Monday morning and those in attendance should register promptly. A registration fee of \$2.00 will be charged all nonmembers, except Enrolled Students and the immediate families of members.

COMMITTEE

The general convention committee for the 1935 summer convention consists of the following members: R. F. Chamberlain, *chairman*; W. H. Timbie, *vice-chairman*; A. C. Stevens, *secretary-treasurer*; P. L. Alger, C. H. Bissell, R. N. Conwell, E. P. Harder, V. Karepetoff, P. M. Lincoln, True McLean, W. E. Meserve, A. C. Stallman, I. Melville Stein, J. O. West, and J. P. Wood; also the following subcommittee chairmen: registration, E. M. Strong; housing, L. A. Burckmyer, Jr.; publicity, M. G. Malti; transportation, B. K. Northrop; inspection trips, J. T. Littleton; entertainment, W. C. Ballard, Jr.; and women's committee, Mrs. R. F. Chamberlain.

This is a reprint from

Electrical Engineering

Published monthly by the
American Institute of Electrical Engineers
33 West 39th St., New York, N. Y.

6/17/35

May and June 1935 issues

The 200 inch astronomical mirror cast at the Corning Glass Works last December. Production equipment for this mirror, as well as the manufacture of many products for scientific and general use, may be inspected during the trip to Corning, N. Y., scheduled as part of the Institute's convention on Wednesday, June 26. Hand production of the famous "Steuben" art glass will be of especial interest to women

