THURSDAYS,
7:00 to 9:00 P.M., Starting October 13, 1977
I.T.T. Avionics Auditorium (at foot of tower)
500 Washington Avenue
Nutley, New Jersey 07110

Group Sponsors: Ralph Hernandez, Conrac, (201) 575-8000 ext. 262
Sergi Bogatenko, Singer Keurrott Div., (201) 256-4000 ext. 3661

Speaker:
Dr. Charles Gierla, Professor, Fairleigh Dickinson University, Director, Fort Monmouth Extension of the College of Science and Engineering.

For whom intended: This information is presented for the benefit of all reliability engineering professionals world-wide.

Course Objectives: Fundamental methods and applications developed and presented for basic reliability and design considerations. Topics will include: statistical and estimation procedures, data base implementation and effective reliability analysis for original design and design improvement, failure analysis techniques and equipment selection for determining failure modes. Techniques for improving system reliability will also be presented (i.e., redundancy, effective failure detection procedures, improved hardware and software).

(1) October 13—BASIC CONCEPTS AND DEFINITIONS—Reliability, availability, MTBF, failure rate, reliability distributions (exponential, gamma, weibull)

(2) October 20—RELIABILITY STRUCTURES—Series, parallel, (M, N) systems, combinations, stand-by systems.

(3) October 27—STATISTICAL PROCEDURES IN RELIABILITY—Sampling, hypothesis testing (conventional, non-parametric, sequential), inspection diagrams, confidence limits, estimation nomenclature (unbiasedness, efficiency, sufficiency, consistency), estimation techniques (maximum likelihood, bayesian).

(4) November 3—RELIABILITY & APPLICATIONS—Case studies

(5) November 10—RELIABILITY ANALYSIS FOR DESIGN IMPROVEMENT—Failure mode and effects analysis (FMEA), worst case circuit analysis, prediction analysis.

(6) November 17—CONSIDERATIONS FOR RELIABILITY IN DESIGN—MTBF or failure rate objective, operating life, storage life, environmental considerations.

(7) December 1—FAILURE ANALYSIS TECHNIQUES AND FACILITIES TO DETERMINE FAILURE MODES & MECHANISMS.

REGISTRATION FORM
Mail to: Mr. Ralph Hernandez, 324 B Hackensack St., Woodridge, N.J. 07075
Make checks payable to: North Jersey IEEE

Please enroll me in RELIABILITY AND ITS APPLICATIONS.

Name: _____________________________
Company: __________________________
Address: ___________________________
City, State, ZIP: _____________________
Phone: ___________________________
Fax: $50.00 IEEE Members
$70.00 Non-IEEE Members

The IEEE

Volume 24 September 1977 No. 3
Published monthly by the North Jersey Section of the Institute of Electrical and Electronics Engineers, Inc. Office of Publication: Robert Toreau, Mount Arlington, N.J. 07856.

NEWSLETTER STAFF
Editor: B. Blair Managing Editor: B. Blair Business Manager: M. M. Pergini
Staff: Joe Winston John Zinn George Finn
Publications Chairman: Joe Winston

Deadline for receipt of material is the 1st of the month preceding the month of publication. All communications concerning editorial matter should be addressed to Ray Vasnani, Editor, 116 Summit Rd, Mountain

Vol. 24, No. 3

Revolution In X-Rays

CANDIDATES DEBATE

Candidates for IEEE President will debate at Princeton University on October 13, 1977.

For additional information, contact: S. J. Vlahovides, (609) 639-2426.

Revolution In X-Rays

The Multigraph Group of North Jersey IEEE is sponsoring a talk by Joseph B. Kruskal on the subject of X-Ray Tomography on October 19, 1977, at 7:30 PM in the Punchbowl Room of Jersey Central Power & Light Corp., Madison Avenue at Punchbowl Rd. in Morrisville.

Despite many major advances in X-ray sources and detectors since Roentgen's discovery, X-rays are still used to make pictures in basically the same way. A conventional X-ray picture is like a shadow cast by a cloud: each point in the image shows the total X-ray attenuation along a line through the object. In 1970 Sir Geoffrey Hounsfield first demonstrated a useful method for displaying an image showing the local X-ray attenuation at each point in a plane slice. There are now hundreds of commercial tomography machines in routine medical use, costing hundreds of thousands of dollars each. Dr. Kruskal displays several medical tomographs, but his talk will focus on the method by which X-ray attenuation of the conventional kind are mathematically massaged to create these new images.

Dr. Kruskal has been a member of Technical Staff at B.T.L. Murray Hill, since 1959, in the Mathematics and Scientific Research Center. He received his B.S. and M.S. from the University of Chicago and his Ph.D. in mathematics from Princeton in 1954. He held several academic positions from 1954 prior to joining Bell Laboratories.

He has held many high posts in technical societies, including: President, Psychometric Society, 1975; President, the Classification Society, 1972-75; and Fellow of American Statistical Association.

He is a member of: American Mathematical Society, Mathematical Association of America, Society of Industrial and Applied Mathematics (SIAM), the Psychometric Society, American Statistical Association, The Classification Society, Institute for Mathematical Statistics, Sigma Xi (Honor Society), and Phi Mu Epsilon (Honor Society).

Cardiac Pacemakers: What’s New?

The Metropolitan New York Chapter of the IEEE Group on Engineering in Medicine and Biology announces its program for October to cover “What’s New in Cardiac Pacemakers”. The speaker for the October 5th meeting is Dr. Philip Hursteler, Cardiac Pacemaker Center, Montefiore Hospital, Bronx, New York.

Time: 7:30 PM, Wednesday, October 5, 1977.
Place: Rockefeller University, South Laboratory, Room 2004, 65th Street and York Avenue, New York City.
Pre-Meeting Dinner: 6:00 PM, Tower Café, 64th Street and York Avenue, New York City.

Report Writing Workshop

The IEEE announces a joint effort in a “Communication and Report Writing Workshop,” of a two-day duration, by the Professional Communications Group and the Educational Activities Board. The Workshop is scheduled for New Brunswick, N. J. from September 30 - October 1.

An interactive program between the students and instructors, this Workshop is designed to improve the technical writing capabilities of the participants. Registration fees are $135.00 for IEEE Members, and $160.00 for non-members. Enrollment is limited to 30 participants per location. Those interested are requested to contact Debbie Zemsky, IEEE Service Center, 445 How Lane, Piscataway, N. J. 08854, or phone (201) 981-0060, Extension 174.

CONTINUING EDUCATION

IEEE Career Workshops

1. Your work is not properly appreciated or adequately paid.
   You’re underemployed

2. You’d rather be doing something else, or anything else.
   You’re unemployed

3. You’re not producing as you know you can.
   You’re unemployed, or you soon will be.

These are the silent boxes of work, they cramp you when you’re in them, but you miss them when they’re gone.

IEEE Career Workshop offers a way out. One is scheduled for City Squire Motor Inn, 7th Ave. between 50th & 51st on October 1, 1977 (Saturday) with J. T. Crystal.

The workshop fee includes Workbook (Non-Members $60).

Tuition will be for students and unemployed Members is available.

IEEE Home-Study Course available for $20.

Call Lorraine Castiglia, (201) 981-0060 ext. 174 or 175 for details and registration. in cooperation with the New York Section.

AES Pioneer Award

Aerospace and Electronic Systems Society has announced that proposal of names for consideration by the Pioneer Awards Committee from the membership must be received by the chairman of the committee, M. T. Weiss, The Aerospace Corporation, P. O. Box 92957, Los Angeles, California 90009, telephone (213) 648-3344. The names should be accompanied by substantiating information to justify consideration. Contributions by more than a single individual can be recognized by a joint award. Nominations can be submitted on a Pioneer Award Nomination Form available by writing or calling Dr. Weiss. The guidelines followed by the Pioneer Awards Committee are that the award must have “contributed significantly to bringing into being systems that are in existence.” These systems should be within the specific area of interest of AES, that is, aerospace or electronic systems. The contributions for which the award is given should have occurred at least 20 years prior to the year of the award; this guideline is to ensure proper historical perspective for evaluation of the contribution. Significant contribution, of a specific nature, is the key criterion. Nationality, residence, membership in AES, IEEE, or any other organization are not factors. All nominations should be submitted by December 1, 1977, for consideration in the 1978 award.

“OP AMPS 77”

The New York, North Jersey, and Long Island Joint Chapter Instrumentation and Measurements is sponsoring a Fall study seminar entitled OP Amps 77 (Active Filters). It will be held on Tuesday, November 1, 8, 15, 22, 29, 1977 from 7:30 PM to 9:30 PM at the ITI conference center, 500 Washington Street, Nutley, New Jersey.

The subject of each of the lectures is as follows:

1. OP Amp Update
2. Single OP Amp Active Filters
3. Multiple OP Amp Active Filters
4. Gyrators
5. Hybrid Microelectronics

The cost for IEEE Members is $40 before October 1, 1977; $45 after October 1, 1977.

Cost for Non-IEEE Members is $50 before October 1, 1977.

Checks should be made payable to “Joint Chapter, I&M IEEE” and mailed to Dr. Joseph J. Patalano, New Jersey Institute of Technology, Department of Electrical Engineering, 322 High Street, Newark, New Jersey, 07102.

For further information: In New Jersey - Dr. J. Patalano (201) 645-5321, In New York - Mr. D.C. Roberts (212) 422-6800, Ext. 8224.

REGISTRATION FORM

Mail to: Mr. John Dombar, Automatic Switch Co., 6 Watertown Ave., Bloomfield, N.J. 07003
Make checks payable to: North Jersey IEEE

Please enroll me in ELECTRICAL DESIGN FOR WATER AND SEWAGE TREATMENT FACILITIES.

Name: ____________________________
Company: ________________________
Address: _________________________
City, State, ZIP: __________________
Phone: __________________________
Fax: ____________________________

Cell: $60.00 IEEE Members
$70.00 Non-IEEE Members
STUDY GROUP NO. 1

PRACTICAL SYMMETRICAL COMPONENTS

TUeSDAYS,
7:00 to 9:00 P.M., Starting October 4, 1977
Jersey Central Power & Light
Madison Ave. & Punchbowl Road
Morristown, New Jersey 07960

Group Sponsor: Frank Relotto, GTE Sylvania, (201) 283-0600
Speaker: J. L. Blackburn, Westinghouse Corp.

For whom intended: Electrical Design Engineers, including those who perform short circuit and coordination analysis, electrical distribution system studies and power distribution equipment design.

Course Objective: To give the electrical engineers an understanding of a basic design tool. Emphasis on symmetrical components as a thinking and analytical process. Typical problems will be assigned each week.

(1) October 4—INTRODUCTION AND HISTORICAL BACKGROUND—Representation of power system, Per unit and percent notation, Phases and polarity.
(2) October 11—MATHEMATICS OF SYMMETRICAL COMPONENTS—Sequence networks, Mechanics of short circuit calculations, Sequence quantities during faults. A typical line to ground fault calculation.
(3) October 25—TRANSFORMER AND REACTOR CHARACTERISTICS AND IMPEDEANCES.
(4) November 1—GENERATOR CHARACTERISTICS AND IMPEDEANCES.
(5) November 8—LINE CHARACTERISTICS—Positive, negative and zero sequence. Reactance and capacitance of overhead line circuits, Mutual impedance calculations.
(6) November 15—LOAD AND FAULT CALCULATIONS, SIMULTANEOUS FAULT, OPEN PHASES. (PART I)
(7) November 22—LOAD AND FAULT CALCULATIONS, SIMULTANEOUS FAULT, OPEN PHASES. (PART II)
(8) November 29—APPLICATION OF SYMMETRICAL COMPONENTS IN PROTECTIVE RELAYING. (PART I)
(9) December 6—APPLICATION OF SYMMETRICAL COMPONENTS IN PROTECTIVE RELAYING. (PART II)
(10) December 13—WORKSHOP ON PRACTICAL PROBLEMS SUGGESTED BY STUDENTS.

REGISTRATION FORM

Mail to: Mr. Frank Relotto, 153 B Maritime Ave., W. Paterson, N.J.
Make checks payable to: North Jersey IEEE

Please enroll me in PRACTICAL SYMMETRICAL COMPONENTS.

Name: ____________________________
Address: ____________________________
City, State, ZIP: ____________________________
Phone: ____________________________

Fee: $60.00 IEEE Members  
$70.00 Non-IEEE Members

IEEE Report On Societal Needs Of Young Engineers

In summary, the entire Institute must thoughtfully and openly re-examine the needs of the substantial and valuable segment of the Institute membership that consists of 30- and under members.

TECHNOLOGY FORECASTING

Data
"IEEE should help our country, profession, and members through forecasting."
"IEEE should be more active in helping to evaluate and forecast technological developments."
"National Science Foundation influences number of engineering students by scholarships, keeping supply large for industry. IEEE should represent EE's interests on NSF."  
"IEEE should not promote engineering during periods of economic instability."  
"Given when funding is needed, schools push for enrollment, supported by IEEE, because college staffs exert exressive influence in IEEE."

The survey developed a deep feeling from interviewees that there was a serious need for meaningful technology forecasting. Many believed that the engineering profession was already overpopulated and that IEEE should not just blindly encourage more students to join the ranks of the engineers who are presently seeking employment. In spite of the areas most severely hit by recent cutbacks in the aerospace and defense industries, many young engineers became jobless. Young engineers suffered from general lack of experience when seeking new employ-  
ment, while the more mature engineers suffered from highly specialized experience; both groups had difficulty within the engineering field. Many engineers, young and mature, had to leave the engineering field after long periods of unemployment. Since many experienced engineers were available, the young engineers who had limited experience were not in demand. The situation thus was a difficult one for the young engineer who had recently completed a long period of study in order
News By Phone

It is now possible to obtain an update on events of professional interest by telephoning the USAB information line, 202-785-2180, for a recorded message. This news is of two to five minutes duration, updated weekly. A Washington Office staff is available at all hours. Some messages include employment opportunities as well as news.

Guarnera Condemns Salary Busting

In testimony containing a virtual tongue of abuse against one segment of the vital technical human resources of this country, John J. Guarnera IEEE Vice President for Professional Activities has before the Subcommittee on Labor-Management Relations of the House Education and Labor Committee. The testimony was submitted in support of legislation called the Employment Non-discrimination Act for Federal Employees which guarantees equal opportunity for Federal employees. The bill was introduced by James G. O'Hara, the IEEE attorney in this matter; Dorothy Bomberger, Staff Parliamentarian; and Peter O'Day, Staff Assistant for Walter Edwin, an official of the South Carolina Society of Professional Engineers. Mr. Frank Leslie, Secretary of the South Carolina Society of Professional Engineers (C.A.P.E.); Mr. Roy Peck, Chairman of the California Society of Professional Engineers; Frank Palmer, Chairman of the IEEE task force on the Service Contract Act; Ron Wojtasinski, State Chairman of the Professional Engineers of California; and Bishop, Professional Activities Chairman of the IEEE in Huntsville, Alabama.

FOR BAYLESS

We believe that the incumbent Ex- ecutive vice-President of the Institute, Carlsten A. Bayless, should be re- elected for a second term. It is par- ticularly important to insure the election of Carl at this time. Among the four Presidential and three Executive candidates, he is the only nominee who has served in Institute offices including the Board of Directors and the Executive Committee. We believe that the present Board needs the continuity of Institute management.

Carl's support comes from members who have a broad spectrum of interests and activities within the Institute. His opponent is supported by a group that is primarily appealing to an elite point of view. Some members of this group hold high IEEE offices during the 1960's and did nothing to avoid the painful situation that developed for many of our members at the turn of the decade. They appear to want the Institute to return to the narrow technical base of that period.

Gerry Parsons
Chairman, IEEE Committee for a Member Oriented Institute

FOR HOGEN

You have soon receive your ballot for the election of officers and directors of the IEEE. A number of IEEE members who have been active in the electrical and electronics engineering profession, and the role of the Institute in shaping the future, have formed an independent candidate group which has become known as the Good Government Group. The sole purpose of GGG is to seek qualified, dedicated candidates for the leadership of the organization, and to provide, through a national ballot, an alternative to the present leadership of the Institute. In the past two years, the GGG group has been involved in a number of activities and professional activities. The split in the IEEE between the CON- SULTANT, the PRODUCT, and the SUPPLIER.

The consumer group is represented by the GGG group. The GGG group, in cooperation with the IEEE Good Government Group (GGG)--the backbone of hypocrisy. These so-called professionals weigh heavy from malpractice, rowdy, brawny, and often abuse the public. The product, of course, is the practicing engineer. The supplier, as you very well know, is the management in engineering schools. The GGG also represents this supplier. GGG's secretary, Karl Willenbrock, is the Dean of SMU's School of Engineering. A number of members of this student group were unacquainted with the IEEE/EGG/Self-appointed committee will secure a large supply of college engineering student enrollments and a low-priced supply of engineers. Caught between these two forces is the product, the practicing engineer. He has not been permitted the opportunity to be heard, and is being forced by the two forces, the consumer and the supplier, to work for the good of the Institute. Because of this, we have made several changes as a response to student and industry pressures. We are currently working on several other proposals which, if adopted, will improve the position of the practicing engineers. For instance, we are trying to get the faculty to agree on a minimum level of education for entry into the profession, and we are also discussing the possibility of establishing a national register of professional engineers.

The United States Activity Board (USAB) and the Professional Activities Committees (PAC) are also working on several of these issues.

For professional problems, you may write to Mr. Edw. Feinst, a professional engineer, at 123 Main St., Anytown, USA. He will answer any queries you may have.

Mr. Jack Bland, Director of IEEE at Philadelphia, is eager to assist you. He will be pleased to share his experience and knowledge with you.

Richard L. Tax
PAC Chairman
North Jersey Section
EDUCATION PROGRAM—FALL 1977
SPECIAL STUDY GROUPS

WHY SHOULD YOU ATTEND OUR STUDY GROUPS:

Self-development and continuing growth of the professional in all phases of engineering has never been as important as it is now. Every day new techniques are developed and new knowledge is available which could be of vital importance in your professional activities. Keeping up with these continuing and rapid changes is imperative for any individual to stay on top of important new developments.

By attending our study groups knowledge of new facets in business and industry can be obtained. Each study group is structured in such a way as to encourage participation from the attendees. Raising questions and discussing case histories and solutions in a professional atmosphere creates a profitable learning experience for all involved.

You owe it to yourself to attend these stimulating study groups. It's a sure investment in your future.

REGISTRATION INFORMATION FOR SPECIAL STUDY GROUPS

<table>
<thead>
<tr>
<th>FEE PER GROUP</th>
<th>PAYABLE TO</th>
<th>MAIL TO</th>
</tr>
</thead>
<tbody>
<tr>
<td>$85 each for members, IEEE, ASME; $70 each for all others</td>
<td>&quot;POWER &amp; IND. GROUP N.Y. SECTION IEE&quot;</td>
<td>Kurt Herzog, Chairman Education Committee, IEEE Consulting Engineer 5 Manning Circle Pelham, N.Y. 10803</td>
</tr>
</tbody>
</table>

FOR FURTHER INFORMATION, CONTACT INDIVIDUAL SPECIAL STUDY GROUP COORDINATOR OR: Kurt Herzog, Chairman Education Committee, IEEE, Consulting Engineer, 5 Manning Circle, Pelham, N.Y. 10803

NOTE
Fill out one registration form for each group and mail with payment. Registrations will be accepted at first and second sessions to the limit of room capacity.

REGISTRATION FORM

<table>
<thead>
<tr>
<th>Name (printed)</th>
<th>Position</th>
</tr>
</thead>
<tbody>
<tr>
<td>First</td>
<td>Business Address</td>
</tr>
<tr>
<td>Home Address</td>
<td></td>
</tr>
</tbody>
</table>

Study Group

Member of:

[ ] IEEE
[ ] ASME
[ ] OTHER
[ ] NON-MEMBER

Membership No.

(Do Not Write In This Space)

Admission Card No.
Refund Certificate No.
Fee Paid $ (Cash, Check, M.O.) Date By

STUDY GROUP NO. 6
INTRODUCTION TO MICROPYROCESSORS

(Starting September 19, 1977) Stone & Webster (41st Floor Training Room) 1 Penn Plaza, New York, N.Y. 10001

Course Sponsor: Kurt Herzog Consulting Engineer (914) 738-2439
Course Coordinator: Michael Casella 1 Loring & Assoc. (212) 563-7400
Instructors: Dr. Robert Borrmann Dr. Robert Mauro

This intensive course is designed to give the student an understanding of microprocessor basic concepts, assembly language programming, concepts and digital logic design within a microprocessor environment. Students will learn to assemble and edit programs, implement logic which requires assembly language, and digital logic packages to interact. Reference books for this course will be available only when ordered at pre-registration. "An Introduction to Microcomputers" by Adam Osborne, copyright 1978 by Adam Osborne & Associates, Inc., Berkeley, Calif., 2 Volumes. $20 per set.

1. September 19-8:30 to 9:30—Organization of a Microcomputer-Microcomputer Memory; The data, address, and control buses for the 8800; Timing of instruction execution; Elementary data transfer, and input/output (I/O) in the 8800. Example: A programmable pulse train generator.
# Educational Program—Special Study Groups

## Study Group No. 7
**Protective Relaying**

**Tuesdays, 6:00–8:00 PM, Starting September 20, 1977**

**Stone & Webster (42nd Floor)**
1 Penn Plaza, New York, N.Y. 10001

<table>
<thead>
<tr>
<th>Group Sponsor</th>
<th>Group Coordinator</th>
</tr>
</thead>
<tbody>
<tr>
<td>McKinley Moore</td>
<td>Alex Koren</td>
</tr>
<tr>
<td>General Electric</td>
<td>Stone &amp; Webster</td>
</tr>
<tr>
<td>(212) 750-2245</td>
<td>(212) 760-2192</td>
</tr>
</tbody>
</table>

A nine-session study course to aid engineers in the commercial, industrial, and utility fields. The course will cover the basic principles of operation, application, selection and coordination of protective relays.

1. September 20—Symmetrical Components—Three Phase Systems; Phasor definitions and per unit system; Symmetrical components definitions; Equipment representation; Fault calculation.

2. October 4—Generator Protection—Rotor Winding; Normal Operating Conditions; System Back Up.

3. October 11—Transmission Line Protection Overcurrent—Types and Characteristics; Applications; Systems Coordination.

4. October 18—Transmission Line Protection Distance and Pilot Relays—Types and Characteristics; Applications; System Coordination.

5. October 26—Communication Channels—Types of Equipment Available; Operating Times; Coordination and Channel Logic; Single Function Versus Multi-Function Equipment.

6. November 2—Transformer and Bus Protection—Transformer Differential; Transformer Pressures; Transformer Gas Detection; Transformer Temperature Detect; Bus Differential; Current Bus Differential, Voltage.

7. November 9—Power Station Auxiliary Protection—Motor and Feeder Protection; Transformer Protection; Unit Substation Protection.

8. November 16—Digital Relays—A Digital Distance Relay; Substation Automation.

## Study Group No. 8
**Topics in Electric Load Management**

**Wednesdays, 6:00–8:00 PM, Starting September 21, 1977**

**FBA/ECO Services**
2 Rector Street, N.Y., N.Y. 10006

<table>
<thead>
<tr>
<th>Group Sponsor</th>
<th>Group Coordinator</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ralph Mauro</td>
<td>Gustavo Labrador</td>
</tr>
<tr>
<td>Com Edison Co.</td>
<td>Port Authority of N.Y. &amp; N.J.</td>
</tr>
<tr>
<td>(212) 450-4100</td>
<td>(212) 466-4792</td>
</tr>
</tbody>
</table>

This course is designed for Engineering Consultants, Architects, Contractors and Building Managers. The lecture series will explain how Electric Load Management is important and beneficial for both the utility and the consumer. Discussion will center around the problems and tools available to achieve Load Management. Recent developments and future trends in Load Management methodology will also be presented with emphasis on ongoing projects sponsored by the Federal Government and utility industries. The course will conclude with a panel discussion at which many of the speakers will be available for clarification of points discussed in the preceding sessions.

1. September 21—Load Management—What and Why—An overview of the role of Load Management in both utility and consumer, introduction to rate structures and economic benefit of decreased electric demands.

2. September 28—Utility Alternatives to Load Management—Discussion of rate increases due to increased capital investment. Rate structures based on demand, Voltage Reduction, Rotating Blackouts, Frequency Decrease & System Disruptions due to excessive demand.

3. October 5—Tools of Load Management—Discussion of Conservation efforts, demand controllers from clocks to computers (Ripple control, Radio control, control of day rates).

4. October 12—Load Management in Commercial Buildings—Specific applications of the items discussed in Session 1—3 showing changing demand envolves, equipment to control and savings to be gained in commercial buildings.

5. October 19—Load Management in Industrial Buildings—An extension of session 4 with applications directed at the Industrial sector.

6. November 2—Future Technology for Load Management (R&D)—Discussions on storage techniques, heat pump, fuel cells, batteries, windmills & future developments.

7. November 9—Summary and Panel Discussion—This session will summarize the discussion of the previous seven sessions and allow for additional in depth discussion with the instructors at an informal session.

## Study Group No. 9
**Grounding Principles and Practices**

**Thursdays, 6:00–8:00 PM, Starting September 22, 1977**

**Stone & Webster (42nd Floor)**
1 Penn Plaza, New York, N.Y. 10001

<table>
<thead>
<tr>
<th>Group Sponsor</th>
<th>Group Coordinator</th>
</tr>
</thead>
<tbody>
<tr>
<td>John Tambascio</td>
<td>Alex Koren</td>
</tr>
<tr>
<td>New York State Urban Development Corp., N.Y.</td>
<td>Stone &amp; Webster Engr.</td>
</tr>
<tr>
<td>(212) 574-7605</td>
<td>(212) 760-2195</td>
</tr>
</tbody>
</table>

A review of the engineering practices and principles of systems and equipment grounding. This will include the important elements in protection of transmission and distribution systems, code requirements, earth connection electrical safety and public health.


3. October 5—Substation Grounding—Grounding of substation equipment and structures.


10. December 1—Connections to Earth—Characteristics of grounds, earth resistivity, calculations and tests. 

Speakers for all sessions will be announced.