



The IEEE

# Newsletter

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Volume 20 September 1973 Number 1

## NEWSLETTER STAFF

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## Newsletter Deadline

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Engineers, Inc., 345 East 47th Street  
New York, N. Y. 10017

It is not necessary to inform the North Jersey Section when you change your mailing address. The NEWSLETTER and other section mailings use a list provided by IEEE's national headquarters in New York. This means the Section has no need to maintain a mailing list or addressing plates. Section membership records are changed when Headquarters notifies us.

## SECTION OFFICERS 1973-1974

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Member-at-Large..... James C. Gass  
Member-at-Large..... Dr. Robert McMillan  
Jr. Past Chairman..... Carl C. Torell

## Pensions

Few subjects of interest to engineers have had as much airing recently as the "pension problem." Still, because of its complexities, it remains inadequately understood and recent relevant events are not widely known. The subject will be dealt with in a talk to the North Jersey Section to be given by Art Rossoff on Wednesday, September 19th. Mr. Rossoff's talk will define the nature of the problem and will discuss the range of solutions which are under consideration, offering comment on their viability. He will then review the progress of attempted pension reform, both from the standpoint of legislation and IEEE action. His talk will be followed by a question and answer period.

Mr. Rossoff has been following the pension question for years and has been an activist for reform through IEEE and other society activities. He first wrote on the subject in the July '70 Spectrum. He was L.I. Section Chairman, '70-'71. In '72, he was a member of the IEEE Professional Activities Committee and is now a member of the Government Relations and Employment Practices Committees. He also represents the IEEE on the Inter-Society Committee for Professional Employment Guidelines and participated actively in the preparation of the Guidelines. He is a Fellow of the IEEE and candidate for Region 1 Director.

*Time:* 7:30 P.M., Wednesday, September 19, 1973

*Place:* Jersey Central Power & Light Co., Punchbowl Road & Madison Avenue, Morristown, N.J.

*Pre-Meeting Dinner:* Rod's 1890's Ranch House, Madison Avenue & Convent Station, 5:30 P.M. Contact Paul Orehek, Public Service, 80 Park Place, Newark, N.J. 07101; (201) 622-7000, Ext. 3154.

## WESTAR - First U.S. Domestic Satellite

The September meeting of the North Jersey Chapter of the Communications Society will feature a talk on Western Union's WESTAR, the first U.S.-owned domestic satellite system. The speaker will be Robert E. Greenquist, Director-WESTAR Engineering for the Western Union Telegraph Company.

WESTAR is a \$70 million domestic communications satellite system that is scheduled for inauguration before mid-1974. Plans call for two 1,260-pound satellites which will be in synchronous orbit 22,300 miles over the earth. Five earth stations will provide the terrestrial segment of the system, with the primary station in Vernon Township, N.J. Microwave relay equipment at all the earth stations will transmit and receive voice, video, and data signals to and from Western Union facilities in satellite serving cities. The WESTAR satellites will be designed to serve all 50 states and Puerto Rico.

Mr. Greenquist is responsible for WESTAR systems requirements, filings with the Federal Communications Commission, and integration of the satellite system with terrestrial facilities, customer-owned ground stations, and customer-owned facilities. He received his BEE from Cornell University in 1948 and then joined the Radio Research Division of Western Union where he participated in microwave propagation tests and in testing and modifying WU's radio relay systems. Since 1966, he has been immersed in the technological planning involved with domestic communications satellite systems.

*Time:* Tuesday, September 11, 1973, 8:00 p.m.

*Place:* Western Union's Teleprocessing Industries, Inc., 82 McKee Dr., Mahwah, N.J. (Just off the Island Road Exit of Route 17 Northbound) Tel. 201-529-4600.



## Picatinny Arsenal Tour

The Metropolitan I&M Chapter is sponsoring a trip to Picatinny Arsenal on Thursday, October 11. This Arsenal is one of the leading munitions research and development establishments in the U.S. Department of Defense. The tour will cover the following areas: Museum; Aeroballistics Laboratory; Propulsion Test Facility; Computerized Instrumentation Center; Radio Frequency Interference Laboratory and Environmental Test Laboratory. This tour will be limited to 40 guests, who must be citizens and at least 18 years of age. Arrival time at the arsenal should be between 8:00 and 9:00 A.M. Adequate parking is available. Transportation within the arsenal will be provided for the tour. Lunch will be held at the Officers' Club at an estimated maximum cost of \$3.00. Due to the restricted number of guests, early registration would be advisable. For further information contact: In New Jersey: Mr. Al S. Mindes (201) 328-4066, or Mr. Dennis Roerty (201) 465-2295; In New York: Mr. David Roberts (212) 422-4800, Ext. 8228.

### Registration - Tour of Picatinny Arsenal

Name (Print) \_\_\_\_\_

Firm \_\_\_\_\_

Bus.Address \_\_\_\_\_

Bus.Phone \_\_\_\_\_

Mail to: Mr. Al. S. Mindes, Bldg. 3109,  
Picatinny Arsenal, Dover, N.J. 07801.

## Ion Implantation

Ion Implantation Technology is the subject of the Metropolitan Electron Devices Group's October 11 meeting. The speaker will be C.W. Mueller, RCA Laboratories, Princeton, New Jersey.

### About The Talk

Ion implantation has become a most significant tool in the sophisticated technology of silicon devices and integrated circuits. A general physical description of ion machine operation and the physics of ion implantation will be given. The characteristics of ion implantation will be de-

scribed and applications where these attributes are most readily exploited will be described in general terms. Specific applications of ion implantation will be discussed by illustrating uses of ion implantation to COS-MOS devices, to high-value resistors, and to bipolar transistors.

### About The Speaker

Dr. Charles W. Mueller joined RCA Laboratories, Princeton, N.J. in 1942 as a Member of the Technical Staff where he has remained to the present time. He served as Head of the Silicon Devices Group there from 1965 to 1971 and is at present a Fellow of RCA Laboratories directing ion implantation research.

Dr. Mueller's contributions to electron devices have spanned the range from variations on the DeForest triode to the most recent of solid-state elements.

He earned the B. Sc. degree (magna cum laude) from the University of Notre Dame in 1934 and the M. Sc. degree from the Massachusetts Institute of Technology in 1936. The following two years were spent at Raytheon, Corp., Waltham, Massachusetts, as an electron tube engineer, after which he returned to M.I.T. where he received the D. Sc. degree in 1942.

*Time:* 8:00 p.m., Thursday, October 11, 1973.

*Place:* ITT Laboratories, Nutley, N.J.

## Communications Multiplexing Economics

The October 9th meeting of the North Jersey Chapter of the Communications Society will consist of a tutorial presentation on the subject: The Economics of Communications Multiplexing. The speaker will be Robert S. Smith of General DataComm Industries, Wilton, Conn.

This tutorial will emphasize four main points: Examination of the system and economic factors which make multiplexing worthwhile; Comparison of Time Division Multiplexing (TDM) vs. Frequency Division Multiplexing (FDM); Consideration of the operating and maintenance factors involved in the use of multiplexers; Analysis of a specific network where multiplexing has been employed.

Robert S. Smith is Vice President of Plans and Programs for General DataComm Industries where he was one of the company's founding group. In his present position, he is responsible for product planning and product development for all aspects of data communications.

Mr. Smith received his BEE from Brooklyn Poly and his MSEE from NYU and is a registered Professional Engineer.

*Time:* Tuesday, October 9, 1973 - 8:00 p.m.

*Place:* ITT Laboratories Auditorium, 500 Washington Ave., Nutley, N.J.

## Corona Detection Seminar

A one-day seminar on Corona Detection sponsored by the Metropolitan Chapter on Instrumentation & Measurements is scheduled for Thursday, October 25, 1973, 9 AM to 4 PM, at the Con Edison Bldg., Rm. 811, 4 Irving Place, New York, N.Y. 10003.

## A Cashless Society

The New York Chapter of the IEEE Computer Society, in conjunction with the IEEE Technological Forecasting and Assessment Project, will present a feature: "Approaches to assessing and forecasting the Cashless Society" by Murray Turoff, Computer Science Department, Newark College of Engineering.

*Time:* 7:30 p.m., Monday, September 24, 1973.

*Place:* IEEE Board Room, 10th Floor, IEEE-United Engineering Bldg., 345 East 47th Street, N.Y.C.

*Pre-Meeting Dinner:* 6:00 p.m., Le Marmion, 116 East 49th Street, N.Y.C.

## Microwave Transistors & Circuits Developments

At the October meeting of the North Jersey Chapter of GMTT/AP, Mr. G. Hodowanec of RCA Solid State Division will discuss: "Recent Developments in Microwave Transistors & Circuits."

*Time:* Wednesday, October 17, 1973 - 8:00 p.m.

*Place:* ITT Auditorium, 500 Washington Ave., Nutley, N.J.

*Pre-Meeting Dinner:* 6:15 p.m., Copperhcod Restaurant, Park Ave. Lindhurst.

### ADVANCE NOTICE

The Metropolitan Chapter of Aerospace and Electronic Systems plans an 8:00 P.M. meeting on Thursday, October 25, 1973 at Singer Company, Kearfott Division, Plant 12 Auditorium, 150 Totowa Road, Wayne, New Jersey. Tactical Microwave Landing Systems will be discussed by Mr. George Henf,

PLEASE POST ON BULLETIN BOARD — ALL GROUPS ARE OPEN TO THE PUBLIC

N. Y. Section, IEEE

Metropolitan Section



Power and Industrial Div.



## EDUCATIONAL PROGRAM — FALL 1973

### SPECIAL STUDY GROUPS

The Fall Educational Program consists of the following subjects, which are described in detail within this bulletin:

STUDY GROUP NO. 6 - CONFERENCE LEADERSHIP/MANAGEMENT

STUDY GROUP NO. 7 - ADVANCED ENGINEERING COMPUTER PROGRAMMING

STUDY GROUP NO. 8 - CRITICAL AND EMERGENCY ELECTRICAL SYSTEMS

STUDY GROUP NO. 9 - PROBABILITY AND STATISTICS

STUDY GROUP NO. 10  
SYMMETRICAL COMPONENTS AS APPLIED TO SHORT CIRCUIT CALCULATIONS

STUDY GROUP NO. 11 - NOISE CONTROL

NOTE: Review Study Groups timed for the November 1973 Professional Engineering License Examinations are already in progress.

Complete information for Review Study Groups timed for the April 1974 Examinations will be published at a later date.

#### REGISTRATION INFORMATION FOR SPECIAL STUDY GROUPS

##### FEE PER GROUP

\$35 each for members, IEEE, ASME;  
\$45 each for all others

##### PAYABLE TO

"POWER & IND.  
GROUP N.Y.  
SECTION IEEE"

##### MAIL TO

Gary Golinski, Educational  
Committee, IEEE  
501 Doremus Avenue  
Glen Rock, N.J. 07452  
Phone: (212) 267-1466

Fill out one registration form for each group and mail with payment

#### REGISTRATION FORM

Name (printed) .....  
Firm ..... Position .....  
Business Address .....  
Phone No. ....  
Home Address .....

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 .....

Note: See Registration Information for Checks

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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 .....

Note: See Registration Information for Checks

Registrations will be accepted at first and second sessions to the limit of room capacity





**STUDY GROUP NO. 6**

**CONFERENCE LEADERSHIP/MANAGEMENT**

MONDAYS, 6:30-8:30 P.M., Starting September 17, 1973

Consolidated Edison Co., Rm 1701

4 Irving Place, New York, New York 10003

*Group Sponsor  
& Coordinator:*

*Kent Weitzel, Westinghouse  
Tel. (212) 692-3613*

*Instructors:*

*Dorothy I. Tucker: Training Consultant  
for Bankers Trust Co.*

*Joseph E. Cosby: Associate Director of  
AMACOM, American Management  
Associations*

The purpose of this course is to provide information and some techniques in the areas of both conference leadership and management. It is recommended for Managers who direct problem solving sessions, training and development specialists and any professionals involved with their societies or association's conferences.

The topical outline of this course will be adjusted to meet the needs and objectives of the group which will be determined at the first session.

1. September 17 - Planning and Controlling the Conference - Conference budgeting, contingency planning, facilities management and special activities.
2. September 24 - Planning and Controlling the Conference - continued.
3. October 1 - Conference Publicity and Public Relations - Directing and motivating attendees and effective use of media.
4. October 15 - Care and Feeding of - Exhibitors, speakers, volunteers, and professional staff.
5. October 29 - Care and Feeding - continued.
6. November 5 - Presentation Planning - Conference climate, learning in groups, understanding human behavior and transactional analysis.
7. November 12 - Presentation Planning - continued.
8. November 19 - Presentation Planning - continued.
9. November 26 - Presentation Techniques - Role of conference leader, group dynamics, using visuals and obtaining feedback.
10. December 3 - Presentation Techniques - continued.

**STUDY GROUP NO. 7**

**ADVANCED ENGINEERING  
COMPUTER PROGRAMMING**

**Introduction to IBM Assembler Language**

TUESDAYS, 6:30-8:30 P.M., Starting September 18, 1973

Consolidated Edison Co., Rm. 1425\*

4 Irving Place, New York, New York 10003

*Group Sponsor:*

*David Hawkins, Consolidated Edison Co.  
Tel. (212) 460-2650*

*Group Coordinator:*

*Gerry Ryff, Consolidated Edison Co.  
Tel. (212) 460-3983*

*Instructor:*

*Jack Driscoll, Consolidated Edison Co.*

This course will introduce the Student to the fundamentals of 360/370 Assembler Language. Many example problems will be covered in class. Homework assignments will be given. Student access to a 360 or 370 computer would be of advantage for mastery of the material.

1. September 18 - S/360 Architecture and Data Formats.
2. September 25\* - Instruction Formats and Instruction Execution.
3. October 2 - Fixed Point Binary Arithmetic.
4. October 9 - Program Relocatability and Looping Techniques.
5. October 16 - Character Operations.
6. October 23 - Introduction to Sequential I/O Operations.
7. November 13 - Decimal Arithmetic.
8. November 20 - Editing and Logical Operations.
9. November 27 - Subprograms and Standard Linkage Conventions.
10. December 4 - Data Validation.

\*Except second session will be in Room 811.

# A — Special Study Groups



FALL 1973

## STUDY GROUP NO. 8 CRITICAL AND EMERGENCY ELECTRICAL SYSTEMS

TUESDAYS, 6:30-8:30 P.M., Starting September 18, 1973  
Roger Smith Hotel, Cavalier Room  
47th Street & Lexington Ave., New York, N.Y.

*Group Sponsor:* William Perlman, Roytran, Inc.  
Tel. (212) 782-1505

*Group Coordinator:* John Domorski, Automatic Switch Co.  
Tel. (212) 344-3765

This Study Group will consider the methods available for assuring continuity of supply to lighting and critical power loads upon loss of the primary supply. Equipment for monitoring and upgrading normal supply voltage will be described. Solid-State uninterruptible supplies and time-sequencing of large emergency power systems will also be covered.

1. **September 18 - General Considerations** - The need for emergency power, National Electric code requirements and design considerations. *Speaker to be announced.*
2. **September 25 - Diesel and Turbine Engines** - Features, size considerations, auxiliary requirements, fuel requirements and governors.  
*Speaker: Paul Waskewics, H.O. Penn Machinery Co.*
3. **October 2 - Generators** - Voltage, regulation, phasing and connections, and protection.  
*Speaker: Don Weaver, Elect. Machinery Co.*
4. **October 9 - Synchronizing and Generator Controls** - Governor and voltage regulator requirements, enclosures, space requirements, automatic synchronizing and manual standby.  
*Speaker: George Whitteker, Russel Electric Inc.*
5. **October 16 - Automatic Transfer Switches** - Sequence of operation, accessories, withstand ratings, Underwriters Laboratories Standard 1008 and sizing.  
*Speaker: Jack Powell, Russelectric, Inc.*
6. **October 23 - Electronic Voltage Monitors and Regulators** - Types and range of regulators, voltage and frequency, monitors-analog and digital.  
*Speaker: William Cashen, Airoyal Mfg. Co.*
7. **October 30 - Batteries** - Types, duty and reliability.  
*Speaker: Doug Zachan, C & D Batteries, Div. of Eltra Corp.*
8. **November 13 - Uninterruptible Power Supplies** - Rectifiers, inverters, single phase and three phase, redundant and standard systems.  
*Speaker: Tom O'Neil, Lorain Products Corp.*
9. **November 20 - Battery Emergency Lighting Systems** - Code requirements, wall mounted, control systems, voltage considerations and battery choices.  
*Speakers: Jack Kalabza, Exide.*  
*William Jansen, Royal Switchboard*
10. **November 27 - System Design** - Three source arrangements, elevator schemes, and multiple switch sequencing.  
*Speaker: George Whitteker, Russelectric, Inc.*

## STUDY GROUP NO. 9 PROBABILITY AND STATISTICS

WEDNESDAYS, 6:30-8:30 P.M., Starting September 19, 1973  
Consolidated Edison Co., Rm. 811\*  
4 Irving Place, New York, New York 10003

*Group Sponsor* Roch Cappelli, Consolidated Edison Co.  
*& Coordinator:* Tel. (212) 460-2848

*Instructor:* Ed Parascos - Consolidated Edison Co.

This elementary statistics course will introduce engineers to the basic tools of data reduction and analysis. It will concentrate on practical engineering applications and will only introduce theory to enhance the practical solutions. In addition, Time-sharing application of statistical techniques will also be presented.

1. **September 19 - Introduction to General Applications of Statistics** - Concept of statistical distributions and examples of engineering applications.
2. **September 26 - Introduction to Concepts of the Universe and Sample** - Normal distribution and statistical inference with applications.
3. **October 3 - Basic Probability Theory** - Sets and subsets, sample space, probability laws, discrete and continuous probability distributions with applications.
4. **October 10 - Statistical Inference** - Statistical hypothesis, level of significance, test of statistical hypothesis with example applications.
5. **October 17 - Linear Regression and Correlation** - Simple linear regression, confidence limits and tests of significance with applications using linear regression techniques.
6. **October 24\* - Multiple Linear Regression and Polynomial Regression** - Least squares estimator, tests for hypothesis, with applications.
7. **October 31 - Factorial Experiments** - Choice of sample size, discussion of multifactor models analysis of variance, with application examples.
8. **November 7\* - Computer Applications of Statistical Techniques** - Time-sharing terminal demonstration, statistical laboratory experiments.
9. **November 14\* - Time-Sharing Terminal Statistical Experiments** - Reliability Engineering Statistics and Applications.
10. **November 28\* - Statistical Quality Control** - Mil-Std-105.

\*Except Meeting Nos. 6,8,9,10, which will be held in Room 1701.

N. Y. Section, IEEE



Power and Industrial Div.

# EDUCATIONAL PROGRAM FALL 1973

Metropolitan Section



ASME

## STUDY GROUP NO. 10

### SYMMETRICAL COMPONENTS AS APPLIED TO SHORT CIRCUIT CALCULATIONS

WEDNESDAYS, 6:30-8:30 P.M., Starting September 19, 1973

(Except Meeting No. 1, which will start at 6:00 P.M.)

Roger Smith Hotel, Cavalier Room

47th Street & Lexington Ave., New York, N.Y.

Group Sponsors: *Jalal Gohari, American Electric Power  
Tel. (212) 422-4800, ext. 551*

*Gary Golinski, Bussman Mfg. Co.  
Tel. (212) 267-1466*

Group Coordinator: *Al Cox, Bussman Mfg. Co.  
Tel. (212) 267-1466*

Speakers: *Steve Ehrmann, American Electric Power  
Clarence Tsung, Syska & Hennessy*

Short circuit calculations and values are an integral part of the design criteria for electrical distribution systems and an important tool for the electrical design engineer. This course will follow through from basic symmetrical components to practical job applications.

1. **September 19 - Introduction** - Definitions and concepts. *Mr. Ehrmann.*
2. **September 26 - Analysis** - Various calculation methods includes ohmic, per unit and network reduction. *Mr. Ehrmann.*
3. **October 3 - Symmetrical Components I** - Introduction, fault types and three phase faults. - *Mr. Ehrmann.*
4. **October 10 - Symmetrical Components II** - Phase to Phase and Phase to Ground. - *Mr. Ehrmann.*
5. **October 17 - System Applications and Concepts** - X/R ratio, Irms, Ipeak, thermal and mechanical energy considerations and R+JX values of electrical components. *Mr. Tsung.*
6. **October 24 - System Short Circuit Calculations** - Three phase, phase to phase and phase to ground calculations using Ohmic Method. - *Mr. Tsung.*
7. **October 31 - System Short Circuit Calculations** - Three phase, phase to phase and phase to ground using Per-Unit Method. *Mr. Tsung.*
8. **November 7 - Short Circuit Calculations Applications I** - Practical use of calculations on various network configurations. - *Mr. Tsung.*
9. **November 14 - Short Circuit Calculations Applications II** - *Mr. Tsung.*
10. **November 28 - Workshop** - Short cut methods, practical applications and problems. - *Mr. Tsung.*

## STUDY GROUP NO. 11

### NOISE CONTROL

THURSDAYS, 6:30-8:30 P.M., Starting October 4, 1973

Consolidated Edison Co., Rm. 1701

4 Irving Place, New York, New York 10003

Group Sponsor: *John Tambasco, NYS Urban Development Corp.  
Tel. (212) 974-7617*

Group Coordinator: *Shelton Heitman, OTIS Elevator  
Tel. (212) 244-8008, ext. 84*

Instructors: *A.M. Teplitzky, Consolidated Edison Co.  
Dr. J. Applebaum, New York Hospital,  
Cornell Medical Center*

These noise control lectures will be broadbased for both the engineer and environmentalist.

1. **October 4 - Introduction** - Acoustical terminology, noise measurements, and noise measuring instruments.
2. **October 11 - Noise Criteria** - Community noise, construction noise, occupational noise, recommendations for noise criteria and New York City noise standards.
3. **October 18 - Hearing Conservation** - New York State Workmen's Compensation Act, Occupational Safety and Health Act - 1970 and Hearing Conservation Program.
4. **October 25 - Noise Control Techniques I** - Sound absorption and vibration isolation.
5. **November 1 - Anatomy and Physiology of Hearing** - The effect of noise on human hearing. *Speaker: Dr. J. Applebaum.*
6. **November 8 - Noise Control Techniques II** - Barriers, enclosures and sound transmission loss.
7. **November 15 - Noise Specifications** - Specifying noise levels for equipment, specifications for noise control hardware, performance specifications and proposal evaluation.
8. **November 29 - Noise Control Standards** - Technical Societies, ANSI, ISO and Federal.
9. **December 6 - Noise Sources and Their Characteristics** - Fans, engines, mechanical and air conditioning equipment, and case studies.
10. **December 13 - Case Studies in Noise Control.**



# FUNDAMENTALS OF ELECTRICAL DESIGN

This ten session study group is presented for the benefit of electrical, consulting and project engineers, contractors, manufacturers, and designers who are concerned with power distribution systems.

This course will stress practical design and application information for distribution systems, stressing actual experience over abstract theory.

**September 25, 1973—MEDIUM VOLTAGE (5-15KV)**—Switchgear construction ratings. Application. Relaying fusible switches. Circuit breakers. Motor starters.

**October 2, 1973—TRANSFORMERS**—Dry type. Askarel filled. Oil filled. Ratings. Application. Connections.

**October 9, 1973—SERVICE ENTRANCE EQUIPMENT**—Large services. Small services. Code requirements. Metering. Circuit breakers. Service protectors. Bolted pressure switches.

**October 16, 1973—LOW VOLTAGE SWITCHGEAR**—Construction. Air circuit breakers. Ratings. Application. Selectivity. Magnetic trip units. Static trip units.

**October 23, 1973—LOW VOLTAGE SWITCHBOARDS**—Nema standards. Design and construction. Bus ratings. Bus bracing. Circuit breakers. Fused switches. Hybrid types. Application.

**October 30, 1973—PANELBOARDS**—Circuit breakers and ratings. Switches and fuses. Construction. Application. Standards. Special features. UL fuse classifications.

**November 6, 1973—ELECTION DAY**—No session.

**November 13, 1973—MOTOR CONTROL AND MOTOR CONTROL CENTERS**—Starters reduced voltage starting. Ratings. Overcurrent protection. Short circuit protection. Motor control center construction. Application.

**November 20, 1973—GROUND FAULT PROTECTION**—Needs. 1971 code requirements. Practical system design. Application. Damage limits. Coordination. Life protection. Hospital systems.

**November 27, 1973—GROUNDING**—Power factor correction. Wire and cable. Grounding code requirements. Good grounding power factor. Cost savings. Calculations. Application.

**December 4, 1973—BUS DUCT**—Bus duct design types. Horizontal systems. Vertical risers. Code requirements. Voltage drop take-off devices and methods. Application.

**TIME:** 7:00-9:00 P.M. Tuesday evenings, beginning September 25, 1973.

**PLACE:** To be announced.

**FEE:** \$60.00 to members of IEEE, ASME, AIME, ASCE, etc. \$70.00 to non-members.

**SPECIAL OFFER:** A \$5.00 savings for advanced registrants whose mail registrations are received prior to September 18, 1973.

**CHIEF GROUP COORDINATOR:** Frank Carragher, Roytran, Inc. Phone (212) 782-1505.

**GROUP COORDINATOR:** George Tortora, B-K Electrical Products Co., Inc. Phone (201) 731-7212.

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## REGISTRATION FORM—FUNDAMENTALS OF ELECTRICAL DESIGN

*Mail to: Frank Carragher, Roytran, Inc., 179 North 10th Street, Brooklyn, N.Y. 11211; phone (212) 782-1505.*

Name \_\_\_\_\_ Tech. Society \_\_\_\_\_

Firm \_\_\_\_\_ Position \_\_\_\_\_

Business Address \_\_\_\_\_ Phone \_\_\_\_\_

Home Address \_\_\_\_\_ Phone \_\_\_\_\_

*Check or money order enclosed: Member: \$55.00 (after September 18, 1973, \$60.00)*

*Non-member: \$65.00 (after September 18, 1973, \$70.00)*

*Please make check or money order payable to: North Jersey Section IEEE.*

# INDUSTRIAL POWER SYSTEM GROUNDING

This seven-session study group is intended to develop a theoretical and working knowledge of grounding. The presentation will provide basic instruction in the areas of grounding phenomena and technique, centered on the National Electric Code and OSHA requirements.

Specific instruction will be given in ground fault protection, calculations to specify grounding equipment and the "state of the art" topic of "Arcing Ground Faults." The course will include a familiarization with human electrocution.

The instructors will be some of the top experts from leading manufacturers of grounding equipment.

**October 4, 1973—SOURCES OF GROUND CURRENT**—Occurrence of faults, arcing faults, leakage and unbalance and their effects on equipment operation and maintenance.

**October 11, 1973—ESTABLISHING A GROUND**—Techniques for grounding equipment and providing an adequate ground path.

**October 18, 1973—STATE AND NATIONAL CODES AND LAWS**—Codes and laws applicable to grounding including OSHA and NEC.

**October 25, 1973—GROUND SENSING, LOCATION AND RELAYING**—Devices and techniques for identifying the presence of a ground, locating the ground and responding to the ground.

**November 1, 1973—ARCING GROUND FAULTS**—Causes and effects of arcing ground faults. Why they are treated differently from bolted faults.

**November 8, 1973—TYPES OF GROUNDING AND EQUIPMENT SELECTION**—Comparison of the advantages and disadvantages of solid grounding, low resistance grounding and high resistance grounding. Quantitative calculations to select resistors, reactors and zig-zag transformers to establish a ground.

**November 15, 1973—THE NATURE OF ELECTRICAL INJURIES**—The methods by which electricity harms the human being. The amount of current required to kill.

**TIME:** 7:00-9:00 P.M. Thursday evenings beginning October 4, 1973.

**PLACE:** Main Auditorium, Jersey Central Power & Light, Madison Avenue at Punch Bowl Road, Morristown, New Jersey.

**FEE:** \$45.00 to members of IEEE, ASME, AIME, ASCE, etc.; \$55.00 to non-members.

**SPECIAL OFFER:** A \$5.00 savings for advance registrants whose mail registrations are received prior to September 20, 1973.

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## ADVANCE REGISTRATION FORM—INDUSTRIAL POWER SYSTEM GROUNDING

*Mail to: Harold W. Bell, General Electric Company, 25 East Willow Street, Millburn, N.J. 07041; phone (201) 376-9000*

Please enroll me in the INDUSTRIAL POWER SYSTEMS GROUNDING COURSE, Fall, 1973.

Name \_\_\_\_\_ Tech. Society \_\_\_\_\_

Firm \_\_\_\_\_ Position \_\_\_\_\_

Business Address \_\_\_\_\_ Phone \_\_\_\_\_

Home Address \_\_\_\_\_ Phone \_\_\_\_\_

Check or Money Order Enclosed: Member \$40.00 (after Sept. 20, 1973, \$45.00)  
Non-Member \$50.00 (after Sept. 20, 1973, \$55.00)

Please make check or money order payable to: North Jersey Section IEEE.