

Newsletter

The Magazine of the Northern New Jersey Section

Volume 10

The

OCTOBER, 1963

Number 2



IEEE NEWSLETTER North N. J. Section P. O. Box 241, Morristown, N. J.

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SECTION PROGRAMS

The following section programs have been arranged for the coming year.

October 26, 1963:

Combination field trip and outing to Aqueduct Race Track to learn about the betting and totalizing electronic equipment and to see the horses run.

November 13, 1963:

Joint meeting of the Section and the PTGEWS. J. C. Chognard of Hewlett Packard will speak on "Patents" at ITT Federal Laboratories, Nutley. Pre-meeting dinner at the Copper Hood Restaurant.

December 19, 1963:

Joint field trip sponsored by the North Jersey and New York Sections, to see the Western Electric plant at Kearny including manufacture of telephone cable and telephone apparatus. The trip will be by bus from Newark. Western Electric will provide lunch.

January 15, 1964:

Lecture and inspection of the Public Service Electric Switching Station at Newark. R. N. Southgate of P. S. will be the principal speaker. Bus transportation will be provided between the P. S. auditorium and the switching station.

February 19, 1964: Students Night.

March 11, 13 or 14, 1964:

Probable date for annual Fellows Night.

April 15, 1964:

Tentative arrangements have been made for a field trip jointly sponsored by the Section and PTGCS to the Unicom prototype at Bell Telephone Laboratories at Holmdel.

May and June 1964:

No programs selections have been made and suggestions are welcome.

With respect to programs by the Professional Technical Groups (PTG's), reports to date to the Section Program Committee are as follows:

- PTGEC: Firm programs for September 17 and October 15. Probable meeting dates for November 14, February 13, April 16, and May 14.
- PTGCS: Firm programs for September 24 and November 19. Tentative programs for January 23 and April 15.
- PTGAC: Firm programs for October 8 and February 19. Probable meeting dates for November 26, March 10, April 28, May 26.
- PTGEWS: Firm programs for October 17 and November 13.

The NEWSLETTER congratulates the program committee and its chairman, Roger McSweeny, for an early and very impressive start in setting up this season's programs. Certainly a job well done.

Newsletter

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All communications concerning The Newsletter, including editorial matter, advertising, and mailing, should be addressed to:

> THE NEWSLETTER P.O. Box 241 - Morristown, N. J. Telephone: JEfferson 9-4909

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MEET THE STAFF

Paul Schwanenflugel formerly served with the Program and Publicity Committee of the AIEE — New Jersey Division.

Mr. Schwanenflugel holds a BEE degree from the Polytechnic Institute of Brooklyn and a MSEE from Newark College of Engineering. He is also a registered professional engineer.

Mr. Schwanenflugel is a design engineer with the Relay-Instrument Division of Westinghouse Electric Company, in Newark. He has also worked at the Rome Air Development Center in Rome, N. Y.

Born in New York, he now resides in Belleville, New Jersey.

REPORT ALL ADDRESS CHANGES TO: INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS, BOX A, LENOX HILL STATION, NEW YORK 21, N. Y.

The Newsletter, October 1963

New BALLANTINE True RMS VTVM Measures 10 µV to 320 V regardless of Waveform

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M.S. VOLTS

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Our accuracy specification of "2% of reading" is far more accurate over half the scale than for a linear meter rated at "1% of full scale."

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- Frequency Range......5 cps to 4 Mc (3 db bandwidth is 2 cps to 7 Mc)
- Measures signals with Crest Factor....5 full scale to 15 down scale
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- Input Impedance.... 10 megohms in parallel with 11 or 27 pF
- Amplifier. Choice of balanced or single ended, 5 cps to 4 Mc, up to 90 db gain, 50 V into 20K load
- DC Output.....Proportional to mean square of ac input, for connection to recorder; output 1V; source resistance 1000 ohms
- Power requirements......115/230 V, 50-420 cps, 90W
- Accessory (optional).....To measure up to 10,000 volts, use Model 1320 Multiplier (40 megohms, 3pF)

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CONTROL THEORY IS TOPIC OF OCTOBER 8 MEETING

Dr. Bernard Friedland of General Precision, Inc. will discuss the impact of optimum control theory and Lyapunov's Second Method on the control field.

MEETING NOTICE

Subject:	RECENT DEVELOPMENTS IN MODERN CONTROL THEORY
Speaker:	BERNARD FRIEDLAND AEROSPACE RESEARCH CENTER
Place:	GENERAL PRECISION, INC. PLANT 3 1225 MC BRIDE AVENUE LITTLE FALLS, NEW JERSEY
Date:	TUESDAY, OCTOBER 8, 1963 AT 7:45 P.M.
	the free threeas



All PTGAC members are invited to monthly executive committee meetings. If interested, please contact Mr. Robert Sokalski at CA. 6-4000.



The Newsletter, October 1963

A DAY AT THE RACES

We are off to the races on Saturday, October 26. The Section will enjoy a unique combination technical meeting and outing at Aqueduct, the largest and most modern race track in the country. This field trip will provide an insight into the complex automatic betting and totalizing machinery as well as a chance to see the horses run. You can even prove your practical knowledge of probability theory if you wish to do so.

Wives of members (but not children) are invited to come with their husbands and they are promised an exceptionally interesting day.

Aqueduct is one hour's drive from Northern Jersey with expressways or parkways throughout the route as shown on the adjacent map. Enter the track grounds either from Conduit Avenue (the parallel road of the Southern Parkway) or from Rockaway Boulevard. Gates open at 10:30 A.M. Park in the clubhouse parking area southwest of the grandstand. The parking fee is \$1.00. Gather at the clubhouse entrance promptly at 11 A.M. The clubhouse is marked by multicolored square plaques and vertical louvers.

The track can also be reached by subway: 8th Avenue "A" train to Euclid Avenue, and then change to Rockaway train, getting off at Aqueduct station where an overhead walkway leads to the track. Special express trains direct to Aqueduct leave Manhattan from the downtown platform of the Ind. station at 42nd Street and 8th Avenue. Running time is 30 minutes and the first special leaves at 10:30 A.M. Many buses run to the track from various parts of the metropolitan area. For information call MIchigan 1-4700, Extension 355.

IEEE members should bring identification and they will be checked and admitted without charge. Normal admission to the clubhouse is \$5.00, but it will be bargain day for IEEE ladies. They or other guests of members will be admitted for \$2.50 to cover the ticket taxes. After entering, the group will gather in the small theater where racing films are shown for a lecture on the track and betting equipment.



Part of Main Distributing Frame in Tote Room

Mr. Heyman of the American Totalisator Company will describe the conduct of races, the machines for issuing betting tickets, the central computer which continuously fixes the odds, and the automatic display equipment. After a question and answer period, our group will be conducted to reserved seats in the clubhouse stands.

Lunch may be purchased at any one of the three restaurants at the track. Races begin at 1:30 P.M. After the second race (the conclusion of the Daily Double), about 2 P.M., the IEEE group will be taken to the Totalisator Room where Mr. Heyman will explain the central electronic installations, the computers, and the automatic display control equipment. He will also demonstrate one of the ticket issuing stations and its electrical connections to the center. The Money Room and the security precautions for guarding the immense flow of cash will be shown.

Races end at 6 P.M. but IEEE members and their guests may leave at any time.

Aqueduct racetrack cost \$35 million and it is the greatest sports structure ever built in America. It can accommodate 80,000 persons, 15,000 automobiles, and 500 thoroughbred horses. The grandstand with one million square feet of space on four levels is the largest of any track anywhere. The main racetrack is a mile and an eighth oval with a one mile grass course and a seven furlong steeplechase course inside the oval. Betting averages several million dollars per day with higher figures on Saturdays and holidays.

Our guide and mentor will be Mr. Robert Heyman, a member of the New York IEEE Section. He received a BSEE from Purdue in 1947 and an MBA from Hofstra in 1961. He has been employed by the American Total-



isator Company in various capacities since 1947 and he is now District Manager for New York State. If you behave well, Mr. Heyman may give you a tip on the races.

The odds are you will enjoy this day.

Executive Committee Report

As part of a general program to better inform our membership, Chairman Vadersen is relinquishing his "corner" to others, in order that they may communicate more directly with the North Jersey Section members. As Treasurer, I should like to summarize our fiscal situation for you. The following background information may also be of interest.

In the past, operating only as IRE, our yearly budget for the Northern New Jersey Section has run around \$26,000.00. Of this, approximately 70% of the income and disbursements are in direct connection with the publication of your Newsletter. A major part of the balance is associated with the presentation of the ten Section meetings held through the year, and the Section meetings run by the Professional Technical Group Chapters.

Our operations of the past year have been quite different than normal because of the smooth but somewhat complicated gradual merger of the Northern New Jersey Section of IRE and the New Jersey Division of the New York Section of AIEE. The major fiscal effect of this activity was to increase our Newsletter circulation from an average of 4800 copies per month to over 6200 copies per month. These increased costs were borne by the Northern New Jersey Section IRE Treasury.

In addition, IEEE Headquarters has changed the rebate policy (source of the funds for Section activities, other than Newsletter advertising) to a schedule of payment twice a year. As a result, our rebate income for the fiscal year ended on June 30, 1963, was one-half of the normal value. Since the second-half payment will be received this fall, no net reduction of the magnitude of Section income will occur, only a shift in phase.

Even though Section activities had been merged effectively in the spring of 1963, it was mutually decided to delay merger of the parent sections' funds until the close of the fiscal year on June 30, 1963 and, until separate audits of these funds could be completed. Happily, these audits were accomplished without difficulty and the funds of the parent sections were merged on July 18, 1963. The following statement indicates the funds brought to the merged activity from the parent sections.

IRE	Savings Checking	\$	3,956.06 919.96	
	Total IRE	\$	4,876.02	
AIEE	Savings Checking	\$	6,424.00 2,602.26	
	Total AIEE	\$	9,026.66	
	Grand Total	\$1	3,902.68	

As a result of the diligent efforts of our Newsletter Business Manager, Mr. Henry Evans, our sale of advertising for the Newsletter has been gratifyingly good. Further, as a result of advertiser advance payments, our income in July and August has been such that our total cash as of August 31, 1963 is slightly over \$16,000.00. Thus, you can see that we are in a suitable fiscal position to properly serve our membership with interesting technical programs, stimulating field trips, and other Section activities, our limitations being those of participation and imagination, rather than lack of funds.

Headquarters has asked all Sections to convert their fiscal year to a calendar year basis, so we will have another financial summary for you carly in 1964.

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Managing	Editor		I	3.	Meyer

Executive Committee Meetings

October 2 November 6 December 4 January — 1964 February 5 March 4 April 1 May 6 June 3

The Newsletter, October 1963

Microcircuitry...for SMALL Production Runs

For Special Circuits that will NOT be Produced in Great Volume, GI MULTICHIP Technology Can Provide the Ideal, ECONOMICAL Answer

ECONOMICALLY SPEAKING, the familiar "Monolithic" Integral Circuit Package — in which all components are built up on a single, shared substrate — is unsurpassed for circuitry of a fixed, "standardized" character that can be manufactured and sold in vast quantities.

SUCH CIRCUITS as Eccles Jordan Flip-Flops, for instance, are used in 90% of today's computers — and, of course, each computer uses hundreds or thousands of them. The high cost of tooling up to manufacture such a monolith becomes insignificant when divided among the enormous number of units that can be manufactured and sold.

BUT SUPPOSE you want a special circuit of your own design — and suppose, further, that you can use only a few hundred of them... Does this mean that you must abandon the very real advantages of microcircuitry —? Far from it! That's where General Instrument's highly advanced *multichip* technology can give you virtually all the advantages of monoliths (plus a few that even monoliths *don't* offer, in some applications) at a tooling-up cost far below that of a "made-to-order" monolithic ICP.

What Every Engineer Should Know About GI Multichips

THE INDIVIDUAL components of CI Multichips are batch-manufactured on individual wafers or substrates by exactly the same techniques as are used in monolithic

circuits-except that each sili-

con wafer, instead of forming the base for many *different*

components is used as the

substrate for a large number

of the same component-a

large number of identical

transistors, resistors, diodes,

or other circuit elements.

These components are later

"diced" apart, and then



Typical example of multichip circuits: General Instrument NAND-Gate on TO-5 header

assembled to your circuit design.

THE FLEXIBILITY of this process reduces the tooling-up cost to a matter, usually, of only a few hundred dollars... for although the finished circuit combination is custommade for you alone, the individual components can obviously be combined in other configurations for other customers. THE NET RESULT – still speaking in terms of economics – is a tooling-up cost that compares favorably with conventional, bulky, discrete components on a circuit board ...but with the miniaturization, reliability, rapid switching-time and other outstanding advantages afforded *only* by integral microcircuit techniques. But that's not all ...

Substantial PERFORMANCE Advantages, Too!

IN MANY APPLICATIONS, moreover, the capability of a multichip circuit is definitely superior to that of the best monolith. This is particularly true, for instance, where parasitic *coupling* between components is undesirable or intolerable, such as in high-frequency applications. Such coupling is currently unavoidable in monoliths, because the components share a common substrate—it is easily avoided in a GI multichip. Something quite similar is true where a heat-sensitive component must be isolated from a heat*producing* component. Because a GI multichip is composed of *separate* substrate planes, isolation of components from each other is a relatively simple problem.

A FURTHER technical advantage, in some applications, is the fact that the GI Multichip technique permits the selection of substrate materials with physical parameters ideal for *each* component—since only a single type of component will be built on any particular wafer. In the monolith, of course, the substrate must be a *compromise* in its bulkmaterial properties, since it is shared in common by *many* different kinds of components.

When It's Hard to Decide - We'll be Glad to Help

NEEDLESS TO say, the GI Multichip is not a panacea. We make monoliths as well, and expect to continue making them for many years to come. Each type has its place; each has certain advantages over the other, depending on the application, the requirements, the specific problem. Our best advice is: when in doubt, please call on *us*. Our experts will be happy to give you their unbiased, experienced advice.

BUT WE do think the multichip story — all of it — should be better known. We've compiled considerable literature and data on the subject — all of which, of course, is yours for the asking. To avoid delay, write to Jerry Fishel at the address below.





65 Gouverneur Street, Newark 4, New Jersey

ERROR CONTROL IS SUBJECT OF COMPUTER GROUP MEET

A panel of experts will discuss ERROR CONTROL at a meeting sponsored by the NJ Chapter of PTG Electronics Computers. The meeting will be held on October 15, 1963 at ITT Communication Systems, Inc.

Without some direct or indirect type of error control, data processing systems are vulnerable to various random error generating processes. As the use of computers and data processing equipment grows in the business, scientific and communications field, a thorough knowledge of the various error control techniques available now and in the near future is vital to the system and subsystem engineer.

During the course of the meeting, a survey of the state-of-the-art of the error control field will be presented in a tutorial manner and an attempt will be made to indicate the probable direction of future developments. A question and answer period will follow the presentations.

Mr. C. A. Deutschle, holds a BS in Electrical Engineering and an MS in Physics from the Pennsylvania State University. He is a Member of the Technical Staff of ITT Communication Systems, Paramus, N. J. Mr. Deutschle's major activities have been in quantized communications and digital computer systems. He is currently engaged in advanced communication system planning.

Mr. T. G. Kuhn received a BS in Electrical Engineering from the Univ. of California at Berkeley. He is a member of the Technical Staff of Hughes Aircraft Co., Culver City, Calif. and is a resident engineer for Hughes Aircraft Co. at ITT Communication Systems. Mr. Kuhn's work at ITTCS has included data synchronization, data transmission and error con-

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trol. He is presently involved in developing standards for military communications. In his talk, he will discuss error control objectives and acceptable error control standards for operators, terminal equipments and transmission links.

Mr. R. N. Watts holds a BS in Electrical Engineering from the University of Miami and an SM in Electrical Engineering from Massachusetts Institute of Technology. He is a Member of the Technical Staff of Bell Telephone Laboratories, Holmdel, N. J.

Mr. Watts experience has been concentrated in the areas of binary transmission and error control. He will present error statistics on various carrier links and will outline future areas for investigation.

Mr. J. Cashman received a BS in Electrical Engineering from the University of Illinois. He is a member of the Data Division of the Communications Department of the U.S. Army Research and Development Laboratory, Ft. Monmouth, N. J. Mr. Cashman has worked on the AN/MYK series of computer systems, Fieldata tape terminals and the random access memory for the CCIS-70 system. He will discuss the hardware aspects of error control in terminal units.

A pre-meeting dinner will be held at Manero's Steak House on Route 17, 6 P.M.

Contact Mr. Louis Small for reservations at HU. 9-7400.

MEETING NOTICE

Subject:	ERROR CONTROL
Speakers:	MR. J. CASHMAN
	MR. T. G. KUHN
	MR. R. N. WATTS
Moderator:	MR. C. A. DEUTSCHLE
Place:	ITT COMM. SYSTEMS
	PARAMUS, N. J.
Time:	8 P.M.
Date:	OCTOBER 15, 1963
Pre-Meeting	6 P.M.
Dinner:	MANERO'S STEAK
	HOUSE
	RT. 17, SOUTH OF ITTCS

The Newsletter, October 1963

Millimeters to Microns

Microwave technology is advancing into new areas using wavelengths as short as millionths of a meter. For example, in the immediately forseeable future, laser-generated light beams are expected to open broad new communications channels beyond the expectations of optimistic engineers of just a few years ago.

This series is designed to survey this rapidly developing technology for engineers with a variety of backgrounds and working interests. By obtaining lecturers who are actively engaged in these new disciplines and combining them on one program, non-specialists and specialists alike are expected to find the series a good background study and a report on current developments.

The meetings will be held at the Western Union Auditorium in lower New York City. Subways and buses stop at the door. Street parking is available after 6 P.M. on most local streets in the immediate vicinity of the building.

Registration Information

Registration fee for the series is \$5 for members of IEEE, \$8 for nonmembers and \$1 for students. Registrations must be made in advance. To register, send check payable to "Communications and Electronics Division, New York Section, IEEE" and stamped self-addressed envelope to Mr. F. Sellinger, American District Telegraph Co., 155 Sixth Ave., New York 13, N. Y.

Component Course

The Education Committee, New York Section, IEEE, has scheduled a series of lectures on electronic components beginning October 8, 1963 and running for six consecutive Tuesday evenings. The meetings are planned for 7 to 9 P.M. at the Western Union Auditorium, 160 West Broadway, New York City. Plenty of free parking is available.

Iron components, relays, capacitors and resistors will be covered during this fall lecture series. The material presented at the lectures will be available as printed notes and will be distributed to those in attendance. This will make the data available as a desk top reference and will prove valuable in daily design and specification activity. For each of the components presented, the following will be discussed:

- 1. Basic and theoretical modes of operation, including physical and mathematical exposition.
- 2. Latest state of the art by those actively working with them at the present time.
- 3. Methods of specification and test.

Reliability Group Meetings

The 1963-64 season of the Metropolitan Chapter of the PTG on Reliability will begin on October 18, 1963 with the Fourth Annual New York Conference on Electronic Reliability. This Conference is sponsored jointly by the PTGR, the PTG on Component Parts, and the PTG on Product Engineering and Production. Information concerning this Annual Conference will be found elsewhere in this issue.

On November 18, 1963, the Chapter will meet at the Burroughs Corporation, 215 Park Avenue (Corner 18th Street), New York City, 7:45 P.M. The program for this occasion will be a panel discussion on "The Role of Standards in Reliability". The panelists will be Harold R. Terhune, I.T.T. Federal Labs; Barney A. Diebold, U.S. Army Signal Materiel Support Agency, Fort Monmouth; and Clayton Senneff of the Allen-Bradley Company. Mr. Terhune will represent the viewpoint of the equipment manufacturer and designer; Mr. Diebold will take the point of view of the military interests; and Mr. Senneff will state the component manufacturer's position. The session will be moderated by P. S. Darnell of the Bell Telephone Laboratories.

Advance Notice of Seminar

Early details on an all day seminar scheduled by the Instrumentation Division of the New York Section are: Event: All day seminar Title: Shock and Vibration Measurement Date: November 14, 9 A.M. Place: United Engineering Center, 47 Street and First Avenue Registration Fee: \$8.00; \$1.00 for en-

gineering society student members For advance registration, checks payable to Instrumentation Division, New York Section, IEEE should be sent to John J. Dietz, Instrument Division, McGraw-Edison Company, 51 Lakeside Avenue, West Orange, New Jersey.



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PTGEWS

How Our Words Become The Dictionary

The fascinating workings of dictionary design will be the subject of the October 17th meeting of PTGEWS. Dr. Charles R. Sleeth will discuss dictionary making at the Kearfott Auditorium in Little Falls after a dinner at the Robin Hood Inn in Clifton.

Dr. Sleeth will speak from his experience as an Associate Editor of the G. & C. Merriam Company where he worked on Webster's Third International Dictionary and Seventh New Collegiate Dictionary.

His talk will cover information sampling taken from the ever changing reservoir of common usage, information selection, and production of copy. More specifically, Dr. Sleeth will remark on the roles of specialists and of general definers in the editing process. He will cover the highlights of pronunciation, synonymy, and the standards applied in admission, rejection, or limited usage of words.

Of particular interest to the engincering community will be the etymology of words, especially the unique histories of trade words that have come into common usage.

THE SPEAKER

Dr. R. Sleeth is presently Assistant Professor of English at Brooklyn College. A Rhodes scholar, he entered Oxford University in 1934 where he studied English Language and Literature, achieving First Class Honours in 1936. Dr. Sleeth then continued his graduate work, this time in philology. He has taught both English and German at Princeton University after receiving his doctorate there in 1941. In 1946, after a stint in the Army, he returned to Princeton University where he was responsible for the entire graduate course program in German Language and Literature (through 1500 AD).

Dr. Sleeth was affiliated with the G. & C. Merriam Company before accepting his present position.

He is married and the father of three children.

October 17th, Thursday

- DINNER—6:00 P.M. Robin Hood Inn 1129 Valley Road Clifton, N. J. PI. 4-4510
- MEETING-8:00 P.M.

Kearfott Auditorium Kearfott Division 1225 McBride Avenue Little Falls, N. J.

Writing-Improvement Programs

A two-day seminar on writing-improvement programs for engineers will be conducted by the Professional Technical Groups on Engineering Writing and Speech and on Education. The meeting, to be held in New York City on February 24-25, 1964, will provide an opportunity for engineering managers, training directors, and publications specialists to exchange information on problems in engineering communications and on methods of solving them.

Each session during the seminar will consist of a series of short papers, followed by open discussion. General areas of discussion will include, but will not necessarily be limited to, the following:

- 1. Specific needs of engineers for writing-improvement training.
- 2. Course content, approach to subject, methods, and results of various training programs.
- Program administration: in-plant vs. university courses; intensive vs. part-time training; facilities; etc.
- 4. Evaluation of existing programs and recommendations for the future.

Those interested in presenting a paper should send a brief summary to the Seminar Chairman, Charles A. Meyer, RCA, Harrison, N. J., by November 15th. Others interested in receiving further details concerning the program and registration should also write to Mr. Meyer for future mailings.

PTG on COMMUNICATION SYSTEMS CHAIRMAN'S MESSAGE

Gunther (Gus) Karger

The executive committee of the PTGCS chapter has made a sincere effort to bring its members and all interested section members a program of important and timely subjects. Last month, if you did not attend our event, we presented Major General John B. Bestic, USAF who discussed the National Military Command System (NMCS) with particular emphasis on Survivable Communications. General Bestic was well qualified to speak on this subject since he is the person who heads it.

The events planned for the future are:

November 19

RADA (Random Access Discrect Address)

A New Tool for Communications B. V. Blom,

ITT Communication Systems, Inc.

January 23 VOCODERS WITH DEMONSTRATION Bell Telephone Laboratories Arnold Auditorium Murray Hill, N. J.

April

INSPECTION TRIP TO THE UNICOM PROTOTYPE Bell Telephone Laboratorics Holmdel, N. J.

Further details concerning the above meetings will be announced on this page in the month during which the meeting is scheduled. Mark your calendar NOW so that you will remember to book for these details.

Your committee invites suggestions and we will be pleased to hear from you. Kindly address your suggestions or comments to the following address:

priced at \$6.00 (PTGMTT Members),

\$7.00 (IEEE Members), \$8.00 (Non-

Members) and \$3.00 (Students). Single

admission is \$1.50 (IEEE Members)

tures and tickets may be obtained from

Mr. Adrian C. Gately or Mr. Leonard

J. Kaplan, New York University, Elec-

trical Engineering Department, Bronx,

New York 10453, (Ludlow 4-0700).

Further information about the lec-

and \$2.00 (Non-Members).

G. Karger ITT COMMUNICATIONS SYSTEMS INC. Route 17, Paramus, N. J. 201 HU 9-7400

Microwave Lectures Set

The New York Chapter of the PTGMTT (Microwave Theory and Techniques) will hold a lecture series on microwave impedance matching. The lectures will be held on five consecutive Tuesday nights, November 19 through December 17 at the General Telephone Laboratories (Sylvania) in Bayside, Queens. The speakers and topics are as follows:

Tickets for the lecture series are

			I
November	19	Professor Don J. R. Stock New York University	Introductory Lecture, Smith Chart and Circle Diagrams
November	26	Professor Walter K. Kahn Polytechnic Institute of Brooklyn	Waveguide Junctions
December	3	Dr. Richard LaRosa Hazeltine Corporation	"Fano Type" Matching and Extensions
December	10	Dr. Henry J. Riblet Microwave Development Laboratories	Non Uniform Transmission Lines and Quarter Wave Transformers
December	17	Professor Lowell I. Smilen Polytechnic Institute of Brooklyn	Active Networks in Impedance Matching

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SV-5A	4-50 vDC	5 Amps
SV-10A	4-32 VDC	10 Amps



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Institute of Electrical & Electronics Engineers Fall 1963 Study Group North Jersey Section

SURVEY COURSE ON ADJUSTABLE SPEED DRIVES

Today's modern industrial plant is turning more and more to the various makes and types of variable speed drives to take advantage of the flexibility and future adaptability offered over and above that of the constant motor drive. Yet, in many plants there is still a lack of complete understanding of all the types of drives available and application of the correct drive for each specific requirement.

This study group is intended to give a broad background on the fundamentals basic to any of the variable speed drives available and then launch into the various types, makes, applications and comparison of those offered in today's market. Each session dealing with a particular type of drive will be given by that company considered a leader in the manufacture and application of that drive. The first sessions on fundamentals and overall coordination of this study group will be handled by Mr. J. L. Barbi of the Westinghouse Electric Corporation, an Application Engineer who has specialized in all variable speed applications for over 20 years and who has conducted similar study groups during that time.

The course is designed for those having very little experience and knowledge of drive fundamentals. It will not get too complex but will strive for an overall understanding of the types available and the best application of each so that those attending can correctly apply a drive for their requirements.

Starting Thursday, October 10, 1963 Time 6:30 P.M. to 8:30 P.M. Location:

Vail Hall, Bell Telephone Bldg., 540 Broad Street, Newark, N. J.

Registration Fee:

\$20 to members of IEEE, ASME, AIME, ASCE, AINE, PE — \$25 to others. A \$5 discount will be allowed for all registrations received before the first session.

Send Advance Registrations to: Mr. A. J. Dolan, Westinghouse Electric Co., 1180 Raymond Boulevard, Newark, N. J. Make checks payable to: North Jersey Section IEEE.
Enclosed is a check for \$...... for advance registration for the "Adjustable Speed Drives" Study Group.
Name
Home Address

Business Address

Business Phone

Session 1 Thursday—October 10, 1963 Fundamentals of AC and DC Machines as applied to Adjustable Speed Drives.

SPEAKER—J. L. Barbi Westinghouse Elec. Co. Newark, N. J.

Session 2 Thursday—October 17, 1963 Fundamentals (continued) and Wound Rotor Motors and Rectiflow Drives.

SPEAKER—J. L. Barbi Westinghouse Elee. Co. Newark, N. J.

Session 3 Thursday—October 24, 1963 Single Motor Adjustable Voltage DC Drives

SPEAKER—Representative of Reliance Electric & Engineering Company

Session 4 Thursday—October 31, 1963 Multi-Motor DC Drives and their Applications

SPEAKER—J. L. Barbi Westinghouse Elec. Co. Newark, N. J.

Session 5 Thursday—November 7, 1963 Static Type DC Drive Packages, both SCR and Magnetic Amplifier.

SPEAKER—J. Colligan Electro-Dynamic Div. of General Dynamics Avenel, N. J.

Session 6 Thursday—November 14, 1963 Eddy Current Coupling Drives

SPEAKER—G. Lott of Wolock & Lott Union, N. J.

Session 7 Thursday—November 21, 1963 Mechanical Adjustable Speed Drives and Adjustable Frequency Drives.

SPEAKER—Representative of U.S. Electrical Motors

SPEAKER—James Freeman General Electric Co.

PTGMTT

Beam Forming and Steering Techniques For Phased Array Antenna Systems

Mr. R. S. McCarter of Bell Telephone Laboratorics, Inc., Whippany, New Jersey, will speak at the October 16th PTGMTT meeting on "Beam Forming and Steering Techniques for Phased Array Antenna Systems". The meeting is scheduled for the Arnold Auditorium, Bell Telephone Laboratories, Murray Hill, New Jersey at 8:30 P.M. The pre-meeting dinner will be at 6:30 P.M. at the Bottle Hill Tavern, Madison, New Jersey.

Recent Developments

In recent years the development of new microwave components have stimulated interest in phased array antenna systems for a wide variety of applications. To perform these tasks a large number of beam forming and steering techniques have been proposed. The selection of a technique for any specific application is aided by grouping the many beam forming and steering methods according to some of their major characteristics. These categories include a ray bandwidth, processing bandwidth, separation of beam forming and beam steering, cost, effect of adding independent signal channels or beam clusters. An explanation of several of the promising techniques will be presented as well as a classification of all techniques known to the speaker.

THE SPEAKER

Mr. R. S. McCarter received a BSEE degree from Texas A and M College in 1957 and an MEE degree from NYU in 1959. He joined Bell Telephone Laboratories in 1957 and worked on microwave ferrite devices for phased arrays until early 1961.

Microwave Component Needs

Specific design requirements for components needed in next-generation air surveillance radars will be spelled out in detail at the first **Conference on Microwave Component Needs**, to be held Sunday, November 3rd, 1963, 2 to 4:30 P.M. at the Sheraton-Plaza Hotel, Boston, Mass.

Senior design specialists in aircraft surveillance radar will state their needs at the conference. The quasi-off-therecord nature of the meeting (proceedings and transcripts will not be pub-



Since that time he has been working on radar systems that utilize phased arrays. He contributed to the selection of the beam forming and steering techniques of those systems.

MEETING NOTICE

Subject:	BEAM FORMING AND STEERING TECHNIQUES
	FOR PHASED ARRAY
	ANTENNA SYSTEMS.
Speaker:	MR. R. S. MC CARTER,
	BELL TELEPHONE
	LABORATORIES
Place:	ARNOLD AUDITORIUM
	BELL TELEPHONE
	LABORATORIES,
	MURRAY HIL, N. J.
	8:30 P.M.
Date:	OCTOBER 16, 1963
Pre-Meeting	6:30 P.M. AT THE
Dinner:	BOTTLE HILL TAVERN
	MADISON, N. J.

lished) is expected to encourage frank mention of detailed performance figures, quantities, and dollars.

Tickets for the Conference, including an informal cocktail klatsch with the speakers and participants, are available at \$7.50 per person from:

Dr. Howard Scharfman Spencer Laboratory Raytheon Company Burlington, Massachusetts

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Fourth Conference On Electronic Reliability To Be Held

The Fourth New York Conference on Electronic Reliability will be held at the United Engineering Center, New York City on Friday, October 18.

The all day meeting is sponsored by the metropolitan chapters of the IEEE Professional Technical Groups on Reliability, Product Engineering and Production and Component Parts.

Four technical sessions are planned, two in the morning and two in the afternoon. The morning sessions will start concurrently at 8:30 A.M. and the afternoon sessions at 2:00 P.M.

REGISTRATION INFORMATION

The registration fee is \$5.00 for members and \$7.50 for non-members which includes one copy of the conference proceedings. Additional copies of the proceedings may be purchased at \$3.00 each for members and \$5.00 each for non-members.

Proceedings of the 2nd and 3rd conferences can be purchased from Mr. E. Murphy, Sperry Gyroscope Co., Mail Station 1A36, Great Neck, N. Y.

Advance registration may be made by sending a check made payable to "New York Conference on Electronic Reliability" to Mr. E. Murphy (Address above).

Door Registration will begin at 8:00 A.M. on October 18.

Morning Session IA — Reliability Engineering, 8:30 A.M.

Moderated by Paul Darnell

Economic Balance in Reliability Objectives

Gregor L. Hetzel, Bell Telephone Laboratories

The relationships between system characteristics such as performance, reliability, maintainability, etc., have to be estimated utilizing past experience and existing preliminary system information. Trade-offs between these characteristics are then evaluated to arrive at a system developmental and operational plan which realizes the system's intended function at minimal total cost.

Economics of Implementing Reliability Objectives

George H. Ebcl, Fairchild Camera & Instrument Corp.

An effective reliability program must be economically justifiable. That is, the total system cost should be reduced as a result of the reliability program. A discussion of various tools and techniques to achieve a more efficient program will be presented. Demonstrated Consequences of an Economically Balanced Reliability Program William H. Von Alven, Arine Research Corp.

In recognition of the need for improvements in systems effectiveness and operational readings, the Department of Defense has established by Instruction 3200.6 (7 June 1962) the Technical Development Plan (TDP). The TDP, applied to new systems, requires that considerations be given to orderly planning for reliability and maintainability as well as to performance requirements, initial and operating costs, delivery schedule, and personnel requirements. This plan also requires the establishment of appropriate tests and evaluation procedures for the new system, which will include consideration of adequacy of the system design, reliability and maintainability.

Morning Session 11A — Parts Reliability, 8:30 A.M.

Moderated by Terry Utz

Application Reliability of Integrated Semiconductor Circuits

Paul Buckler, Texas Instruments, Inc.

Over three years ago a reliability program for integrated semiconductor networks was initiated with a resultant flow of data and information to the industry. Specific benefits have resulted from this program. These will be presented with electrical data, reliability indicators, radiation effects, designs and package innovations useful to the application of integrated semiconductor networks.

Establishment of a Reliability Testing Program

Earl P. Reed, Sylvania Electronic Systems

This paper describes the thin film microelectronic program of the Sylvania Electronic Systems Microelectronics Laboratory. A brief description will be presented of manufacturing techniques, process controls and inspection procedures. Applications of thin film microcircuits and their advantages and limitations will also be discussed.

Application Reliability of Micromodule Donald T. Levy, Radio Corporation of America

Since the start of the Micromodule program six years ago, the primary objective has been to achieve an exceptionally high level of performance and reliability. The establishment of Micromodule reliability has required an integrated four-fold program, whose accomplishments are described in this paper.

Afternoon Session 1P — Reliability Mathematics, 2:00 P.M.

Moderated by Victor Selman

Markov Processes Applied to Aerospace Systems Reliability Models

N. G. Jagodinski, Sylvania Electronic Products Corp.

A mathematical technique was developed for application to operational equipment to provide a dynamic reliability program capable of instantaneously forecasting the probabilities of mission success at any time during the mission. The technique is based on the application of the Markov process and matrix theory to operational equipment. Calculation of Circuit Reliability by Use of Von Neumann Redundant Logic Analysis

Dr. N. T. Grisamore, George Washington University

In determining the reliability of circuits with redundant paths, it often becomes necessary to utilize complex mathematics which include Boolean algebra, conditional probabilities, etc. The flip-flop permutation problem of closing when normally closed, closing when normally open, is especially difficult to be handled conveniently by the usual mathematics. The works of Von Neumann include methods of handling these problems by use of algorithms which can greatly reduce the amount of computation necessary to determine the reliability of a multi-channel redundant circuit design.

The MTBF and Availability of Compound Redundant Systems

Ronald Dick, International Electric Corp.

This paper deals with A subsystems with similar failure and repair rates for each subsystem where no more than N out of A may fail and the system be considered operative. The MTBF starting in any state is found for any A and N. The relationship between MTBF and steady state solutions is given. The theory is illustrated for the case N-1 and A-2, which is the wellknown Epstein-Hosford case of two machines in parallel.

Afternoon Session 11P — Product Reliability, 2:00 P.M.

Moderated by Robert Gauger

Reliability: The Design-Production Interface

E. F. Dertinger, Raytheon Corp.

Constraints on time and money and mismatch between Design and Production result in not applying all the reliability and quality control techniques during the design phase in order to optimize the achievement of reliability during production. Suggestions are made as to how to apply reliability and quality control techniques in parallel with design effort.

Product Reliability Through Management of Men and Machines

Charles C. Tyler, Western Electric Co.

It is recognized that technical competence will not in itself produce product reliability. Neither will management competence in itself produce reliability. The two are interdependent and the total mutual output from them determines the overall effectiveness of the manufacturing program for product reliability. The paper will discuss objectively the importance of this mutual effect.

Can Reliability Survive the Hazards of Cost Reduction?

Marvin Kaplan, Loral Electronics Corp. This paper deals with reliability oriented techniques which must be considered when implementing value engineering in a product or design. In the same manner that cost reduction can be accomplished without degrading quality, so can value engineering be utilized without affecting specified reliability parameters.

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