

The IEEE

# Newsletter

The Magazine of the North Jersey Section

**HON. GEORGE E. FOUCH**

**Deputy Assistant Secretary of Defense**

**TO SPEAK AT JOINT SECTION MEETING**

**On Tuesday, October 26, 1965**



# Ballantine AC-DC Digital Voltmeter

Model 355

Price: \$590

Measures  
Full Scale AC  
to 10 mV

Measures  
AC & DC from  
0 to 1000 V

1/4% Accuracy f.s. for AC & DC Voltages up to 500  
and for mid-band AC Frequencies



## NEW The only Digital Voltmeter of its type in the U.S.A.

Ballantine's new Model 355 is a versatile, economical digital voltmeter . . . ideal for production line and quality control applications.

You'll find it useful in place of analog instruments in reducing personnel errors, in speeding up production. Its accuracy and reliability, so typical of Ballantine equipment, should start saving you time and money in its first day of operation.

The Model 355 features a servo-driven, three-digit counter with over-ranging . . . combines many virtues of both digital and analog voltmeters in one small, compact, economical package. Its large, well-lighted readout with illuminated decimal point, mode and range information, allows fast, clear readings, while the indicator can follow and allow observation of slowly varying signals. The position of the last digit can be interpolated to the nearest tenth, thus avoiding the typical " $\pm 1$  digit" restriction of a fully digitized display. An optional foot-operated switch retains voltage readings and enables you to cut the time between successive readings materially. Another aid in reducing personnel errors is provided by an over-range indicator that signals excessive input or voltage of the wrong polarity.

### PARTIAL SPECIFICATIONS

Voltage Range	AC	DC	Accuracy in % of Full Scale	AC	DC
Full scale, most sensitive range	0 to 1000 10 mV	0 to 1000 100 mV	1 mV to 500 V	1/4%, 50 Hz to 10 kHz 1/2%, 30 Hz to 50 kHz 1%, 50 kHz to 250 kHz	1/4%
Frequency Range	30 Hz to 250 kHz	DC	Power Requirements . . . 115/230 V, 50-60 Hz, 52 W		
Optional Model 600 Resistors	are available for measuring current directly in volts		Relay Rack Version . . . Model 800 rack mounting kit is optional		

Write for technical data sheet

Member Scientific Apparatus Makers Association

— Since 1932 —



**BALLANTINE LABORATORIES INC.**  
Boonton, New Jersey

CHECK WITH BALLANTINE FIRST FOR DC AND AC ELECTRONIC VOLTMETERS/AMMETERS/OHMMETERS, REGARDLESS OF YOUR REQUIREMENTS. WE HAVE A LARGE LINE, WITH ADDITIONS EACH YEAR. ALSO AC/DC LINEAR CONVERTERS, AC/DC CALIBRATORS, WIDE BAND AMPLIFIERS, DIRECT-READING CAPACITANCE METERS, AND A LINE OF LABORATORY VOLTAGE STANDARDS FOR 0 TO 1,000 MHZ.

Represented by GAWLER-KNOOP COMPANY 178 Eagle Rock Ave., Roseland, New Jersey

## professional notices

### Wheeler Laboratories, Inc.

Subsidiary of Hazeltine Corporation

Consultation — Research — Development  
Radar and Communication Antennas  
Microwave Assemblies and Components  
Laser Devices and Applications  
Harold A. Wheeler and Engineering Staff

Main office:

Great Neck, N. Y. HUNTER 2-7876  
Antenna Laboratory: SMITHTOWN, N. Y.

### PHASE METERS

0.001 cps to 18 kmc

### DELAY LINES

### PRE-AMPLIFIERS • FILTERS

### AD-YU ELECTRONICS INC.

Sales Rep.: Gray & Reed Associates  
9 Dunford Street, Huntington Station, N. Y.  
(516) GE 3-3333

### New Jersey Coast

Date: Wednesday,  
October 20, 1965, 8:15 P.M.  
Place: Little Silver Fire House,  
Prospect Avenue,  
Little Silver, New Jersey  
Speaker: Dr. Michael J. DiToro  
Vice President of Research  
Cardion Electronics, Inc.  
Title: Adaptive Communication  
Pre-Meeting: Pleasant Valley Inn,  
Dinner: State Highway No. 34  
Holmdel, New Jersey  
6:00 P.M.

### ADAPTIVE COMMUNICATION

Many transmission media are characterized by an impulse response which is both time-variable (frequency spread) and dispersive (time spread). Examples of such media are electromagnetic HF ionospheric and troposcatter transmission, underwater sonic transmission and, to a lesser extent, transmission on voice quality telephone lines. For the transmission of random data, such time-variable dispersion generates a self-noise or intersymbol interference. This produces errors which do not decrease with increase of channel signal/noise at the receiver.

Both optimal and sub-optimal dispersion correction networks are discussed.

The results of actual performance on high speed digital transmission over a simulated time-variable multipath HF medium, and on increased-speed facsimile transmission over voice quality telephone lines, will also be discussed.

Dr. Michael J. DiToro's experience comprises extensive work and original contributions in the following fields: electro-acoustics, piezoelectric and electromagnetic transducers, tracing distortion analysis, speech compression, etc.

## The IEEE Newsletter

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### ABOUT ADDRESS CHANGES

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.

REPORT ALL ADDRESS CHANGES TO:  
INSTITUTE OF ELECTRICAL AND ELECTRONICS  
ENGINEERS INC., 345 EAST 47th STREET  
NEW YORK, N. Y. 10017

### NEWSLETTER STAFF

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### North Jersey Section IEEE Executive Committee

#### Section Officers

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Member-at-Large ..... Bernard Meyer  
Member-at-Large ..... Herbert Blaicher, Jr.  
Past Chairman ..... John K. Redmon

### Executive Committee Meeting

at Verona Public Library  
OCTOBER 13

## CALENDAR

### Monday, October 4

#### IEEE Basic Sciences Committee

6:30 P.M.—Keen's Chop House, 72 W. 36th Street, N. Y. C.

See p. 6

### Tuesday, October 5

#### COMTEC

"The Application of Coherent Light to Communications"

O. E. DeLange, BTL

8:00 P.M.—Arnold Auditorium, Bell Labs, Murray Hill, N. J.  
*Brooklyn Polytech*

See p. 5

NET Courses (First Session)

6:00 P.M.—Polytechnic Institute of Brooklyn, Brooklyn, N. Y.

See p. 6

### Thursday, October 7

#### Power

"Power Distribution for High Rise, All-Electric Apartment Buildings"

H. E. Campbell, General Electric

D. W. Tracey, Jersey Central/N. J. Power & Light

E. Kern, Consultant

7:30 P.M.—Punch Bowl Room, Jersey Central/N. J. Power & Light  
Morristown, N. J.

See p. 4

### Wednesday, October 13

#### Computer

"Machine Aids to Design"

R. H. Roth, Bell Telephone Labs

8:00 P.M.—Arnold Auditorium, Bell Laboratories, Murray Hill, N. J.

7:30 P.M.—Pre-Meeting Film

6:00 P.M.—Wally's Tavern on the Hill, Watchung, N. J.

#### N. Y. COMTEC

"Talking Computers and Access Line Switching"

G. E. DuBois, IBM Corp.

E. Osmann, N. Y. Telephone Co.

7:00 P.M.—Carnegie Building, N. Y. C.

See p. 5

See p. 4

### Thursday, October 14

#### North Jersey Section

See September issue

Survey of Modern Magnetics (First Session)

7:00 P.M.—Room 3171A, Public Service Electric & Gas Co.  
80 Park Place, Newark, N. J.

### Monday, October 18

#### N. Y. COMTEC

Switched Voice and Data Networks (First Session)

7:00 P.M.—Western Union Auditorium, 160 West Broadway, N. Y. C.

See p. 6

### Tuesday, October 19

#### Parts, Materials and Packaging Reliability

See p. 4

"LEM Avionics" (U. S. Citizenship required)

G. Wiesinger, Grumman Aircraft

8:30 P.M.—Plant 5, Grumman Aircraft, Bethpage, L. I.

7:30 P.M.—Pre-meeting dinner

6:30 P.M.—Social hour

6:00 P.M.—LEM mockup. Tour

#### N. Y. COMTEC

Communications Transmission (First Session)

7:00 P.M.—N. Y. Telephone Co., 140 West Street, N. Y. C.

See p. 6

### Wednesday, October 20

#### Microwave Theory & Techniques

See p. 5

"Antiferromagnetic Materials"

Dr. Gerald S. Heller, Brown University

8:00 P.M.—Arnold Auditorium, BTL, Murray Hill

6:30 P.M.—Wally's Tavern — pre-meeting dinner

### Thursday, October 21

#### Engineering Management

See p. 6

"Management Aspects As Industry Views Them"

John A. Vaughan, Maxson Electronics

8:00 P.M.—United Engineering Center, N. Y. C.

### Tuesday, October 26

#### Joint North Jersey Section

See p. 4

"Technical Performance — Its Relation to Quality and Value"

Hon. George E. Fouch, Dep. Assistant Secretary of Defense

8:00 P.M.—Thomm's Restaurant, Newark

6:00 P.M.—Cocktail hour and pre-meeting dinner

### Thursday, October 28

#### N. Y. COMTEC

See p. 4

N. J. Bell Telephone Electronic Switching Exchange

9:30 A.M.—Succasunna, N. J.



## JOINT SECTION MEETING

### TECHNICAL PERFORMANCE ITS RELATION TO QUALITY AND VALUE

The subject of Technical Performance and Its Relation to Quality and Value will be presented at a joint meeting with the American Society for Quality Control and the Society of American Value Engineers. Guest speaker of the evening will be *The Honorable George E. Fouch*, Deputy Assistant Secretary of Defense.

The meeting will be held on *Tuesday, October 26, 1965, 8:00 P.M.*, at Thomm's Restaurant, 80 Park Avenue, Newark, New Jersey. A pre-meeting dinner and cocktail hour will take place at 6:00 P.M. Cost of dinner, including gratuities, is \$3.95. Parking facilities are available.

The functional approach in design will be presented. Before he makes a drawing of the product, the designer must decide which process will be used, for example: casting, forging, machining, stamping, or welding? The drawing takes on the characteristics of the process selected. The planner tends to plan the manufacturing operations based on this process. Similarly, the buyer calls in his sources on this process. Thus, the attention is focused on a process or method visualized by the designer and sight of the function is lost. Everyone who makes a decision on the basis of a drawing must determine the function so he can determine the value. By determining the function, rather than focusing attention upon the drawing, many opportunities for obtaining better value and quality can be explored.

In trying to achieve better value and quality, it is important to have confidence that it can be done. The positive attitude: that costs are too high and that something can be done about it, must prevail if effective action is to be taken. Almost everything being produced today could be replaced by something that would perform the same function equally well or better, and at a lower cost. Techniques are only the tools to help achieve better value.

#### Reservation Coupon:

To: Mr. M. R. Cohen  
Dinner Chairman  
Value Engineering  
ITT Federal Laboratories  
500 Washington Avenue  
Nutley, New Jersey 07110

Enclosed please find my check (or money order) made payable to the American Society for Quality Control in the amount of \$ ..... (\$3.95 each) for which please reserve in my name ..... ticket(s) for the joint technical meeting of ASQC, SAVE and IEEE, on Tuesday, October 26th, at Thomm's Restaurant, 80 Park Avenue, Newark, New Jersey. (Please print name and address).

## Power Group Meeting

### Manufacturer's, Utilities' and Consulting Engineers' Viewpoint **POWER DISTRIBUTION FOR HIGH RISE ALL-ELECTRIC APARTMENT BUILDINGS**

*Speakers:* H. E. Campbell  
Distribution Systems  
Engineering  
Electric Utility  
Sales Division  
General Electric Company  
D. W. Tracey  
Builder Sales Representative  
Jersey Central/New Jersey  
Power and Light Company  
Emil Kern  
Consulting Engineer  
*Date:* Thursday, October 7, 1965  
*Time:* 7:30 P.M.  
*Place:* Punch Bowl Room  
Jersey Central/New Jersey  
Power and Light Company  
Madison Avenue at  
Punch Bowl Road  
Morristown, New Jersey

## PARTS, MATERIALS AND PACKAGING RELIABILITY

### LEM AVIONICS

The metropolitan chapters of the Groups on Reliability and Component Parts will present a talk on "LEM Avionics" at a joint meeting in October.

*Date:* Tuesday, October 19, 1965  
*Place:* Grumman Aircraft  
Engineering Company,  
Plant 5, Bethpage, N. Y.  
*Schedule:* Tour of LEM mockup:  
6:00 P.M. (promptly)  
Social Hour: 6:30 P.M.  
Dinner: 7:30 P.M.  
Presentation of  
LEM Avionics: 8:30 P.M.  
*Speaker:* Mr. George Wiesinger, LEM  
Reliability Engineering,  
Grumman Aircraft  
Engineering Company,  
Bethpage, N. Y.

Dinner including social hour under \$4.00.  
Limited registration. U. S. Citizenship  
required.

## Microwave Theory and Techniques

The new officers for the 1965-66 season are:

Mike Thompson  
Chairman  
Dean Mitchell  
Vice Chairman  
John Vogler  
Secretary  
Gerold De Piazza

Program Chairman (appointed position).

## Group Com. Tech. 1965-66 Organization

### Chairman

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### Vice-Chairman

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J. E. Unrue, Jr.

### Membership

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### Liaison and Nominating

R. G. Chipp

## N. Y. Communications Technology Group

### NEW JERSEY BELL TELEPHONE COMPANY ELECTRONIC SWITCHING EXCHANGE Inspection Trip

The trip will be to the New Jersey Bell Telephone Company's Electronic Switching Exchange, at Succasunna, New Jersey, to inspect the No. 1 Electronic Switching System (ESS). The system has the potential to follow switching schemes of an almost limitless variety, depending upon the particular user's needs.

An animated movie of the features of the exchange will be shown. This will be followed by a tour of the facilities. Technical personnel from the Bell System will be on hand to answer questions.

Attendance is limited to 40 persons and is by advance registration only. Transportation has been made available by Chartered Bus (\$2.00 Round Trip), leaving 43rd Street and Vanderbilt Avenue, New York at 9:00 A.M., Thursday, October 28, 1965. Use the below registration blank (or duplicate) and return before October 20, 1965.

Mr. F. E. Sellinger, A.D.T. Company, Inc.,  
155 Sixth Avenue, New York, N. Y. 10013.

..... Yes, I will attend the tour of ESS  
Exchange, Succasunna, New Jersey,  
on October 28, 1965.

..... Enclosed is my check for \$2.00 for  
bus transportation.

..... I will provide my own transportation.

## TALKING COMPUTERS AND ACCESS LINE SWITCHING

For many years, man has talked to machines using a language that the machine can understand. Now the tables are turned—machines talk to man in his own language. On October 13, 1965, Messrs. G. E. DuBois, IBM Corp., and E. Osmann, N. Y. Telephone Company, will discuss the recently installed stock market quotation system at the N. Y. Stock Exchange.

The meeting will be held on Wednesday, October 13, 1965 at 7:00 P.M. at the Carnegie Building, 345 East 46th Street, N. Y. C.



## Microwave Theory & Techniques

### Antiferromagnetic Materials and Their Application to Millimeter and Sub-Millimeter Devices

On October 20, Dr. Gerald S. Heller will discuss device applications of antiferromagnetic materials at Bell Telephone Laboratories' Arnold Auditorium in Murray Hill, New Jersey. The MTT meeting at 8:00 P.M. will be preceded by a dinner at Wally's Tavern at 6:30 P.M.

The lecture will treat those properties of antiferromagnetic materials which are pertinent to practical devices. These include the use of single crystal materials in isolators and circulators. Consideration will also be given to the use of the absorption edge in polycrystalline materials for switches and modulators.

Dr. Heller's talk inaugurates the 1965 MTT lecture series. The next lecture is scheduled for November 17, 1965 and will be given by R. S. Engelbrecht, of Bell Telephone Laboratories, who will speak on recent advances in high frequency transistor amplifiers.

Gerald S. Heller received the Sc.B. in Physics from Wayne University in 1942, the Sc.M. in Applied Mathematics in 1946 and the Ph.D. in Physics in 1948 both from Brown University. Since then, he has been associated at various times with both Brown University and M.I.T. in both research and teaching capacities. He is presently a Professor of Engineering at Brown University.

An old Indian was standing with his grandson, both looking over a beautiful valley below. Said the old Indian: "Some day this all belong to Indian again. Paleface all go to moon.

## COMTEC

### THE APPLICATION OF COHERENT LIGHT TO COMMUNICATIONS

**Speaker:** O. E. DeLange  
**Place:** Arnold Auditorium,  
Bell Laboratories,  
Murray Hill, New Jersey  
**Date:** Tuesday, October 5, 1965,  
8:00 P.M.

Mr. DeLange will discuss the inherent advantages and disadvantages of a coherent light carrier system and how these affect the possibility of achieving a practical and economical system.

The various components required for a broadband light transmission system will be listed and the present state of development of each discussed, along with consideration of possible future developments.

There will be some discussion of possible transmission media including those enclosed and protected, as well as those open to the atmosphere. This will include some experimental data concerning the losses and stability which can be expected from each medium.

There will be a brief description of an experiment involving the transmission of television pictures and voice multiplex over a light beam.

Mr. O. E. DeLange received a BSEE from the University of Utah in 1930 and an MA in Physics from Columbia University in 1937. From 1930 to the present time he has been with Bell Telephone Laboratories. He was involved in studies of FM up to the start of World War II. The war years were spent on the develop-

ment and design of naval radar. A number of years following the war were devoted to studies of broadband amplifiers and pulse systems, with emphasis on PCM. He was responsible for the satellite tracking radar employed at the Holmdel, N. J. Bell Laboratories for Echo I experiment. Recent years have been devoted to studies of light propagation and light transmission systems. He is a Senior member of IEEE.

## COMPUTER GROUP

### Machine Aids to Design

A presentation on Machine Aids to Design will be given by Mr. R. H. Roth of Bell Telephone Laboratories at the October meeting of the NJ Computer Group.

The meeting will be held on Wednesday, October 13, 1965 at 8:00 P.M. at Arnold Auditorium, Bell Telephone Laboratories, Murray Hill, New Jersey. A pre-meeting dinner will take place at 6:00 P.M. at Wally's Tavern on the Hill, Watchung, New Jersey.

To date most computer assistance in design has been in the areas of final design and production of manufacturing information. Some efforts, however, have been made to provide aids in the earlier stages of the design by providing programs for designing combinational and sequential circuits. Even these programs can only be used after the design process is well along since a good deal of work is required to get the input in the required form, e.g., a state table for a sequential circuit.

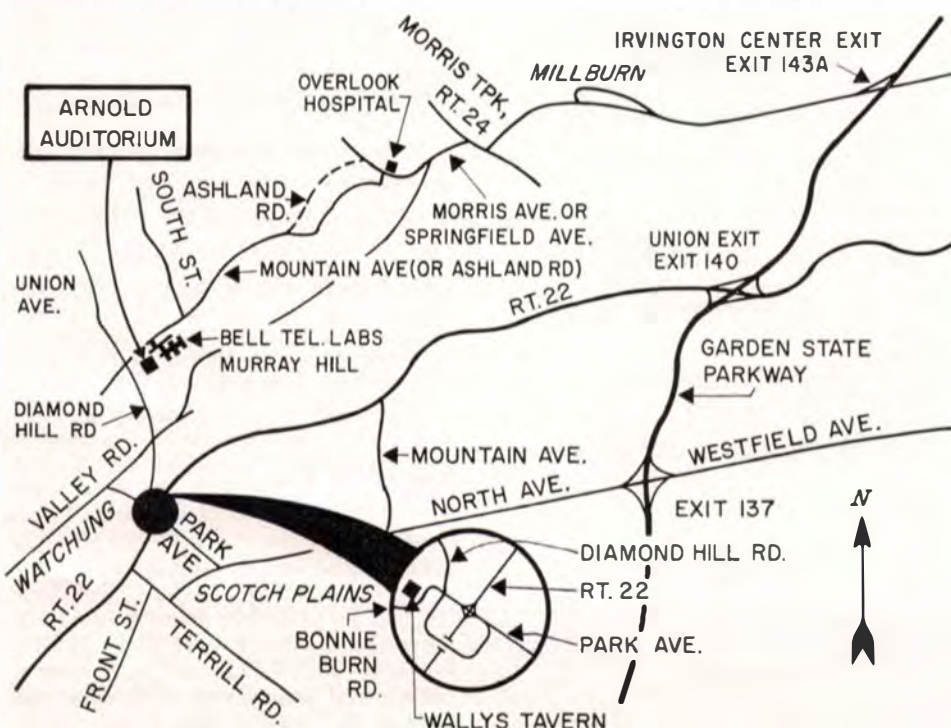
Mr. Roth will discuss the possibilities of using computers throughout the design process and will propose a suitable input language for describing digital machines.

Mr. R. H. Roth is a member of the Technical Staff in the Computing Research Department of Bell Telephone Laboratories, Murray Hill, New Jersey. Since joining Bell Laboratories in 1960, he has been engaged in studying various uses of computers in digital machine design.

Mr. Roth received a B.S. degree in Mathematics from Rensselaer Polytechnic Institute in 1960, a M.S. degree in Mathematics from New York University in 1962, and is currently working towards a Ph.D. in Computer and Information Sciences at the University of Pennsylvania.

### Pre-Meeting Film Automation in Design IBM Corporation

In addition to the main meeting, a pre-meeting film will be shown at 7:30 P.M. This film explains the fundamental principles of design automation as it is used in computer design at IBM's Poughkeepsie facilities.





## EMG Officers for 1965-1966

### \*Chairman:

Mr. D. Selwyn  
ITT Federal Labs  
Nutley, N. J.  
(201) 284-2342

### \*Vice-Chairman:

None

### Secretary-Treasurer:

Mr. N. P. Karalekas  
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320 Park Ave.  
New York City, N. Y.  
(212) PL 2-6000 x541

### Management Adviser:

Mr. J. Vaughan  
(V.P. of Engineering)  
Maxson Electronics  
Great River, N. Y.

### Chairman Emeritus:

Mr. H. N. Oppenheimer  
CBS Laboratories  
Stamford, Conn.  
(203) 325-4321

\*Note: After the election in May, Bill Clements was unexpectedly compelled by the requirements of his business to relocate to Rochester, N. Y. As a result, the Executive Committee met and designated Mr. Selwyn CHAIRMAN, vacating the office of Vice Chairman.

## MANAGEMENT ASPECTS AS INDUSTRY VIEWS THEM

by: Mr. John A. Vaughan,  
Vice President of R & D  
Maxson Electronics Corporation

Thursday, October 21, 1965—8:00 P.M.  
UNITED ENGINEERING CENTER  
345 E. 47 STREET  
UNITED NATIONS PLAZA,  
NEW YORK CITY

The need for careful policy formulation and planning to reap the full potential of an organization's technical and scientific employees is more important today than ever before due to the severe competition between companies. Mr. Vaughn, who has broad experience in all phases of engineering management and is particularly well versed in the utilization of engineering manpower, will discuss the difficulties of adequately coupling engineering talent to a company's endeavors. He will stress, from a management viewpoint, changes and new programs that may be needed to increase the effectiveness of engineering personnel by improving their utilization within an organization.

## ELECTRON DEVICES

### 1965-1966 Session

Meeting dates and locations for the coming year have been established as follows:

November 18, 1965, 8:00 P.M.  
G.T.&E. — Bayside, N. Y.  
January 13, 1966, 8:00 P.M.  
I.T.T. — Nutley, N. J.  
February 24, 1966, 8:00 P.M.  
G.T.&E. — Bayside, N. Y.  
April 14, 1966, 8:00 P.M.  
I.T.T. — Nutley, N. J.  
May 19, 1966, 8:00 P.M.  
U.E.C. — New York City

## IEEE BASIC SCIENCES COMMITTEE New York Section

The New York Section of the IEEE Basic Sciences Committee will hold a meeting of the Executive Committee Members on Monday, October 4, 1965, at 6:30 p.m., at Keen's Chop House, 72 West 36th Street (WI 7-3636).

For more information, call Mr. C. LeVine, Vice-chairman at 201-TU 7-1000, Extension 2891.

### N. Y. Com. Tech.

## COMMUNICATIONS TRANSMISSION — A CHANGING TECHNOLOGY

"Communications Transmission — A Changing Technology" is the subject of a series of 18 lectures being sponsored by the Education Committee of the Communications Technology Group, New York Section IEEE. The series is divided into three parts. Each part will be presented by a recognized authority in his field.

All lectures will be held in the "Little Theater", New York Telephone Company in (main floor) 140 West Street, New York City, on Tuesday evenings from 7 to 9 P.M. This auditorium is near the Chambers Street or Cortland Street stops on the IND and IRT subways respectively.

The basis for this series will be the recently revised text "Transmission Systems for Communications" which was written by the Bell Telephone Laboratories staff to provide training material for engineers in the transmission field.

### FALL SERIES 1965 — PART I FUNDAMENTALS

October 19  
Information Transmission  
October 26  
Limitations Due to Noise

November 9  
Introduction to Digital Technique  
(Pulse Modulations)  
November 16, 23, 30

### Introduction to Analog Modulation WINTER SERIES 1966 — PART II SYSTEMS DESIGN

January 18  
Introduction to System Design  
January 25  
Load Capacity, IM Requirements  
February 1  
Feedback Repeater Design  
February 8  
System Layout and Analysis  
February 15  
Misalignment, Equalization  
and Regulation

### March 1 Design of AM Carrier System SPRING SERIES 1966 — PART III DESIGN APPLICATIONS OF WIDEBAND SYSTEMS

April 12  
Microwave Systems  
April 19  
Radio Propagation and  
Frequency Allocation  
April 26  
Radio Systems Design  
May 3, 10  
Pulse Code Modulations  
May 17  
Wideband Data

## POLYTECH ANNOUNCES NEW PROGRAM OF "NET" COURSES

The Polytechnic Institute of Brooklyn has announced a new program of engineering courses intended to satisfy industry in keeping their personnel up to date on the latest engineering techniques. The program, known as NET (New Engineering Techniques) will include 18 separate courses, in the initial offering, in the fields of:

Linear Systems  
Computer Science  
Heat Transfer  
Rocket Propulsion  
Chemical Reactor Design  
Creativity

Presented in 6 week "blocks", the highly intensive NET courses will meet one evening per week from 6:00 P.M. to 9:30 P.M. on the Brooklyn campus, starting October 5, 1965. For additional information contact:

E. J. Thielen, Director  
Office of Continuing Professional Studies  
Brooklyn Polytech  
333 Jay Street  
Brooklyn, N. Y. 11201

Registration must be made in advance. Fees are as follows: for the three part series: IEEE members—\$30.00; non-members—\$40.00; full time students—\$10.00. For individual parts: (1, 2, or 3) IEEE members—\$15.00; non-members—\$20.00; full time students—\$7.00.

(The fees above include a copy of the required text "Transmission Systems for Communications". Those participants who already have the text may deduct \$5.00 from the enrollment fees listed above.)

To register please send name, address, phone and company affiliation. Mail with appropriate check or money order made payable to Communications Technology Group, New York Section IEEE to W. J. Carroll, Chairman, Education Committee, New York Telephone Company, 140 West Street, New York, New York 10007. Further information can be obtained from Mr. Carroll (telephone 212-394-1250.)

## IEEE SYMPOSIUM ON SWITCHED VOICE AND DATA NETWORKS FOR U.S. DEFENSE COMMUNICATIONS

Six lectures will be held on successive Monday evenings, commencing October 18, 1965, at the Western Union Auditorium, 160 West Broadway, New York City, from 7:00 P.M. to 9:00 P.M.

Registration may be accomplished by sending your check payable to "Communications Technology Group, New York Section, IEEE" to N. J. Syvertsen, 463 West Street, Room 930, New York, N. Y. 10014. Please include a stamped, self-addressed envelope.

Registration fees are as follows:

	IEEE Members	Non-Members	Full-Time Students
Full series ....	\$5.00	\$8.00	\$1.00
Per lecture ....	1.50	2.00	—

Reciprocal arrangements with other professional societies will be in effect.



# 50 Mc



## portability with Dual-Trace and Sweep Delay



Here's the new portable oscilloscope for DC-to-50 Mc applications. It operates almost anywhere—and under severe environmental conditions. It's small and light—with overall dimensions of 7¼" high x 12½" wide x 22½" deep (including extended carrying handle), and weighs less than 29 pounds.

### Performance features include:

Bandwidth (with new P6010 Probe)

20 mv/div through 10 v/div > 50 Mc

10 mv/div > 45 Mc

5 mv/div > 40 Mc

1 mv/div > 25 Mc (Channels cascaded)

Sweep Rates—5 sec/div to 10 nsec/div (with 10X Mag.)

Calibrated Sweep Delay—50 sec to 1 μsec.

CRT—New 4" rectangular, operating at 10 kv.

X-Y Operation—DC to > 5 Mc, 5 mv/div through 10 v/div.

Triggering—To 50 Mc, from Channel 1 or combined signals (both sweeps).

Type 453 Oscilloscope U.S. Sales Price f.o.b. Beaverton, Oregon . . . \$1,950



new  
453  
from  
tektronix





# NEW INSTRUMENTS



## HP MODELS 333A AND 334A SPEED NULL-FINDINGS

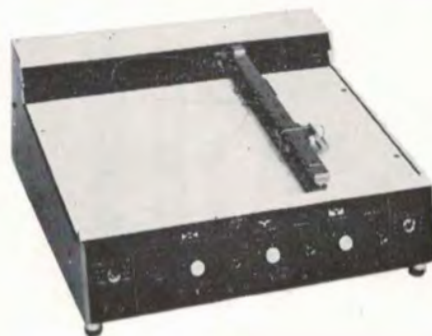
Automatic electronic null-finding is incorporated into two new all solid state total harmonic distortion analyzers from Hewlett-Packard, Model 333A and Model 334A. The automatic feature increases speed and simplifies operation.

The auto-null circuit tracks frequency variations of  $\pm 1\%$ , so the user may continuously view accurate distortion readings while making adjustments on the circuit under test, without continually re-nulling the distortion analyzer.

Full-scale reading on either instrument's most sensitive scale is 0.1%, giving meaningful measurements of signals with as little as 0.03% total harmonic distortion. The signals thus measured may be as small as 0.3 v rms. Fundamentals may range from 5 cycles to 600 kc; harmonics are measured to 3 mc.

A switchable high-pass filter prevents hum components from influencing the distortion measurement when fundamentals higher than 1 kc are examined. Model 334A differs from Model 333A only in having a precision AM detector for distortion measurement of modulation envelopes on carriers as high as 65 mc.

Prices are: \$760.00 for Model 333A  
\$790.00 for Model 334A



## MOSELEY INTRODUCES A NEW GRAPHIC RECORDER

The Moseley 2FA is a two-pen, two-channel ( $X-Y_1-Y_2$ ) graphic recorder for applications requiring simultaneous plotting of two dependent variables against a single independent variable. It accepts dc signals representing the related functions and produces cartesian coordinate curves on standard graph paper which has a writing area of 10" x 15", or smaller.

All ranges have an input resistance of 1-megohm at null. Horizontal separation of the two pens is 0.1 inch. Models 2FA and 2FRA are bench and rack versions, respectively; 2FAM and 2FRAM are corresponding models calibrated in metric units.

### STANDARD FEATURES:

- Simultaneously plots two curves
- Three electrically independent servo-mechanisms
- Built-in time base on X-axis
- Bench or standard rack models
- Accepts standard 11" x 17" graph paper, or smaller
- 1-megohm input resistance on 11 ranges
- Standard or metric scaling and calibration
- AUTOGRIP electric paper holddown

The price of the Moseley 2FA is \$3,375.00. And for complete information on the 2FA call or write your RMC FIELD ENGINEER.

**HEWLETT  
PACKARD**



**FIELD ENGINEERS-ELECTRONIC INSTRUMENTATION**

236 East 75th Street, New York 21, N. Y., TR 9-2023 • 391 Grand Avenue, Englewood, N. J., LOwell 7-3933