

NORTHERN
NJ
SECTION



The

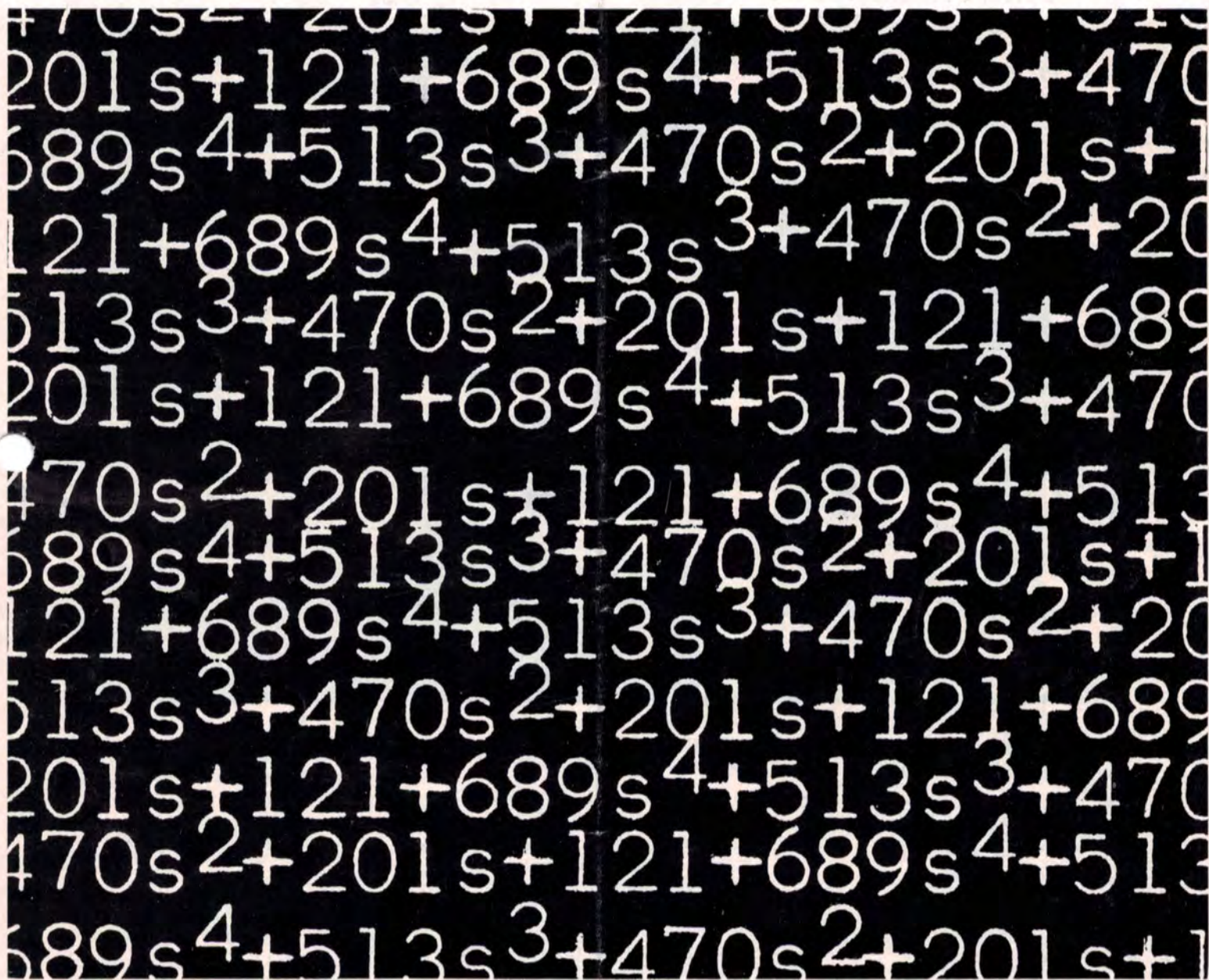
Newsletter

The Magazine of the Northern New Jersey Section of the IRE

Volume 9

FEBRUARY, 1963

Number 6



FEBRUARY MEETING — STUDENT NIGHT

THE NEW MATHEMATICS

PLACE:

NEWARK COLLEGE OF ENGINEERING
AUDITORIUM

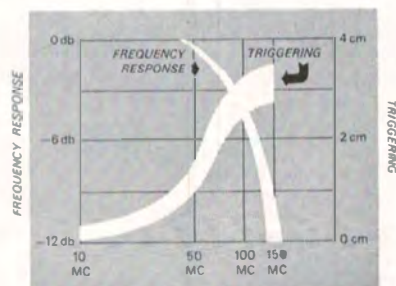
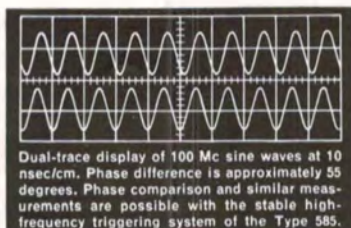
DATE: FEBRUARY 13, 1963

TIME: 8:00 P.M.

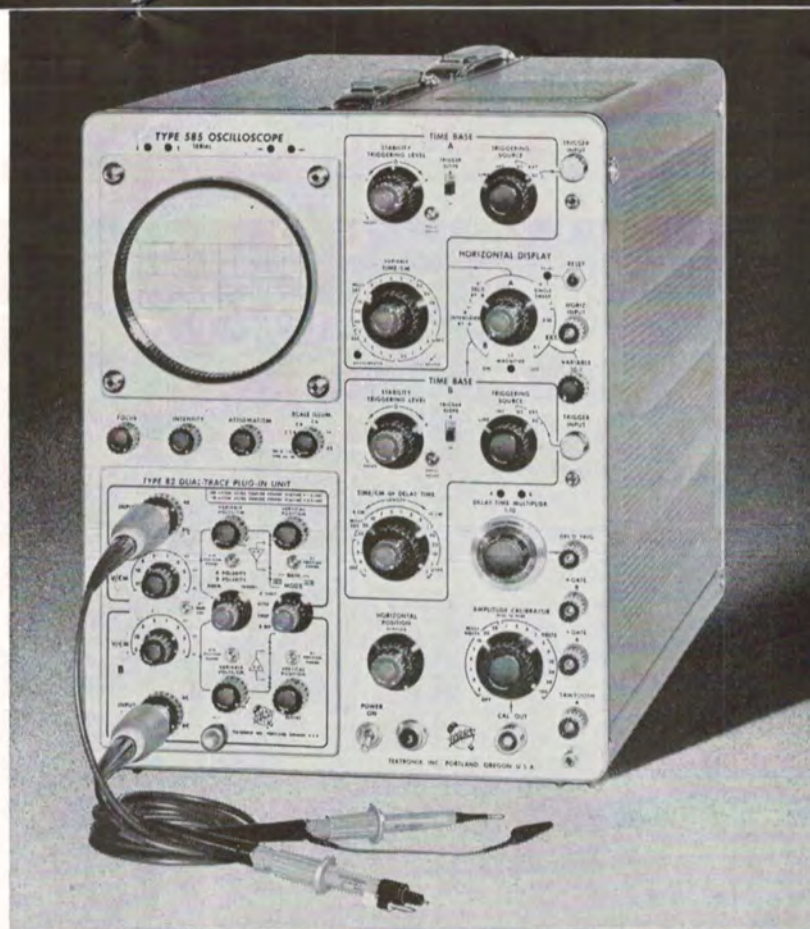
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The

Newsletter

Published monthly by the Northern New Jersey Section
of the Institute of Radio Engineers

Volume 9

FEBRUARY, 1963

No. 6

Deadlines for all material are the first of the month preceding each month of publication.

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

THE NEWSLETTER
P.O. Box 226 - Glen Ridge, N. J.
Telephone: Pilgrim 4-0453

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MEET THE STAFF

Dick Radcliff, a new member on the Newsletter staff this year, is serving as Professional Groups Editor. He received a B.S.E.E. degree in 1960 from the Milwaukee School of Engineering.

Following graduation, he joined the Western Electric Company at the Bell Telephone Laboratories in the Reliability Engineering Center. Presently, he is Project Engineer at Associated Testing Laboratories, Inc., Wayne, N. J.

Dick resides in Dover.



CREDIT DUE

The feature article published on the PGCS page in our December issue was the work of R. McSweeney and G. Karger.

THE COVER

The "old" or conventional mathematics is represented by this month's cover. For information on the "new" mathematics in this space age come to this month's Section Meeting. (Cover by Gus Sauter, Art Director, *EEE - Electronic Equipment Engineering*.)

ANNUAL SECTION BANQUET —

NNJ SECTION OF IRE

(Formerly called Fellows' Night)

Date:

TUESDAY, MARCH 12, 1963

Place:

HOTEL SUBURBAN
141 S. Harrison St.
E. Orange, N. J.
(Excellent Parking Facilities;
Rear of Hotel)

Time:

Social Hour at 6:15 P.M.
Dinner at 7:15 P.M.
Awards and Addresses at
8:30 P.M.

Price:

\$4.50 per person, including
Dinner and one Cocktail.

Speaker:

Mr. Cowles Andrus,
Special Assistant, NASA

Title of Address:

"Satellite Communication"

ANNUAL SECTION BANQUET

Please reserve tickets for The Annual Section Banquet to be held at the Hotel Suburban, 141 So. Harrison Street, East Orange, N. J., on Tuesday, 12 March, 1963. Tickets are \$4.50 per person.

Enclosed is \$.....

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SECTION MEETINGS

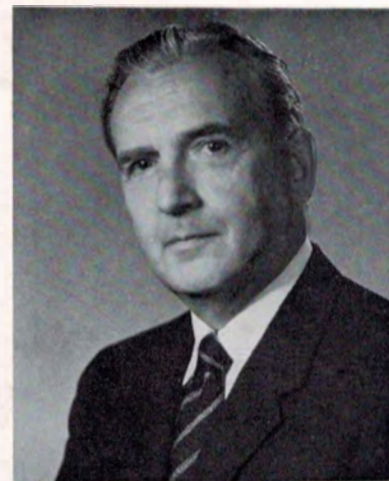
February 13
March 12
April 10
May 8
June Field Trip

**EXECUTIVE
COMMITTEE MEETING**

February 27
April 3
April 24
May 22
June 26

**CHAIRMAN'S
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A. W. PARKES

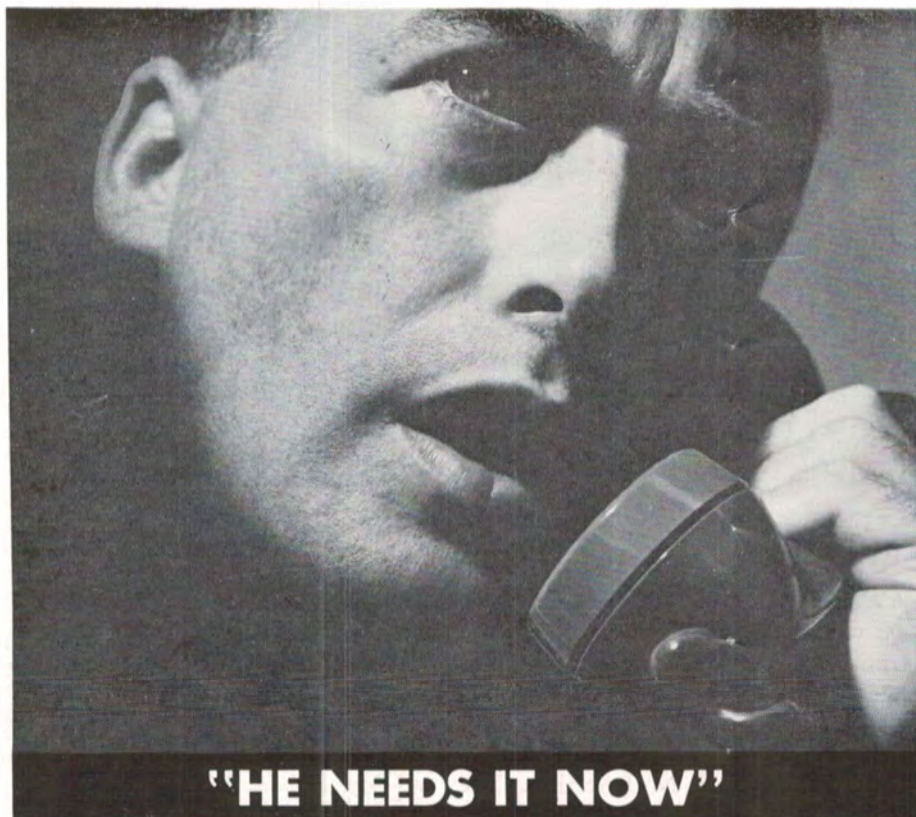


AWARDS. At the Annual Section Banquet Tuesday, March 12, 1963, we will have the honor of presenting our compliments to two members from this section who will receive awards at the International Convention later. They are Dr. George C. Southworth and Dr. Ian M. Ross. It will also be our pleasure to present certificates of the election to the grade of FELLOW Of The INSTITUTE OF RADIO ENGINEERS to twelve members from the NNJ Section. They are Mr. Robert T. Adams, Dr. Maurice Arditi, Mr. Joseph T. Cimorelli, Dr. Edward E. David, Jr., Mr. Elwood K. Gannett, Mr. Alexander J. Grossman, Dr. Arnold M. Levine, Mr. William A. Malthaner, Mr. Robert L. Mattingly, Mr. David A. McLean, Dr. Samuel P. Morgan and Mr. Arthur C. Peterson. **Please reserve March 12.** We are particularly anxious that FELLOWS in the NNJ area attend to assist in honoring the newly elected FELLOWS. More details will be published in the March issue of THE NEWS-LETTER. Please note that Tuesday, March 12, 1963 is **not** the date originally set for this affair.

SPRING LECTURE SERIES. The 1963 Spring Lecture Series will be a cooperative venture with Fairleigh-Dickinson University held on ten successive Thursday evenings beginning February 21, 1963, with the exception of March 28, the week of the International Convention of IEEE in New York. The series is titled "Applications of Microwave and Semiconductor Devices." The Chairman of the series representing NNJ IRE Section is Charles G. Gorss, Jr., Boonton Radio Corp., and the Business Manager is John A. Zieger of Aircraft Radio Corp. Fairleigh-Dickinson will be represented by Professor Virgil Johannes of the Electrical Engineering Department. Application blanks will be mailed to NNJ members in addition to appearing in this issue of THE NEWS-LETTER. It is hoped that corporations will recognize the educational opportunity for their engineering personnel and arrange to subscribe for the series.

The NNJ Section recognizes its responsibility to provide educational lecture series for its more than 5,000 members.

NEED FOR LECTURE SERIES. The fast-broadening scope of research in electronics is so great that no university can hope to have personnel capable of teaching in all fields. For this reason the IEEE must step in with its many experts to meet the needs of members. We owe much thanks to the speakers who spend a great deal of time, and often their own money, to give lectures at the section meetings and at the Fall and Spring Lecture Series. We appreciate their contribution to the intellectual growth of our community and nation.



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THE NEW MATHEMATICS

The February meeting of the Northern New Jersey Section will be held on Wednesday, February 13, at the Newark College of Engineering auditorium. It is scheduled to begin at 8 P.M. and will be preceded by a pre-meeting dinner at 6 P.M. The speaker will be Dr. Jacques Dutka, who will discuss modern mathematic techniques used in electronic systems analysis.

It has been stated that unless a phenomenon can be quantitatively analyzed it cannot be reduced to an exact science. Further, unless the quantification is applicable to symbolic logic or mathematics, the scientific observation cannot be extrapolated to predict behavior under conditions differing from those of the observation. Modern technology has put an increasing stress on the classical mathematics; and new number systems and logics have been evolved to cope with this diversity of problems. Boolean algebra, for example, has become a powerful tool in computer technology, as have non-decimal number systems. Non-euclidian geometries have been evolved to describe other physical problems.

In recent years, there has been an increasing tendency in science and technology to apply the methods and techniques of modern mathematics, much of it developed in the last two or three decades, to the solution of a wide variety of problems. This trend has been considerably accelerated by the availability of high speed digital computers which can be programmed to furnish numerical solutions to problems which were previously regarded as intractable from a computational standpoint.

In this lecture, some applications of modern mathematical techniques to the solution of engineering problems will be discussed by Dr. Dutka and illustrated by particular examples.

SPRING SCHEDULE

March 12, 1963

Annual Section Banquet

"SATELLITE COMMUNICATIONS"

Dinner, Hotel Suburban

A discussion of Relay, Syncom, and Telstar techniques of global communication and some predictions as to future programs.

April 10, 1963

"PHYSICS OF COHERENT LIGHT"

Bell Telephone Laboratories
Auditorium, Murray Hill
Pre-Meeting dinner, Wally's

An analysis of techniques for generating, modulating, and detection of coherent light including but not limited to lasers, Faraday modulators and photocell detectors.

May 8, 1963

"SUMMATION AND SPECULATION"

ITT Federal Laboratories
Pre-Meeting Dinner, Copper Hood

A review of the entire series with emphasis on the unifying principles common to all.

June 1, 1963

FIELD TRIP (to be determined)
Suggestions—BTL, FAA, RCA,
NYU, Brookhaven, Kodak
Laboratories



ABOUT THE SPEAKER

Dr. Jacques Dutka is currently Manager, Operations Analysis, with the Radio Corporation of America, Defense Electronic Products Surface Communication Division.

In this position he is directing the activities of various subgroups engaged in operations and systems analysis of command communications problems, computer applications, etc.

Dr. Dutka holds a Ph.D. in mathematics from Columbia University, where since 1954 he has been teaching mathematics and engineering analysis and is now an Adjunct Professor of Electrical Engineering. He has been a consultant for McGraw-Hill Book Company on a scientific information evaluation project, and is also a reviewer for the IRE Transactions on Information Theory.

Dr. Dutka has been active in mathematical systems analysis as a Leader, Engineering Systems Projects, for the U. S. Navy; Mathematician at the Norden-Ketay Corporation; Assistant Professor of Mathematics at Rutgers University; Instructor of Mathematics at Princeton University; Consultant, Office of Naval Research; Member of Operations Research Group of the U.S. Navy; and Assistant Research Mathematician with Columbia University Applied Mathematics Panel.

Dr. Dutka is a member of the American Mathematical Society, Institute of Mathematical Statistics, and Sigma Xi, the honorary scientific society.

MEETING FACTS

PLACE:	Newark College of Engineering Auditorium
TIME:	8:00 P.M.
DATE:	February 13, 1963
SUBJECT:	The New Mathematics
SPEAKER:	Dr. Jacques Dutka
PRE-MEETING DINNER:	School Cafeteria
TIME:	6:00 P.M.

SPRING LECTURE SERIES

"APPLICATIONS OF MICROWAVE AND SEMICONDUCTOR DEVICES"

Fairleigh Dickinson University in co-sponsorship with the Northern New Jersey Section of the IRE is offering a Spring Lecture Series on "Applications of Microwave and Semiconductor Devices."

This series is designed for both the practitioner in the microwave art as well as engineers concerned with the design of systems using such components.

The lecturers will briefly discuss the theory of operation of these devices, their applications in various systems and the present state of the art limitations. The latter is important to those engineers who are responsible for component specifications in microwave systems.

Dates Thursday Evening 8:00 to 10:00 P.M.

Place Gymnasium—Fairleigh Dickinson University
1000 River Road, Teaneck, N. J. —
Parking Available on Campus

Co-ordinator Jesse Markson and Dr. V. Johannes

IRE Program Chairman Charles G. Gorss, Jr.
Boonton Radio Corp.
P.O. Box 390, Boonton, N. J. — OA 7-6400

IRE Business Manager John A. Zieger
Aircraft Radio Corp.
Boonton, N. J. — DE 4-1800

Lecture No. 1 — February 21, 1963

"TRAVELING-WAVE TUBES — PRINCIPLES AND PRACTICE" DR. WARREN MENKE

During the past decade, the use of microwave tubes has made possible unprecedented advances in the field of electronics. Almost daily we hear reports of increase in the quantity and quality of intelligence in the communications and radar fields. Rapid strides are being made in medicine and biology using microwave tubes as tools to study, induce or inhibit cellular mutations.

One of the most versatile microwave tubes available for the above purposes is the traveling-wave tube. Its usefulness is sometimes misunderstood, and its characteristic performance features are sometimes misapplied. The purpose of this lecture is to correct this situation by outlining the principles of operation of traveling-wave tubes to help participants gain a better understanding of TWT characteristics and uses. Other types of microwave tubes will be briefly discussed. This lecture will also serve as background material for succeeding lectures of this series where the characteristics of tubes other than TWT's will be defined in more detail.

Dr. Warren Menke is now Section Head, Electronic Tube Division, Sperry Gyroscope Company in Great Neck, L. I. Dr. Menke received his Bachelor's degree from MIT 1942 and his Master's and Ph.D. from Purdue in 1949 and 1953 respectively. Dr. Menke is a member of the IRE.

Lecture No. 2 — February 28, 1963

"THE GENERATION OF SUPER POWER AT MICROWAVE FREQUENCIES"

MR. WILLIAM C. BROWN

The generation of super power by various microwave tubes will be studied. Their construction and mode of operation and how they affect the operating characteristics which are important in the generation and application of super microwave power. Important differences in the various devices are the result of differences in energy conversion systems, differences between injected beams and continuous cathode arrangements, and differences in circuit properties and configurations.

It will be indicated that these various devices are capable of being made into tubes

Lecture No. 7 — April 11, 1963

"PARAMETRIC AMPLIFIERS — VARIABLE CAPACITANCE" PETER LOMBARDO

The subject of variable reactance (parametric) amplifiers has been one of intense interest. Various theoretical analyses as well as reports of actual low noise uhf and microwave performance have been published.

The theory of the parametric amplifier will be discussed briefly leading to an equivalent circuit representation. Formulae for gain, bandwidth and noise factor will be derived. This results in simple design equations in terms of the varactor and external circuit parameters including parasitic stray reactances associated with the varactor.

In addition, problems of measurement will be discussed and several microwave structures described.

Mr. Peter Lombardo is Section Head Applied Electronics Department, Airborne Instruments Laboratory, Melville, L. I. He received his B.E.E. from Brooklyn Polytechnic Institute in 1953. Mr. Lombardo is a member of the IRE.

Lecture No. 8 — April 18, 1963

"VARACTOR HARMONIC GENERATORS" MARION E. HINES

Multiple-stage varactor harmonic generators are now commercially available. These devices, in most cases, are entirely passive except that RF power is applied at frequencies from 50 to 200 Mc. The input frequency may be multiplied by two, three, or four in each stage. Outputs in any common microwave band are obtainable from multistage units. The interesting feature of varactor harmonic generators is the high efficiency obtainable in doubling, tripling or quadrupling. Efficiencies from 50 to 90 percent are commonly reported for single stage devices, while multistage units are, of course, lower. Varactor nonlinearity is reactive rather than resistive in varactor diodes, resulting in higher efficiency. Residual power losses are associated with parasitic series resistance of the varactor diodes. Harmonic generators have many similarities to parametric amplifiers and are subject to some of the same types of instabilities.

Mr. Marion E. Hines is Research Director at Microwave Associates, Burlington, Mass. He received his Bachelor's and Master's degrees from California Institute of Technology in 1940 and 1946 respectively.

capability of these devices by increasing the dissipation of RF structures.

Mr. William C. Brown is Associate Director of Engineering, Crossed Field Device and Materials Laboratory for Applied Research on Crossed Field Devices, Raytheon Co., Burlington, Mass. Mr. Brown received his B.S.E.E. in 1937 from Iowa State College, and his M.S.E.E. from MIT in 1941.

Mr. Brown is a Fellow in the IRE.

Lecture No. 3 — March 7, 1963

"A REVIEW OF MICROWAVE FERRITE DEVICES"

DR. COLIN BOWNESS

The microwave ferrite device is an accepted component in almost all present day microwave systems.

The major advances which have occurred during the last five years have been in the field of practical devices and materials rather than in the theoretical aspects. For this reason and to make this lecture of more practical value, ferrite theory will be reviewed briefly and only as it applies to the practical devices.

Dr. Bowness is Manager of Special Microwave Devices Operation at the Raytheon Co., Waltham, Mass. He received his BS in Physics in 1951 from Northern Polytechnic, London. He received his Ph.D. from the University of London in 1956.

Dr. Bowness is a Senior Member of the IRE.

Lecture No. 4 — March 14, 1963

"LOW NOISE AMPLIFIERS USING ELECTRON BEAMS"

DR. ROBERT ADLER

This lecture will deal with the historical background of amplification, leading up to the limitations imposed by the finite velocity of electron beams, and the eventual use of this transit time as the mechanism for amplification. The basic theory of operation of the Klystron and the development of the traveling-wave tube and its noise properties will be thoroughly covered. Factors which contribute to the noise in the electron beam amplifier will also be discussed. Quadrupole amplifiers must be considered in this general category and therefore, the factors that make them operate at low noise temperature will be investigated.

Dr. Robert Adler is Associate Director of Research at Zenith Radio Corp., Chicago.

III. Dr. Adler received his Ph.D. in physics in 1937 from the University of Vienna.

Dr. Adler is a Fellow in the IRE.

Lecture No. 5 — March 21, 1963

"DEFINITION AND MEASUREMENT OF RECEIVER NOISE PERFORMANCE"

RUDOLPH ENGELBRECHT

The IRE definitions of noise figure, effective input noise temperature and operating noise temperature will be reviewed. Particular emphasis will be placed on their application to multiple response devices such as, parametric amplifiers and converters. The current capabilities of low noise microwave receivers will be presented and evaluated in terms of overall systems noise performance.

Some of the methods of noise frequency measurements will be discussed with particular attention focused on their relative merits and accuracies.

Mr. Rudolph Englebrecht is now at the Bell Telephone Laboratories, Murray Hill, N. J. He received both his BSEE and MSEE from Georgia Institute of Technology in 1951 and 1953 respectively. Mr. Englebrecht is a member of the IRE.

Lecture No. 6 — April 4, 1963

"MICROWAVE SEMICONDUCTOR DIODES"

DR. ARTHUR UHLIR, JR.

The diode is a very versatile component for the microwave engineer. In this lecture, the speaker will deal with the diverse uses to which diodes have been put in the microwave field. The Varactor Diode as used in Harmonic Generators and Amplifiers will be discussed. The mixer diode is an old but important subject in its uses for low level detection. The newer Esaki Diode with its giant potential as well as the lesser known PIN diode will also be described and discussed. The limitations as well as the applications of these various diodes will also be described.

Dr. Arthur Uhlir, Jr. is Director of Semiconductor Research and Development at Microwave Associates, Burlington, Mass. Dr. Uhlir received his BS and MS in Chemical Engineering from the Illinois Institute of Technology in 1945 and 1948. Later he obtained an MS and PhD. in Physics from the University of Chicago in 1950 and 1952 respectively.

Dr. Uhlir is a Senior Member of the IRE.

Lecture No. 9 — April 25, 1963

"THE MICROWAVE MIXER"

THEODORE S. SAAD

In the early stages of microwave development there were no low noise amplifiers at microwave frequencies, and it was necessary to receive signals either by direct detection or by mixing. Since direct detection was so insensitive, the engineer resorted to a superheterodyne circuit using a mixer stage.

In recent years, however, with the advent of the traveling wave tubes, the varactor diode, and tunnel diode, the mixer lost some of its original importance. With the introduction of more complex communications systems and the application of computer techniques, the mixer is beginning to take on a slightly altered role.

The bulk of mixers used today are of the type that have a power level of 1 to 2 milliwatts in the local oscillator and an IF frequency of 30 Mc. In recent years, however, there has been a growing need for family of devices which, although directly related to conventional mixers, are probably more accurately classified as modulators or converters.

Although there are many applications for these devices and many have been designed and built, relatively little information is available in existing technical literature.

Theodore S. Saad is President of Sage Laboratories, Natick, Mass. He is also co-founder and Editor-in-Chief of "The Microwave Journal," "Solid State Design," and "The Microwave Engineer's Handbook."

Mr. Saad received his BSEE from MIT in 1941.

He is a Senior Member of the IRE.

Lecture No. 10 — May 2, 1963

"MICROWAVE SEMICONDUCTOR CONTROL DEVICES"

DR. KENNETH E. MORTENSON

During the past few years, a new class of microwave control components has emerged. These devices differ from earlier components in that they are electronically controlled as opposed to those that were mechanically controlled, and, they employ some form of semiconductor junction as the active element. The application of these microwave semiconductor components has been extended into all phases of microwave control. For example, semiconductor components have now been evolved to perform as switches and variable attenuators, limiters and duplexers, phase shifters and tunable filters.

The features of these microwave semiconductor control devices which are compelling their adoption in many microwave systems are as follows:

1. Moderate control requirements or self actuated.
2. High response speed, less than 100 nanoseconds, for all components.
3. Compact and light weight.
4. Long life and high reliability provided by solid state components.

With these features fully established, it is apparent that the semiconductor control components will be a major factor in the design and development of microwave systems for some time to come.

Dr. Kenneth E. Mortenson is Director of Research and Development of Microwave Semiconductor Components and Devices at Microwave Associates, Burlington, Mass.

Dr. Mortenson received his BS, BEE in 1947 and 1948 respectively from RPI. His MS and PhD in 1950 and 1954 respectively from RPI, in Physics.

He is a Senior Member of the IRE.

Registration Fee \$25.00 for the Complete Series

Printed copies of the lecture notes will be made available at cost

Please reserve tickets for the spring lecture series, starting February 21, 1963.

Name

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Mail To:

Dr. Harold Rothbart, Dean
College of Science and Engineering
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1000 River Road, Teaneck, N. J.

IDEAS WANTED!

By T. H. CROWLEY,

Bell Telephone Laboratories

The June 1962 issue of the Newsletter contained a short discussion of the objectives of the NNJ Chapter of the PGCS together with a plea for active support by all its members. Incidentally, Roger McSweeney, our chairman, has received several offers of help but there are still plenty of openings for anyone who is interested. It might be worthwhile to consider here very briefly, but somewhat more broadly, possible objectives and activities of our organization.

Since the engineers and scientists who are potential members of our organization are probably about as busy and active a group of people as one can find, they certainly feel no need or desire to join any organization just for the sake of joining. The group must serve some positive purpose or it cannot hope to play a very active role in the lives of the members. It is also clear that the objectives and activities of the group should be determined by the members rather than specified arbitrarily by the officers or anyone else.

It is not difficult to list some desirable and important functions for such a group. For example, the Chapter can encourage the presentation and publication of good technical papers in our field of interest, it can provide a forum for disclosing important advances in the art, and it can promote fellowship among engineers working in our field in Northern New Jersey. These are objectives which are certainly in line with our charter and insofar as they are felt to be important by the members they help to create an active organization.

But perhaps we can arouse greater interest and develop more support by broadening our horizons. It is clear that there are very substantial and critical problems in today's world that touch more or less closely in our field. Many of these problems are undoubtedly of interest and the subject of some thought by members of the group, but because of their scope and sometimes because of their abstract nature they cannot be dealt with on an individual basis. It may be that group discussion

can be helpful and perhaps even lead to ideas for constructive action. In line with the above, it is of course, essential that such topics be generated within the group in order to assure its interest and support. However, let us mention several examples in order to illustrate possibilities and perhaps stimulate some controversy and maybe some suggestions.

It is clear that the existing organization of research and development activity has grown in a rather haphazard manner. Furthermore, it has grown extremely rapidly and is very heavily dominated by government spending. The resulting effects, particularly on the "research industry" and major universities, are obvious and close to many of us. Of particular interest at this time is the effect on the organization of professional societies since we are obviously in a transient state. Although this is not a strictly technical topic, the group might find it interesting to investigate, discuss, and perhaps comment upon this situation, particularly with respect to research and development in communications.

As another possibility, scientists and engineers as a body are becoming more interested in (in fact, are being pushed to think about) the effects on society of their work. There is probably no technical field which has a more immediate and widespread effect than communications. Perhaps the group would be interested in pursuing communication systems, e.g. intercontinental transmission of television via satellite or communications used in nuclear explosion detection network.

The preceding topics may seem somewhat far afield, but it is hoped that they will stimulate some of us to consider heretofore ignored possibilities. And it seems very clear that the easiest way to assure a vital growing organization is to develop from within the group some strong desire for pursuing some worthwhile objective. In a world as complex, interesting, and as torn with strife as today's, that should not be impossible or even difficult.

AIEE Division To Hold Computer Study Group

The Instrumentation Division of the AIEE's New York Section will hold a study group on special purpose control computers and their application. The course will be held on Mondays beginning on February 18 and ending April 8. Analog and digital units will be covered.

Study Group Summary

Objective:

Strong competitive forces both domestic and foreign are accelerating the drive to bring American Processing and Manufacturing Plants abreast of recent advances in Instrumentation. The attainment of this goal is receiving increasing support through the application of Special Purpose Control Computers and significant improvements in cost, efficiency and product quality are being reported. This Study Group will provide the Engineer with important background information on smaller "on line" computers of both the analog and digital type and on the latest developments in their application to both supervisory and dynamic control.

Place:

Ebasco Services, Inc.
Auditorium — Room 240,
2 Rector Street, N. Y. City

Time:

Mondays—February 18 through April 8, 1963 — 6:30 P.M. to 8:30 P.M.

Fee

Society Members	\$15.00
Non-Members	25.00
Student Members	3.00

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AROUND THE PG CIRCUIT

The Metropolitan Chapters of the PG's on Component Parts, Reliability and Quality Control, and Product Engineering and Production plan meetings for February.

PGCP

CONNECTOR PERFORMANCE AT HIGH ALTITUDE

February 20, 1963
7:45 P.M.

The Island Inn (Cumberland Room)
Old Country Road
Westbury, L. I., N. Y.

Connector Performance at High Altitude is the subject of the February 20 meeting of the PG on Component Parts. Messrs. W. P. Whallon and M. A. Chaplin of the Bendix Corporation, Scintilla Division, will present a program which will include a history of thinking regarding high altitude effects. The original German thoughts on high altitude and space ambients will be discussed, with a period of time devoted to the theoretical minimum flash-over voltages. The contributing parameters will be briefly investigated prior to delving into dielectric material considerations and the effect that the dielectric constant has on corona and flash-over ignition.

The universal dielectric fluid air will be considered as a contaminant while ionization physics will be discussed. Flux field stresses and deionization will be developed. The missile evolution and inherent RFI problems interlaced with corona thinking will be investigated.

Laboratory equipment will be available to demonstrate actual problems. Corona will be effectively demonstrated in a completely blacked-out room.

PGRQC

RELIABILITY ENGINEER —

A NEW BREED

February 11, 1963
7:30 P.M.

Burroughs Corporation
215 Park Avenue
(Corner 18th Street)
New York City

The PG on Reliability and Quality Control will sponsor a talk on the *Reliability Engineer — A New Breed* on February 11. Dr. John H. K. Kao, of Cornell University, will present the talk. The questions raised by Dr. Kao will include whether reliability is basic

to all engineering, is it a new discipline, or does it fit both categories. He will discuss the viewpoints of both industry and the academic world; and whether there should be a curriculum in Reliability Engineering leading to a Baccalaureate or possibly a graduate degree.

Dr. Kai is well qualified to represent both the academician and the practicing engineer on this question. At present, he is Associate Professor of Mechanical Engineering, Sibley School of Mechanical Engineering, Cornell University. Formerly, Dr. Kao served in charge of Purchasing and Specifications at the official purchasing agency of the Republic of China, and has also served as Consultant to the U.S. Army Signal Corps and many industrial firms on system and component problems.

PGPEP

TOUR OF FACILITIES, FILTORS, INC.

February 27, 1963
8:00 P.M.

Filtors, Inc.
Daly Road
East Northport, L. I., N. Y.

The February 27 meeting of the PG on Product Engineering and Production will include a tour of the facilities of Filtors, Inc., E. Northport, L. I. Mr. Louis D. DeLalio, chief engineer and vice president of engineering, will present a brief talk about the production line, production methods, techniques and problems. Following the talk, there will be a tour of the plant, showing how electromagnetic relays are manufactured. Included in the tour will be a demonstration of Filtors' high-voltage electron beam welder.

Those planning to attend are asked to detach and return coupon below:

Mr. Arnie Goldfarb
c/o J. A. Maurer, Inc.
37-01 31 Street
Long Island City, N. Y.

Dear Mr. Goldfarb:

Please register me as an attendee at the February 27th meeting of the PGPEP at Filtors Inc.

Name

Title

Address

City and State

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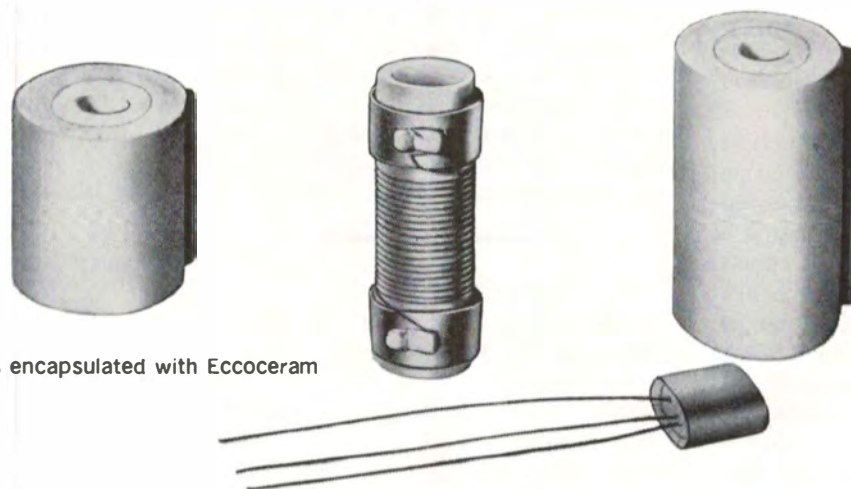
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Recent Developments on Gas Switching Devices

Mr. William R. Ghen, Staff Engineer for Metcom, Inc., Salem, Massachusetts, will speak at the February 20th PGMTT meeting on "Recent Developments in Gas Switching Devices". The meeting is scheduled to be held at the ITT Laboratories Auditorium, 500 Washington Avenue, Nutley, New Jersey. The pre-meeting dinner is at 6:00 P.M. at the Copper Hood Restaurant, 1 Park Avenue, Lyndhurst, New Jersey.

In recent years the emphasis on search radar systems has shifted toward ultra high power and extremely long range with capability to locate and track small objects, such as missiles and satellites, at ranges up to several thousand miles. In order to accomplish this, transmitter peak powers have been pushed up into the tens of megawatts, and average powers in excess of 100 kilowatts. These conditions have forced the duplexer designers to improve duplexing capabilities accordingly. Some of this improvement has been accomplished by refining well established design and techniques, but in order to improve operating reliability and performance, several comparatively new duplexing techniques have been developed.

A brief comparison of some of the more commonly used duplexing systems will be presented, with emphasis toward some of the low frequency, high power coaxial systems now in use. A 20 mc coaxial duplexer system will be described which has operated at peak powers up to 10 megawatts, and average powers up to 200 kilowatts. A new high power gas switching element which has shown remarkable power handling capability and an L-Band waveguide balanced duplexer employing such an element will also be described. This duplexer has successfully operated at peak powers up to 20 megawatts and average powers up to 200 kilowatts. Duplexing systems using ferrite circulator devices will be discussed as well as solid state limiters.



William R. Ghen

William R. Ghen is a native of Stoneham, Massachusetts, and a graduate of Northeastern University where he received a BS in Electrical Engineering. He has also done post graduate studies at Northeastern University in physics and electrical engineering.

In 1952, upon completion of schooling he joined Bomac Laboratories, Inc., where he rose to the position of Assistant Chief Engineer, Gas Switching Tube Department. In this capacity he was responsible for such products as high-power, high-repetition-rate gas switches; cell type tubes; folded cylinders, complete duplexers, both high and low frequency; and waveguide and coaxial configurations.

Mr. Ghen joined the staff of Metcom, Inc., on its formation, as Chief Engineer, Gas Switching Tubes. In this position he is responsible for the research, design and development of all gas switching devices.

As a member of the IRE he has served on the IRE subcommittee on operation measurement for microwave oscillator tubes and holds patents on many broad-band and associated gas switching devices.

MEETING NOTICE

Subject: Recent Developments in Gas Switching Devices

Speaker: William R. Ghen, Staff Engineer, Metcom Inc.

Place: Auditorium of ITT Laboratories
500 Washington Ave.
Nutley, New Jersey

Date: February 20, 1962,
at 8:00 P.M.

Pre-Meeting: Copper Hood

Dinner: Restaurant
1 Park Avenue,
Lyndhurst, New Jersey

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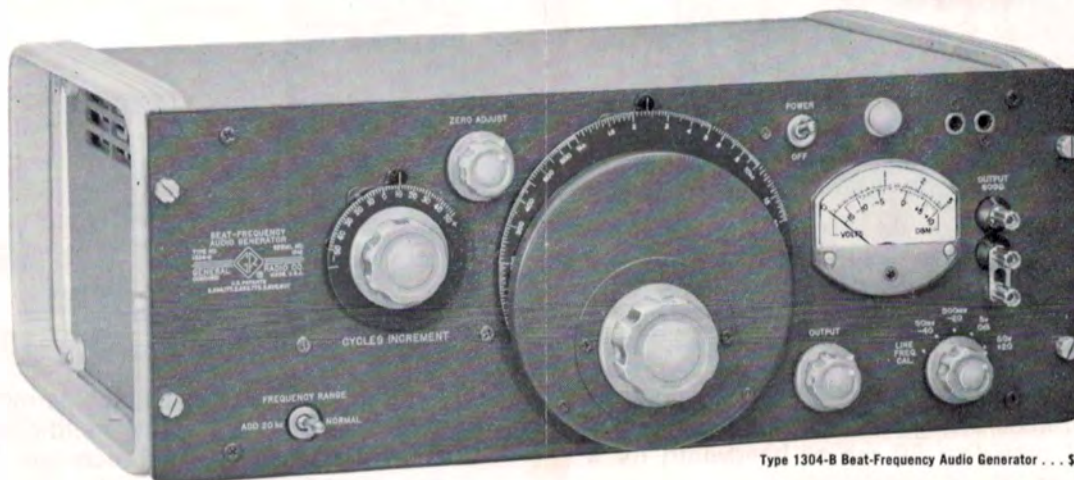
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MARCH						
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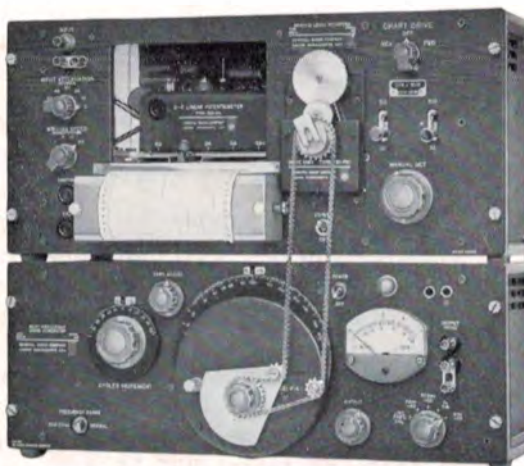


SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
					1	2 Groundhog Day
3	4	5	6	7	8	9
10	PGRQC 7:30 P.M. BURROUGHS CORPORATION 215 PARK AVE. SOUTH NEW YORK CITY, N. Y. 11	12 Lincoln's Birthday	NNJ SECTION MEETING SEE DETAILS BELOW 8:00 P.M. 13	14 St. Valentine's Day	15	16
17	AIEE Lect. #1 STUDY GROUP STARTS EBASCO SERVICES, INC RM. 240 18 2 RECTOR ST., N. Y. C.	19	PGMTT 8:00 P.M. ITT LABS., NUTLEY, N. J. PGCP 7:45 P.M. THE ISLAND INN OLD COUNTRY RD. WESTBURY, L.I., N.Y. 20	21 SPRING LECTURE SERIES LECT. #1 8:00 P.M. F.D.U.—TEANECK, N. J.	22 Washington's Birthday	23
24	AIEE Lect. #2 STUDY GROUP (SEE DATE OF 18th FOR DETAILS 25	26 Shrove Tuesday	27 Ash Wednesday	28 SPRING LECT. SERIES Lect. #2 8:00 P.M. F.D.U. TEANECK, N. J.		
		FEBRUARY SECTION MEETING — STUDENT NIGHT Subject: THE NEW MATHEMATICS Place: NEWARK COLLEGE OF ENGINEERING AUDITORIUM Time: 8:00 P.M. Pre-Meeting Dinner: CAFETERIA Time: 6:00 P.M.				

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- The entire audio-frequency spectrum is covered in an accurate logarithmic manner in one sweep of the dial (a 1000-to-1 frequency change without switching ranges) . . .
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- Unusually stable — drift from cold start is less than 7 cycles in the first hour — essentially complete in two hours . . . made possible by thorough component compensation and equalization.
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Calibration Accuracy: $\pm (1\% + 0.5 \text{ cycle})$ after standardization with zero-beat control

Output: Balanced 600- Ω resistive, or one side grounded. Output voltage continuously variable from less than 5 mv to 50v, open circuit. Output voltmeter accurate to $\pm 5\%$ of reading. Attenuator for use with single-ended output has three steps of 20 db each;

accuracy $\pm 1\%$. Output continuously variable at each setting. Power output is 1 watt, max., into 600 ohms.

Frequency Characteristic (for 600-ohm load):
20 to 20000 cycles, ± 0.25 db
20 to 30 kc, ± 0.5 db
30 to 40 kc, ± 1.0 db

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Some specs:

- ✓ 16 channel recording.
- ✓ Flush-front mounting in latch-slide assembly.
- ✓ Galvanometer sensitivity . . . ± 400 milliamperes provides ± 10 millimeters writing deflection.
- ✓ Natural Frequency . . . 66 cycles per second.
- ✓ Frequency Response . . . 3 db down at 66 cycles at 0.7 critical damping.

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