The IEEE
Newsletter
The Magazine of the North Jersey Section

GUIDED TRANSMISSION OF LIGHT

DR. GEORG GOUBAU, USAEL

An optical beam waveguide, as shown in the above photograph, is used to obtain experimental data.

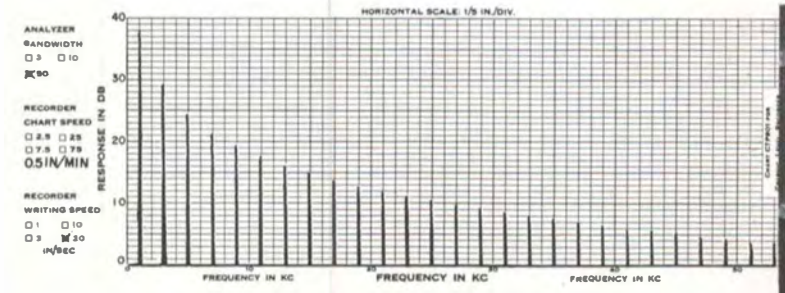
WEDNESDAY, MAY 19, 1965

ARNOLD AUDITORIUM, BELL TELEPHONE LABS.

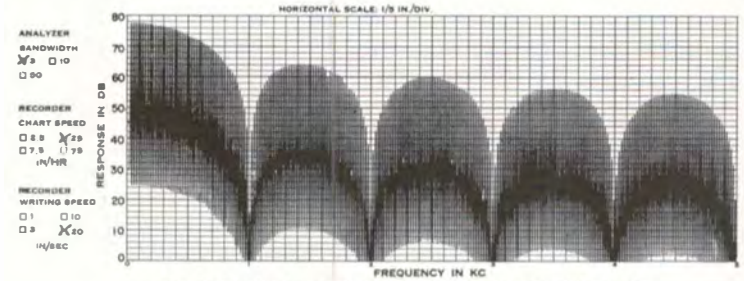
Elections of North Jersey Section Officers

MAY 1965 Volume 11 / Number 9

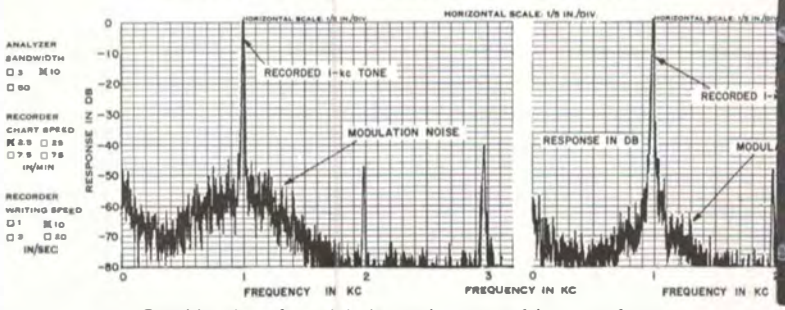
M. Fourier would have liked this Recording Wave Analyzer



Harmonic components of a 1-kc square wave.



Analysis of a 1-ms pulse with a 20-cycle repetition rate.



Graphic plot of modulation noise on a 1-kc tone for two different types of magnetic tape. Note that one tape has 10dB less noise. The Recording Analyzer is ideal for this type of measurement since its 80-dB dynamic range permits uninterrupted recording over wide ranges.

Type 1910-A Recording Wave Analyzer comes complete with Type 1900-A Wave Analyzer, Type 1521-B Graphic Level Recorder, and all accessories.

- Three bandwidths let you choose the best selectivity for each measurement . . . 3 c/s or 10 c/s for detailed measurements, 50 c/s for rapid analysis or for measurement of drifting signals. Bandwidth skirts are better than 80-dB down at ±25 c/s, ±80 c/s, and ±500 c/s for 3-, 10-, and 50-cycle bandwidths, respectively.
- Linear frequency scale from 20 c/s to 54 kc/s.
- Two outputs for recording, 100 kc/s with 80-dB dynamic range for inputs above 0.1 V, and 1-mA dc.
- 80-dB dynamic range for recording. You can make uninterrupted recordings . . . no attenuator switching in the midst of measurements.
- High input impedance (1-MΩ) on all ranges.
- Voltage range is 30μV to 300V, full scale, in 15 ranges. Accuracy, ± (3% of reading +2% of full scale).
- As a "Tracking Generator," instrument is both a signal source (delivering 2V across 600Ω) and a detector tuned to each other exactly.

For point-by-point measurements where the recorder is not used, these additional wave analyzer features add versatility and convenience

- Easy-to-read in-line frequency readout graduated in 10-cycle increments. ±0.5% calibration accuracy. Output for counter where extreme accuracy is desired.
- Incremental-frequency dial lets you fine-tune any component, covers ±100-cycle range independently of analyzer setting.
- AFC follows slowly drifting signals.
- Choice of 3 meter speeds – meter does the averaging.
- Excellent tunable filter. For example, the instrument can be used to produce 3-, 10-, and 50-cycle bands of noise over a tunable range from 20 c/s to 54 kc/s when a random-noise generator is connected to the analyzer.
- Price: Type 1900-A Wave Analyzer alone, $2150; Type 1910-A Recording Wave Analyzer, $3500 in U.S.A.

We believe M. Fourier's disciples will like this Analyzer, too.

Write for Complete Information.

GENERAL RADIO COMPANY

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Sales Engineering Office in NEW YORK: Broad Avenue at Linden, Ridgefield, New Jersey
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LOCAL SERVICE AND REPAIR

For your convenience, the New York Office has a Service Department, manned by factory-trained service engineers. This Department can supply prompt and efficient repairs or recalibration of any G-R equipment. Considerable time can be saved by taking advantage of these facilities.

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, BOX A, LENOX HILL STATION, NEW YORK 21, N. Y.

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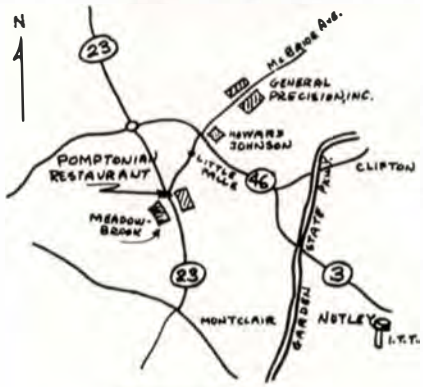
Automatic Control

CONTROL OF SHIPBOARD CABLE-LAYING MACHINERY

Dr. R. W. Gretter of the Bell Telephone Laboratories will speak on "Control of Shipboard Cable-Laying Machinery" at the *May 11, 1965* meeting of the Group on Automatic Control. The meeting will be held at the Pomptonian Restaurant, Route 23, at Stevens Avenue, Cedar Grove, at 8:00 P.M. A pre-meeting dinner will start at 6:30 P.M.

R. W. Gretter received S.B., S.M., Engineer, and Sc.D. degrees from Massachusetts Institute of Technology. He was a member of the M.I.T. faculty of Mechanical Engineering until 1955, when he joined Bell Telephone Laboratories. At the Laboratories he initially did analytical work in the field of cable mechanics. This was followed by participation in the development of cable-handling machinery for C. S. Long Lines. Later he supervised a group responsible for cable-handling equipment.



Advance Meeting Notice

On Thursday, June 10, 1965 Dr. George Kovatch will discuss the "Mission of the New NASA Electronics Research Center at Cambridge."

SYMPOSIUM ON SIGNAL TRANSMISSION & PROCESSING
MAY 13-14
COLUMBIA UNIVERSITY
NEW YORK, N. Y.

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Group Power (P)	Herbert Blaicher

Joint: N. J. Power and N. Y. Power Groups

POWER ENGINEERS OF THE FUTURE

Educational needs for power engineers to cope with future power systems, power equipment design, utilization of energy on earth and in space.

Moderator:	Larry Dwon, Manager Engineering Manpower American Electric Power Service Corporation
Panel:	Professor F. A. Russell, Chairman E.E. Department Newark College of Engineering Mr. A. F. Gabrielle Ass't. Head of Operating Division American Electric Power Service Corporation Dr. B. H. Caldwell Manager Engineering Education General Electric Company Mr. B. Raab, Engineer Republic Aviation Corp. Space Research & Development Center
Discussion:	Audience Participation
Time:	*May 18, 1965* at 6:30 P.M.
Place:	*Consolidated Edison Company Building* 4 Irving Place, New York, N. Y. 19th Floor Cafeteria

N. Y. Power and Industrial Division

EVENING INSPECTION TRIP
INDUSTRIAL REACTOR LABS.
PLAINSBORO, N. J.
TUESDAY, MAY 18, 1965

The tour will highlight the pool type reactor and its peripheral equipment. This privately-owned reactor with its visible core is used for experimentation in radiation damage, nuclear physics, radio-isotope production, etc.

Round trip bus fare $3.00. Bus leaves 40th Street and Eighth Avenue at 6:30 P.M. and returns approximately 11:00 P.M. Advance registration required and attendance limited to 45. Requests for tickets must be made by May 12. Requests for tickets to be sent to: F. L. Parkas, Operations Bldg. #1, L. I. Lighting Co., 175 Old Country Rd., Hicksville, N. Y. Please include a stamped, self-addressed envelope.

Executive Committee Meetings
at Verona Public Library
May 5
June 2

N. Y. Electron Devices

HOLOGRAM OPTICS

At the *May 20, 1965* meeting of the N. Y. Metropolitan Chapter of the ED Group, which will be held at the *United Engineering Center*, 345 East 47th Street (at First Avenue) at 8:00 P.M., Mr. K. S. Pennington will discuss hologram optics.

A pre-meeting dinner will be held at the Copain Restaurant, 50th Street and First Avenue.

The high degree of coherence available from lasers finds practical application in the storage and processing of signals with hologram techniques. Hologram formation is essentially a process of recording a complex interference pattern.

An experimental demonstration will be given.

Keith S. Pennington is a member of the technical staff at Bell Telephone Laboratories, Murray Hill, N. J. He obtained the BSc degree in physics at Birmingham University, United Kingdom in 1957, and the PhD degree from McMaster University, Hamilton, Ontario in 1961. Since that time he has been with Bell Telephone Laboratories, where he was initially engaged in high intensity flash lamp studies. More recently he has been connected with laser applications, with particular emphasis on hologram techniques and applications.

N. Y. Reliability and Component Parts Groups

DESIGN AND FABRICATION OF THIN-FILM AND MONOLITHIC SILICON CIRCUITS

Date: Tuesday, May 18, 1965

Time: 7:30 P.M.

Place: Sperry-Rand Building, 1290 Avenue of Americas, N. Y. City

Program:

Monolithic Silicon Circuits—*Mr. Robert D. Richardson*, Integrated Circuit Engineering Corporation.

Thin-Film Circuits—*Dr. Hans J. Degenhart*, Airborne Instruments Laboratory.

Each of the two major and competing techniques currently used in the production of integrated circuits will be described in great detail. Emphasis will be given to the physical and electrical properties of commonly used materials, to the choice of materials and fabrication techniques, to proper layout of circuit topology, and to cost versus circuit complexity trade-off.

SIXTH NEW YORK CONFERENCE ON ELECTRONIC RELIABILITY

The Sixth N. Y. Conference on Electronic Reliability will be held at the Carnegie Foundation Building, N. Y. C. on *Friday, May 21, 1965.*

See April issue for details.

Electronic Computers

ENGINEERING ASPECTS OF PARALLEL PROCESSING SYSTEMS

Mr. John G. Gregory, Manager of the SOLOMON Parallel Network Processor program at Westinghouse will speak on Engineering Aspects of Parallel Processing Systems at the May meeting of the Computer Group.

Mr. Gregory will describe the organization of a parallel network computer having unprecedented power of computation in areas where parallelism can be used. Such a machine has many identical processors, all programmed by a common control but each acting upon its own individual data. The overall organization, instructions, logic design, circuits, memory, and packaging will be described.

Mr. Gregory has been in the computer field since the days of ENIAC and was responsible for improvements and operation of the EDVAC and ORDVAC computers at the Ballistics Research Laboratory of the Aberdeen Proving Grounds. He was responsible for the design and development of the BRLESC computer at the Army's Ballistics Research Lab and now is manager of Computer Development at Westinghouse, Aerospace Division, in Baltimore.

Meeting Notice

Date:	Wednesday, May 12, 1965
Time:	8:00 P.M.
Place:	Arnold Auditorium Bell Telephone Laboratories, Inc. Murray Hill, New Jersey
Pre-meeting dinner:	6:00 P.M. Wally's Tavern on the Hill Watchung, New Jersey

North Jersey Section Trip

On Friday night, May 14, 1965, the North Jersey Section will sponsor a trip to New York to see the Mets play the Cincinnati Reds at Shea Stadium. The committee is also trying to arrange a pre-game tour of the scoreboard facilities for those who are interested, but as we go to press this detail is still not finalized. Scoreboard tour or not, this trip promises to be most enjoyable. SO COME ON OUT!

NORTH JERSEY SECTION

ELECTIONS OF SECTION OFFICERS

Microwave Theory & Techniques

GUIDED TRANSMISSION OF LIGHT

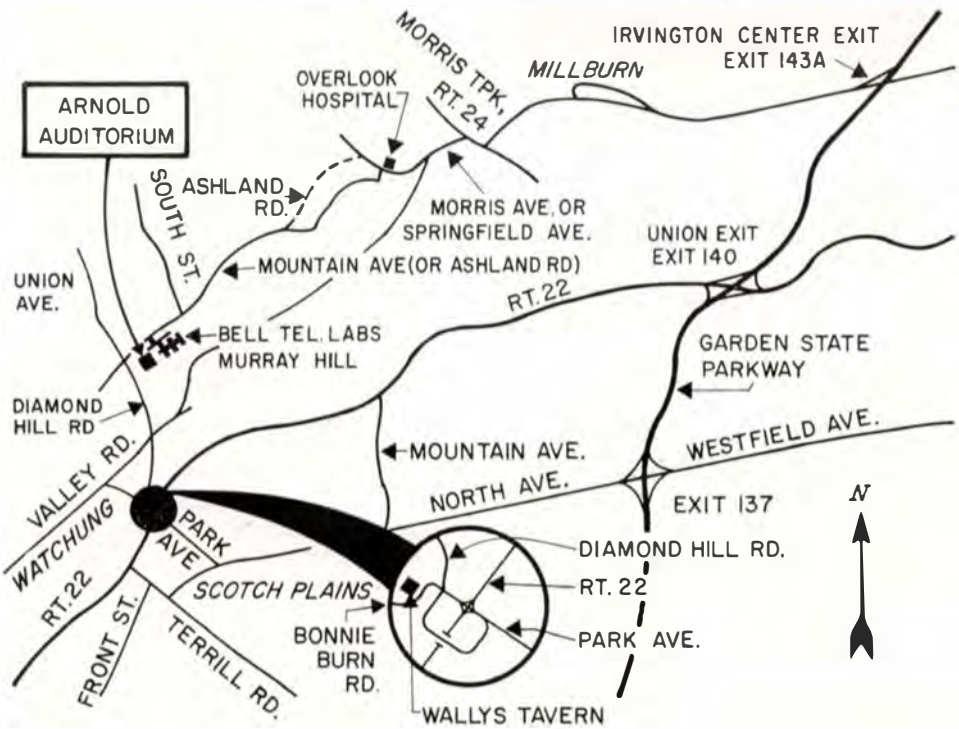
On May 19, Dr. Georg Goubau will discuss the "Guided Transmission of Light" at the Arnold Auditorium of Bell Telephone Labs. The MTT meeting at 8:00 P.M. will be preceded by a dinner at Wally's Tavern at 6:30 P.M.

Also, at this meeting, the elections of North Jersey Section Officers for the year 1965-66 will be held.

The lecture will be limited to the discussion of various methods which have been proposed for the guided transmission of light and the problems associated with their practical realization. Special attention will be given to the beam waveguide for which experimental data are available. The data demonstrate that the obtainable transmission loss is substantially lower than that of microwaves in circular waveguides.

Dr Georg Goubau, born in Munich, Germany, is a Senior Scientist with the U. S. Army Electronics Laboratories, Ft. Monmouth, N. J. He received his Master's and PhD degrees in physics from the Institute of Technology in Munich, Germany where he also was a member of the Teaching Staff for a period of eight years, until he received a professional appointment at the University of Jena in 1939. His present non-academic career was interrupted in 1962 when he accepted a guest professorship at the University of Wisconsin.

Dr. Goubau's early research activity was in the field of ionospheric research. He established the first ionospheric research station in Germany and he made basic contributions to the theory of wave propagation in the ionosphere. Later contributions were in the fields of microwave circuit theory and techniques and more recently in surface waves and guided transmission of electromagnetic wave beams. He is the inventor of the surface wave transmission line (G-line) and the beam waveguide.



A NIGHT WITH THE NEW YORK METS

The price of the trip will be $4.00 per person, which includes a reserved seat ticket for the game and charter bus transportation, which will originate in Newark and bring you back after the game. The buses will leave the Public Service Terminal, Pine Street, Newark NOT LATER THAN 6:00 P.M., and will return to the same place about midnight. Excellent public parking facilities at moderate cost are available near the P.S. Terminal.

For reservations and further information write:

Mr. Thomas Comerford
P.S. Electric and Gas Co.
Room 247
80 Park Place, Newark, N. J.
Phone: MA 2-7000—Ext. 3629

Please send me ..... tickets at $4.00 each for the Shea Stadium trip.
Enclosed is my remittance for $ .....
Name .....
Address .....
Phone .....
Make check or money order payable to North Jersey Section IEEE and include a stamped, self-addressed envelope for your game and bus tickets.

professional notices

N. Y. Communications Technology

TOUR OF WORLD'S FAIR BELL TELEPHONE EXHIBITION

On *Saturday, May 15*, the N. Y. Communications Technology Group is sponsoring a special tour of the Bell Telephone Exhibition at the World's Fair. All IEEE members, including their families, who attend the Fair on this day, can enjoy a special tour of this Exhibition by presenting their IEEE card *between the hours of 9:30 A.M. and 10:00 A.M.* This will include a special ride and a guided tour behind the scenes. Come out and enjoy a day at the World's Fair with your family.

Student News Briefs

FDU BRANCH PLANS DINNER DANCE

The Student Branch at Fairleigh Dickinson University has scheduled its Annual Dinner Dance for May 30th. The Chalet in Rochelle Park will host this gala affair — the third one to be held. The social hour will begin at 7:30 P.M. and each FDU member is cordially invited to close his scholastic year by joining his classmates and friends on this festive occasion. The Chalet is on Passaic Avenue in Rochelle Park. Directions and tickets may be obtained from Professor Haffy on the Teaneck Campus.

Spring Stag Get-Together May 19 — 165th Reg. Armory

Mark May 16 as the deadline date for reservations for the "Spring Stag Get-Together" staged annually by the Power and Industrial Division of the New York IEEE.

EXECUTIVE COMMITTEE COLUMN

The North Jersey Chapter of the Group on Automatic Control

The North Jersey Chapter of the Group on Automatic Control was formed in May 1962 on the initiative of George Marmar, who served as its first chairman until 1964. Since its formation, the Chapter has organized twelve lecture meetings, four during each season. Two of these were regular NNJ Section meetings, co-sponsored by our Chapter.

Basically, the purpose of a local professional group chapter is of an educational nature. What enables it to function are the communication means and the organizational facilities of the IEEE, namely the local Newsletter and the mailing facilities to individuals and to companies (bulletin boards, etc.).

The basic aims and functions of a local Chapter, some of which are listed in the IEEE Section Manual, may be stated as follows:

(1) Promotion of lecture meetings with the purpose of acquainting the audience with given aspects of the field,

(2) Rendering assistance to the group in the management of symposia or national meetings of that PG that might be promoted in the geographical area,

(3) Helping and encouraging members to publish any significant contribution they may have made, and

(4) Promotion of workshops, lecture series, or discussion groups on specific topics such as new theories, design concepts, or new analytical methods.

All of these basic aims and functions have one underlying factor — the development of fellowship among engineers with similar interests. Programs sponsored or organized by a local PG Chapter provide for individual contacts and for the exchange of ideas on new concepts or methods of common interest.

In addition to organizing our own lecture meetings, we are co-operating with the National Group on Automatic Control in the establishment of a speakers' list for the benefit of all local chapters.

Whereas the first two of the basic aims and functions stated above depend mainly upon the action of the executive committee of the local chapter, the last two functions must be left to the initiative of individuals who are interested in some particular program or project. For one thing, the executive committee does not want to push any special program unless a definite need has been expressed. Secondly, a person desiring some particular program or event is probably best equipped and motivated to organize it himself. He should know, however, that the executive committee will always be available to assist him in his task, if it is felt that the project could be of interest to the membership.

Among the possible situations where the executive committee can be of assistance, the following one has been suggested to us: An engineer may have made a technical contribution that he would like to publish or present, but he may not feel too sure about his presentation of the material. His immediate associates may be either too familiar with his work or not sufficiently with the field. The author may like to hear different viewpoints and aspects. He can turn to the executive committee of our chapter from which he will receive the necessary help and publicity to announce a pre-presentation of his work. Such talks would not be suited for general lecture meetings and the audience or number of participants is likely to be small. Nevertheless, we feel that such pre-presentations could be of service not only to the author but to the whole profession; undoubtedly, the quality of technical papers and presentations can be greatly improved by suitable "feedback" in the form of constructive criticism which could be provided by such meetings.

The educational value of small and informal meetings should not be ignored. For example, someone may like to form a discussion group or seminar on some new analytical method or concept. A local PG Chapter is uniquely qualified, by virtue of its access to the IEEE publicity and organizational facilities, to render assistance in such an effort.

In summary, our local chapter has organized and is continuing to organize lecture meetings on various aspects of automatic control. However, we feel that there are more ways in which we can promote fellowship among control engineers in this area. We would like to encourage the initiative of individuals other than the members of our executive committee.

ANDREW U. MEYER
Chairman, N. J. Chapter
Automatic Control


Here's an oscilloscope that doesn't care where you take it, how you take it there, or what you do with it after you get it there. It figures it can pretty well handle most situations that come along... and it figures correctly.
It's the
new
Tektronix Type 422
Dual-trace DC-to-15 Mc
portable oscilloscope
Light weight—less than 21 pounds, with panel cover and included accessories.
Small size—only 7¼" high, 10" wide, 16" deep, overall.
Low cost—only $1325 (AC version).
U.S. Sales Price, f.o.b. Beaverton, Oregon
FOR THE BOOKLET LISTING COMPLETE CAPABILITIES, CALL YOUR FIELD OFFICE.
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NEW INSTRUMENTS

HEWLETT-PACKARD EXTENDS THE PLUG-IN IDEA TO FUNCTION GENERATORS

Hewlett-Packard's new Model 3300A is a compact, convenient, multi-purpose function generator. As a source of test waveforms, the Model 3300A provides two simultaneous outputs which may be any two of three waveforms. These are of common frequency and constant amplitude. Frequency is controllable either by a front-panel dial or by an external voltage to a rear terminal connector, useful for controlled sweeps or programmed frequency. The basic instrument produces sine, square or triangular waves ranging from 0.01 cps to 100 kc.

When the Model 3300A function generator is used with the Model 3302A plug-in, a single cycle is delivered on demand, in known phase with an outside signal, or multiple cycle operation with variable start/stop phase. A phase-lock loop makes it possible to synchronize the 3300A to any periodic signal with a frequency from 10 cps to 100 kc. An exclusive front panel meter positively displays achievement of lock. The loop also provides 360° of phase variability.

The new solid-state Hewlett-Packard instrument is housed in a rack-convertible modular cabinet which is only 5″ high. The basic Model 3300A generator is $570.00, Model 3301A basic plug-in is $20.00, and Model 3302A is $190.00.

NEW 10″ STRIP CHART RECORDERS OFFERED BY MOSELEY

The Moseley Models 7102A and 7103A are two and one channel precision strip chart recorders with 5 mv single span and 4 in/min (10 cm/min) single chart speed. Without extra charge, special spans and chart speeds may be ordered.

Similar to the 7100A/7101A series which have multiple spans and chart speeds, the 7102A/7103A series retains the high accuracy, fast balance speeds, and useful one megohm input resistance in a low-cost unit economical for permanent system installation. Available options are generally the same as for the 7100A/7101A series, including event markers, retransmitting potentiometers, remote electric pen-lift, on-off remote chart control, and high-low limit switches. Metric and rack models are also available.

STANDARD FEATURES:

- Single chart speed, single span
- 1-megohm input resistance at null
- 0.5 second maximum balance time
- 0.1% accuracy and linearity

As for dimensions and price of Moseley Models 7102A and 7103A, the bench models are 16¾″ long, 8-11/16″ wide and 7¼″ deep. The rack models are 16¾″ inside rack clearance, 8¾″ wide and 7¼″ deep. The weight for dual channel is 30 lbs. net and for single channel 25 lbs. net. Price of 7102A is $1100.00 and the 7103A is $875.00.

Don't forget, call your RMC Field Engineer for full information.

HEWLETT PACKARD hp R·M·C SALES DIVISION

FIELD ENGINEERS-ELECTRONIC INSTRUMENTATION

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