



The

PULSE

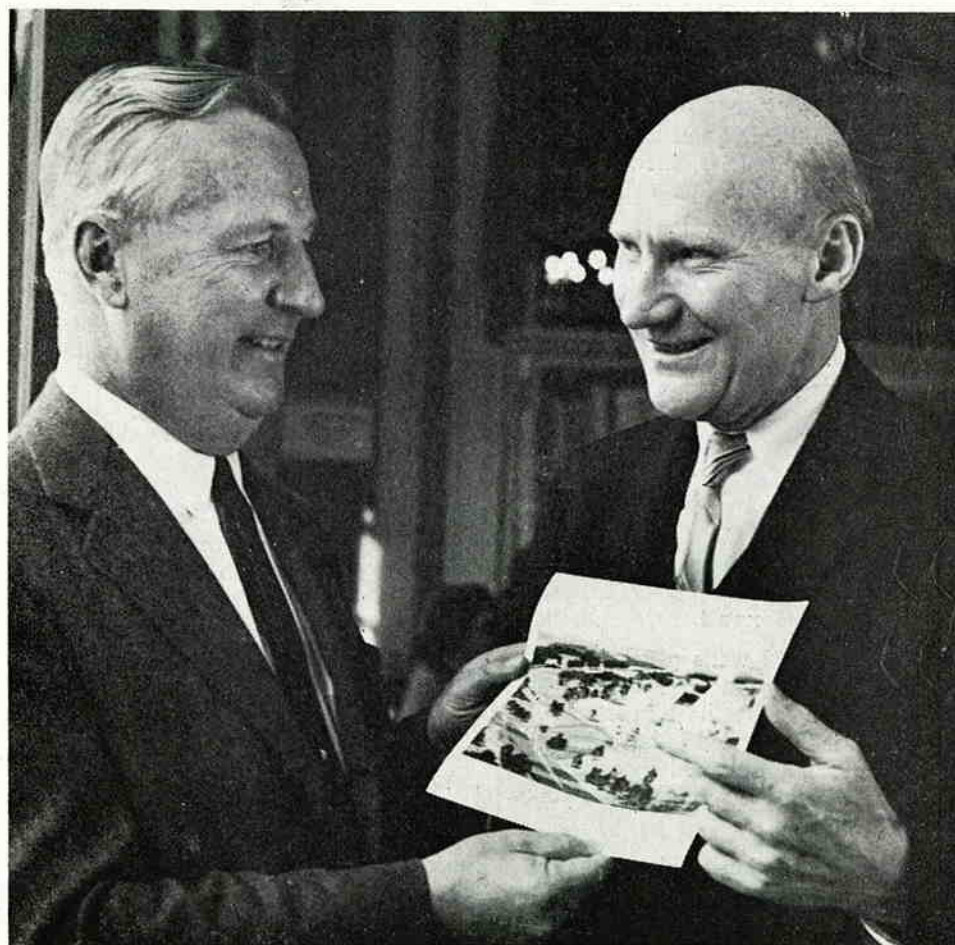
of Long Island

Vol. 8
February

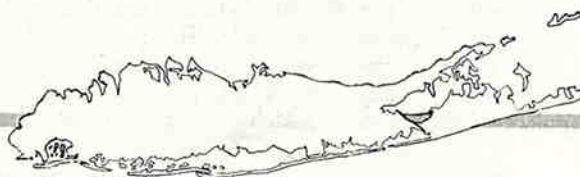
No. 6
1960

BROOKLYN POLY COMES TO LONG ISLAND

Dr. Ernst Weber, president of P.I.B. and former president of the I.R.E. and Mundy I. Peale, president, Republic Aviation Corporation, study a photo of Polytechnic's proposed L.I. center for Graduate Study and Research which will be built on 25 acres of land donated by Republic. Construction will start this Spring.



Graduate Engineering Center to be established in Farmingdale. Classes to start by next February. See page 6 for entire story.



SECTION MEETING — FEB. 9, 1960, Stewart Ave. School



This month's discussion is devoted to work by C. H. Gager and C. J. Meiselbach of our Department of Radar Systems on one type of a transistorized Moving Target Indicator Canceler. Several of the more interesting engineering problems encountered with other types of miniaturized cancellation equipments presently under development will be discussed in future articles appearing on this page.

TRANSISTORIZED MTI CANCELER

One of our recent programs at AIL has been to develop a completely transistorized MTI (Moving Target Indicator) canceler. While designed specifically for use with a radar which operates with a PRF of 360 pps, the equipment can be modified to operate with almost any search type radar. To our knowledge this unit is the first MTI canceler ever transistorized for any radar.

The entire equipment is housed in a $\frac{3}{4}$ -cubic foot cabinet (Figure 1) and operates on 8 watts of power. The transistorized canceler's performance is comparable with the performance of a vacuum tube MTI canceler which was developed earlier, here at AIL. The tube version is housed in a 25-cubic foot cabinet and requires ap-



FIGURE 1.

proximately 600 watts of power. In addition to the economies in size and power achieved by the transistorized canceler, it is expected to have a high degree of reliability and long component life without any sacrifice in performance.

MTI cancellation equipment processes the video output from the MTI receiver of the radar and provides the radar with canceled MTI video and a radar system trigger pulse. The canceled MTI video is composed only of video representing moving targets, the video produced by fixed targets having been canceled out by the equipment. Discrimination between fixed and moving targets is accomplished by comparison of signal amplitudes of adjacent pulses of the pulse

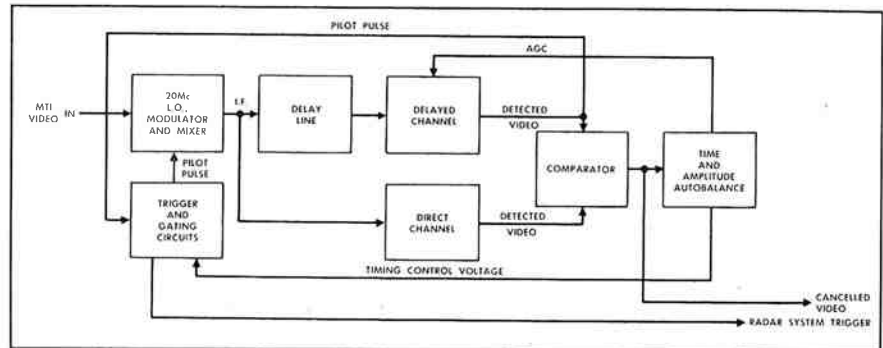


FIGURE 2.

train. Moving targets produce a doppler frequency shift on radar return signals which is converted to amplitude modulation of the pulsed video signal in the MTI receiver; fixed targets produce no doppler shift.

Figure 2 is a functional block diagram of the transistorized equipment which helps to show how the cancellation of fixed targets is accomplished. The delay line delays the target information for one radar interpulse period so that video from each radar sweep can be compared with video from the previous sweep in the comparator. Fixed target pulses, which match in time and amplitude, are canceled.

Practical considerations add difficulties in the implementation of the cancellation function. Ultrasonic delay lines are needed to provide the interpulse period delay with the usual video bandwidth and pulse fidelity requirements. However, ultrasonic delay lines are bandpass devices with substantial attenuation so that the radar video information must be modulated onto an IF carrier (20 Mc) and demodulated after post delay amplification. A feature of the transistorized canceler equipment is the automatic balancing circuits which are used to maintain cancellation in spite of gain drift between the delayed or direct channels. The residue from the cancellation of a standard pilot pulse is used to produce control voltages which maintain the cancellation ratio

in excess of 36 db, despite any drift.

An aid in obtaining the compact packaging of the equipment was the use of a miniaturized quartz delay line, developed by Sturup, Inc., which uses a folded or stacked type of construction. Instead of the one 19-inch diameter quartz blank used in the standard type of construction for the PRF, the folded line uses two 9-inch diameter quartz blanks mounted one above the other, connected by a transition block. The delay is obtained by passing the signal first through one blank and then through the other blank. The result is a delay line which is approximately one-half the weight and volume of a single blank delay line.

This work was sponsored by Rome Air Development Center under contract AF 30(602)-1705.

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Advertisement

IRE International Convention

The Institute of Radio Engineers has announced a change in the title of its annual convention from IRE National Convention to the IRE International Convention. The change reflects the fact that the IRE now has 22 Sections and 6,000 members outside the United States.

March 21 through 24 have been selected as the dates for the 1960 IRE International Convention, which will again be held at the Waldorf-Astoria Hotel and New York Coliseum in New York City. More than 60,000 engineers and scientists from 40 countries are expected to attend what has become the world's largest technical meeting and exhibition.

A comprehensive program of 275 papers, covering the most recent developments in the fields of all 28 IRE Professional Groups, will be presented in 54 sessions at the Waldorf-Astoria and the Coliseum. The high point of the program will be a special symposium on "Electronics—Out of This World" to be held Tuesday evening, March 22. The symposium will be conducted by Ernst Weber, President of the IRE for 1959, and a panel of leading space electronics experts.

The Radio Engineering Show, filling all four floors of the Coliseum, will accommodate approximately 850 exhibitors. Some \$15,000,000 worth of the latest electronic equipment will be on display, most of it for the first time.

The convention will get under way with the Annual Meeting of the IRE on Monday morning, March 21. Dr. Lloyd V. Berkner, President of Associated Universities, Inc., will be the featured speaker.

The social events will include a "get-together" cocktail party Monday evening and the annual IRE banquet Wednesday evening, both in the Grand Ballroom of the Waldorf. The banquet will feature the presentation of IRE Awards for 1960, including the Medal of Honor to Harry B. Nyquist, former Bell Telephone Laboratories engineer, and the Founders Award to Haraden Pratt, Secretary of the IRE.

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FEBRUARY SECTION MEETING

Stewart Avenue School February 9th, 1960

FAA AIR TRAFFIC CONTROL Height Finding Radars

On February 9th the Long Island Section of the IRE will hold its sixth meeting of the current season at the Stewart Avenue School in Garden City. The meeting will start at 7:30 P.M. and will be preceded by the usual dinner at Howard Johnson's on Jericho Turnpike. Dinner hour will be 5:45 P.M.

The speaker for this session will be Mr. Karl F. Bierach Jr., who is associated with the Federal Aviation Agency. Mr. Bierach will discuss the general problem of Air Traffic Control. He will go over in some detail a height finding radar whose antenna system was the subject of a recent very popular L. I. PGMTT meeting.

About our speaker

Karl F. Bierach, Jr., Project Coordinator for the Airport Height Surveillance Radar program of the F.A.A., entered active military service with the U. S. Army Air Corps in 1941 where he served as an instructor of both radio and radar theory. Following graduation from the Harvard-MIT Electronics School he was assigned as Radar Navigational Aids Officer with the Airways and Air Communications Service.

After his release from military service he was associated with Zenith Radio Corporation as an engineer assigned to the Hearing Aid Department. In 1953 he left the Chicago area to accept a position with the 1881st Airways and Air Communications Service Installation and Engineering Group at Timker Air Force Base, Oklahoma, as technical advisor for ATC radar, VOR, and TACAN. In 1958 he transferred to his present assignment with the Development Division, Airways Modernization Board (now Bureau of Research and Development, Federal Aviation Agency).

Mr. Bierach is a member of the Institute of Radio Engineers.

And his subject

With the introduction of semi-automatic air traffic control into the nation's airway structure which involves the use of radar tracking equipments, the problem of maintaining identification of tracked aircraft becomes extremely important. In the volume of air space covered by a conventional search radar the existence of numerous flight paths could result in the loss of aircraft identity

in the radar tracking equipment where two or more paths cross or become coincident except for altitude. One method of retaining this identity, during such conditions, is through the utilization of aircraft altitudes. The maintenance of aircraft identities is paramount in any automatic air traffic control system where minimum controller intervention to resolve ambiguities is an operational requirement.

The system to be described is being designed and constructed by The W. L. Maxson Corporation under a contract with the Bureau of Research and Development, Federal Aviation Agency. It is a non-cooperative system in the sense that it is dependent only upon the radar skin return from the aircraft involved. The system will derive height information on each reflected pulse from the target aircraft and does not require scanning in the vertical plane. It will be a receive only system and will be used in conjunction with the S-Band family of air traffic control radars which will provide the illuminating energy. One hundred ten multiple beams are provided in the vertical plane from 0.5 degree to 40 degrees. The equipment has been designed to provide height information simultaneously from two targets that are in the same general range/azimuth sector. In addition to the normal range, azimuth, and height outputs for tracker use, the system will include two types of displays. One will be capable of displaying only those targets within a selectable altitude "slice" through the use of an altitude layer filter. The other will be an azimuth correlated 3-D display.

— Editor's Notes —

It is very likely that only someone who has held the position of Section Chairman (and his wife) can fully appreciate the amount of work that this position entails. Yet each month our present chairman, in addition to all of his other commitments, manages to prepare a column for the PULSE. It is not at all difficult to see from whence came the inspiration for Mr. Stephenson's February remarks.

One of the points which Mr. Stephenson makes is that some of our "spare" time should be devoted to supplementary education. One of the most efficient means of accomplishing this is by attending the various lectures and meetings sponsored by our local I.R.E. section.

A tremendous amount of effort is expended in selecting subjects of current importance and obtaining top caliber speakers for these sessions. In addition, further expense and effort is incurred in publicizing these activities via the medium of posters and the PULSE. We feel that this year's calendar is one which our section can justifiably point to with pride. The only reward desired is your attendance.

If one counts the number of members at a typical meeting and then consults the membership rolls one must conclude that a substantial portion of the membership has elected to remain at home. Although our facilities chairman would consider it a catastrophic and unprecedented disaster if all 4,000 of us ever did turn out for any single function, we must admit that the other extreme is equally, if not more, embarrassing.

In considering the situation from a merchandising viewpoint it is apparent that either the "product" is not always what the customer wants or else that it is not being properly sold. The remarkable thing is that through the I.R.E. dues many of our members are paying in advance for a product which they do not consume. This is certainly a poor way to do business.

What we are driving at is this. It is to your personal benefit to be a member of a thriving and active I.R.E. section. The vigor of a section is partially gauged by the number of meetings held and by the attendance registered. If you are not participating then you are not getting your buck's worth out of the I.R.E. We would like to know what **you** feel should be done to attract you personally to our meetings. Why not sit down and write us a letter? Even better—attend the next meeting? You might find that you will enjoy it.

The biggest news of the month is the announcement that Brooklyn Poly is establishing a new graduate center in Farmingdale. It is not necessary to detail the obvious beneficial effects which will accrue to us as individuals as a result of this event. Certainly a milestone in the development of Long Island as a leading center of the electronics industry has been reached. The PULSE believes that it voices the unanimous sentiments of our Long Island I.R.E. Section in expressing our gratitude and good wishes to Dr. Ernst Weber, President of P.I.B. and Past President of the I.R.E. on this momentous occasion.

Note should also be made of the generous and intelligent "investment" made by the Republic Aviation Corporation in donating the necessary land for the new graduate center. Although it is our practice to maintain a policy of neutrality towards individual companies in our area we feel that this is one occasion when we can toss away the book and say "well done" to Mundy Peale, President of Republic Aviation.

It is also appropriate at this time to once again thank those in our section who cooperated with the PULSE by returning the Questionnaire which appeared in the June issue. The results of this survey were closely studied by Dean Charles Schaffner of Brooklyn Poly who has been in charge of planning the new center. Inasmuch as our members constitute the largest potential student body of the new school we like to feel that we played some small part in encouraging its erection.

HERB KULIK

The PULSE

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Notice: Suitability of all material for inclusion in the Pulse shall be determined by the editor.

LETTER TO THE EDITOR

January 7, 1960

Dear Mr. Kulik,

I have read your editorial and those comments associated with it (January '60, Pulse). I view your remarks with some degree of approval. Your most important point is implicit. That is, one seldom sees in any technical organ frank discussions of IRE policy.

The purpose of this letter is to bring up for comment another related subject which I feel may be even more important and closer to the IRE member than those which you have discussed.

I believe that the professional standards of our field should be set by the IRE. The definition, the testing, and the qualification of engineers by grade (Jr. Eng., Eng., Sr. Eng., etc.) together with the setting of minimum salaries in a grade should be done by IRE. This would make IRE a professional organization run for engineers primarily, just as the AMA and the Actuarial Society are run for their members. This should give the word "engineer" as applied to our field some degree of unique meaning and guarantee specified amounts of training and competence to the employers of these abilities.

The IRE is an institute of engineers. These engineers require spokesmen expressing their interests. I have felt that what policy exists derives mainly from people who are primarily business executives. These people usually have primary concerns about the electronic industry in mind. Electronic Industry expresses itself but electronic engineers have not done so, a fault for which the engineers are only partially to blame.

Yours truly,

WILLIAM HONIG

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From the Chairman:

On Being Selective

Almost without exception, engineers are faced today with such a deluge of demands on their time that some form of conscious and intelligent selectivity must be employed. Besides the often strenuous requirements of our daily jobs there seems to be an almost endless succession of other *worthwhile* activities that strive for our attention and participation. Who can deny that supplementary education, night courses and outside study are not only desirable but in most cases necessary too? For a family man to ignore companionship with his family is unthinkable. Hobbies, recreation, music, theatre, art, active participation in one or more technical societies, professional writing, reading, the study of current events and international affairs, church activities, PTA, Scouts and other civic projects are all undeniably worthwhile—each worthy of some of our "spare" time. And the pile of literature that arrives on the office desk and at home each month is enough to discourage anyone!

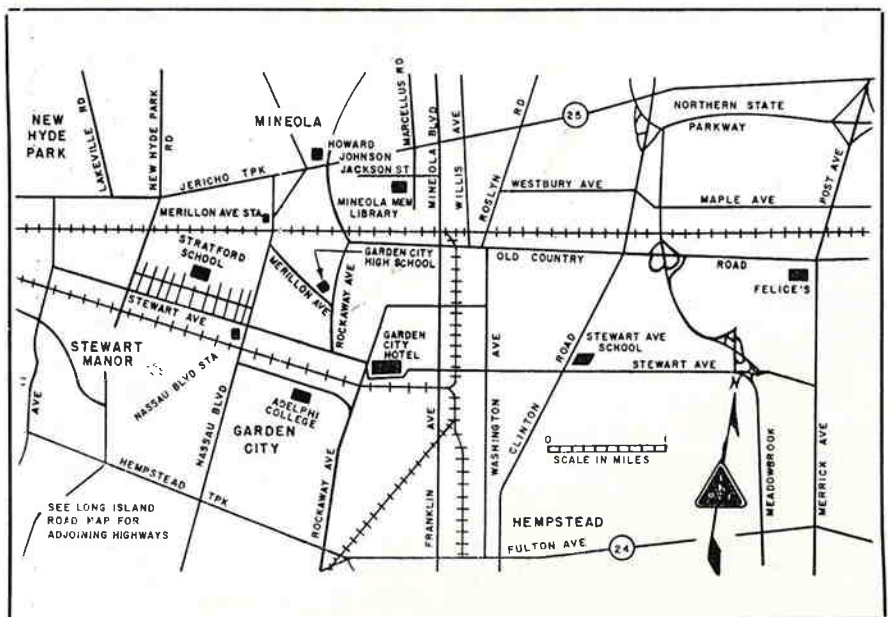
Yes,—with a minimum of initial effort one can easily become utterly swamped — with resulting discouragement and lack of accomplishment — by spreading one's efforts out too far.

Reactions to this age-old problem vary as widely as do individuals, of course. On one end of the spectrum can be found people who participate so heavily in so many activities that their health is endangered, they are seldom seen by their families, they are too tired to carry on their regular jobs adequately, etc. On the other hand, there are individuals who withdraw almost completely from all outside activities and spend most of their spare time in idle passive entertainment with little or no creative or cooperative activity. A balanced choice somewhere in the middle of this spectrum is obviously the sensible solution. It is essential to put "first things first". In most cases this means that one's primary job, family and health considerations take precedence.

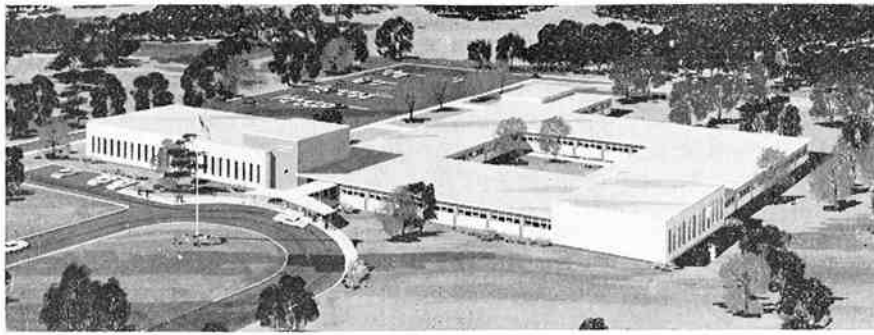
Then out of the wealth of constructive possibilities, each of us can be guided by our personal inclinations and motivations to select a *few* additional activities that can give us the most satisfaction and enjoyment. The selection of these can well change from year to year as our interests shift emphasis. Active participation brings its own rewards. And that pile of monthly literature can be dealt with in part by eliminating truly unwanted items, by judicious clipping of occasional good material where possible, and by scanning the issues for items of genuine interest (for example, "Scanning the Issue" and Scanning the Transactions" in the IRE Proceedings). Every one of us has "all the time there is"; what counts is how we use it.

What we select will vary widely with each of us, and will change with time—but selective we must be. Once the choice is made, we must proceed without regrets on the chosen course.

J. GREGG STEPHENSON



BROOKLYN POLY COMES TO FARMINGDALE



The Polytechnic Institute of Brooklyn officially announced its plans to establish a graduate engineering school at Farmingdale at a luncheon held at the Garden City Hotel on January 12th for members of the Long Island Industrial Community.

In his address Dr. Ernst Weber, president of the Polytechnic and past president of the I.R.E. said that the educational facility with attendant research laboratories will be erected at a cost of \$1,200,000 on 25 acres of land donated to the Polytechnic by Republic Aviation Corporation.

The facility, to be known as the Polytechnic Center for Graduate Study and Research, will be located on Route 110, approximately a half-mile east of the Nassau-Suffolk border. The property was formerly part of Republic Aviation's Farmingdale site. It is hoped that construction can start this spring and that classes can be held by February 1961.

The curricula will be restricted to graduate study with full-time and part-time programs leading to master's and doctor's degrees in aeronautical, electrical and mechanical engineering and in physics and mathematics. Present plans call for facilities for approximately 1000 students. Dormitories will be built when the need arises.

The architectural firm of Eggers and Higgins has designed a structure on one level covering more than 50,000 square feet. It will contain nine classrooms, a library for 20,000 volumes in science and technology, a cafeteria, meeting rooms, and administrative offices. Half the area will house laboratories for research.

Among the major research projects to be conducted at the new center are studies in high-power microwaves and warm plasmas. Both of these studies will be conducted by Polytechnic's Microwave Research Institute and the Department of Aeronautical Engineering under Air Force contracts valued at some \$800,000.

In outlining the plans, Dr. Weber also noted that the center will be made available to Long Island's professional societies for technical meetings.

Mundy I. Peale, president of Republic Aviation Corp. indicated that his firm's own new Research and Development Center's facilities would be available to the Polytechnic scientists to augment their research explorations. This is a \$14-million facility now being completed which will include seven laboratories generally regarded as the most advanced in private industry. They will include such laboratories as a Space Environmental and Human Factors lab; an electronics and a nuclear radiation laboratory; and a Re-entry lab.

Peale said his firm viewed the transaction "not as a gift but as an investment". It was one way, he said, for his firm to fulfill its obligations to the 216 communities (Long Island, Brooklyn and Queens) from which its 15,000 employees are drawn by contributing to a self-perpetuating supply of educated manpower.

"An educated citizenry," he said, "is the most valuable resource of any community."

"It is needed to establish the economic, social and political climate which any business requires to survive and make progress."

Despite the fact that industry today supports education at the rate of more than \$140 million annually, Peale stressed that the needs of educational institutions still exceed the financial support given them.

PAPERS FOR WESCON

Authors wishing to present papers at the 1960 Western Electronic Show and Convention technical sessions to be held August 23-26 should register their interest by May 1. Required are 100-200 word abstracts, together with complete texts or detailed summaries. They should be sent to the Chairman of the Technical Program, Richard G. Leitner, WESCON Business Office, 1435 South La Cienega Blvd., Los Angeles 35, Calif.

Selection of papers for the program will be made before June 1 and authors will be advised of acceptance or rejection by that date.

There will again be an IRE-WESCON Convention Record published in advance of WESCON by the National Headquarters of the Institute of Radio Engineers.

Dr. Weber hailed the gift of land by Republic as "an outstanding example of cooperation between industry and education which has always proven to be of significant mutual advantage."

"The management of Republic," he continued, "is to be commended for its wisdom and foresight in investing in a facility that will promote the growth and development of the entire Long Island community."

"The caliber of our faculty and the extent of the graduate studies we will offer will enable the creative engineers and scientists of Long Island to advance constantly in the dynamic and ever changing fields represented by the majority of companies in Nassau and Suffolk. Indeed it will attract others who might have moved to other areas because of this deficiency," Dr. Weber declared.

"The close proximity of our center to outstanding industrial research and development laboratories and the close relations on professional grounds which will develop between the academic and industrial scientists and engineers indicates a tremendous potential for all of Long Island," he concluded.

Other speakers at the luncheon included Preston R. Bassett, chairman of Polytechnic's board of trustees and retired president of the Sperry Gyroscope Company; Hector R. Skifter, present, Airborne Instruments Laboratory; and W. L. Barrow, vice president of research and development of Sperry Gyroscope.

JANUARY SECTION MEETING

By MURRAY NOVICK

The "Strategy of Deterrence" was the timely topic discussed at the January 12th meeting of the L.I. Section. The speaker, Mr. Harry Davis, first examined the consequences of various types of general war and explained that even though a nuclear war would be an "unprecedented disaster" it would not necessarily mean total annihilation. For example, even if half of the United States were destroyed what remained would still be a very advanced nation. It is estimated that the United States could achieve 50% recovery from a nuclear attack within a year—and 100% recovery within 5-15 years.

Why deterrence? Why not complete disarmament? These questions were asked by a member of the audience who stated that if his child were killed it would constitute a complete disaster for him. In reply, Mr. Davis said that the history of disarmament has been a history of failure. Also with complete disarmament a nation that manages to "cheat" may obtain complete superiority with only a few bombs. The "cheating" nation, knowing that its enemy cannot retaliate or win, may not hesitate to attack. Limited or controlled armament, however, may be practical. Armament levels can be set high enough to make it impractical to achieve an obvious advantage by cheating. With most nations in a position to produce this "unprecedented catastrophe" (within the foreseeable future) possibly the only hope for world peace will be the deterring fear of the indestructible and mighty retaliatory power possessed by other nations.

These two concepts, survival and an indestructible retaliatory power, are basic to a strategy of deterrence. The enemy must be made to feel that you will survive his attack and that your retaliatory power cannot be easily destroyed. Some interesting facets of the concept of deterrence

are that the enemy should expect to receive retaliatory damage proportional to the damage that he has inflicted, that minor incidents such as the one that precipitated World War I are less likely to trigger another global conflict and that large conventional forces are still required.

Though Mr. Davis spoke on a rather grim topic he made it clear that those who were planning our strategy of deterrence were doing so with the intention of doing their job so well that they would never know how well it had been done.

Mr. Davis is to be congratulated, not only for his excellent presentation, but also for his sense of humor. In spite of the morbid nature of the subject most people left the meeting with a piece of seven-layer cake and a feeling that there was hope for humanity.

DECEMBER SECTION MEETING

How do you map the bottom of the ocean? The best method probably has not yet been found. But, at at the Dec. 8 Section Meeting, Dr. J. B. Hersey of the Woods Hole Oceanographic Institution described two methods that are being used with some success—Sonar and photography.

When using Sonar techniques, the main problems are generating enough power so that you can see the bottom, and interpreting what you see. Dr. Hersey described some of the transducers used to generate the large amount of power needed—spark gaps, gas bubbles, explosives, and electronics. In general, explosives have proved most practical (though gory, if there are schools of fish nearby). Several slides indicating the type of data obtained were shown. Multiple echoes, reflections from living "things" and stratified layers of the ocean bottom, and noise complicate interpretation of the data.

Photography is a rather obvious technique for mapping the ocean bottom, but here too the problems are severe. That they are not insurmountable was proven by the very interesting stereo photographs that Dr. Hersey passed among the audience.

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Spectrum Calibrator	to ± 15 mc of center, accurate to 0.5 mc
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Set of 4 detachable W/G mixers	525.

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MEETING NOTICES

SECTION MEETING

Tuesday, February 9, 1960 at 8:00 P.M.

"FAA AIR TRAFFIC CONTROL-HEIGHT FINDING RADARS"

KARL F. BIERACH, Federal Aviation Agency
Stewart Avenue School, Garden City

Movie: "AMERICA'S CUP RACES" — 7:30 P.M.

PRE-MEETING DINNER — Howard Johnson's, Jericho Turnpike, Mineola, 5:45 P.M.

 **PGEM**

Thursday, February 18, 1960 at 8:00 P.M.

"THE COMPUTER AS AN AID TO ENGINEERING MANAGEMENT"

DR. THORNTON C. FRY — V.P. Eng. — Remington Rand
MR. CHARLES F. CRICHTON — Mgr. Data Applications — R.R. Univac

MEETING and PRE-MEETING DINNER — Brass Rail Restaurant, 40th Street & Park Ave., N.Y.C., 6:30 P.M.

N. Y. PGME

Thursday, February 18, 1960

"ELECTRONIC INSTRUMENTATION TECHNIQUES IN SELECTED MEDICAL AND BIOLOGICAL PROBLEMS"

The Rockefeller Institute — Welch Hall, 67th Street and York Avenue, N.Y.C.

L. I. PGAC

Tuesday, February 23, 1960 at 7:30 P.M.

"A SEMI-GRAPHICAL TECHNIQUE FOR DESIGNING THIRD ORDER SYSTEMS"

MR. EDMUND GORCZYCKI — Sperry-Marine Division
Mineola Memorial Library

PRE-MEETING DINNER — Howard Johnson's, Jericho Tpke., Mineola, 6:00 P.M.

L. I. PGMIL

Tuesday, March 1, 1960 at 7:30 P.M.

"DESIGN REQUIREMENTS FOR A SATELLITE TRACKING SYSTEM"

DR. WALTER B. LaBERGE - Director Systems Engineering for
Philco Western Development Laboratories, Palo Alto, California
Mineola Memorial Library

PRE-MEETING DINNER

PRE-MEETING DINNER — Howard Johnson's, Jericho Tpke., Mineola, 5:45 P.M.

N. Y. PGMTT

Thursday, March 3, 1960

"PRACTICAL UTILIZATION OF POWER TRANSMISSION BY ELECTRON BEAMS"

MR. WILLIAM C. BROWN — Raytheon Mfg. Co., Microwave Power Tube Division
Western Union Building, Room 703, 60 Hudson Street, N.Y.C.

L.I. PGMIL

Walter B. La Berge, Director Systems Engineering for Philco Western Development Laboratories, Palo Alto, Calif., will discuss the design requirements for a satellite tracking system at the next meeting of PGMIL. The meeting will be held at the Mineola Memorial Library on Tuesday, March 1, at 7:30 P.M. There will be a pre-meeting dinner at Howard Johnson's, Jericho Turnpike, Mineola, at 5:45 P.M.

L.I. PGAC

The Long Island Chapter of PGAC will hold a technical meeting on February 23, 1960, 7:30 P.M., at the Mineola Memorial Library. A pre-meeting dinner will be held at the Howard Johnson's Restaurant in Mineola at 6:00 P.M.

A Semi-Graphical Technique for Designing Third-Order Systems will be presented by Mr. Edmund Gorczycki of Sperry. Mr. Gorczycki will show a method in which the roots of a system characteristic equation, of higher than the second order, need not be known in order to derive results equivalent to those obtainable from the powerful Evan's root locus method.

Mr. Gorczycki is a native of Brooklyn. He received a B.E.E. from C.C.-N.Y. in 1945 and a M.E.E. from Brooklyn Polytech in 1950. He joined Sperry in 1950 and has completed major assignments in mathematical analysis and development of navigation, guidance, and control systems for aircraft and missiles. Presently, he is a senior engineer in Sperry's Marine Division and is assigned to systems analysis of navigation subsystems for submarines. He is a member of the I.R.E., A.I.E.E., and Sigma Xi.

PGEM

Dr. Thornton C. Fry and Mr. Charles F. Crichton will speak on "The Computer as an Aid to Engineering Management" on February 18, 1960 to the Metropolitan Chapter of the PGEM.

The meeting will be held at the Brass Rail Restaurant, 40th Street and Park Avenue, N.Y.C. Dinner will start at 6:30 p.m., the talk at 8:00 p.m. All are invited to the talk, whether or not they attend the dinner.

Dr. Fry is Vice President, Engineering, of Remington Rand, and Mr. Crichton is Manager of Data Applications for the Military Engineering Division of Remington Rand Univac in St. Paul, Minnesota.

The speakers will stress how computers are used in management of the design and manufacture of complex products. They will show how the computer takes information which the manager normally receives and how it makes many decisions he would have had to make. The manager receives relatively few reports from the computer, only those which deal with deficiencies and exceptions.



DR. THORNTON C. FRY

Dr. Thornton C. Fry was appointed Vice President of Remington Rand after a Bell System career of more than 40 years. His many distinguished posts at Bell Laboratories included Director of Mathematical Research, Director of Switching Research and Engineering, and Assistant to the President.

Dr. Fry was a pioneer in defining the role of professional mathematicians in industrial research. In scientific circles, he is best known as an expert on the mathematical theory of probability. He is the author of a book on this subject, "Probability and Its Engineering Uses."

Dr. Fry is a Fellow of the AIEE, the American Physical Society, and the Institute of Mathematical Statistics. He has been a Vice President of the American Mathematical Society and of the Mathematical Association of America.



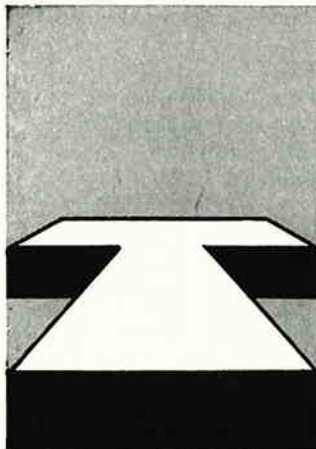
MR. CHARLES F. CRICHTON

Mr. Charles F. Crichton has been with Remington Rand Univac for four years. He has worked with the Sales Division, analyzing customer computer applications. He has also managed large-scale computer centers. With the Military Division, he has been responsible for the resolution of processing problems in connection with products for government customers.

A member of the American Statistical Association, Mr. Crichton has taught at the George Washington University and is Lecturer in Economics at the University of Minnesota.

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DR. SAMUEL W. LEVINE (SM '54) has been appointed to fill the newly created post of *Director of Engineering and Research* for the Defense Products Division of Fairchild Camera and Instrument Corp. in Syosset. He is responsible for all engineering and research efforts for the Division.

Prior to joining Fairchild in '53 when he became Director of R & D for the Graphic Equipment Division, Dr. Levine was associated with Fisher Scientific Co. and Atlantic Refining Co. He served with the Army and the Air Force in World War II as Radar Officer in Panama. He also did some Radar R & D on lightweight ground equipment at the MIT Radiation Lab. He holds numerous patents in the fields of electronics, optics, mechanics and instrumentation and is the author of many articles published in the technical journals of these fields.

S. EDWIN PILLER (M '55) is one of the leading proponents in "Communicating" (which he defines as "Interchanging scientific information by multi-lateral radio communications") and a difficult man to get talking about his personal achievements. He is *Group Supervisor* of the SSB Section of Radio Engineering Laboratory, a position he received in May 1959. Prior to this position he spent nearly a dozen years in the Engineering Department of NBC as Project Engineer on AM, FM and TV. Much of the station planning and construction work accomplished in NBC studios and the Empire State Building was Piller's work.

He received a BSEE from CCNY in '43 and had been interested in Amateur Radio for some years before that. In addition to his work at REL, Piller is President of the SSB Amateur Radio Association (a worldwide organization of Hams) and has been instrumental in organizing various communicating networks by means of which special widely scattered groups may attend specialized lectures and participate in subsequent question and answer periods. He invites any educators, engineers or technicians interested in participating in this type of program to contact him at his home in Whitestone, L. I.

JESSE M. TRACHTENBERG (A '54) has just joined Fairchild Astrionics as *Senior Engineer* and Project Engineer-to-be-when-the-contract-is-received. Formerly he worked for Loral in the Bronx as Senior Engineer in their Microwave Department. Earlier, Trachtenberg was employed as an Engineer with RCA-Moorestown in their Microwave and Antenna Section where he was particularly concerned with BMEWS.

He graduated from Brooklyn College with a BS in Physics and Math in January 1955. He attended the Moore School—U. of Penn. and now Brooklyn College for subjects leading to MSEE. He makes his home in Howard Beach with his wife and children.

EUGENE N. TORGOW (SM '54) is now *Head* of the Special Projects Department of the Engineering Design Section of Polytechnic Research and Development in Brooklyn. A Bronx boy raised in Brooklyn, he received his BEE from Cooper Union in February '46 and his MEE from Brooklyn Poly in June '49. After graduating from college he "joined" the Air Force and spent a year in the Pacific on radar maintenance and installation. Back as a civilian once more, he started his graduate work at Poly and became a member of the staff and Research Assistant at Microwave Research Institute, one of the graduate research centers of Brooklyn Polytechnic. In three and a half years he had worked up to Research Associate.

He left to spend two years with A. B. DuMont where he set up and supervised the Microwave Laboratory in the Government Contracts Division. He returned to MRI in 1953 and in '57 became Leader of the Components Research Section. Last summer he moved over to PRD (now a Division of Harris Inter-type Corp.) where his group is developing a microwave calibration test set for the Frankford Arsenal. He has held many IRE responsibilities and at present is Vice Chairman of the N.Y. Chapter PGMTT and a member of the Antenna and Waveguides Committee.

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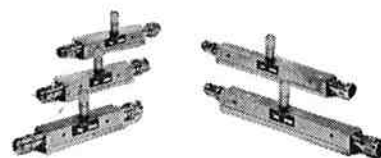
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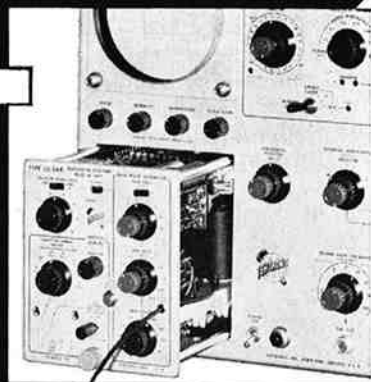
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1960 Conference On Electronic Standards and Measurements

The second national Conference on Electronic Standards and Measurements, co-sponsored by the National Bureau of Standards, The Institute of Radio Engineers' Professional Groups on Instrumentation and Microwave Theory and Techniques, and the American Institute of Electrical Engineers, will be held June 22-24, 1960, at the National Bureau of Standards Laboratories, Boulder, Colorado.

Since the first meeting in 1958, there has been an intensified interest in the development of standard and measurement techniques, stemming in the main from defense requirements and the specialized needs of the space age. Many new laboratories have come into existence as a part of standards and calibrations programs within industry and among defense agencies. The upsurge in the need for greater accuracy and extended range, as well as wholly new measurement techniques, has multiplied the problems of those working in the field of electronic standards.

The 1960 Conference will provide a broad review of the most recent developments and accompanying problems which exist throughout the useful spectrum of contemporary application.

Six sessions are planned on the following subjects:—

- 1) Current and Future Problems in Electronic Standards: Traceability of calibrations to National Standards, anticipated requirements and overcoming adverse environments.
- 2) Direct-Current and Low-Frequency Standards and Calibrations: Current, voltage, power, resistance, impedance and attenuation.
- 3) Methods of Measurement for Materials: Complex permittivity and permeability, tensor permeability and tensor conductivity.
- 4) Frequency and Time Standards: Molecular, atomic and quartz standards; measurement and utilization.
- 5) Microwave Standards and Calibrations: High and low power, phase shift, impedance, attenuation and noise.
- 6) High-Frequency Standards and Calibrations: Voltage, current, power, impedance, attenuation, phase shift and field strength.

A call for papers on the foregoing topics has been issued by the Chairman of the Technical Program: George E. Shafer, National Bureau of Standards, Boulder, Colorado. Requirements are: Title (as soon as possible), and 100-word abstract as well as 500-word summary on or before February 15, 1960.

The General Chairman of the 1960 Conference is Ivan Easton, General Radio Company, West Concord, Mass. Co-chairmen of local arrangements are W. D. George and James Brockman, National Bureau of Standards, Boulder, Colorado.

For further information contact:

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Pulse Scripts . . .



This month we feel that Scott Porter of Sperry Gyroscope is deserving of some praise. Scott, our Refreshments Committee Chairman, is the smiling, broad shouldered blond who so conscientiously serves the cake and coffee at our I.R.E. meetings. Those who attended the January 12th meeting felt that his coffee was "worth the extra pennies". If you don't believe this just attend the next meeting and taste for yourself.

The staff of the PULSE has for several years favored the acceptance of personnel advertising. Because of the reasonable objections of many members of our section the Pulse has never solicited this type of advertising and has rejected those which came our way by sheer accident. This year a survey, conducted by a committee under the direction of Rod Lowman, showed that the opposition had been strongly over-estimated. As a result, the restriction has been removed and our policy in this respect has been brought in line with that of the PROCEEDINGS and all other section publications in the country. The Pulse wishes to express its appreciation to the entire Executive Committee for the rapid and judicious manner in which it reached a decision on this issue.

We have received many letters and comments concerning the photograph of the lightning bolt shown on the cover of the December issue. It was certainly a surprise to find that so many people were doing research in this field. One of the tid-bits gleaned from all of our correspondence is that the theory behind the operation of lightning rods is still in question. Another tid-bit is that the editor's house is in the center of the area on Long Island which gets struck most often by lightning!!

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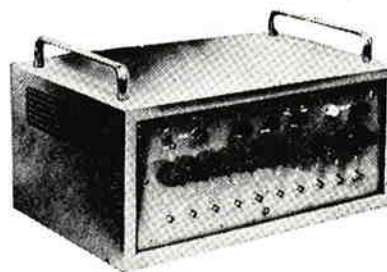


The Dymec DY-5344 Go/No-Go Measuring Set is a simplified, complete testing system which measures and compares dc voltages against preset limits, displays the measured value, and records the test results. Ten manually-selected input channels are provided. Input voltages up to 1000V are handled in four decade ranges. The input signal is converted to frequency and is compared digitally with high and low limits determined by front panel controls. HI, GO, or LO indicator lamps indicate the result of comparison, while a five-place display indicates the measured value.

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SCIENCE, EDUCATION AND OUR LONG ISLAND SECTION

By GUS KRAYER

In the past the PULSE has published various announcements concerning specific facets of the IRE Student Affairs Committee's program. It is now time for a more thorough discussion of this Committee's history, aims and its relationship to other groups and programs with similar goals.

History

Initiated in 1956 by the Long Island Section, this experimental committee has been guided by its present chairman, Joseph W. Kearney, since 1958. In this time a state approved course has been developed for high school teachers, for which In-Service-Training credit is given. Instrumental in implementing this course were Student Affairs Comm. Vice-Chairman Matthew T. Lenenbaum and Jack Rudner, Ass't Superintendent of Mineola High School.

The theme "Recent Advances in the Physical Sciences" is calculated to offer attending teachers a survey of some of the most important aspects of recent scientific achievement, to better enable them to prepare their students.

For the benefit of the high school student, a Lecture Bureau was established, which presently consists of 24 speakers for 19 topics. Augmenting the speakers is a group called the I.R.E. High School Representatives, whose function is to act in liaison with 28 local schools. The High School Lectures Sub-Committee Chairmain, Gus Kraye, is assisted in coordinating these activities by R. Koch and E. Vogel.

All of this effort is an attempt to provide a means by which the substantial L.I. scientific community of graduate engineers, scientists, mathematicians, etc., can make its experience available to the teachers and students of the area. In so doing, it is hoped that both teacher and student might be stimulated, thus making science more meaningful to the student.

No attempt is made to "sell" the student on a particular career, but rather, the talks with their demonstrations, slides, movies, and so forth, are meant to provide him with a fresh view of the world he is preparing to enter. With broader experience, the student's selection of a career may be a little easier and less due to factors of chance. One might hope that the nation's welfare is served by the stimulation of talented youngsters.

Programs with Similar Goals

While this program is unique among professional organizations, its purpose is shared, to some degree, by a number of other groups. Among these are the Junior Engineering and Technical Society (JETS), the Science Explorer Scout Program of the Boy Scouts of America, the Joe Berg Foundation, and various programs

sponsored by industrial organizations throughout the country (usually Big Brother Systems). Each of these programs attempts to meet a specific need in its own locale, and the methods chosen are as numerous as the programs. While the IRE does not sponsor individual student groups, it has made known its willingness to help other organizations by providing speakers at meetings, or by occasionally furnishing consultation on specific problems which have arisen in the course of a project.

An outstanding example of cooperation with another group is provided by the series of nine lectures broadcast by MARS, the Military Affiliate Radio System, under the auspices of J. H. McCoy, Director of the USAF Eastern Technical Net. The audiences for these talks, estimated to number over 14,000 per session, were permitted to take part in limited two-way discussions by means of amateur radio. Very likely these were the largest "classes" ever conducted.

Liaison with Other Programs

Early in the program it was decided to confine the activities of the committee to Nassau and Suffolk counties. In 1958, the Nassau County Council of Boy Scouts of America launched a new Science Explorer Scout Program, for boys of high school age. This group has the en-

Continued on Page 18

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GUS KRAYE

Sharing in the activities of the IRE High School Lectures Committee has become a part of the lives of Gus Kraye and his wife, Darcie. A Senior Member of the IRE, Gus has long been interested in education and it seemed natural in 1957 for him to become associated with the IRE Students Affairs Committee. In 1958, he became Chairman of the High School Lectures Sub-committee which he describes elsewhere in this issue.

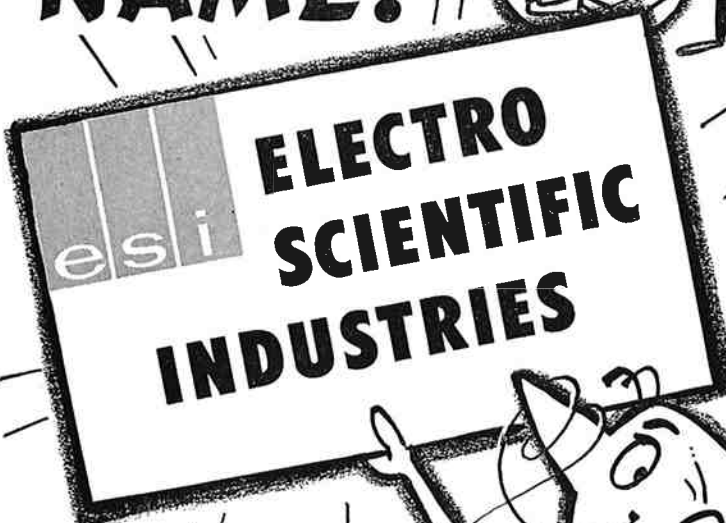
Upon graduating from Amityville High School, Gus, a native Long Islanders, went to Bucknell University in Lewisburg, Pa., where he received his B.S. and M.S. in Physics.

From 1951 until 1957, at the Sperry Gyroscope Company, he was concerned with microwave components and microwave systems work on several naval radar systems. In 1957, he joined Airborne Instruments Laboratory and became involved in very low loss ferrite circulators for maser receivers. Presently he is an RF project engineer in the Reconnaissance Systems Department.

Besides sharing a mutual interest in education, Gus and Darcie are active in church work as members of the choir and Couple's Club of St. Paul's Lutheran Church located in Amityville, where they live with their infant daughter. Gus is also the secretary of the Couple's Club and a member of the Board of Trustees of the church.

The usual homeowner's chores give way to tennis in the Spring and this sport is continued into late Fall when the local high school removes the nets and Gus goes back to his den and other activities for the winter.

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By TOM DOSCH

Recently the Chairman of the Board of General Dynamics Corporation* made the following noteworthy remarks:

"Since the security of the nation is of paramount importance, the Directors of Dynamics are satisfied that large-scale defense activities must be a major and long term function of the American economy . . .

Despite the long term needs of the nation's various defense programs, considerations of growth and stability dictate that a conservative corporate management actively seek diversification in commercial, non-defense business."

Reduced Defense Spending?

Evidently, there is a real possibility of reduced defense spending if we look beyond the immediate future. This is of course dependent upon our relations with Russia. President Eisenhower, in his recent "State of the Union" message said:

"Over the past year the Soviet Union has expressed an interest in measures to reduce the common peril of war. While neither we nor any other free world nation can permit ourselves to be misled by pleasant promises until they are tested by performance, yet we approach this

apparently new opportunity with the utmost seriousness."

One who has considered the effect of disarmament on the over-all economy is Seymour Harris, Lucius N. Littauer Professor of Political Economy at Harvard, who has recently published an article entitled, "Can we Prosper Without Arms". He points out that although defense spending was reduced from 88 billion dollars in 1944 to an average of 14 billion dollars in the years from 1946 to 1950, yet the national income rose substantially in those years¹. The author then asks "If we were to

reduce drastically our outlay for defense, could we expect to repeat *the heartening experience of 1946-1949?*

Many electrical engineers recall this period as far from heartening because of job shortages and low wages. A measure of how poorly engineers and scientists fared during this period of rising national income might be inferred from the record of government expenditures for scientific research and development, as shown in figure one.² It seems that what was good for General Motors in the forties was not necessarily good for the engineer.

Let us consider the electrical engineer's position as we enter the sixties. First, how many electrical engineers are engaged in defense work? The Program Director for Scientific Manpower, of the National Science Foundation answered this question for the "Pulse" in the following manner:

"The precise information you would like is not available."

The Director did suggest, however, various sources from which some suitable information might be pieced together. Although helpful, such data did not supply an answer. It is interesting however, to consider one of the pieces of data; in figure 2 is shown a breakdown of federal agency obligations for research and development.³ The expenditures are not, of course, confined to electronics, but it is evident that government spending in non-defense areas is remarkably small. Further, it is common experience that the majority of electronics research and development work is government supported.

Another evidence of our profession's dependence on defense monies is the percentage of all factory electronic sales which are for the military. Estimates vary somewhat, but 50% appears to be a minimum figure.³ Since most military equipment

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Table No. 1

MANUFACTURE OF DURABLE GOODS, PERCENTAGE OF WORKERS IN VARIOUS CATEGORIES (Ref. 4, 5)

TYPE OF BUSINESS	NUMBER OF PEOPLE EMPLOYED, THOUSANDS
Durable Goods Manufacture	87.6
Non-durable Goods Manufacture	27.3
Contract Construction	34.8
Public Utilities	22.2
Wholesale and Retail	85.2
Finance, Insurance, Real Estate	14.7
Government	63.9
Services and Miscellaneous	62.5

Table No. 2

EMPLOYMENT IN NASSAU-SUFFOLK, SEPT. 1959 (Ref. 5)

*This corporation includes Electric Boat Co., Convair, Stromberg Carlson and General Atomic.

requires an engineering effort greater than that demanded by an equal volume of commercial sales, it is clear that on a nation-wide basis a majority of all electronics engineers are supported by armaments.

But what of Long Island? Is our area more or less dependent on armament spending than is the national average? Again, the answer is not directly available, but manufacturing statistics for Nassau and Suffolk counties are helpful. Particularly noteworthy is the preponderance on Long Island of industry usually associated with defense work, as shown in Table 1. Note that there are no figures for "electronics", because this is not yet considered a separate industry by such surveys.

Durable goods manufacture is of course only one of many wage earning categories. On Long Island workers are distributed as shown in Table 2.

Although the durable goods industry, which absorbs most of the arms money, employs a minority of Long Island workers, many of the other listed occupational groupings such as "government" are largely dependent on defense activities and commuters. Without defense money then, Long Island would be given back to the potato and the commuter.

And so we conclude

First, although there are a wealth of industry statistics available, there is a need for more up-to-date information relating directly to engineering employment.

Second, a majority of electronics engineers are presently employed in defense work.

Finally, the same reasoning which applied to General Dynamics Corporation can well apply to Long Island industry . . . long range considerations of growth and stability dictate diversity.

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4. Monthly Labor Review, November 1959, U.S. Department of Labor (Figures are for August 1959).
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February, 1960

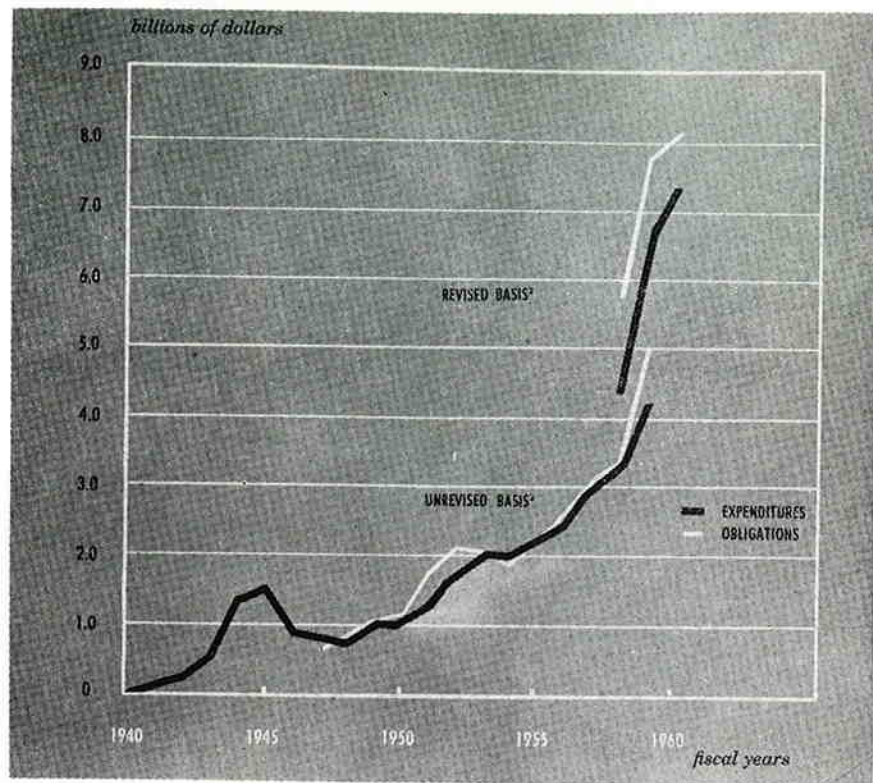


Figure 1 — TRENDS IN FEDERAL OBLIGATIONS FOR CONDUCT OF R. and D.

(reprinted from reference 2)

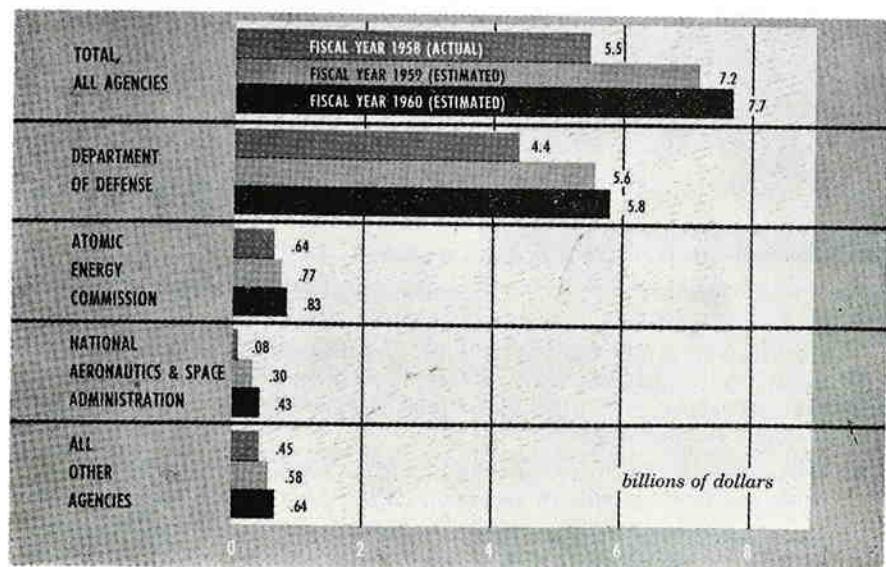
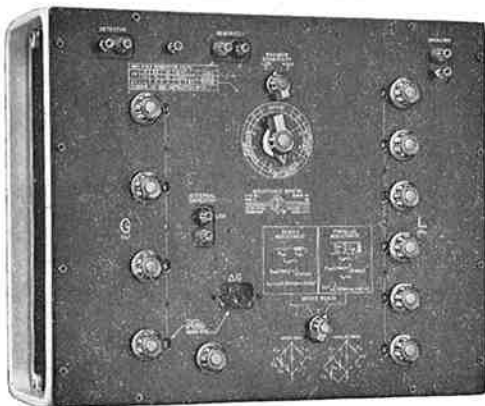


Figure 2 — FEDERAL AGENCY OBLIGATIONS FOR CONDUCT OF R. and D.

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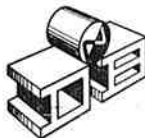
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SCIENCE, EDUCATION . . .

Continued from Page 14

thusiastic support of the USAF at Mitchel Field, and has been building new Posts under the sponsorship of civic organizations such as the Lions, Kiwanis, and Rotary Clubs, and of industrial concerns in Nassau County. One of the commodities in short supply in this effort is, of course, manpower. Adult advisers are urgently needed, and occasionally, consultants. In the latter capacity, IRE speakers can serve by giving talks at meetings. Interested persons who wish to make their services available should contact Mr. Keneth David, Field Director, Nassau County Council, Boy Scouts of America, Shelter Rock Road, North Hills, Roslyn, N.Y., Pioneer 6-8282. This program could provide "science club" activities for a large number of interested boys.

The JETS Program on Long Island centers at Republic Aviation Corporation, Farmingdale. It originated with a program at the Michigan State University in 1950, and now has many chapters all over the United States. The services of the IRE Speakers Bureau have been made available to the Long Island clubs.

The writer recently publicized the IRE Program by describing it to two groups of High School teachers at meetings held in Nassau and Suffolk Counties, in November of 1959. The following topics, not presently covered, were suggested by several teachers: Biology, Radio-activity and its Biological Effects, Space Medicine, and Chemistry. We hope soon to find members of our technical community who can speak on these and other topics.

There is need, too, for High School Representatives, since only about half of the schools in the two counties are presently covered. Among the schools not currently represented are the following: Hicksville, Mineola, Manhasset, Plainview, Rockville Centre, Oceanside, Farmingdale, and Friends Academy, Locust Valley.

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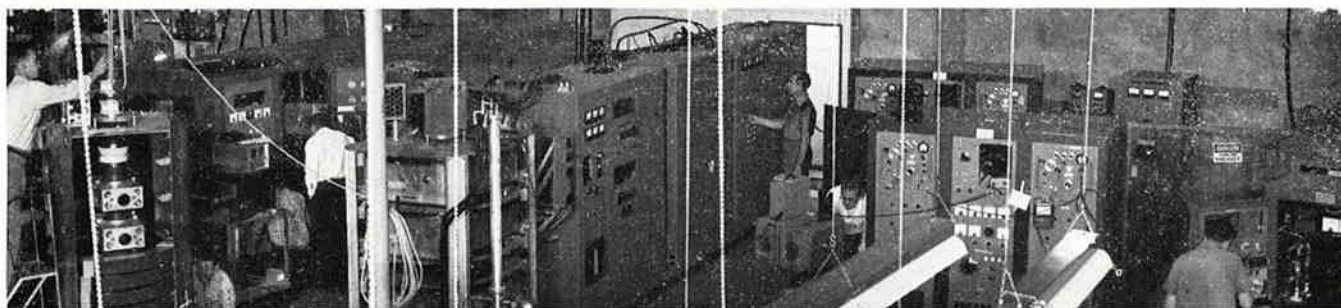
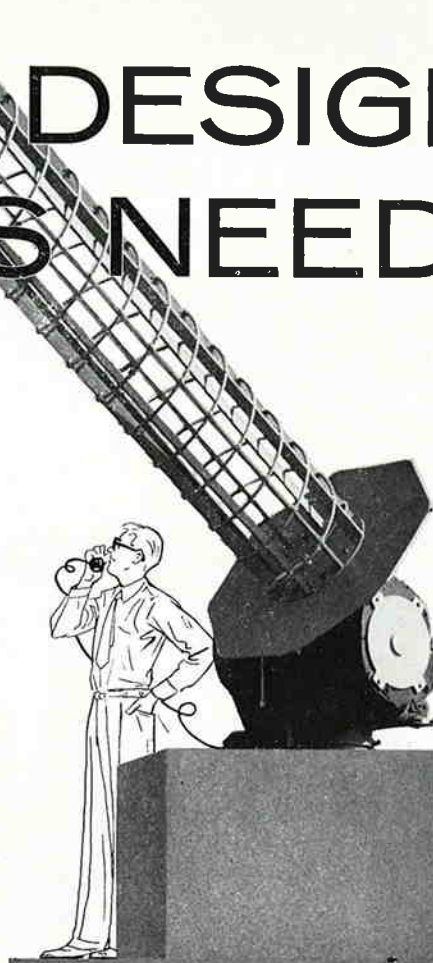
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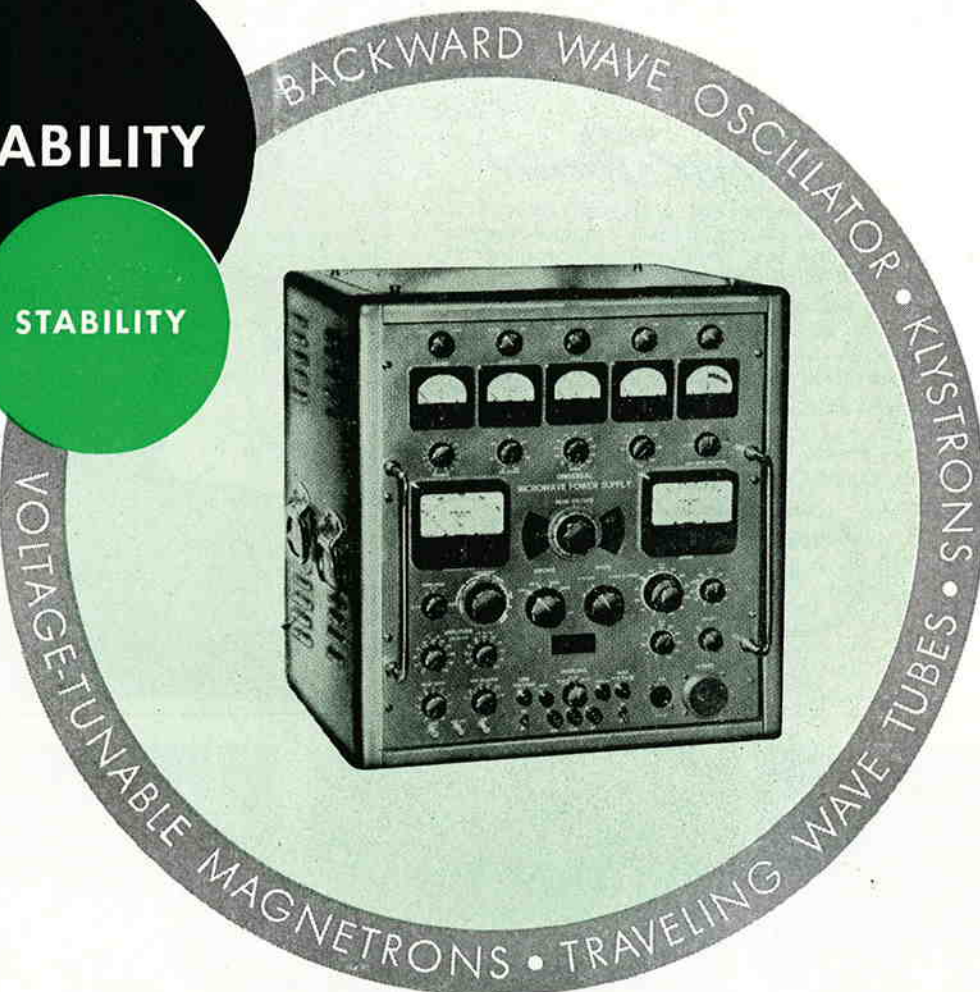
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