BRIDGE OF HKN

Bridge

of ETA KAPPA NU

Electrical Engineering Honor Society

FEBRUARY, 1966, Vol. 62, No. 2

Editor and Business Manager
Paul K. Hudson

Features

OUR COVER

The 3,200,000 volt high capacity impulse generator used in extra high voltage transmission research at EHV near Pittsfield, Mass. See page 3 for a discussion of Electric Utility Engineering.

The BRIDGE is published by the Eta Kappa Nu Association, an electrical engineering honor society. Eta Kappa Nu was founded at the University of Illinois, Urbana, October 28, 1904, that those in the profession of electrical engineering, who, by their attainments in college or in practice, have manifested a deep interest and marked ability in their chosen life work, may be brought into closer union so as to foster a spirit of liberal culture in the engineering colleges and to mark in an outstanding manner those who, as students in electrical engineering, have conferred honor on their Alma Maters by distinguished scholarship activities, leadership and exemplary character and to help these students progress by association with alumni who have attained prominence.

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Real and Imaginary

THREE QUESTIONS

It once occurred to a certain king, that if he always knew the right time to begin everything; if he knew who were the right people to listen to, and whom to avoid; and, above all, if he always knew what was the most important thing to do, he would never fail in anything he might undertake.

And this thought having occurred to him, he had it proclaimed throughout his kingdom that he would give a great reward to any one who would teach him what was the right time for every action, and who were the most necessary people, and how he might know what was the most important thing to do.

And learned men came to the King, but they all answered his questions differently.

In reply to the first question, some said that to know the right time for every action, one must

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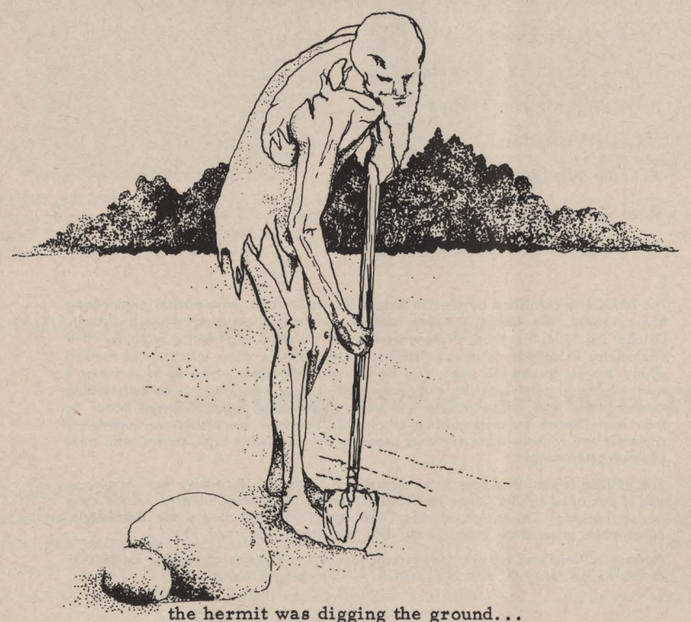

the hermit was digging the ground...

Educating College Graduates In . . . .

ELECTRIC UTILITY ENGINEERING

ERIC T. B. GROSS

Philip Sporn Professor
Rensselaer Polytechnic Institute
Troy, New York

The title of this paper was chosen to indicate that we are discussing a graduate program which has the purpose to supply professional manpower of high caliber for electric power utilities, for consulting firms, and for manufacturers of heavy electric power equipment. Without changing the contents of the paper, "electric power systems engineering" could have replaced "electric utility engineering" in the title. We could have made the title more specific by stressing the fact that the education which we have in mind is "education for today and for tomorrow," as distinct from "education only for days long after tomorrow." This does not mean that the "days after tomorrow" should be excluded, but we wish to emphasize that we are inclined to deal with a program that should afford immediate usefulness as well as engineering background for the professional lifetime of the graduate.

It has recently become fashionable in this country to consider preferably the not so near future—we propose to remain realistic and reasonable. As a case in point, we find it difficult to consider exotic energy conversion methods (1) of extremely low efficiencies in preference to a thorough study of rotating machine theory, or to disguise the latter by calling it something else (2).

This paper deals specificially with a graduate program which has been developed at Rensselaer Polytechnic Institute since early 1962 when a Chair in Electric Power Systems was established. The program has advanced with minor growing pains from scratch to an operation which now includes a group of some 20 American students engaged in work for the Master's degree.

The need for graduate professional education has become evident during the last ten years or more. One generation back, engineers were provided with up-to-date knowledge of useful basic and applied knowledge in limited technological areas, but much more emphasis is now given in undergraduate schools to scientific background, often on levels which are more advanced than necessary to understand the state of the art (3, 4). This has been a move toward the long established approach at the technical universities in Central Europe where the education in special preparatory schools together with that during the first two years in the university has always provided a rigorous scientific background for the subsequent final two years when concentration is on the professional aspects of en-

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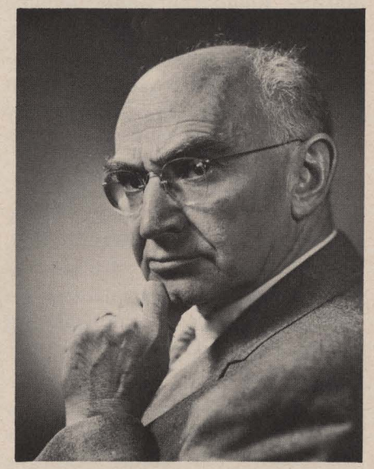


After serving in industry for some 20 years, the author became university professor at CCNY, Cornell and Illinois Tech; he assumed his present position as Distinguished Professor of Electric Power Engineering in 1962, when the Philip Sporn Chair was established at Rensselaer. He served as National President of HKN during 1953-54.

gineering. It has been well known to anyone studying education for engineering in various countries that the graduate of the average engineering college in this country compares roughly to the European university student who has passed the first and comprehensive "intermediate examination" at the end of his second university year.

It is now fully recognized that it is no longer possible to prepare a truly professional engineer in this country completely at the undergraduate college level (5, 6).

New plans are being developed at various universities in this country which divide engineering education into two sections, the first is common to all branches of engineering and preparatory, the second is professional and with emphasis on one of the special areas of engineering. The preparatory part should lay the scientific foundation and include subjects which may become significant for engineering applications and equally important in future technologies. The example of energy conversion illustrates this approach. Surely, the scientific background (1) for non-conventional static and direct energy conversion methods should be included here, but in the professional section emphasis should be given to present-day conventional rotating machines.

A new program at Rensselaer (5) gives all engineering students essentially the same scientific background in a pre-engineering program normally requiring three years; this is capped by a two-year professional school covering in depth one broad field of specialization and developing professional competence. It is evident that such a program, as well as any other program with emphasis on scientific background provides a better preparation for graduate professional studies.

The graduate program in electric utility engineering dealt with in this paper is presently designed as a one-year program, leading to the M.S. degree. It is intended for Bachelor degree graduates of four-year colleges who are acceptable for admission to the graduate school. This usually means academic standing of the student within the top 20% of his graduating class.

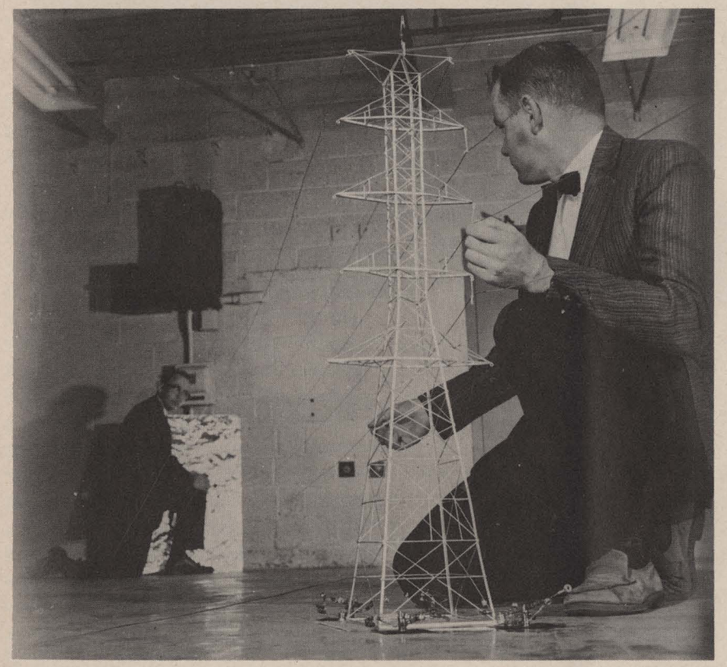
The advancing scientific complexity of power systems problems makes graduate studies ever more important. The existing manpower needs suggest the establishment of such programs at a very limited number of universities throughout the country (7). It must be recognized that such programs, like any other endeavor, must be economically justifiable; the establishment of too many similar operations should be discouraged. Of course, the same consideration applies for every other field of technical specialization and it can be visualized that before long most unversities will provide specialized programs in only a limited number of professional areas of engineering.

To this date, no careful statistical study of the manpower needs of the whole electric power industry for engineers with advanced degrees has been made. It may be roughly and perhaps conservatively estimated that the average yearly demand is for 250 engineers in this category of specialized advanced education. Since an efficient operation would include up to about 25 students, it follows that a total of ten graduate schools can supply the present national annual manpower demand through such specialized programs. It would indeed be a very worthwhile endeavor to assemble data on the basis of a statistical study in order to provide the industry and the universities with a more precise answer. Such study should include future trends in order to put planning on a sound basis.

The electric power systems engineering program at Rensselaer is an example of such a graduate program at one university. Most participants will terminate at the end of the first year, after receiving the Master's degree, in order to accept appropriate positions with utility companies, manufacturers of heavy equipment, and consulting firms. Very few will go on to a doctoral program, either directly, or preferably later after gaining several years' practical experience in industry.

Within the limits of one academic year, there is really not much time to provide the student with more than well-established power engineering fundamentals which supply the backbone for his specialized professional work. In addition to engineering subjects, it is usually necessary for the student to supplement his mathematical background in various areas of advanced and applied mathematics, including digital computer programming and numerical methods for the solution of engineering problems. It is also desirable that the student improve his understanding of classical physics by developing a better working knowledge in advanced areas of electromagnetic field theory and of analytical mechanics. In addition, it is mandatory that he develop a broad understanding of engineering economics. These non-engineering topics will use about half of the time which he has available and cover half of his program distributed over the whole academic year. The remaining half of the academic year will include material in electric power systems engineering proper. The term power systems engineering has come into frequent use during the last 30 years (6) and designates the knowledge and the many techniques applicable to problems which have developed in this field at a rapid rate during this period; it covers a very broad area of power engineering which includes problems in "systems engineering" as one of its very many parts. We emphasize this since the term "systems engineering" has recently been used in a somewhat nebulous way.

In order to clarify the broad coverage of the term "electric power systems engineering," we may summarize the many kinds of essential equipment which make a power system: generators, transformers, overhead open wire lines and underground cables, utilization equipment. Included are switchgear and other apparatus up to the highest voltages in use, as well as a vast amount of equipment for communication, control and relaying problems. The proper selection and arrangement of each piece of equipment to work at all times harmoniously with all other parts anywhere on the system, under regular conditions as well as during and after disturbances, are comprised in the broad field referred to. The selection and arrangement of equipment is essentially a design problem. However, our topics also include studies of operation under steady state condition as well as of phenomena during switching and transient conditions, study of a-c operation up to the highest practical and economical voltages, as well as the application of the most modern electronic components and newest techniques based on computer science, in addition to the possible use of very high voltage d-c operation which has recently again come to the forefront of economic possibilities. Accordingly, the individual courses of a graduate program in electric systems engineering will have to deal with such topics as power systems analysis, that is essentially the evaluation of the parameters covering the location, design and selection of lines and apparatus, the analysis of unbalances through simplified circuit theory, the electro-mechanical behavior of rotating machines during dynamic and transient load changes of varying rapidity, and with other topics such as the elimination of sustained short circuits through relaying and breaker operations, the control of lightning and switching over-voltages, the problems associated with system grounding, potential gradients in earth and with safety conditions, the economic plant selection, generation and load distribution through integrated and interconnected systems, to mention but the main topics. Many problems can be grouped together and treated coherently in one particular course.



50:1 scale model to explore lightning flashover rate on extra high voltage transmission lines. Nanosecond methods have been widely applied in lightning protection engineering problems.

The preparation of the student according to this undergraduate curriculum will decide whether his program will be made up completely of formal courses or

(Continued on next page)

whether he may spend some of his time on a particular study which will result in a report or thesis. It is observed that the thesis requirement has been eliminated at many of our most outstanding universities in the Master's degree program. This is to a large measure desirable because supplemenetary course work is often preferable. In some undergraduate programs, a reduction in the coverage of electrical machine theory has taken place to such an extent that the students are absolutely unqualified to handle any application which involves this important equipment; it is evident that a graduate professional power systems engineering program must include making up for such serious deficiencies.

In order to provide a better understanding of this program at Rensselaer, there is summarized below an outline of course titles included in the program and suggested for selection. The program is very flexible; it permits adjustments to the background education of students who have come from many colleges in various parts of this country. However, there are included certain required courses which are considered the backbone of any professional work in electric power systems engineering. The completion of the program includes ten units, five during each of two semesters, in line with the usual requirements for a first graduate degree. Each unit is a lecture course meeting three times weekly for one hour. As the summary of the course titles indicates, the program permits wide modifications; the student is encouraged to exercise his own initiative in developing a program which fits best into his preparation.

Courses comprising the program in electric power systems engineering:

REQUIRED OF ALL STUDENTS

	UNITS
Power Systems Analysis (One each semester)	2
Engineering Economics	1
Data Processing	1

REQUIRED ONE OF THE FOLLOWING

Electromagnetic Phenomena	1
Introduction to Theoretical Physics	1

REQUIRED 2 OR 3 OF THE FOLLOWING

Protective Relaying	1
Economic Operation of Power Systems	1
Surge Phenomena in Power Systems	1
Advanced Electrical Machines	1
Selective Reading	1

REQUIRED 2 OF THE FOLLOWING

Operational Calculus	1
Fourier Analysis	1
Advanced Calculus and Complex Variable Theory	2
Topics in Advanced Mathematics	1
Linear Algebra	1

PERTINENT ELECTIVES

Advanced Network Theory	1
Statistics and Probability Methods	1
Analytical Methods in Management (Operations Research)	1
Nuclear Energy Conversion	1
Nuclear Reactor Fundamentals	2
Energy Utilization	1
Mathematics of Computation	1
Vibrations in Machines	1
Electromechanical Systems	1
Plasma Electronics	1
Thesis or Report	2
	equivalent

The program is now in its third year of operation. Practically all students are American students who prepare themselves for engineering positions in the electric power industry. As in all other graduate programs, their study is usually underwritten by Scholarships, Fellowships and Assistantships since any qualified high caliber student can easily get such financial help for graduate studies. The need for financial assistance has been recognized by a number of electric power utilities and they have made available funds for graduate fellowships that are comparable to those established in large numbers in other areas of specialized studies (7).

We have been able to attract a number of really outstanding students to this program. Many have had challenging summer experience with industries in the electric power field through which they have become deeply interested in a variety of advanced power systems problems. The fortuitous location of Rensselaer makes it possible to easily visit nearby utility installations at the highest operating voltages, as well as large establishments for the manufacture of heavy power equipment. Project EHV (8) at Pittsfield, Mass., may be mentioned as one example of a nearby large research project; it is now sponsored jointly by Edison Electric Institute and General Electric Co. The formal education of the students is further enhanced

(Continued on page 24)

YOUNG ELECTRICAL

Introduction by

WILLARD B. GROTH, Committee Chairman

On October 22, 1965, Eta Kappa Nu's Jury of Awards named Dr. Edward M. Davis, Jr., of Chappaqua, N.Y. Outstanding Young Electrical Engineer of 1965. Dr. Davis is Assistant to the President, Data Processing Division of IBM, at White Plains, N.Y. The Jury honored Dr. Davis for his contributions to the development of electronic devices and circuits, and his activities in education and church and civic affairs. At IBM, Dr. Davis has received an Invention Award, and an Outstanding Contribution Award for his work on circuit packaging. He is the author of numerous technical papers and holds many important patents.

Awarded Honorable Mention by the Jury was Ronald Stephen McCarter, of Morristown, N.J. McCarter is Supervisor of the Array Radar Systems Group at Bell Telephone Laboratories, Whippany, N.J. He was cited by the Jury for his leadership in the field of phased array radars and the use of radar in national defense as well as for significant participation in civic and community activities.

Members of the Jury Award of 1965 are: Chairman Walter K. MacAdam, Vice President-Government Communications, American Telephone and Telegraph Company; George E. Beggs, Jr., President, Leeds & Northrup Co.; George H. Brown, Executive Vice President, Research & Engineering, RCA; J. Presper Eckert, Vice President, Univac Division, Sperry Rand Corp.; Jerrier A. Haddad, Director of Technology & Engineering, IBM; James H. Harlow, Vice President, Engineering & Research, Philadelphia Electric Company; Howard H. Sheppard, President, Eta Kappa Nu and Vice President, Rumsey Electric Company; Robert T. Weil, Jr., Dean of Engineering, Manhattan College.

As in previous years, candidates for these awards are sought through nationwide circulation of

(Continued on page 12)

Left to right: Walter K. MacAdam, Vice-President, American Telephone & Telegraph Co. & Chairman of the Jury; George E. Beggs, Jr., President, Leeds & Northrup Co.; James H. Harlow, Vice-President, Philadelphia Electric Company; Howard H. Sheppard, President, Eta Kappa Nu & Vice-President, Rumsey Electric Company; Willard B. Groth and Berthold Sheffield, Chairman and Incoming Chairman Respectively of the Award Organization Committee; J. Presper Eckert, Vice-President, Univac Division, Sperry Rand Corp.; Jerrier A. Haddad, Director of Technology & Engineering, International Business Machines Corporation; Robert T. Weil, Jr., Dean of Engineering, Manhattan College; George H. Brown, Executive Vice-President, Radio Corporation of America.

ENGINEER OF 1965

Biography of Edward M. Davis, Jr.,

by A. H. Eschenfelder*

There are many fine qualities that one can attribute to Edward M. Davis, Jr. He is intelligent, thoughtful, informed, decisive, and hard-working. Perhaps Ed's greatest quality is his enthusiasm, and it pervades everything he does. Ed's enthusiasm for science, engineering, management, and for life itself has been paying dividends for him and for those around him for most of his 33 years. It is, therefore, very satisfying for those of us who have worked with Ed to see him honored through the Eta Kappa Nu Award.

In tackling any problem, Ed—both literally and figuratively—rolls up his sleeves and rubs his hands together, clearly demonstrating his interest, excitement, and pleasure in meeting the challenge at hand. At the same time, his experience as a pragmatic electrical engineer comes into play, and it is usually not long before the problem is solved and Ed is working on another. It has always seemed that he never rolls down his sleeves or lets his enthusiasm wane.

But Ed does not limit his energies to the industrial world. While working for IBM in Poughkeepsie, New York, he found time to serve as instructor and lecturer at the local high school and community college; he has taught Sunday school classes for his church; and he was active in the Mid-Hudson Valley Philharmonic Society. His other hobbies include water-color painting, photography (he developed a new technique for color printing), and he claims to be "a very poor tennis player."

(Continued on next page)

—By virtue of his many notable contributions in the development of solid state components and circuits, his managerial ability and his dedicaton to church and civic activities.

EDWARD M. DAVIS, JR.

* Director of Components, IBM Systems Development Division, East Fishkill Facility, Hopewell Junction, New York.

Ed's educational background includes a BSEE degree from Carnegie Institute of Technology (1955), an MS from California Institute of Technology (1956), and a PhD in electrical engineering from Stanford University (1958).

After leaving Stanford, Ed joined IBM's Poughkeepsie development laboratories. His first work was in exploratory development of PNPN four-terminal transistors and field effect devices. During this time, he earned a number of patents for inventions in areas such as photosensitive field effect devices and memory arrays. He also earned the well-deserved reputation as an innovator in the development of semiconductor devices.

Ed undertook an investigation of Esaki diodes and was appointed manager of a development group set up in 1960. By that time, he had accumulated other patents—these ranging from novel circuits such as pulse counters using Esaki diodes to new device processes.

His next assignment began his close association with the engineers and scientists who produced the microelectronic circuit technology used in IBM's current System/360 computers. The program was called Solid Logic Technology; and, as project engineer working with the late Bob Schwartz, Bill Harding, Erich Bloch, and others, Ed saw the fruits of their combined efforts yield a highly significant complete circuit technology, including packaging, that was designed for automated, high-volume production.

Ed made his initial presentation of this technology at the 1963 Wescon Conference. The first application of the circuit technology was made known less than a year later when, in April 1964, IBM announced that its new System/360 computers would feature SLT circuits as the basic electronic components.

He achieved national professional prominence in the IBM Journal of Research and Development with an article entitled, "Solid Logic Technology: Versatile High-Performance Microelectronics," of which Ed was coauthor, and in February 1965, Ed was a keynote speaker at the International Solid State Circuits Conference in Philadelphia.

During most of 1965, Ed was manager of component development at IBM's East Fishkill (New York) facility, working on further development of both monolithic and hybrid integrated circuit technologies.

A very significant product of his development group was the creation and implementation of an advanced form of Solid Logic Technology (ASLT). ASLT is a high-performance technology with circuit speeds of less than 1.5 nanoseconds. The technology employs current steering logic, very fast multidevice chips mounted in modules comprised of two substrates of components stacked one atop the other and packaging that provides the high density and controlled electrical characteristics necessary for very high speed.

Late in 1965, IBM announced that this circuitry—which can be manufactured on the same automatic equipment used for SLT—will be used in the Company's most powerful computers.

It is evident that Ed has played a vital role in IBM's circuit development. In recognition of his technical and managerial achievements, he was recently moved to a new position with the Company in White Plains, New York. As administrative assistant to the president of IBM's Data Processing Division (the Company's marketing and sales division), Ed will gain further understanding of the marketplace while providing an engineering viewpoint to the marketing people.

Apart from IBM, Ed's interest in the technical world manifests itself in his membership in professional societies. Both this year and last, Ed has served on the IEEE solid state devices committee and on the program committee for the International Solid State Circuits Conference. In addition, he is a founder and officer of a chapter of the Research Society of America and a member of the American Society for the Advancement of Science.

Outside of the technical community, Ed—a voracious reader of books on current affairs—belongs to a civic association and takes an active interest in local politics. In this latter category, Ed's activities have complemented those of his lovely wife, Lynne, who has held the office of president of a local chapter of the League of Women Voters—a nonpartisan political organization.

Ed and Lynne Davis and their three children—Catherine, 7, Edward, 5, and Robert, 2—are now living in Chappaqua, a pleasant residential community in New York's Westchester county.

HONORABLE MENTION

—By virtue of his recognized leadership in the field of radar systems engineering and design and his exceptional activities in Civil Defense and other community affairs.

RONALD S. McCARTER

Biography of Ronald Stephen McCarter by Dr. John A. McCarthy

**Head, Radar Systems Research Dept.
Bell Telephone Laboratories
Whippany, New Jersey**

Mr. R. S. McCarter was born in Arkansas on October 23, 1931. At the age of 7 years, he moved with his family to a Missouri farm where he resided until, upon graduation from Crane High School, he joined the U.S. Navy in May of 1949. He was assigned to gunnery fire control, participated extensively in the Korean Campaign, and had risen to the rank of First Class Petty Officer when he was discharged in February of 1953.

After his discharge from the Navy, he co-founded a radio and television repair business in Hillsboro, Texas. However, he soon decided to continue his education, sold his share of the business, and enrolled at Texas A&M. During his student years, he supported himself and his family (he had married Nina Lanning in 1952) by part-time work in radio-TV repair and, during his last year, as a teaching assistant in the Electron Microscopy Laboratory at Texas A&M.

Upon graduation with a BSEE in 1957, Mr. McCarter joined Bell Telephone Laboratories where he was enrolled in the Communications Development Training Program. As part of that program, he worked on the Nike-Hercules system (at White Sands) and did research work on the microwave behavior of ferrites. He received the MS degree in Electrical Engineering from New York University in June, 1959.

During the last year of his formal training, Mr. McCarter had assumed a de facto leadership role in a major ferrite component development program, a role in which he continued until 1961. During that year, he was assigned to the Zeus Multifunction Array Radar project, a major defense R and D program. He soon became the key systems engineer and coordinator of that project. He stayed with ZMAR throughout the design stage (to January, 1963), at which time responsibility for the project was transferred from the Military Research Department to a development organization. Mr. McCarter then became a leading Radar Systems engineer on the new Nike-X program. He had the major responsibility for generation of the Missile Site Radar and made many other contributions, especially in the areas of phased array radar design, hardened point defense, and development planning. He is still very active in the Nike-X program. In addition, he has initiated a new systems research program, the purpose being the development of methods for designing large systems which involve many radars.

Mr. McCarter has also continued his professional development by activities outside of his direct work assignment. He has been active in professional societies, and served the IEEE Northern New Jersey Professional Group on Microwave Theory and Techniques as Secretary, Vice Chairman, and then Chairman in the period 1960-1963. He has given many lectures on radar, especially phased arrays, and is presently conducting an out-of-hours course on radar systems design at Bell Laboratories.

Mr. McCarter has maintained many cultural and community interests throughout his adult life and became very active in community affairs several years ago. He has served in the local PTA since the oldest of his three children entered school in 1961. In addition, he has taken a leading role in Civil Defense activities in Morris Township (Population: 17,000). In 1963-1964 he served as Manager of the Shelter Program and set up a shelter system. Since mid 1964, he has been Deputy Director of Civil Defense, serving as Acting Director for protracted periods on several occasions.

(Continued on next page)

McCARTER (from page 11)

In addition to his professional and community services, Mc. McCarter has continued to be very active in sports, participating in company-sponsored basketball, bowling, and softball leagues and in industrial and church basketball leagues. He is an excellent and popular participant. For example, last year he was selected as Most Valuable Player in the Whippany Bell Laboratories Basketball League.

In summary, Mr. McCarter is leading a very full, professional, community, and social life. He is an outstanding engineer, a respected community figure, and a well-rounded person. He has already accomplished many notable achievements and can be expected to continue to be very active and productive as an engineer and as a person.

GROTH (from page 8)

Eta Kappa Nu Nomination Forms under cover of the annual "Spring Letter" of the Award Organization Committee. Requirements for nomination are the BSEE degree held not more than 10 years, and age not over 35. Winners are judged on the basis of outstanding performance in electrical engineering, civic and social activities, cultural and aesthetic developments, membership in professional societies, etc.

The Award Organization Committee members are Messrs. Robin Beach, Emerson D. Callahan, John H. Craig, Larry Dwon, Anthony F. Gabrielle, Nelson S. Hibshman, Everett S. Lee, Benjamin F. Lewis, John M. Montstream, James H. Mulligan, Jr., Harlan J. Perlis, Berthold Sheffield, Roger I. Wilkinson, and Willard B. Groth, chairman.

AWARD DINNER

DATE: Monday, March 21, 1966.

PLACE: Belmont Plaza Hotel, Lexington Ave. and 49th St., New York City.

TIME: Cocktail Hour—6:00 p.m.
Dinner—7:00 p.m.

RESERVATIONS: $6.50 each. Students and ladies half price. Make checks payable to N.Y. Alumni Chapter of Eta Kappa Nu. Mail to: Mr. Edgar W. Markard, Radio Corporation of America, 75 Varick St., New York, New York 10013.
Tickets will be held for pick-up at the door. All interested persons are cordially invited.

REAL & IMAGINARY (from page 2)

draw up in advance, a table of days, months and years, and must live strictly according to it. Only thus, said they, could everything be done at its proper time. Others declared that it was impossible to decide beforehand the right time for every action; but that, not letting oneself be absorbed in idle pastimes, one should always attend to all that was going on, and then do what was most needful. Others, again, said that however attentive the King might be to what was going on, it was impossible for one man to decide correctly the right time for every action, but that he should have a Council of wise men, who would help him to fix the proper time for everything.

But then again others said there were some things which could not wait to be laid before a Council, but about which one had at once to decide whether to undertake them or not. But in order to decide that, one must know beforehand what was going to happen. It is only magicians who know that; and, therefore, in order to know the right time for every action, one must consult magicians.

Equally various were the answers to the second question. Some said, the people the King most needed were his councillors; others, the priests; others, the doctors; while some said the warriors were the most necessary.

To the third question, as to what was the most important occupation; some replied that the most important thing in the world was science. Others said it was skill in warfare; and others, again, that it was religious worship.

All the answers being different, the King agreed with none of them, and gave the reward to none. But still wishing to find the right answers to his questions, he decided to consult a hermit, widely renowned for his wisdom.

The hermit lived in a wood which he never quitted, and he received none but common folk. So the King put on simple clothes, and before reaching the hermit's cell dismounted from his horse, and, leaving his bodyguard behind, went on alone.

When the King approached, the hermit was digging the ground in front of his hut. Seeing the King, he greeted him and went on digging. The hermit was frail and weak, and each time he stuck his spade into the ground and turned a little earth, he breathed heavily.

The King went up to him and

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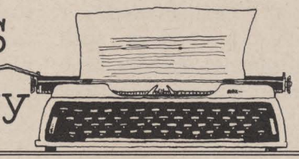
LETTERS from Ellery



Dear Friends:

I think I will tell you about the most interesting person we met on our Florida trip. As a matter of fact we found many interesting persons on the City of Miami train. We traveled in the "Chair Coach." In many ways this is better than to go either in "Pullman" or "Roomette" accomodations. The view of the country is much superior to that afforded by the more shut-in spaces of the other cars. Except for looking ahead it is equal to that of the auto. Then the people in the kind of car we were in appeared more normal and happy. As we walked through the long train to the dining car those in the Pullman looked bored and lonely and the ones in the crowded Roomettes were not the sort of folks I was anxious to talk with and I am certain they wanted nothing to do with me.

In our car the passengers were mostly women and quite a number had children. One young woman with a pretty little girl had come from the far tip of Iowa and was going to St. Petersburg, Florida. It was her second night on the train and the next day she said she rested better in the coach than in the Pullman. She told me she thought sister Olive is "Beautiful."

As we waited for the train in Lakeland a little girl began to ask questions of us. We saw quite a little of her and her mother during the ride to Jacksonville. This was Little Anne. She showed herself to be unusual in many ways. One of the unusual things about her was that she had no arms. She also was unusual in the things she said and the way she said what was on her mind. During the four hours' ride to Jacksonville we formed the opinion she was unusually bright. While waiting in the station in Jacksonville I felt sorry I had not asked the mother more about Little Anne.

So when we took our seats in the Illinois Central car I was surprised and glad to find the little girl and her mother had seats just across the aisle from ours. During the twenty hours until we left the car at Champaign we learned much about this charming little girl.

Anne was born without arms. She wears artificial arms but as yet the means of operating the arms and hands has not been established. They were on the way to Grand Rapids, Mich., where they go every three months to consult with the doctor believed to be the wisest in the country in such cases. I can honestly say that I never before saw a child who is so happy as Anne. I asked her mother if she never was out of sorts. The mother replied "No." Then on second thought she said "Well did you notice late this morning the look on her face and how she drew her lips together?" "She was then tired and at once went to sleep."

I replied "But she did not complain about it."

"No" the mother said. "She never complains."

It seems that Anne did not begin to walk until over two years old. Not having arms to brace and balance with made her cautious. But now she can walk through the swaying car better than normal people can. I never saw a more active child as she amused herself with books, pencils, etc. She colored pictures in the book for that purpose taking the pencil of the desired color from the box and returning it when she wanted a change of color. Not having arms and fingers she of course had to use her

(Continued on next page)

legs and toes. I noticed at once that she was "Left Footed." I never watched a child do such work with normal fingers who was neater or quieter than was Anne.

When tired of coloring she would put away those things and take a book. She could hold a book and turn the leaves just as easily with feet and toes as normal children could do with hands and fingers.

I noticed that Anne can wipe her eye or smooth her hair using her foot as readily as others can do with the hand. Another child gave Anne a piece of candy wrapped tightly with paper and tin foil. Anne took it and unwrapped the candy as neatly as I could have done it with my hands. She passed the pieces of paper as she got it off to her mother to keep from getting the seat littered. She could hand cards or books back over the back of the seat to the one behind as easily as anyone of her size could have done. The only obvious handicap was that when she walked through the car she must put on the shoes. Then those must come off to do the other things.

If you try you will see that you can stretch the thumb until it is about right angles to the fingers. Then the thumb may be bent around against the palm of the hand still about at right angles to the fingers. I noticed that Anne could do that with her great toe. It was evident that her toes were growing longer because of the use she sets them to do. Some years ago I tried to see if I could still as a boy put my big toe in my mouth. Anne can arrange her hair on the back of her head using the bottom of her foot. All these things Anne has learned to do wholly by herself according to her mother. Her mother says that Anne does not seem to realize that she is not like other children. Olive remarked that when she goes to school there may be a problem but the mother replied "I am sure we shall be able to prepare her for that." The mother said the older children in the family go to the Parochial School but that the public school is better prepared to deal with such a special case and Anne will go to the Kindergarten next fall. She might have started last winter but they thought a year and a half was too long a time. Olive says a year is long enough for a child like Anne.

Anne can feed herself as well as a normal child of her age. Her mother brought a paper cup of water and Anne took it and drank without spilling a drop.

Mentally this little girl is very bright. She, all the time while working with pencils, was making comments about the picture. When not talking with someone she was always repeating little poems or children's songs. She was most observant. As an example she noticed me sitting with elbows on the arms of the seat and my hands clasped. At once she asked "Are you saying prayers?"

The mother at once said "Oh he is resting."

But I told Anne that I did say prayers. She quickly remarked "I said prayers last night." Many times after that Anne would look across the aisle and say "Saying your prayers?"

One man passing through the car asked Anne "Won't you come and live with me? I need a little girl like you."

Anne's reply was "Well if that is so why don't you come and live with us?"

Another man in passing greeted Anne. She asked "What's your name?"

"John" he replied.

"John what?" asked Anne.

He gave the last name and said "I have a little granddaughter."

"What does she say? asked Anne.

"She is only ten months old and can't talk" said the man.

"What's the matter with her that she can't talk—doesn't she have a tongue?" came from Anne quick as a flash.

At one time I said something to Anne which evidently pleased her greatly. She came close to me and had she arms I think she would have extended them to me. Instead she leaned against my knee. As I put my hands around her I could feel that the whole upper part of her body was encased. This was the support for the artificial arms. Although the connections are not yet made so Anne can move the arms and fingers of the claw-like looking hands I assume the idea is to have the little girl become familiar with the contraption. In time connections will be made with muscles which will be able to move and control the arms and hands.

Her mother said the doctor is watching the growth of the muscles by X-Rays. He would like to use certain chest muscles but he fears those are in her case too weak to do the service. So others may be called on as Anne becomes older. It is expected that in time She may do things with artificial hands as well as with her feet.

The mother told of other children at the Grand Rapids hospital. She told of one boy who has neither arms nor legs. Still they hope to fix him up. "But in his case his whole body will be encased" said the mother.

We were nearing Champaign when I asked the mother if she had made many trips to Michigan by Illinois Central. She replied this is her first trip from Florida. "The other times I went from Pennsylvania", she said.

I said "I used to live in Wilkes Barre."

"That's where I grew up" she replied.

"I worked for Lehigh Valley Coal Co." I told her.

"My father works for that company" she said.

"But really it was Kingston where I stayed," I remarked.

"My home was in Kingston" came from the mother.

So this seemed to make a new source of interest etween us. I told her I used to be in charge of the electrical equipment in the forty or more mines scattered from near Scranton down to the southern coal region a hundred miles away.

"The Lehigh Valley now has only two mines open" she said.

In reply to my question of what the two are she said "Dorrance and Henry."

She gave me the name and address of her father and I shall write to him for we have two interests in common. Lehigh Valley Coal Co. and more important in a way Little Anne.

Ever since I met her I have been thinking about this little girl. Why should one be born with imperfect body as is hers? Does God allow such cases to demonstrate the remarkable power of adjustment built in the human frame. What may this little girl become as she grows up? May perhaps she be famous as is Helen Keller? At first thought it seems most tragic. Yet little Anne already has a great power to create love and affection. Her case is very different fron that of the boy one of Annie's friends in Lakeland is trying to teach. He has a deficient brain. Although nearly full grown he can still speak only a few words.

It was evident that Anne's mother not only has the greatest love for her little daughter but she is most proud of her. But anyway you look at it it seems very sad.

As I write these lines nearly five days have passed since I said "Good Bye!" to Little Anne. Her mother at that time was becoming tired by travel and was wondering just how she would manage in Chicago. She had hoped to fly from Chicago to Grand Rapids to be there for the ten o'clock appointment the next morning. It would be after eight that evening when the train reached Chicago. The sky had been dark ever since we entered Illinois and much rain was falling.

"I fear the planes will be grounded" said the mother as we talked of the possibilities.

"You may need to go to a hotel for the night" I said.

"It is going to be a problem anyway we work it to be at the hospital for our appointment" she replied.

As I think of Little Anne this Monday morning I think she has had the two days needed with the doctor and that she is now on the way back to her Florida home. I doubt if she has got there yet. But wherever she is I am certain she is happy and is busy with feet and toes working with pencils, books and cards.

If she has become tired I think of her as curled up on a pillow asleep beside her loving mother. And if she is in that position I am sure that she has extended her little foot from under the small blanket which covers her and with that little foot is grasping the hand of her kind mother gaining in this manner a feeling of safety and security.

I wonder if perhaps she is such a happy little girl for one reason because from her entrance into this life she has realized so fully that she is surrounded with Security and Love.

Could you too see Little Anne I am sure you like me would find her most attractive and interesting.

Love to you all from

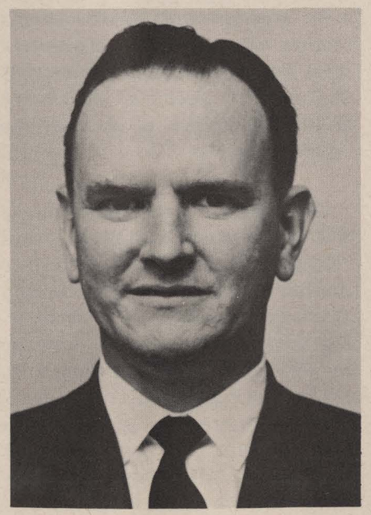
ELLERY B. PAINE
EMINENT MEMBER HKN

1965 NEW OFFICERS

HOWARD H. SHEPPARD

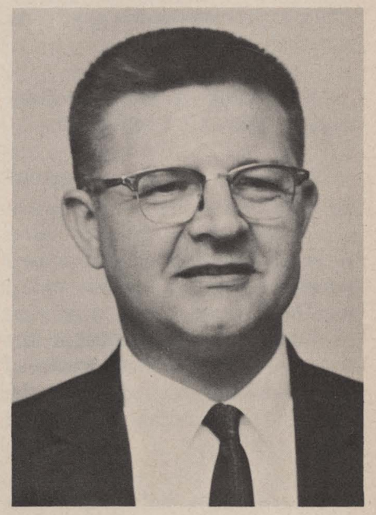
Mr. Howard H. Sheppard of Philadelphia, Pennsylvania, was elected President of Eta Kappa Nu. In his regular employment Mr. Sheppard is Vice-President of Rumsey Electric Company. He is a registered Professional engineer, currently State Director of the Pennsylvania Society of Professional Engineers and formerly President of its Philadelphia chapter. He has served as National Vice-President of the American Institute of Electrical Engineers (now the Institute of Electrical and Electronics Engineers), President of the University of Pennsylvania Engineering Alumni Society and Chairman of the Engineering and Technical Societies Council of the Delaware Valley.

Dr. Clyde M. Hyde of Rochester, Minnesota, was elected Vice-President of Eta Kappa Nu. Dr. Hyde is an Advisory Engineer for the International Business Machines Corporation. He received his Bachelor's and Master's degrees in electrical engineering at Michigan State University and his Ph.D. from Cornell University. Prior to 1964 he was Chairman of the Electrical Engineering Department at the University of Nebraska, and Faculty Advisor of the Nebraska Chapter.



CLYDE M. HYDE

The new National Director for the Western Region is Mr. John Engle, Associate Professor of Electrical Engineering, at the Oregon State University, Corvallis, Oregon. Professor Engle received his Bachelor's, Master's and professional electrical engineering degrees from Oregon



JOHN ENGLE

1966 AND DIRECTORS

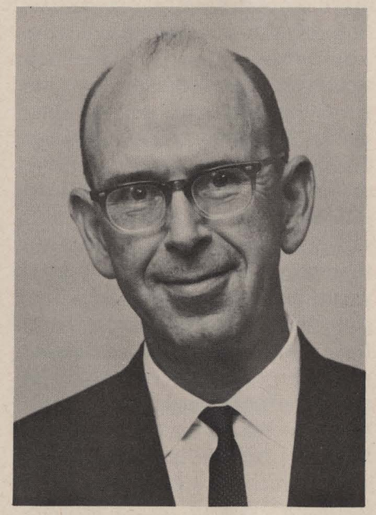
ANTHONY GABRIELLE

Mr. Anthony Gabrielle of New York City was elected National Director for the Eastern Region. Mr. Gabrielle is Assistant Head of the System Operating Division, American Electric Power Corporation. He received his Bachelor's and Master's degrees in electrical engineering from M.I.T. and holds a second Master's degree in Industrial Management from M.I.T. A past president of the New York Alumni Chapter, he has been active in Eta Kappa Nu affairs for many years.

The West Central Region will be well represented by Professor Finley Tatum, Chairman of the Electrical Engineering, Department of Southern Methodist University, Dallas, Texas. Professor Tatum received his Bachelor's and Master's degrees from Columbia University and his Ph.D. from Texas A. & M. University. He is the Faculty Advisor of the Southern Methodist University chapter.

Mr. Jack Farley of Chicago, Illinois, was elected National Director for the East Central Region. Mr. Farley is a Special Services Engineer for the Illinois Bell Telephone Company. He received his Bachelor's degree in Electrical Engineering from the University of Illinois and his Master's degree in business administration from Northwestern University. He is a past president of the Chicago Alumni Chapter and has been chairman of the movie committee for 10 years.

JACK FARLEY



FINLEY TATUM

INVESTING FOR THE FUTURE

By MISS SHIRLEY M. MARCO

BRIDGE Financial Editor

Worrying over the effects of the possible devaluation of the British pound, the side effects of the Medicare Plan or the beneficial aspects of the lifting of the excise taxes are details which will not mean much ten years from now.

There are three long-range certainties that every saver, investor or retirement fund builder should continually keep in mind. They are as follows:

1. *Dynamic growth of the U.S. Economy* — corporations are investing in tomorrow's jobs through research and development.

2. *Decline in the value of the dollar* — ever-growing size of the federal government which brings larger taxes, increased wages and rising prices.

3. *Relative returns on different forms of investments* — yields on common stocks over the years provide a far greater return and serve as the best hedge against creeping inflation.

Miss Shirley M. Marco is an account executive with Goodbody & Co., member firm of the New York Stock Exchange. Her business consists of stocks, bonds and commodities. Miss Marco attended H. Sophie Newcomb College in New Orleans and later was graduated from the University of Illinois with a degree in economics.

If we are to follow a conclusive and sound investment policy, it is best to keep these concepts firmly entrenched and not cloud the issue with superfluous facts.

We find that the Mutual Funds serve a great need to a large portion of the investment community. These funds offer continuous investment selection and supervision by a management company. Their portfolio is widely diversified and thereby reduces the effect of inevitable errors of judgment. They provide a convenience to the fund-holder in that he or she is free to take a vacation, go on business trips and generally attend to their own affairs, while research, selection, purchase and sale of securities are done for them with a nominal advisory fee. This service helps to plan a flexible investment program which would be found exceedingly difficult on an individual basis.

To sail a smooth financial ship takes a sense of balance, (by combining savings, insurance, investable funds) design and determination. Today, people are living longer and retiring earlier. Many people are becoming aware of the opportunities of providing for this retirement through Mutual Funds. The popularity of this "modern method of investing" is best illustrated by the fact that more than 3,500,000 investors now own over $32,000,000,000 worth of mutual fund shares.

The following are probably the most prevalent objections:

1. They cost too much to purchase.

2. I can do better on my own.

3. Performance of most mutual funds was no better than the Dow Jones average.

4. Funds take a high percentage of all dividends received as their fee.

5. I can get 4.5% in savings and loan—and do not have to pay a management fee or acquisition cost—and my money can never drop in amount.

With regard to the prime objection of excessive cost, the question is whether professional management can do more with your initial $1,000.00 in the next 10 to 15 years than you can on your own. No merchandise or service is available without cost. Anything obtained free of charge usually is worth just what it costs—nothing.

Another objection is that this media is felt to be "too slow" and the buyer desires quicker profits. Some traders are successful and lucky. But only a few succeed in making quick and easy profits. A single case of bad judgment often can wipe out a series of small successes. What if something should happen to him? Would his beneficiary be able to assume these responsibilities? No one tries to be his own doctor, lawyer, banker or carry insurance on himself. "Excitement" is a poor excuse for risking money which has been earned. It may be a serious mistake to play with your own future well-being as well as your family's for the sake of excitement.

Many of the Mutual Funds did a whole lot better than the Dow Jones average of thirty industrials in bouncing back from 1962 lows. Some stocks in the average are still selling near their lows.

Management fees generally are based on total value assets (usually ½ of 1%) and in some instances are based on income. The management contracts can be cancelled on not more than sixty days' notice, and they must be approved annually by directors and shareholders. The fund that emphasizes growth strives to keep dividend income at a rock-bottom minimum. The growth fund shareholder here bought this fund just for that explicit purpose of maximum growth and minimum income. The less taxes he has to pay on true income, the better.

The guarantee of a savings and loan is "iffy" at best and the 4.5% rate can be reduced tomorrow. If you need more dollars for current living expenses, there is the systematic cash withdrawal plan: "Check-a-Month" plan. Most investors who want regular monthly checks (which is derived from income and capital) for living expenses are conservative. They are generally older, often living on fixed incomes and, usually, want to avoid excessive risk. The fact that annuities are often used to provide monthly income is evidence of the conservatism. If withdrawal plans are designed primarily for conservative investors, it follows that withdrawal plans should use conservative balanced funds, which contain bonds, preferred and common stocks.

For a stockholder's first investment, he could use whatever amount he wishes to invest right now. Then whenever he wishes

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to invest more, he could simply send a check (usually there is a minimum) to the fund's custodian bank: because all cash distribution would automatically be reinvested, he would not be tempted to spend it. Such a plan would make his future investing very simple.

Investment companies are classified either as "closed-end" or "open-end" (ex. Mutual Funds). Buyers purchase shares from the company at a price which is the net asset value plus a sales charge. The company is required to repurchase shares that any of its shareholders wish to sell at the net asset value at the time of sale. The shareholders of the "open-end" mutual fund always has a ready market at going values for any shares the shareholder wishes to sell.

Shareholders of "closed-end" investment companies buy and sell to and from each other. They do not issue new shares continuously; neither do they redeem shares like the above. The prices for a closed-end investment are determined by the supply and demand for the shares rather than by their liquidating value. Occasionally, these shares will sell at a discount below their net worth based on asset value or possibly at a premium. Mutual Funds net assets have grown considerably in comparison to the closed-end investment companies in recent years.

To redeem the holder's shares for cash, he can either deal through his stock broker or go directly to the Fund. The general procedure of buying shares is to place an order with an authorized securities dealer or representative who forwards it and the money paid to the investment company distributor. A certificate is issued in the name of the buyer for the number of shares purchased and is forwarded to him. The Investment Company Act of 1940 requires payment within not more than seven days after shares are tendered for redemption. Exceptions are provided for when the company can not evaluate its stocks fairly or dispose of them because of emergency conditions; periods when trading on the New York Stock Exchange is restricted or stopped also are expected. Offering prices usually are calculated at prices as of 1:00 p.m. and 4:00 p.m.

There are a wide variety of Mutual Funds:

1. All common stock funds.
2. Balanced Funds which combine common stocks, preferred stocks and bonds.
3. Specialty Funds (ex. Canadian Funds, Regional Funds and Special Industries).
4. All bond funds including types of tax-exempt bond funds.
5. Preferred stock funds (this type is not as conservative as the bond fund, but the income is generally greater).
6. Exchange Funds (whereby large blocks of holdings are exchanged for certificates of this Fund. This enables the larger block shareholder to spread his risk without having to liquidate and obtain a huge tax bill at the same time. By owning shares of the Fund, the shareholder can redeem when he wishes and the tax cost per share will be averaged in with the other shares. These funds establish certain standards and will only accept particular companies providing they meet these requirements.

Shareholders are kept fully informed as to the following:

1. They are advised as to what portion of their income from their Mutual Fund investment is taxable as ordinary income and what portion is taxable as capital gains.
2. They are kept fully advised as to the securities they own, by receiving reports which show how their interests are served.

In order to get the benefit of special tax treatment in any year, a regulated investment company must distribute at least 90% of its ordinary net income. Accordingly, investment companies are not required to pay taxes on their net income if they pay it out to their shareholders in the year it is earned. Such income is taxable to shareholders. Most funds pay out in dividends practically all of their net income. The amount of security profits which is paid out depends whether or not profits or losses are taken within the calendar year. True income is derived from interest and dividends received from the portfolio within the fiscal year.

Mutual Funds are not the media for short term capital appreciation. They are primarily for long term investment growth and retirement income benefits.

Miss Marco will be very happy to answer your questions regarding the securities market. Please address your letters to: BRIDGE of Eta Kappa Nu.

HAWAII VISITATION

By President Howard Sheppard

National President Howard Sheppard was in Hawaii last summer on personal business and used the occasion to visit the HKN chapter at the University of Hawaii.

Dr. Paul C. Yuen
Head of Department of
Electrical Engineering
University of Hawaii

Dear Paul:

I cannot tell you how much I enjoyed my visit to the University of Hawaii on Friday, August 27. I was indeed fortunate that you were able to round up so many members of Eta Kappa Nu as well as the pleasure of meeting your new Dean, Dr. John W. Shupe. I also enjoyed the sightseeing tour that you took me on and in particular the visit to Roundtop with such a beautiful view of Diamond Head and the whole Waikiki area. My new son-in-law has been in the area for over a year and he did not know of this off-the-way spot with its outstanding view, so I had the pleasure of going with him there the last day I was in the area.

On top of all your various kindnesses to me and courtesies I was overwhelmed to come home to my daughter's on Saturday and find the beautiful Antrurium flowers along with the lovely box full of such marvelous orchids. I was able to put plastic around them and get them in the refrigerator before flying back to Philadelphia and when I arrived home they appeared to be in just as fresh condition as when you had them delivered to my daughter's apartment. She too enjoyed them, and wants to extend her thanks as well.

As I mentioned when I had the pleasure of being with you, Hawaii exceeded even my fondest expectations not only the fabulous scenery and equally delightful climate, but in particular I was most impressed with the outgoing friendliness of all the people that I had the pleasure of meeting. I certainly hope that I will have the opportunity of returning to Hawaii, and by the same token if you ever come East and are in the Philadelphia area I would like nothing better to have a chance to reciprocate to some extent for the pleasure that you extended to me.

I was also intrigued with the many wonderful activities of the Delta Omega Chapter and in particular the visits of the Eta Kappa Nu members to the intermediate and high school students wherein your members performed experiments for the benefit of the students and to interest them in electrical engineering as a career.

(Continued on next page)

L to R — Douglas Au, Vice-Pres. HKN ('66); Edwin Yoshizawa ('66) HKN Recording Secty.; Randall Utsumi ('65) HKN Member & Pres. IEEE Student Branch; Dr. Paul C. Yuen, Prof. & Head of Elec. Engrg. Dept. & HKN Faculty Advisor; Howard H. Sheppard, Pres. HKN; Dr. Bertil S. M. Granborg, Prof. of Elec. Engrg. & Member HKN; Stephen Sato ('65) Corr. Secty. - Delta Omega Chapter HKN, Univ. of Hawaii, Keller Hall in background.

HAWAII (from page 21)

I was interested in the fact that your Eta Kappa Nu members earn money by grading papers and that this money is used to assist high school students and university students. You also mentioned the fact that your members put on a TV show at the end of engineer's week last year. This is certainly a most worthwhile and novel idea. Finally, I was intrigued by the fact that you have three (3) young ladies in the electrical engineering class of 1967 and it will be interesting to see if any of them become members of Eta Kappa Nu. I had the pleasure of attending an initiation of the Lambda Chapter at the University of Pennsylvania a few years ago, and they initiated a very attractive and intelligent young lady engineer. I am sure that if this comes to pass that Paul Hudson would appreciate your sending him a photograph for his use in the BRIDGE because I know it would be a big improvement over my photograph and some of the others that have appeared in the past.

Again I congratulate you on having such a fine Chapter and wish you the very best for the future.

Very truly yours,

Howard H. Sheppard,

REAL & IMAGINARY (from page 12)

said: 'I have come to you, wise hermit, to ask you to answer three questions: How can I learn to do the right thing at the right time? Who are the people I most need, and to whom should I, therefore, pay more attention than the rest? And, what affairs are the most important, and need my first attention?'

The hermit listened to the King, but answered nothing. He just spat on his hand and recommenced digging.

'You are tired,' said the King, 'let me take the spade and work awhile for you.'

'Thanks!' said the hermit, and, giving the spade to the King, he sat down on the ground.

When he had dug two beds, the King stopped and repeated his questions. The hermit again gave no answer, but rose, stretched out his hand for the spade, and said:

'Now rest awhile—and let me work a bit.'

But the King did not give him the spade, and continued to dig. One hour passed, and another. The sun began to sink behind the trees, and the King at last stuck the spade into the ground, and said:

'I came to you wise man, for an answer to my questions. If you can give me none, tell me so, and I will return home.'

"Here comes someone running,' said the hermit, 'let us see who it is.'

The King turned round, and saw a bearded man come running out of the wood. The man held his hands pressed against his stomach, and blood was flowing from under them. When he reached the King, he fell fainting on the ground moaning feebly. The King and the hermit unfastened the man's clothing. There was a large wound in his stomach. The King washed it as best he could, and bandaged it with his handkerchief and with a towel the hermit had. But the blood would not stop flowing, and the King again removed the bandage soaked with warm blood, and washed and rebandaged the wound. When at last the blood ceased flowing, the man revived and asked for something to drink. The King brought fresh water and gave it to him. Meanwhile the sun had set, and it had become cool. So the King, with the hermit's help, carried the wounded man into the hut and laid him on the bed. Lying on the bed the man closed his eyes and was quiet; but the King was so tired with his walk and with the work he had done that he crouched down on the threshold, and also fell asleep—so soundly that he slept all through the short summer night. When he awoke in the morning, it was long before he could remember where he was, or who was the strange bearded man lying on the bed and gazing intently at him with shining eyes.

'Forgive me!' said the bearded man in a weak voice, when he saw that the King was awake and was looking at him.

'I do not know you, and have nothing to forgive you for,' said the King.

'You do not know me, but I know you. I am that enemy of yours who swore to revenge himself on you, because you executed his brother and seized his property. I knew you had gone alone to see the hermit, and I resolved to kill you on your way back. But the day passed and you did not return. So I came out from my ambush to find you, and I came upon your bodyguard, and they recognized me, and wounded

(Continued on page 24)

A New World . . .

FOR TRAVELERS

Whether or not man reaches the moon by 1970, travelers here on earth can expect to see a new world of air transportation as we move into the next decade.

Supersonic jet flights may turn intercontinental journeys into routine hops. The French-British Concorde, which Air France has scheduled for passenger service by 1971, will whisk travelers between New York and Paris in two hours and 45 minutes. Within our own country, passenger movement by helicopter will supplant much inter-city automobile travel.

The new Japanese superlimited express train, which turned out to be the fastest thing on wheels at the 1964 Tokyo Olympics, is a preview of what's in store for the 450-mile run between Boston and Washington. A new billion-dollar super-railroad, with trains running at top speeds of 125 mph and possible future speeds of 160 mph, is expected to take the pressure off crowded highways and airways between the two cities. Similar in design to the Japanese model, the new railroad may be in service within a year or two.

In addition, more than 15 American cities will be building new rapid transit systems in the '70's. Washington, Los Angeles, Atlanta, Pittsburgh, Miami, St. Louis, Seattle and Baltimore all plan on beginning construction within the next five years.

Some of the problems being met and overcome in the development of the Concorde supersonic jet challenge the imagination.

At 1400 mph, heat generated in the exterior will climb to about 311° Fahrenheit on the nose needle and leading edges of the wings and tail. (Water, incidentally, boils at 212° F.) But prospective passengers needn't get hot under the collar.

Passenger cabins will be cooled by circulating air discharged around the insulation and between cabin walls and the plane's outside skin. Triple windows, to assure cabin pressurization, will be large anough to give an exciting view of the world below.

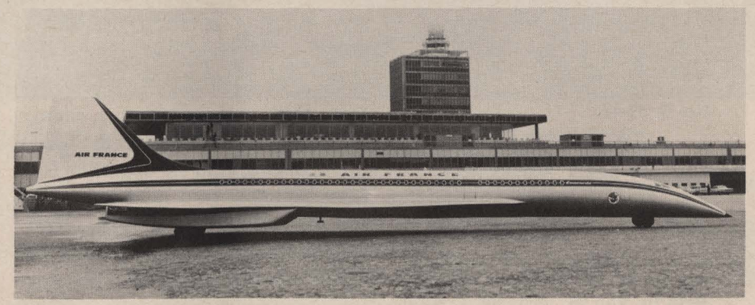
Zipping to Paris in less than three hours is exciting enough, but the excitement really begins once you reach your destination. A $15 billion modernization program, launched a few years ago, promises to enhance the face of Paris by the late '60's.

If you were to arrive tomorrow, you'd find that the City of Light has begun to acquire a brand-new radiance. Hundreds of beloved landmarks and historic buildings, darkened by the passage of time, have been given a thorough scrubbing in a gigantic city-wide cleanup compaign. In the Montparnasse section, famous haunt of artists, Europe's tallest building, a 50-story skyscraper, is near completion.

Other European capitals are also modernizing. Rome is currently in the midst of a building boom; great variety, imagination and color mark the architecture now being planned and executed in the Eternal City.

In London, some of the modernization projects on the drawing boards include: a pedestrian mall above Piccadilly Circus; new government buildings at Whitehall; a "new look" for Knightsbridge and the Albert Embankment; and a 19-story hotel overlooking Hyde Park at Lancaster Gate. Also still in the planning stage is an 18-mile-long tunnel under the English Channel to link Dover and Calais.

Supersonic aircraft, modernized cities, super-railroads, helicopter "commutes," and a tunnel-link between England and France: these are just a few of the exciting developments in store for you in the "super-seventies." Have a pleasant trip!



SUPERSONIC JET IN YOUR FUTURE—Just five years after the introduction of jetliner service, a major travel advance, construction is well underway on the 1,450-m.-p.-h. Concorde supersonic jet. Air France has scheduled opening of service in 1971, and New York-Paris flights will take only 2 hours and 45 minutes, less than half the time of present-day transatlantic jet flight.

GROSS (from page 6)

through seminar lectures given by specialists from these nearby organizations, and by other outside lecturers covering many advanced topics in this field.

REFERENCES

1) Eric T. B. Gross, Efficiency of Thermoelectric Devices, American Journal of Physics, Vol. 29, 1961, 729-731.

2) J. T. Duane, Talk presented on accepting the Eta Kappa Nu Annual Award, The Technology Review, M.I.T.—Cambridge, Vol. 65, 1963, No. 7, May issue, p. 46; Opportunities in Engineering, Bridge of Eta Kappa Nu, Vol. 39, 1963, No. 4, 11-12.

3) M. A. Biot, Science and the Engineer, Applied Mechanics Reviews, Vol. 16, 1963, 9-90; Journal of Engineering Education, Vol. 54, 1964, 169-170.

4) Philip Sporn Foundations of Engineering (book), The Macmillan Co. (for Pergamon Press), 143 pp., New York, N.Y., 1964.

5) A. A. Burr, Problems in Developing a Professional Graduate Program in Engineering, Journal of Engineering Education, Vol. 55, 1965, 287-291.

6) W. A. Lewis, The Importance of Graduate Work in the Power Field, Electrical Engineering, Vol. 70, 1951, 391-393.

7) J. W. Rittenhouse, Engineering Education at a Crossroad, Transactions of the IEEE, Vol. 83, 1964, 817-826.

8) L. O. Barthold and H. G. Pfeiffer, High Voltage Power Transaction, Scientific American, Vol. 210, 1964, No. 5, 39-47.

9) O. E. Sawyer, Meeting the Technical Manpower Requirements for the Operating Technical Utilities, International Convention Record IEEE, Vol. 13, 1965, Part 13, 59-63.

10) H. B. Gotaas, Trends in Engineering Education, The Bent of Tau Beta Pi, Vol. 56, 1965, No. 1, 11-14.

11) W. R. LePage, Theory and Experiment—The False Dichotomy, Electrical Engineering, Vol. 81, 1962, 772-775.

12) R. T. Weil, The Effect of Changing Curricula on Engineering Manpower for the Power Industry, Proceedings of the American Power Conference, Vol. 25, 1963, 116-120.

13) J. R. Pierce, What Are We Doing to Engineering? Science, Vol. 149, 1965, 397-399.

THE OLD PROFESSOR SAYS:
When the world starts grinding on you, you either get smaller or take on a polish, depending on what you are made of.

REAL & IMAGINARY (from page 22)

me. I escaped from them, but should have bled to death had you not dressed my wound. I wished to kill you, and you have saved my life. Now, if I live, and if you wish it, I will serve you as your faithful slave, and will bid my sons do the same. Forgive me!'

The King was very glad to have made peace with his enemy so easily, and to have gained him for a friend, and he not only forgave him but said he would send his servants and his own physician to attend him, and promised to restore his property.

Having taken leave of the wounded man, the King went out into the porch and looked around for the hermit. Before going away he wished once more to beg an answer to the questions he had put. The hermit was outside, on his knees, sowing seeds in the beds that had been dug the day before.

The King approached him, and said:

'For the last time, I pray you to answer my questions, wise man.'

'You have already been answered!' said the hermit still crouching on his legs, and looking up at the King, who stood before him.

'How answered? What do you mean?' asked the King.

'Do you not see,' replied the hermit. 'If you had not pitied my weakness yesterday, and had not dug these beds for me, but had gone your way, that man would have attacked you, and you would have repented of not having stayed with me. So the most important time was when you were digging the beds; and I was the most important man; and to do me good was your most important business. Afterwards, when that man ran to us, the most important time was when you were attending to him, for if you had not bound up his wounds he would have died without having made peace with you. So he was the most important man, and what you did for him was your most important business. Remember then: there is only one time that is important—Now! It is the most important time because it is the only time when we have any power. The most necessary man is he with whom you are, for no man knows whether he will ever have dealings with any one else: and the most important affair is, to do him good, because for that purpose alone was man sent into this life!'

—Tolstoy

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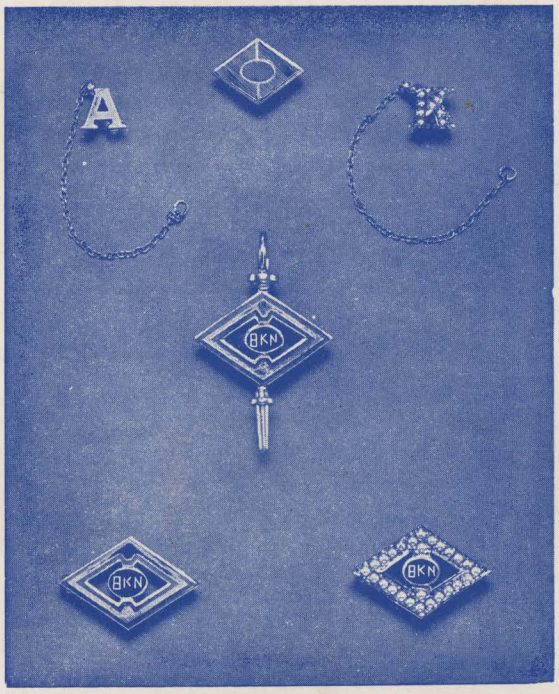

Top to bottom, left to right: Plain Guard, Pledge Button, Crown-Set Pearl Guard, Standard Plain Key; Standard Plain Pin, Crown-Set Pearl Pin.