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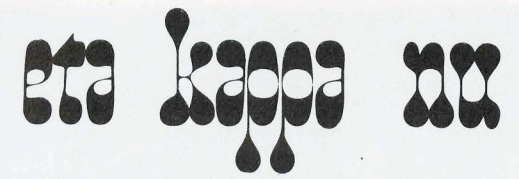
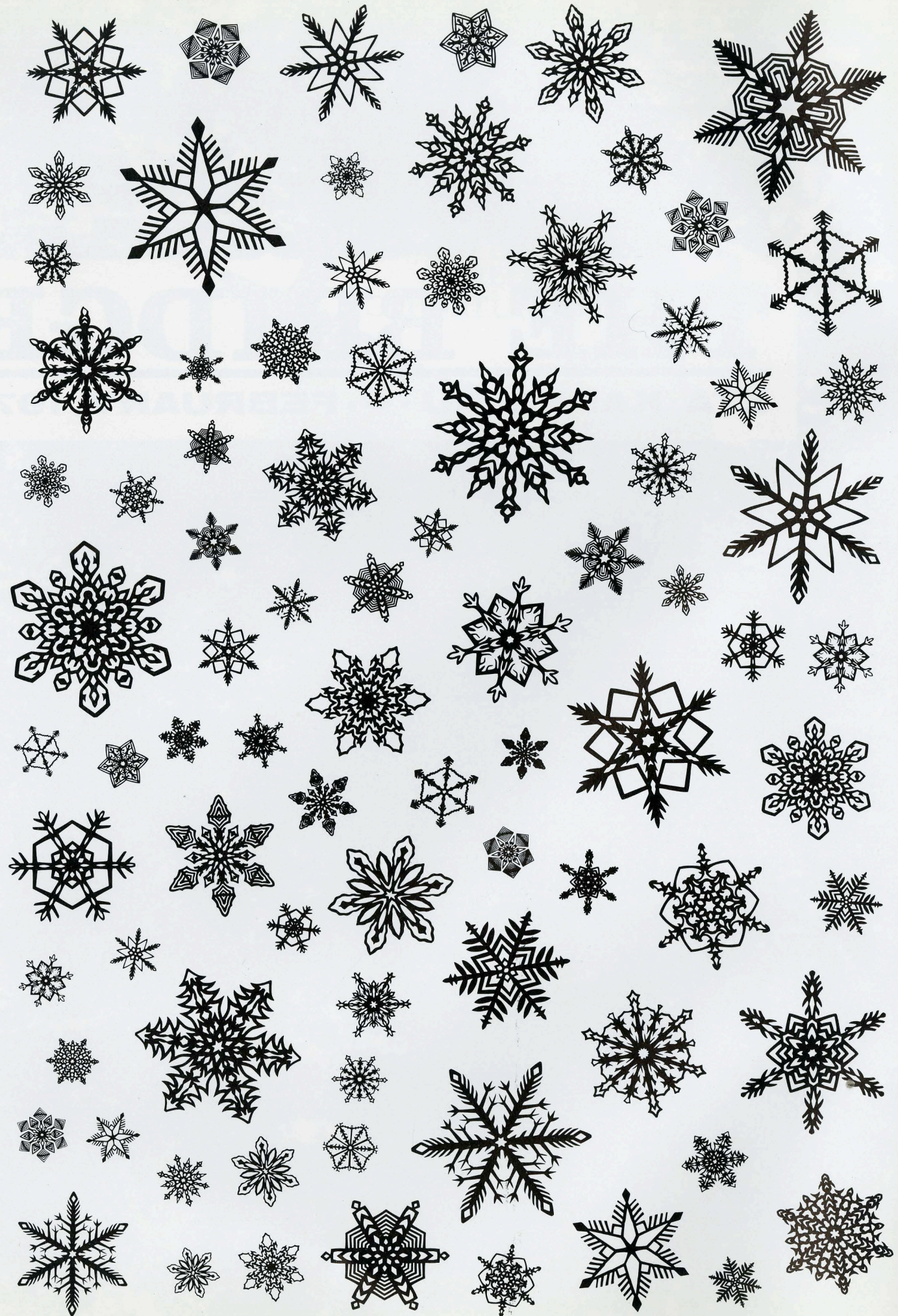
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# THE BRIDGE

ETA KAPPA NU .... FEBRUARY, 1978

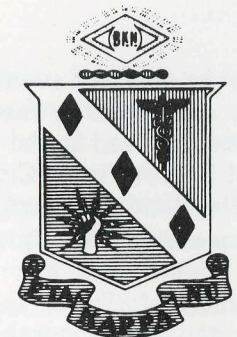




Electrical Engineering Honor Society  
February 1978, Vol. 74, No. 2

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OUR COVER

*Snow, snow, beautiful snow. On the front cover is the real article and on the opposite page the flakes were made with a pair of shears and folded paper. See page 22.*

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# NEW YORK Award Dinner

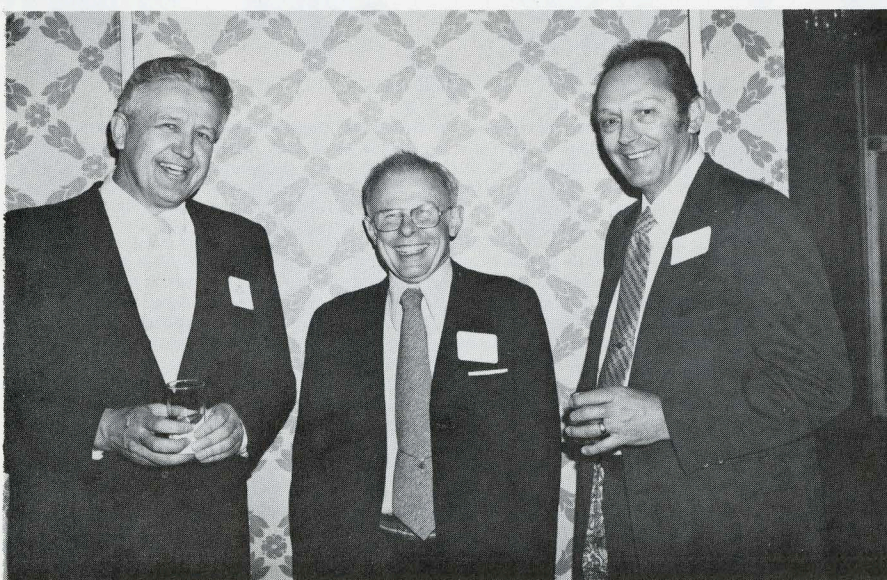
*Photos by Howard Sheppard*



On the pleasant evening of April 18th, one hundred members and guests gathered at the Americana Hotel in New York City to honor the Outstanding Young Electrical Engineers of the United States. The winner was Mr. Clinton S. Hartman of Texas Instruments, Inc., and the Honorable Mention went to Mr. John G. N. Henderson of RCA Laboratories.

Initiated in 1936, the Eta Kappa Nu Recognition was created to "emphasize among electrical engineers that their service to mankind is manifested not only by achievements in purely technical pursuits but in a variety of other ways. It holds that an education based upon the acquisition of technical knowledge and the development of logical methods of thinking should fit the engineer to achieve substantial success in many lines of endeavor."

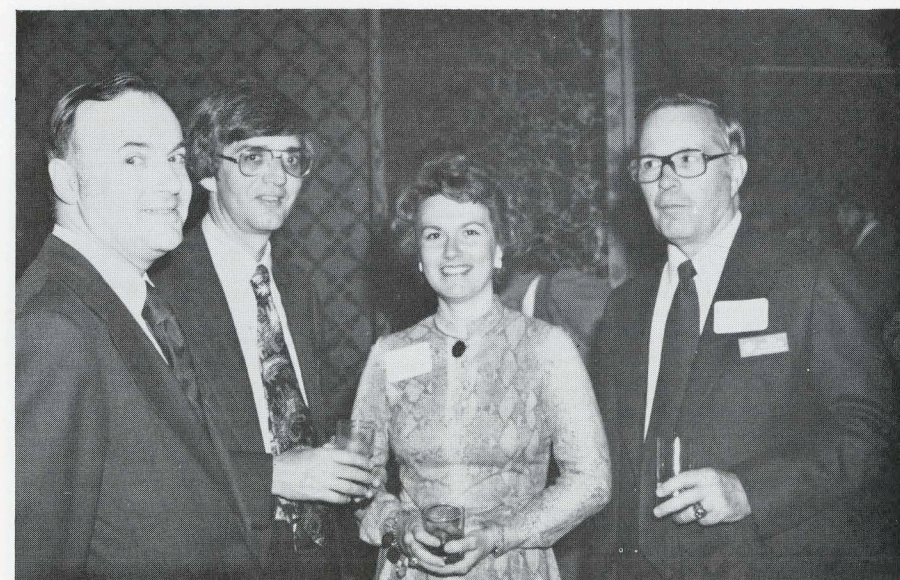
Since 1936, 40 electrical engineers who are less than 35 years of age and who received their baccalaureate degree less than 10 years before have received the award and 91 of similar characteristics received honorable mentions. The award is given on the basis not only of what success the young electrical engineers have had in



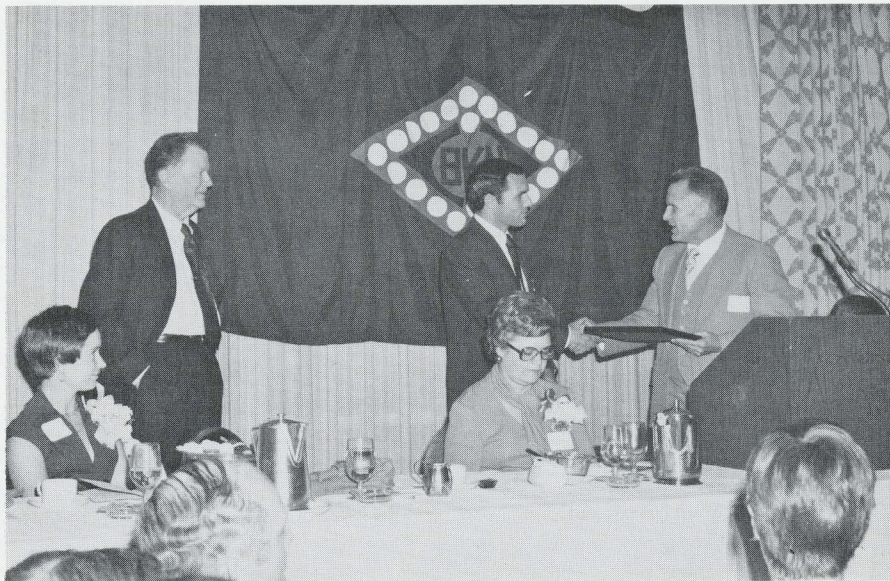
their vocation, but also what they did to broaden themselves culturally and what they have done for others. A review of what these engineers have accomplished since graduation is astonishing.

**Identification of photos:** Opposite page, top to bottom, [1] Family of Winner, L to R, Brother, Father, Mother, Winner and Wife. [2] Group from New Jersey Bell. Tel. [3] Eugene Mleccko, Past President of the Los Angeles Alumni Chapter, William J. Johnson, National Director, Marcus Dodson, National Vice President.

This page, top to bottom, [1] National Director Quayne Gennaro pinning corsage on Mrs. Henderson, wife of the Honorable Mention recipient. [2] Mrs. Hartman, Mother of Winner, pinning corsage on her Daughter-in-Law, Mrs. Clinton S. Hartman, wife of Winner. [3] Donald Christiansen, Chairman of the Award Organization Committee, Dr. and Mrs. R. W. Lucky. Next page, top to bottom, [1] Mrs. Henderson, Dr. S. Reid Warren, Jr., John Henderson receiving Honorable Mention from President Earl Eyman. [2] Dr. and Mrs. Norman G. Einspruch. [3] Texas Instruments Table with Head Table in background.







## DIRECTORY

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# NEW OFFICERS AND DIRECTORS

## MARCUS D. DODSON President

Marcus D. Dodson has been a member of the committee for the selection of the Outstanding Electrical Engineering Student and program chairman for the years 1971, 1972 and 1973. This is administered by the Los Angeles Alumni Chapter of the Eta Kappa Nu Association. He has been active in the Los Angeles Alumni Chapter, having gone through the chairs of office. He was president in 1970.

"Marc" Dodson was born in Kentucky on March 26, 1924 and attended elementary and high school in Kentucky and Georgia. He left the University of Kentucky to serve with the USMC in the Pacific and China. Following WW-II, he returned to the University of Kentucky. He received the B.S. degree in electrical engineering from the University of California, Berkeley in 1951 and the M.S.E.E. degree from the University of Southern California in 1968.

He started his professional career with Lockheed Corp., Burbank, in the development of a cargo plane prototype. He transferred to the Design and Construction Division of the Los Angeles Department of Water and Power. There he has served as a design engineer with the Receiving Station Group, as a field engineer for the construction of steam generation planes and as resident electrical engineer during the construction of Sylmar Converter Station, the southern terminal of the Pacific-Northwest H.V.D.C. Intertie, and for its reconstruction following the 1971 earthquake. He is presently the resident electrical en-

gineer for the construction of Unit III, Scattergood Steam Plant.

He holds registration as a Professional Engineer in the State of California and is a member of IEEE.

## Albert Hauser Vice President

Albert Hauser was born in Alsace, France and was educated at the Strasbourg Gymnasium and at the French Municipal School, majoring in Commerce, Humanities and Languages. He came to the United States in 1923 and became a naturalized citizen in 1930. From 1926 to 1934 Mr. Hauser was a student at the Armour Institute of Technology (now the Illinois Institute of Technology) majoring in Mathematics and Electrical Engineering. He has been a Registered Engineer in the State of Illinois since 1946.

In 1934 Mr. Hauser founded the Electrical Utilities Company which manufactures industrial capacitors. He now serves as Chairman of the Board. From 1962 until 1965 Mr. Hauser was a member of the Board of Directors of the Illinois Manufacturers Association. He is a member of numerous civic organizations.

## Sidney Parker Director

Sydney R. Parker received the B.E.E. degree from the City College of New York and the M.S. and Sc.D. degrees from the Stevens Institute of Technology, Hoboken, New Jersey. His major area of

doctoral study was in Electrical Engineering with a minor in Mathematics.

He served as an officer in the U.S. Army Signal Corps from 1944 through 1946 and attended the Radar Schools at Harvard University and the Massachusetts Institute of Technology. He then taught in the Electrical Engineering Departments of the City College of New York and the Massachusetts Institute of Technology. In 1952 he joined the Advanced Development Group of the Radio Corporation of America where he was a Project Engineer working on the early development of analog and digital electronic computers. In 1956 he rejoined the Department of Electrical Engineering at the City College of New York as an Assistant Professor, leaving in 1965 as an Associate Professor to become Professor of Electrical Engineering at the Cullen College of Engineering, University of Houston, Houston, Texas. In 1966 he joined the faculty of the Naval Postgraduate School in Monterey, California as Professor of Electrical Engineering. In 1970 he was appointed Chairman of the Department of Electrical Engineering at the Naval Postgraduate School, leaving in July 1975 to become Professor of Electrical Engineering and Computer Science as well as Dean of the College of Engineering at Rutgers University, New Brunswick, New Jersey. He returned to the Naval Postgraduate School in July 1976.

Dr. Parker is co-author of a well known textbook, "Principles of Control Systems Engineering" (McGraw Hill 1960) and has published over 50 major technical papers and monographs. His research has been recognized by his

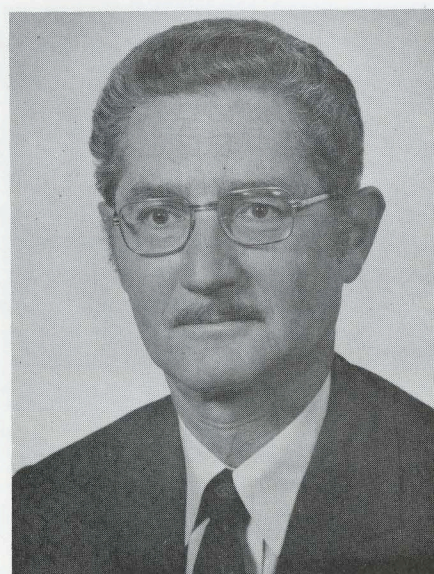




**Marc Dodson**  
President

election as a Fellow of the Institute of Electrical and Electronic Engineers (IEEE) for "contributions to circuit and systems theory". His most recent research interests and publications are in the areas of computer-aided circuit analysis and design, sensitivity studies, and digital (discrete time) filters. He is currently an Associate Editor of the IEEE Transactions on Circuits and Systems. He has also been an Associate Editor for a special issue on Computer Aided Design of the IEEE Transactions on Circuit Theory.

**Sydney Parker**  
Director



Dr. Parker has been a consultant to several publishers and industrial organizations including the McGraw-Hill Book Company, Pergamon Press, the McMillan Company (series editor), North American Rockwell Corporation, Automation Dynamics Corporation, and others. In 1968 he founded the Asilomar Conference on Circuits, Systems, and Computers and directed its activities until 1974. In 1973 he served as Chairman of the IEEE International Symposium on Circuits and Systems.

Dr. Parker has been very active in national professional affairs. He was a member of the Administrative Committee of the IEEE Circuits and Systems Society for several years, served as Vice President of that Society in 1973, and was President in 1974. For the past three years he has been a member of the IEEE Educational Activities Board and served as Chairman of the Short Course Committee and Chairman of the ad hoc Course Quality Assurance Committee. He has also been (1973-74) director of Region IV (Pacific) of the Computers in Education Division of the American Association of Engineering Education (ASEE). He is also a member of the Engineering Education Accreditation Committee of the Engineers Council for Professional Development (ECPD), the national accreditation agency for engineering schools.

**Robert Betten**  
Director

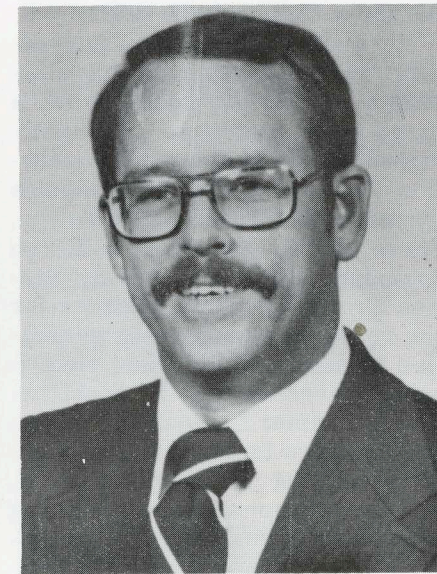


**Albert Hauser**  
Vice-President

**J. Robert Betten**  
Director

J. Robert Betten was born in Omaha, Nebraska on November 10, 1932. He attended public school there and was graduated from Omaha Technical High School in 1950. In 1950 he enrolled at Iowa State University and received the B.S. degree in Electrical Engineering in 1955. From 1955 to 1957 he served as a lieutenant in the Army

**Ronald Phillips**  
Director



Signal Corps teaching radar and anti-aircraft fire control electronics. He worked as an electrical engineer for Convair Aircraft Company in the Advanced Electronics Systems Design Group from 1957 to 1958. He attended graduate school from 1958 until 1962 receiving the M.S. and Ph.D. degrees in Electrical Engineering from Iowa State University in 1959 and 1962 respectively. During the summer of 1960 and 1961 he returned to Convair in San Diego. In the Fall of 1962 he joined the Electrical Engineering Department at the University of Missouri Rolla (UMR) as an Associate Professor. In 1964 he was promoted to the rank of Professor and since 1967 he has served continually as Department Chairman. He is also a consultant to the Oil Industry.

He is a member of HKN, T $\beta$ TT,  $\Sigma\chi$ ,  $\Phi\epsilon\Sigma$ , IEEE and NEC. He has served as president of NEC and on the NEC Board of Directors. He has also held key posts in the Electrical Division of ASEE including the Division Chairmanship.

Dr. Betten is married to the former Connie Jo Moore and they have two daughters: Barbara Jo and Amy Elizabeth who were born in 1962 and 1970 respectively.

**Ronald Phillips**  
Director

Dr. Ronald L. Phillips was born in Phoenix, Arizona, in 1942 and received his early education there. He did all of his university study at Arizona State University. He holds a B.S.E., M.S.E. and the Ph.D in Electrical Engineering. Also, he holds an M.S. in Mathematics.

After he finished his Ph.D. in 1970, he joined the faculty at Florida Technological University as an Assistant Professor in Electrical Engineering, and since 1974 he has served as an Associate Professor on the faculty. Dr. Phillips has spent several summers working for Martin Marietta Aerospace, the U.S. Navy Naval Training Equipment Center, and the U.S. Army

Project Manager-Training Devices. All of his summer work has been concerned with electro-optic devices and communications. He has served as a consultant to General Electric Space Systems, Martin Marietta Aerospace and NASA Kennedy Space Center in the areas of lasers, electro-optics, optical communications, and fiber optics. He is currently serving on the U.S. delegation to NATO for the study of the use of lasers for weapon fire simulation in joint NATO training exercises. His current areas of research are optical fiber communications through turbulent media.

He is a member of the Optical Society of America, Eta Kappa Nu, Sigma Xi, and the IEEE. He is the immediate past president of the Florida Section of the Optical Society of America. He is the faculty advisor of the Zeta Chi Chapter of Eta Kappa Nu which he helped initiate in 1975. His biography is listed in Who's Who In The South And Southwest, American Men and Women of Science, and Personalities of the Southeast. In 1973 he received the FTU Foundation Faculty Development Award, and in 1976 the Walt Disney World Community Service Award.

## CHAPTERS

If your chapter has sent in news that does not appear here, it will be in the next issue. Bridge is always pleased to publish pictures of chapter members and activities.

**ALPHA CHAPTER, University of Illinois** — The 1977 spring semester was full of involvement by the members of Alpha Chapter. The officers: Judi Lifton, President; Steve Vaughn, Vice President; Michael Coffman, Treasurer; Eric Knight, Recording Secretary; and Daniel Asta, Engineering Council Representative coordinated their efforts to serve the members of Alpha.

Participation in the chapter's Professional Engineering Refresher Course was extremely good. This lecture oriented program aided seniors in all areas of Engineering to prepare for the Engineer in Training Exam, the first step in obtaining the certification of Professional Engineer.

Many Electrical Engineering students took advantage of the two chapter sponsored plant trips. Bell Labs in Naperville, Illinois was the site for the first trip. The students and Professor William Albright were presented with an informative program to become familiar with the telephone industry research at Naperville.

Students with an interest in the power field and Professors M. Stanley Helm and Paul Egbert enjoyed the second plant trip to Sargeant & Lundy, Engineers in Chicago, Illinois and the Commonwealth Edison Collins Station Power Plant. Participants learned about the activities of an electric power

consulting firm and toured an operational power plant the same day.

Near the end of the semester, the initiation ceremony took place, adding 41 students and faculty member Professor Paul Coleman to the Alpha Chapter. Following the ceremony, the initiates and many distinguished guests from the Electrical Engineering Department attended a banquet at which awards were presented and an address was given by Dr. M. Krasnow. The Harold L. Olesen Award was received by John Allemong, with Honorable Mentions to Alex Mihalka and William Richards. The Outstanding Senior Award honoring Electrical Engineering seniors for their leadership qualities, participation in activities, and academic excellence was presented to Judi Lifton, Eric Nagel, Robert Schleicher, and James Tendick.

At the final meeting of the semester, the election of officers for the following term was held. They are: Michael Nowak, President; Ronald Meck, Vice President; James Giacobazzi, Treasurer; Keith Fries, Recording Secretary; Nancy Pepper, Corresponding Secretary; and Daniel Asta, Engineering Council Representative. *by Mike Nowak*



# MERRY MOMENTS WITH MARCIA

You can't change the past but you can ruin a perfectly good present by worrying about the future.

\* \* \* \*

Retirement: You get up in the morning with nothing to do, and by nightfall you haven't got it half done.

\* \* \* \*

It's really fantastic how far this credit-card craze has gone. Last night there was a fella who wanted to pay cash and they wouldn't take it — until he showed his BankAmericard as a reference.

\* \* \* \*

She more than kept her girlish figure — she doubled it. A word to the wise is sufficient — if you cheat on a diet — you gain in the end.

\* \* \* \*

Wouldn't it be great if life's problems hit us when we're 18 and know everything?

\* \* \* \*

Rich: About that book I lent you last week....  
Glen: Sorry, I just lent it to a friend. Did you want it back?  
Rich: Not for myself, but the guy I borrowed it from says the owner is looking for it.

Gas prices are so high, when I pulled into a station this morning and asked for a dollar's worth ... the attendant dabbed some behind my ears.

\* \* \* \*

Wife: "I'm happy to see that the neighbors finally returned our lawn mower before they moved. They certainly had it long enough."

Husband: "Our lawn mower? I just bought it at the garage sale they're having."

\* \* \* \*

Wife showing husband her new, expensive fur coat: "One just can't help feeling sorry for the poor thing that was skinned for this."

Husband: "I appreciate your sympathy, dear."

\* \* \* \*

A winning Bet — The worker said: "Boss, I betcha I can wheel something across the street in this wheelbarrow that you can't wheel back."

"I can wheel anything you can," shot back the boss. "I'll take \$5 of that bet!"

"Okay," replied the worker, "hop in!"

\* \* \* \*

Customer: If it only costs \$15.00 to make these watches, and you sell them for \$15.00, where does your profit come in?

Shopkeeper: That comes from repairing them.

\* \* \* \*

The young lady eyed her escort with great disapproval. "That's the fourth time you've gone back for more ice cream and cake, Harold," she said acidly. "Doesn't it embarrass you at all?"

"Why should it?" the hungry fellow shrugged. "I keep telling them I'm getting it for you."

\* \* \* \*

Father: "Well, son, how are your school grades?"

Son: "They're under water."

Father: "What do you mean, under water?"

Son: "Below 'C' level."

\* \* \* \*

by Marcia Peterman

New Chapter At...

# FAIRLEIGH DICKINSON

On Friday evening, April 22nd, twenty-two Fairleigh Dickinson University students and faculty members were inducted into Eta Kappa Nu Association in the auditorium of Robison Hall. The group, organized in 1976, was awarded an official charter by Ms. Quayne Golden Gennaro, Director, and thereby became the Theta Gamma Chapter. New members are: Dr. Martin Brin, Dr. Gloria B. Reinish, Dr. William Schick, Mr. Alan S. Rosenthal, Salman Y. Abbasi, John J. Blyskal, Roy Bustillo, David J. Fulton, Alex Matusevich, Robert C. Seay, Aaron S. Waitz, Susan Bristol, Dudleigh C. Fong, William T. Fullam, Michael T. Harm, Anthony L. LoPresto, Mozafar Rafizadeh, Joseph A. Skrzypczak, Alvin J. Walter, Arthur J. Wilton, Robert J. Esposito, and Michael Steinmetz. The induction was led by Ms. Gennaro. Participating also were Theresa Vega, Dwight Morss, Robert Bagienski, Joseph Drabic and Raymond Johnson. Following the ceremony, refresh-



ments were served. A word of appreciation from all in attendance to Linus Rogers and Joseph Drabic, the Ad Hoc Committee, responsible for all arrangements. Their efforts produced a memorable evening.

Identification - Above, Dr. Martin Brin presents a plaque to Theresa Vega in appreciation of her efforts in the founding of Theta Gamma Chapter. Left, Michael J. Steinmetz, Inductee, receiving congratulations from Ms. Gennaro. Looking on are Dwight Morss and Joseph Drabic.



# A FIRESIDE CHAT with Leon Zelby

## GOOD TEACHING



### Introduction

The spreading practice of using assessments of good teaching in the merit considerations of instructors, assessments as perceived by the students on an end-of-semester basis, coupled with open admissions have had a major, not yet fully appreciated, impact on education. The hypothesis developed here contends that these two factors, not unlike several other innovations in education, may have produced desirable results in the short term and under conditions of limited experience confined to selected groups of subjects and experimenters; but because of the rapid and wide acceptance, these factors in fact have a detrimental impact on learning in the long-term. The implication of this hypothesis is that the effect on education in the customary meaning of the word (2) may be so adverse, that either the utilization of the two factors will have to be substantially modified, or education redefined.

Many new trends have been appearing at various educational levels during the last few decades, e.g. case studies substituted for usual classroom experiences, open classrooms, programmed instruc-

tion, performance contracting, and the like. Some of the innovations were developed spontaneously through experiments by educators; some, through development and application of different teaching aids; and some, in response to real or imagined needs of the growing student population and social pressures for more schooling time culminating in various post-secondary degrees. Most, if not all, of these innovations have consistently, with great vigor, laid claims to greater successes than other, long established, methods. This proselytizing, in turn, led to the rapid acceptance of many of the innovations even though the long-term successes of those methods with many different groups of students have not yet been established. On the contrary, a number of concerns about the merits of some of the methods have begun to be voiced lately. For instance, over grade inflation (3,4), declining educational skills (5,6,7), and levels of mastery (8). In addition, critiques of several innovations (9,10) have been receiving greater public and professional attention than ever before. Not surprisingly, the specific critiques have been addressed usually to primary and secondary education because college entrance examinations and post-secondary educational studies provide some sort of measure of skills acquired at the primary and secondary levels. Skills acquired at college levels are not so easily measured, particularly after graduation, except when

studies are continued in graduate schools. This, however, cannot be considered typical because of the relatively strict graduate admission requirements.

It is precisely because of the difficulty in assessing accurately the changes in the quality of post-secondary education that innovations at university levels need be tested more extensively, both for the short- and long-term effects, before they are generally accepted. Furthermore, the complexity of our society and of our institutions precludes a valid analysis of an impact of one isolated factor, a factor whose effects cannot in reality be isolated. Consequently, it would be inappropriate to consider separately the effects of each, open admissions or student-faculty evaluations, by itself. Rather, the effect of both must be considered not only jointly but also in the presence of other influences. Inasmuch as many of the other influences are here considered substantially less important than the effect of coupling open admissions with student-faculty evaluations, they are less emphasized — even if at all mentioned — in this paper.

### Education — A Definition

To bring the basis of the hypothesis into perspective, it would be desirable to review the definition of education, and some of its main constituents. One such definition was mentioned before (2); another, from one of the very prestigious

dictionaries is (11): "The systematic instruction, schooling or training given to the young in preparation for the work of life; by extension, similar instruction or training obtained in adult age..." The common point of these definitions is that education represents preparation. This preparation takes the form of compressing experience, compressing it in time in an attempt to prevent as well as to avoid unnecessary mistakes by virtue of analyzing and reviewing recorded experiences of others, an aspect of education recognized at least 400 years ago: "Learning teacheth more in one yeare than experience in twentie..." (12)"

The way education compresses experience is twofold: one, by information storage and retrieval; the other, by the development of several open-ended skills. The information storage and retrieval constituent involves essentially memorization of a modicum of definitions, facts, beliefs, etc., as well as probable location of information sources. This constituent is usually common to both education and training, and relies primarily on the development of ability to memorize and to duplicate familiar situations.

The other constituent of education involves the development of several open-ended skills that lead to competence in handling and analyzing unfamiliar and complex situations; in extrapolating, projecting and synthesizing available information into new, or merely different, more accurate more descriptive, more aesthetic arrangements. The development of these skills involves the development of the ability to locate, sort out, analyze and evaluate information in conformance with accepted standards; ability to correlate the different fragments of information into a reasonably consistent aggregate, which may lead to better understanding or appreciation of the aggregate or its components; and the ability to communicate both the process and the results in a clear, logical, preferably concise, fashion.

It is the development of these skills that constitutes the main difference between education and training, because the latter is con-

cerned primarily with the development of proficiency in coping successfully with well established activities and situations; whereas the former is concerned with the development of proficiency in coping successfully with novel situations. And inasmuch as education requires more intensive and more rigorous mental processes than training, it calls for very intensive cerebral activity by the participants, students and faculty alike, activity whose results cannot be measured so readily as those of training.

### Open Admissions and Teacher Evaluations

Undoubtedly, some of the motives behind the concept of open admissions were laudable. To many prospective students, that meant a second choice, another opportunity to obtain a better education as well as a degree. To some, however, this simply represented an opportunity to obtain a degree or some other credentials by spending more years in an educational institution. Public sentiments, used to equating greater quantity with better quality, contributed to the pressures for extending the years of schooling, converting college education "from a prerogative into a duty, somewhere between unintelligible, boring and onerous (13)." Prolongation of schooling, clearly not synonymous with improvement, required on appropriate expansion of facilities and of staffs which, once established, had to be maintained if not increased as a sign of health by the conventionally accepted economic standards. This meant that enrollment levels had to be at least maintained. As a result, "freedom from flunking" became part of open admissions at CCNY and at other colleges requirements were consistently reduced (14), with eventual reduction of standards expected (15). However, neither the freedom from flunking, nor relaxed requirements, nor modified standards sufficed to make college experience adequately attractive to those who were enrolled against their desires and sometimes against their will (16). It then became necessary to make the so-

journal in the university less demanding, more pleasant, even entertaining.

To that purpose, it seemed appropriate to increase student involvement not only in the administrative structure of the university and its governance but also in the assessment of teaching effectiveness through student-faculty evaluations. Ostensibly, the purpose of this evaluation was to help improve instruction, and had it been used that way, it probably could have had a beneficial impact on the process of education. As a matter of fact, a number of schools have been using such evaluations for years to help instructors improve their teaching techniques. It is often the case, however, that what is potentially good it also has a potential for bad. The apparent objectivity and readily quantifiable results, as well as expectations of instant improvement of instruction by putting "teeth" in the evaluation process, seemed useful for merit consideration. This use of the evaluation began to destroy its potential benefits. This is because the practice of using such evaluations in merit consideration coupled with the need to maintain enrollment levels, began to serve not to improve instruction but to make it easy, attractive, and entertaining. The reason for this is that less demanding (17), and more entertaining forms of instruction, even if devoid of content (18), receive better evaluations. Relaxed grading standards also meet with greater student approbation (19).

### Discussion

It seems to me that if one believes that open admissions and the use of student-faculty evaluations in merit considerations will tend to improve education, then one must also subscribe to the following: a. most of the students are diligent and interested in their studies; b. the students are competent to discern effective teaching on the basis of a semester exposure to an instructor (i.e. for a typical three credit course, on the basis of less than 40 hours of con-

Leon W. Zelby

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Norman, Oklahoma



tact — 50 minutes x 3 times/week x 15 weeks = 37.5 hrs); and c. teachers do not have enough sense or intelligence to follow the prescription for "good" teaching, i.e. to obtain positive responses to a given set of questions. This, in itself, would not be bad provided the questionnaire was such as to elicit positive results, and provided the students were indeed perceptive and knowledgeable enough to discern effective teaching. Unfortunately, what constitutes effective teaching has not yet been really established according to some reputable writers (20), with others contending that instructors may improve their ratings without actually improving their teachings (21).

There is no question that there are bad teachers, just as it is true that there are bad students. Inasmuch as the numbers of both have grown, one needs to expect more of each kind in each category. The issue, however, is whether student-evaluations are accurate, and whether the use of such evaluations will in fact improve teaching and education. The reported results of studies are inconclusive, controversial, and often more emotional than factual. First, some confuse education with training and point with pride to selected results obtained with programmed instruction, experiential learning, case studies, computer assisted instructions, and other innovative methods. Some educators expect people to "learn to think as an accidental by-product of playing (22)," which may be suitable for pre-schoolers, or at elementary levels, but it is not at all obvious that it is either desirable or suitable at post-secondary levels.

What is particularly distressing in teacher-effectiveness evaluation is that it is almost entirely dependent upon student input. In the absence of classroom visitations by peers, the instructor's effectiveness is determined only by student inputs through different channels: horizontal, when the student shares his views about an instructor with friends, colleagues, and associates; and vertical, when the student and his colleagues

share their views with other teachers, departmental chairmen, and deans. All these views, essentially from one source, ultimately participate in the evaluation process, having arrived there through various routes and after much filtering and modifications unavoidable in such a word-of-mouth process whether formalized along the way or not. It requires but little common sense to realize the detrimental effect of such a process even if sanctified by a computer printout, and it takes little imagination to envision the corruption of the teaching function that may follow the use of student evaluations in merit considerations (23).

In view of this, it is necessary to reevaluate the aims of education, as well as the process. With growth of the universities, both seem to have changed in some respect: the long accepted aims of education do not now seem to represent the aims of the students or administrators. Students seem primarily interested in their degrees, their diplomas or certificates that presumably serve to smooth the path to satisfactory employment, the good life; administrators seem primarily interested in maintaining or increasing the levels of economic, budgetary factors, in administering for administering sake rather than for the purpose of facilitating and improving the process of education (24).

### Conclusions

The introduction of open admissions increased the student body, many of whom enter the role reluctantly. This increase of enrollment led to the increase of facilities and staffs. Introduction of student-faculty evaluations into merit consideration confused "good" teaching with "popular" teaching. "Men are made wiser through educations (25)," a process that need not be objectionable, but one that cannot be always either easy or entertaining (26).

As a result, this new method of determination of what constitutes good teaching relaxed the demands in the teaching-learning environment, an effect whose impact may not necessarily be noticed im-

mediately. It took several generations of students to reveal to the public deficiencies in reading (8) and mathematics (9) competencies, and other educational skills (5) to the point that competency examinations are considered and instituted (8). (It took 30 years to find that irradiation for medical purposes increased the incidence of cancer of the thyroid.) It may again take several generations of students to reveal the adverse impact of open admissions and the use of student-faculty evaluations in merit considerations.

Education represents a resource which is produced by the compression of experience in time. Its intrinsic, though impalpable, value depends upon its density, that is on what and how much was compressed and how well it was packed. Its concrete value can be ascertained in two ways: one, by an assay of a sample, by an analysis. This requires an expert. The only other way one can determine the quality of education is by its utilization, and that usually takes place after graduation.

This view of education is not consistent with the effect caused by the continued use of the main factors here discussed: that of dilution of the resource. Consequently, either the use of these factors needs modification, or education requires a redefinition.

### Acknowledgements

I should like to thank my colleagues, W. T. Cronenwett, C. R. Haden, and G. Tuma, for comments and reviews of earlier drafts of this paper.

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## 11

## CHAPTERS

**LAMBDA CHAPTER, University of Pennsylvania** — The Lambda Chapter of Eta Kappa Nu at the University of Pennsylvania has been relatively inactive in the past few years, but under the leadership of President Paul M. Chau, the chapter has been revitalized and has become very active. In the past year there has been an increase in the quantity as well as quality of activities. Besides regular HKN functions, the Lambda Chapter has worked with other engineering student societies in various affairs and projects. The goal of the past year's officers has been not only to make the Chapter active again, but also interactive with other societies, thus greater serving all the students of the College of Engineering and Applied Science (CEAS).

The past year's HKN functions included: a tutoring service for engineering students; a smoker for new HKN members; an elaborate initiation ceremony; and a banquet for all HKN members, faculty, administrators and alumni. (Several of the Alumni were members of the Philadelphia HKN Alumni Association. Amongst them was Howard Shepard, the Photography Editor of the HKN Bridge Magazine.) The number of new initiates was the largest in recent years. In addition to student initiates, there were eight professional initiates. This reestablished a tradition that has had a lapse of over a decade.

The Chapter has also been a vigorous participant with other engineering societies in sponsoring a variety of activities for engineering students. As one of the societies in the Engineering Student Activities Council (ESAC), it aids in the bi-annual evaluation of courses and advisors in CEAS. In conjunction with the Moore School Council, another ESAC society, it cosponsored a CEAS Disco Party. Another function was a Canoe Trip on the upper stretches of the Delaware River jointly sponsored by the Chapter and the Student Branch of the

IEEE. With the Hexagon Senior Society, the Chapter cosponsored a Senior Graduation Dinner Party and a field trip to the Theodore Roosevelt Opera Company. These were the highlights of the many activities the Lambda Chapter conducted during the past year.

The key to the interaction of the Chapter with other societies was due to the extensive involvement of HKN members in other activities. For example, the Treasurer of the Chapter, Wayne Tracton, was also the President of the Student Branch of the IEEE. William Kerns, the Chapter's Secretary, was very active as the President of the Moore School Council. The President of the Chapter, Paul M. Chau, kept himself busy by being the Chairman of ESAC and the Business Manager of the *Pennsylvania Triangle* (The Engineering and Science Magazine of Penn, which in addition to publishing, cosponsored a talk by the noted sci-fi writer, Issac Asimov).

The 1977-78 year promises to be another active year for the Lambda Chapter. Like his predecessors, President-elect Timothy J. Webb is also involved in many other engineering student societies. He will be the Chairman of ESAC, Editor-in-Chief of the *Pennsylvania Triangle*, and a participant in a host of other activities. As the former President, I wish him, the Chapter, and the newly appointed Faculty Advisor, Dr. Mark Chang, the best of luck in the coming year. I shall be looking forward to reading of their accomplishments and activities in the Bridge of Eta Kappa Nu. *by Paul M. Chau*

**NU CHAPTER, Iowa State University** — Nu Chapter at Iowa State University filled the 1976-77 academic year with a variety of activities. Twenty-nine new HKN members were initiated fall quarter. Prospective candidates were sent a letter describing HKN. Those showing interest then met with active members over free pizza to discuss membership in Nu Chapter. This meeting was followed by the pledge week which was culminated by the initiation ceremony.

For Engineer's Week at Iowa State, members of Nu Chapter built a digital clock. Fall also marked the publication of the first of four articles in the Iowa Engineer entitled "Hobby Circuits". This series, authored by HKN members, was directed at non-EE readers who wished to have some fun with simple electronic circuits. Nu Chapter also sponsored a talk by Roger Fisher, manager of microprocessor design engineering for Texas Instruments in Houston. Mr. Fisher spoke on the design and



production of microprocessors and described the type of people needed in this rapidly expanding field.

Among the most gratifying of the year's activities was the donation of a student-built electronic tic-tac-toe game to the Woodward State Mental Hospital. We have since received a letter inviting members to make a formal presentation next year, and we hope to present another game at that time.

Spring brought the election of new officers who subsequently initiated sixteen more qualified students. All of these initiates and many of our other members took part in Veisha, Iowa State's spring celebration run entirely by students. Among the electrical engineering projects viewed by the public was a citizen's band antenna display developed by Joe Henschel, former Nu Chapter president. Curious C.B. operators saw how antenna placement on their car affected the reception pattern.

To increase the awareness of new students concerning HKN, a short presentation was made to freshman electrical engineering students which described the opportunities available to Eta Kappa Nu members. Finally, to top off the year, Nu Chapter held its annual HKN student-faculty picnic. Members and E.E. faculty enjoyed an outdoor cookout which included softball, volleyball and plenty of free food and drink. *by David Ellenberger*

**OMICRON CHAPTER, University of Minnesota** — In the Fall and Spring initiations, 10 and 11 new members respectively were initiated into Eta Kappa Nu. During both the quarters a dinner party was held at the home of Chapter Advisor, Professor Fred Waltz for new initiates, old members and guests.

During the year, Mr. Rolf Iverson, a senior in the Electrical Engineering Department was nominated for the Alton B. Zerby Outstanding Student Award. Also, Dr. Mostafa Kaveh, an Assistant Professor in the department was nominated for the C. Holmes Mac Donald award for distinguished achievement in teaching.

During the spring quarter the senior electives seminar was held giving an opportunity for seniors to listen to Professors explain the elective courses available in the department. The annual spring picnic was held on June 4 for Electrical Engineering students, faculty, staff and guests. The picnic which was arranged jointly by the Omicron Chapter of HKN and the student chapter of IEEE was attended by about 125 people. Fortunately, it didn't rain during the picnic even though the weather forecast called for it.

Elections were held to elect new Chapter Officers for the year 1977-78. The new officers are: President, Jeffrey Haley; Vice President, James Frame; Treasurer, Bartley Johnson; Recording

Secretary, Deborah Marshik; Corresponding Secretary, Jennifer Wolgram; BRIDGE Correspondent, Jerald Burmester. *by B. R. Suresh*

**DELTA GAMMA CHAPTER, Louisiana Tech University** — The Delta Gamma chapter at Louisiana Tech recently held its spring smoker and elected three new members. At initiation ceremonies in May, these three were taken into membership, along with one other candidate who was elected at the fall smoker.

Delta Gamma chapter recently chose Steve O'Bannon as the outstanding sophomore electrical engineering student at Tech. Steve is the beginning

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## ALUMNI

Dr. Kerns H. Powers (PSI 1951) was appointed staff vice president, communications research, at RCA Laboratories, RCA David Sarnoff Research Center in Princeton, New Jersey.

Dr. Powers received B.S. and M.S. degrees in Electrical Engineering from the University of Texas in 1951 and his SC.D. degree from MIT in 1956. He joined RCA Laboratories in 1951 but from 1953 to 1955 worked at MIT under an Industrial Research Fellowship with the team that constructed the first cesium beam atomic clock.

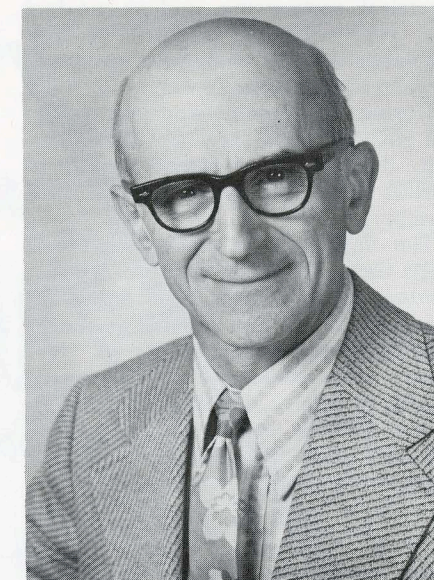
After receiving his doctorate from MIT, he returned to RCA Laboratories in 1956 to pursue his work in communication theory. In 1967, Dr. Powers received the Navy's Forty-one for Freedom Award for his work on a low frequency radio system. In 1966, he was appointed director of the communications research laboratory, the position he held until being named staff vice president.

Dr. Powers is a Fellow of the Institute of Electrical and Electronics Engineers and a member of Eta Kappa Nu, Tau Beta Pi and Sigma Xi. He has served on several government committees concerned with satellite and terrestrial communications. The author of a number of papers on communication theory, Dr. Powers holds six U.S. Patents.

## Words Of The Wise

### A Book Review

BY BERT SHEFFIELD



When woman's place was still generally in the home or in the classroom, Frances Perkins became the first woman to hold a cabinet post in the United States Government. Her appointment, made by President F. D. Roosevelt, was controversial from the first, but she served for twelve years, longer than any other secretary.

Biographer George Martin portrays the remarkable cabinet career of this vivacious and pious lady with skill and sensitivity. In a detailed flashback he also covers her training and her colorful background in labor relations.

She accepted the cabinet position with honest hesitation and repeatedly suggested others for the post. At Roosevelt's insistence she finally accepted, with the condition that he agree to her pursuing "certain programs". These included federal aid to the states for direct unemployment relief; prohibition of child labor; some laws on maximum hours and minimum wages; unemployment insurance and old age pension; reorganization of the Bureau of Labor Statistics; reform of the Bureau of Immigration.

From day one in her cabinet position she displayed her determination to run a tight ship. She directed her uncooperative prede-

cessor to vacate her new office at once, and promptly fired a civil service group which had preyed on immigrants. After the firing she surprised the group and their boss after hours as they attempted to clear out their files "of personal items". She said "These files can't be personal... anything personal must be in your desks and not in the files". She directed them to leave at once, without taking anything. They could return the next day to request any specific personal items from her assistant. While a grim and husky operator held the elevator door they reluctantly filed out.

There was much apprehension to the appointment of a woman by those who did not know her. After her first cabinet meeting, Vice President Garner was asked by his wife "What kind of woman is she?" "I guess she's all right," he had said. "She didn't interrupt. She didn't butt in. She didn't ask any questions. She kept still until the President asked her what she had to say. Then she said it. She said it loud enough so I could hear. She said it plain and distinct. She said it short. When she was through, she stopped. I guess she's all right."

Miss Perkins was Secretary of Labor from 1933 to 1945. After

several successful terms of office she attempted to resign, but President Roosevelt would not hear of it. After his death even President Truman retained her initially, but finally accepted her resignation. She was a staunch admirer of FDR and wrote the well-known *The Roosevelt I Knew*, the first biography of FDR and considered one of the finest.

At age seventy-three she began a new career — lecturer on "The Labor Movement During the New Deal". As a result of her wisdom and popularity, Cornell University kept renewing her contract. She became the first invited lady guest at Cornell's exclusive Tellurite Association. Interestingly, this thrifty lady accumulated a capital worth \$100,000 — all amassed after she was sixty-five.

The biography, 490 pages long, reveals the human, and sometimes not so human, aspects of public life, methods of making decisions without coercion, the frustrations, the pressures and the sacrifices. Biographer George Martin appears to have done a thorough research job. Each of the 36 chapters is amply annotated and referenced, there are two appendices, a seemingly exhaustive bibliography. To this reviewer *Madam Secretary — Frances Perkins* was an inspiring reading experience and is highly recommended.

National Director Quayne Gennaro tries out a gift presented to her at the Initiation Banquet of City College of New York.





electrical engineering student we feel best represents the qualities of high scholastic ability, character, personality, and a willingness to work.

During Engineer's Week activities, the HKN entry in the "Mr. Tech" contest, Jim Holeman, placed second to IEEE's entry, Bill Robertson (also HKN member).

The final activity of the year was Delta Gamma's spring barbeque. Overlooking an area lake, HKN members enjoyed steak, a return performance by juggling fiend (first runner-up "Mr. Tech") Jim Holeman, a very short speech by faculty advisor Prof. Richard Steere ("thank you"), and, of course, the very best of company. *by Gerald Page*

**DELTA ETA CHAPTER, University of Massachusetts** — To begin with, the officers for the Spring semester are: David Ferguson, president; Frank Engstrom, vice president; James Leiser, secretary; Dale Labossiere, treasurer and David Kulig, corresponding secretary. Also, since our previous advisor Professor Hutchinson has been made Dean of the U. Mass. Graduate School, an election was held and Professor Ting-Wei Tang was chosen as our new advisor.

A final note on chapter activities is that the chapter is organizing and sponsoring a monthly student-faculty lunch. This luncheon is open to all students of electrical engineering and faculty in the department. *by David M. Kulig*

**DELTA EPSILON CHAPTER, Ohio University** — On January 19 and April 21, 1977, two very fruitful student faculty dialogues were sponsored by the Delta Epsilon Chapter of HKN. These sessions were a means through which important and pressing topics were discussed between the O.U.E.E. faculty and EE students.

The dialogues were well attended and have been very popular with both faculty and students. One of the many topics discussed was the possibility of having student members on EE departmental committees. As a direct result, HKN members were assigned the responsibility of electing student nominees to these departmental committees. The following students were elected:

Bill Dill, Lab Committee; Lee Blake, Curriculum Committee; Dennis Seipel, Library Committee; Randy King, Research Committee.

Another event was the recognition of the outstanding sophomore. This award was presented to Joseph C. Sligo for his

achievements. Engineers' Day was planned for January 28, 1977; this was later cancelled because of a blizzard.

As always, tutoring services were made available by HKN for sophomore and junior level courses.

During the year several fund raising schemes were undertaken to bolster our sagging treasury. The first, and what appears to be the best, was the idea of designing a T-shirt transfer which would encompass all the engineering disciplines at Ohio University. Several designs were proposed by the HKN members, with the final design being modern computer style lettering. The transfers did not arrive until two weeks before summer break, but the emblem became an instant success with all engineering students on campus. The transfer is worn with pride by many students and will be seen in the hometowns of students over the summer break.

Additional efforts to raise funds came from recycling IBM cards. These cards were collected from various locations on campus.

A spring banquet and initiation was held May 6, 1977, for new initiates. Then, on May 12, 1977, election of officers was conducted. Persons elected for the coming year were: Sam Benson-haver, president; Gerald DeChant, vice-president; Joe Longworth, treasurer; Chinh Hoang, recording secretary; Jeff Cox, corresponding secretary; Patrick Morrissey, Bridge correspondent; and Brian Manhire, faculty advisor.

To finish off a very busy and very difficult year, the department had its annual EE picnic, with all the warm beer you could drink! Potato salad, cole slaw and baked beans were eaten within minutes, but you could still have all the rare hamburgers you could eat—served up with a smile by Professor Chen. In all respects, it really was a nice way to finish up a great year. *by Patrick Morrissey* see opposite page.

**DELTA THETA, Pratt Institute** — Last semester we began our activities with a Resume-Interview Workshop. The workshop was organized to aid students in improving their resumes and interview techniques. We invited personnel from Carrier and General Electric to come and advise us in these techniques. A photograph along with details of this event have been sent to headquarters.

Our next activity was a Thanksgiving Dinner, sponsored by the Chapter. With the aid of a few food science students, we prepared turkey and other food to serve the entire student body.

This dinner was a big success and was enjoyed by all.

Another of our semester activities was a Christmas party for the children at Cumberland Children's Hospital. This has been a traditional event sponsored by the Chapter each year. We gathered toys and candy from donations of local stores and corporations and presented them at the party. Photographs were also taken at this event and will be sent when processed. Our initiation dinner turned out to be a success also.

This semester's activities have been very fulfilling for the Chapter and we look forward to many more. *by Maurice L. Cottman*

**DELTA THETA, Pratt Institute** — The Delta Theta chapter at Pratt Institute visited the children's section of Cumberland Hospital on April 5 for our annual Easter Party. At the party, Easter baskets of candy were given to the children. The candy was distributed by one of our members suited in a bunny outfit. The bunny outfit gave the event a real touch of warmth.

Student initiation and banquet were both held on May 6, at our school facility. Our dinner was held along with Tau Beta Pi and Pi Tau Sigma chapters at Pratt. Our guest speakers were Joseph McCabe, member A.S.M.E., and Larry Hollender, executive vice president of Tau Beta Pi. Our dinner was a big success. *by Maurice Cottman*

**EPSILON OMICRON, University of Delaware** — The 1976-1977 year was a busy year for the Epsilon Omicron Chapter here at the University of Delaware. In the spring of '76 nineteen new brothers were inducted into Eta Kappa Nu. This was the largest number for quite a while, reflecting the increasing enrollment in engineering here. The new officers were elected immediately following the initiation ceremonies.

Beginning last fall, various field trips, lectures, and workshops were cosponsored by the members of Eta Kappa Nu and IEEE. The most popular of which included a trip to Bell Labs and a calculator workshop. We are presently engaged in the planning for this spring's initiation. Thirteen new candidates have been selected, two of which are faculty members who have recently joined the university.

Several projects that members of HKN are working on include; the modification of a Xerox Telecopier into a computer driven graphics device, a "scratch pad" random access memory for graphic use, and various devices dealing with laser projection and communication. *by Walter E. Willing*

**ZETA BETA CHAPTER, Texas A&I University** — The Zeta Beta Chapter at Texas A&I University in Kingsville, Texas recently concluded an eventful and enjoyable semester.

The beginning of the semester found us searching for a new advisor due to the departure of Dr. Donald Todd. We were very fortunate to have Prof. Homi Gorakhpurwalla and Dr. T. Joe Boehm accept the position as joint advisors.

Our officers this semester were Mike Smith, President; Doug Jackson, Vice President; Reymundo Ybarra, Secretary-Treasurer; and Keith Pollock, Corresponding Secretary.

The main event of the semester was the initiation of 6 new members. One of the initiates, Carol Bishop, became the first female member since the formation of the chapter at Texas A&I University. The initiation was followed by a banquet at the Round Table Inn. Mr. Van Hilliard Jr., Gulf Coast District Manager of Central Power and Light was our guest speaker. He gave an interesting talk entitled "Doing My Thing."

Awards were presented to Philip C. Wottrich, outstanding sophomore; and to Yu Ping Wing, outstanding freshman.

The election of new officers for the fall semester was also conducted in our closing meeting. The new officers are Keith Pollock, President; Doug Jackson, Vice-President; Juan Carmona, Secretary; Robert Neatherlin, Treasurer; and Reymundo Ybarra, Corresponding Secretary. *by Reymundo Ybarra*

**Zeta Beta, Texas A. & I. Initiates** — Seated from left to right are, George Allen Erchinger, Carol Ann Bishop, and John R. Volkman. Standing from left to right are, Jose Luis Moreno, Eliazar Perez, and Dwight N. Michalk.



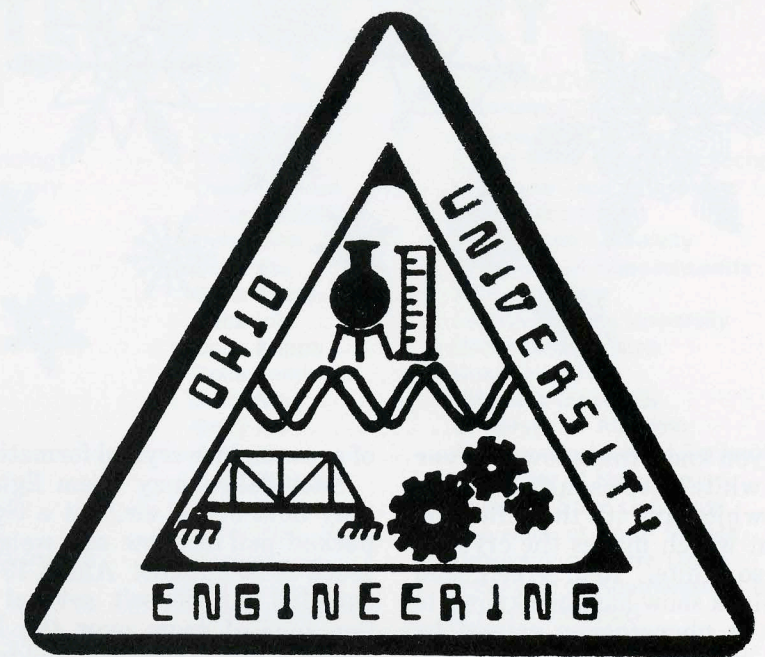
If at first you don't succeed, try looking in the wastebasket for the directions.

Conscience is a quiet inner voice which warns you that somebody may be looking.

Golfer: "Notice any improvement since last year?"

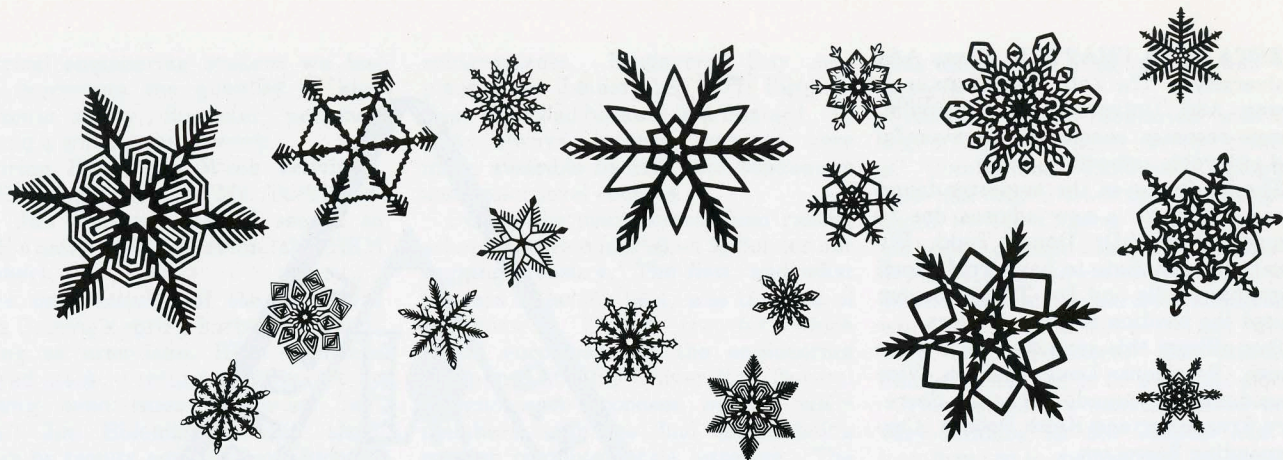
Caddy: "Polished your clubs, didn't you?"

Worry is like a rocking chair. It gives you something to do but it doesn't get you any place.



**OHIO UNIVERSITY  
ENGINEERING**





Did you know that snow is **never** really white? It's usually colorless or off-white, and it's the reflection of light which makes the crystals seem so white. Red, green, and even black snow has been known to fall — a phenomenon caused by fungi or dust particles around which the snowflakes have formed.

Snow results when water vapor in the atmosphere freezes and forms crystals around a central core, such as a particle of dust. The structure of snowflakes is one of great complexity, variety and beauty. A snowflake can be composed of one or a cluster of hundreds of crystals. The designs are branched and usually six-sided, although some with three sides have been recorded.

While the first snowflake drawing was made as early as 1555 by Archbishop Glaus Magnus of Uppsala, Sweden, the real pioneer in the field was Wilson A. Bentley of Jericho, Vermont, who in a period of 50 years made over 6,000 plates

of snow and ice crystal formations!

Snowflakes may **seem** light as they float in the air, but a tightly packed pile of snow can weigh as much as 50 pounds! And a 10-inch snowfall can deposit several million tons of snow over the land. Silver Lake, Colorado, holds the record for the most snow in one day — 76 inches back in 1921; the heaviest annual snowfall was 1,000 inches at Paradise Ranger Station at Mt. Ranier in Washington.

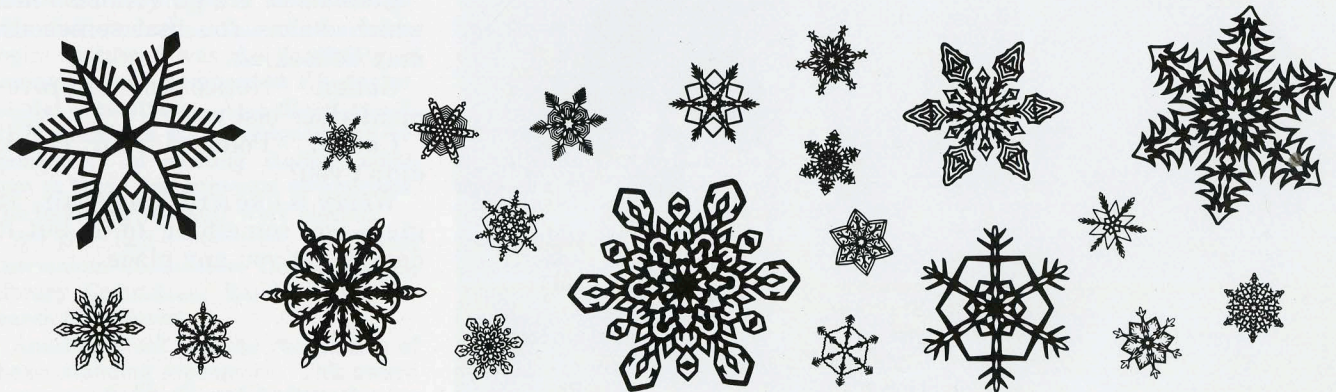
While you may agree that snow can be a poetic, inspiring sight, it often creates a nuisance by choking driveways and walks, and ties up traffic on busy city streets.

In the what-to-do-about-it department, the first snow-melting apparatus was patented by a New York City man in 1869. The device separated a mass of snow into flakes and then melted them. Today, though, an individual has available to him an easy, quick way of melting snow and ice. Solvay calcium chloride melts snow and ice at temperatures of 40° below zero, and does the job seven times

faster than rock salt! Many communities are also making their streets and highways safer in winter through the use of calcium chloride in bulk form, which costs only pennies a pound.

Snow has been a subject not only of practical concern but of literary expression as well. The fairy tale, "The Snow Queen," by Hans Christian Andersen has delighted children of all ages around the world. In contemporary literature, Ernest Hemingway wrote the famous story, "The Snows of Kilimanjaro," and one of Robert Frost's best-known works is "Stopping by Woods on a Snowy Evening." Many literary critics agree that "Snowbound" was John Greenleaf Whittier's finest poem.

Snow caters to the farmer as well as to the author. In certain areas of the country where winters are severe, snow blankets dormant vegetation with an insulating layer which protects it against the fatal cold. This snow "blanket" works to retain the heat rising from the warm layers of earth below.



## CHAPTER DIRECTORY

Alpha .....	University of Illinois	Gamma Psi .....	Lafayette College
Beta .....	Purdue University	Gamma Omega .....	Mississippi State University
Gamma .....	Ohio State University	Delta Alpha .....	Wayne State University
Delta .....	Illinois Institute of Technology	Delta Beta .....	Lamar State College of Technology
Epsilon .....	Pennsylvania State University	Delta Gamma .....	Louisiana Tech. University
Zeta .....	Case West. Reserve U.	Delta Epsilon .....	Ohio University
Theta .....	University of Wisconsin	Delta Zeta .....	Washington University
Iota .....	University of Missouri	Delta Eta .....	University of Massachusetts
Kappa .....	Cornell University	Delta Theta .....	Pratt Institute
Lambda .....	University of Pennsylvania	Delta Iota .....	Louisiana State University
Mu .....	University of California-Berkeley	Delta Kappa .....	University of Maine
Nu .....	Iowa State University	Delta Lambda .....	Duke University
Xi .....	Auburn University	Delta Mu .....	Villanova University
Omicron .....	University of Minnesota	Delta Nu .....	University of Alabama
Pi .....	Oregon State University	Delta Xi .....	Air Force Institute of Technology
Rho .....	University of Colorado	Delta Omicron .....	University of New Mexico
Sigma .....	Carnegie Mellon University	Delta Pi .....	Colorado State University
Tau .....	University of Cincinnati	Delta Rho .....	University of North Dakota
Upsilon .....	University of Southern California	Delta Sigma .....	University of Notre Dame
Phi .....	Union College	Delta Tau .....	University of Southwestern Louisiana
Chi .....	Lehigh University	Delta Upsilon .....	Bradley University
Psi .....	University of Texas-Austin	Delta Phi .....	University of South Carolina
Omega .....	Oklahoma State University	Delta Chi .....	Cooper Union
Beta Alpha .....	Drexel University	Delta Omega .....	University of Hawaii
Beta Gamma .....	Michigan Tech. University	Epsilon Alpha .....	Cleveland State University
Beta Delta .....	University of Pittsburgh	Epsilon Beta .....	Arizona State University
Beta Epsilon .....	University of Michigan	Epsilon Gamma .....	University of Toledo
Beta Eta .....	North Carolina State University	Epsilon Delta .....	Tufts University
Beta Theta .....	Massachusetts Institute of Technology	Epsilon Epsilon .....	University of Houston
Beta Iota .....	State University of Iowa	Epsilon Zeta .....	Lowell Technological Institute
Beta Kappa .....	Kansas State University	Epsilon Eta .....	Rose Hulman Institute
Beta Lambda .....	Virginia Polytechnic Institute	Epsilon Theta .....	California State-Long Beach
Beta Mu .....	Georgia Institute of Technology	Epsilon Iota .....	San Jose State University
Beta Nu .....	Rensselaer Polytechnic Institute	Epsilon Kappa .....	University of Miami
Beta Xi .....	University of Oklahoma	Epsilon Lambda .....	Vanderbilt University
Beta Omicron .....	Marquette University	Epsilon Mu .....	University of Texas-Arlington
Beta Pi .....	City College of New York	Epsilon Nu .....	California State-Los Angeles
Beta Rho .....	West Virginia University	Epsilon Xi .....	Wichita State University
Beta Sigma .....	University of Detroit	Epsilon Omicron .....	University of Delaware
Beta Tau .....	Northwestern Technological Institute	Epsilon Pi .....	Princeton University
Beta Upsilon .....	University of Kentucky	Epsilon Rho .....	Tennessee Tech. University
Beta Phi .....	University of Tennessee	Epsilon Sigma .....	University of Florida
Beta Chi .....	South Dakota School of Mines	Epsilon Tau .....	University of Cal.-Santa Barbara
Beta Psi .....	University of Nebraska	Epsilon Upsilon .....	Tuskegee Institute
Beta Omega .....	University of Connecticut	Epsilon Phi .....	Calif. Poly. State University
Gamma Alpha .....	Manhattan College	Epsilon Chi .....	University of Louisville
Gamma Beta .....	Northeastern University	Epsilon Psi .....	University of Santa Clara
Gamma Gamma .....	Clarkson College	Epsilon Omega .....	University of Mississippi
Gamma Delta .....	Worcester Polytechnic Institute	Zeta Alpha .....	Monmouth College
Gamma Epsilon .....	Rutgers University	Zeta Beta .....	Texas A. & I. University
Gamma Zeta .....	Michigan State University	Zeta Gamma .....	University of Rhode Island
Gamma Eta .....	Syracuse University	Zeta Delta .....	University of Texas-El Paso
Gamma Theta .....	University of Missouri-Rolla	Zeta Epsilon .....	Florida Institute of Technology
Gamma Iota .....	University of Kansas	Zeta Zeta .....	University of Akron
Gamma Kappa .....	Newark College of Engineering	Zeta Eta .....	Brigham Young University
Gamma Lambda .....	Columbia University	Zeta Theta .....	California State Poly College
Gamma Mu .....	Texas A & M	Zeta Iota .....	Clemson University
Gamma Nu .....	Texas Technological College	Zeta Kappa .....	Tennessee State University
Gamma Xi .....	University of Maryland	Zeta Lambda .....	Prairie View A & M College
Gamma Omicron .....	Southern Methodist University	Zeta Mu .....	Northrup Inst. of Tech.
Gamma Pi .....	University of Virginia	Zeta Nu .....	University of Tulsa
Gamma Rho .....	South Dakota State University	Zeta Xi .....	S. E. Massachusetts
Gamma Sigma .....	University of Utah	Zeta Omicron .....	W. VA. Inst. of Tech.
Gamma Tau .....	North Dakota State University	Zeta Pi .....	S. U. of N. Y. Buffalo
Gamma Upsilon .....	John Hopkins University	Zeta Rho .....	University of New Haven
Gamma Phi .....	University of Arkansas	Zeta Sigma .....	Polytech. Inst. of N. Y.
Gamma Chi .....	New Mexico State University	Zeta Tau .....	San Diego State Univ.

Continued



Zeta Upsilon ..... Old Dominion University  
Zeta Phi ..... Tri State University  
Zeta Chi ..... Florida Tech. Univ.  
Zeta Psi ..... Southern University  
Zeta Omega ..... Univ. of Cal.-Irvine  
Theta Alpha ..... Tulane University  
Theta Beta ..... Univ. of Portland  
Theta Gamma ..... Fairleigh Dickinson U.

## INVITATION

*The Eta Kappa Nu Award Dinner in honor of the Outstanding Young Electrical Engineers of the United States will be held this year on Monday January 30th, 1978, at the Statler Hilton Hotel in New York City. All Eta Kappa Nu members and guests are invited. For tickets please contact Mr. Albert Fakheri, American Electric Power Co., 2 Broadway, New York, New York, 10004. Phone 212-422-4800 Extension 563.*