Journal of Tau Alpha Pi

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Journal of Tau Alpha Pi

Executive Director/Secretary
Editor Frederick J. Berger

Tau Alpha Pi journal is the official publication of Tau Alpha Pi, National Honor Society of Engineering Technologies. Write Professor Frederick J. Berger (Executive Director), Editor, P.O. Box 266, Riverdale, New York 10471. The opinions expressed are those of contributors and do not necessarily reflect those of the editorial staff of Tau Alpha Pi.

Statement from the
Executive Director-Secretary

A year passed quickly, especially when viewed in retrospect, and the time has come for the publication of the Tau Alpha Pi annual Journal. Copies of this publication are sent to all Tau Alpha Pi chapters. As always, I find my position as editor to be most rewarding, for it affords the opportunity to communicate with chapter members and share with them chapter news, items of concern to engineering technology, and, of course, appropriate scholarly developments.

Communication through the Journal is essential. Since Tau Alpha P1 chapters are not centralized, virtually the only single published document to reach all is the Journal. It is, therefore, necessary and important for each chapter to forward news of particular activities, dates of events, planned projects, and names of officers. The publication of such information not only extends merited recognition to a chapter, but permits other chapters to learn what is happening in Tau Alpha Pi. I look forward to hearing from all Tau Alpha Pi affiliates.

Chapter news and articles to be considered for publication should reach me no later than June 15 in order to be editorially reviewed. Requests for certificates, keys, and organizational information should be forwarded sufficiently in advance so that I may have two weeks to prepare and mail materials. Correspondence should be sent to me at P.O. Box 266, Riverdale, New York 10471.

In the writing of this column I again mention that Tau Alpha P1 is the national honor society for the engineering technologies, extending honor and recognition to the highest 4% of the total engineering-technology enrollment. Election to Tau Alpha P1 is the highest honor that can be bestowed on engineering-technology students. I emphasize that Tau Alpha Pi is a national honor society, not a club or a professional society that one joins at will. Membership in Tau Alpha Pi should be included in resumes and records of achievement.

The primary purpose of Tau Alpha Pi is not, however, ceremonial. It is to encourage, inspire, and recognize excellence in scholarship, character, and qualities of leadership. To accomplish this objective effectively, Tau Alpha Pi must be made visible. I have previously indicated ways of promoting visibility: the large replica of the key on campus, the emblem as a plaque mounted in the technology building, bulletin boards and display cases devoted toTau Alpha P1 activities, and the wearing of the pendant by the four initiating officers during induction ceremonies and als&during the commencement procession over academic attire by members who purchase it. In addition, I strongly recommend that each chapter have its own stationery, printed ocally and bearing both chapter and university designations. Appropriate stationery is fitting to an honor society, and it advances the

society's visibility as well.

With regard to the emblem, my column in the 1984 Journal illustrated the plaque prepared byTheta Beta chapter of Old Dominion University from the emblem on the cover of the Lournal. Through the courtesy of Theta Beta, I have a pattern of this plaque. Those chapters seeking information in the planning of such project should forward inquiries to me.

Similarly, work is now in progress on a print for the pattern of the large key. Professor Bruce Harding and Professor Robert English of Pi Alpha chapter (Purdue University, West Lafayette) have undertaken this task. As soon as the pattern is completed, it will become available from my office for other chapters to use.

The number of chapters of Tau Alpha P1 continues to grow. During 1984-1 985 five chapters were chartered: Delta Epsilon (Central New England College), Nu Gamma (DeVry Institute of Technology, Lombard, III.), Nu Epsilon (Illinois Valley Community College), Omega Beta (University of New Mexico), Alpha Michigan (Lake Superior State College). I welcome these chapters and thank them for inviting me to their chartering ceremonies. In two instances a conflict in schedule prevented my presence. I want to thank Dr. Dimitrios Kyriazopoulos of Nu Delta for ably representing me at the chartering of Nu Gamma, and Dr. Michael F. Kavanaugh for ably representing me at the chartering of Alpha Michigan. At this point, I should remind newly established chapters to identify alumni who may be considered for Tau Alpha Pi membership.

During the 1984-1985 year I had the pleasure also to be present and deliver the keynote address at the initiation ceremonies of Beta Delta (Bronx Community College) and Beta Gamma (Queensborough Community College).

One of my most pleasant duties as executive director is the bestowing of meritorious service awards on individuals who have contributed significantly to Tau Alpha Pi. It was my privilege on May31, 1985 to grant such award to Professor Jacob Wiren (Delta Beta), who served his university for thirty-eight years and supported Delta Beta since its founding in 1976; and on July 9, 1985 to Professor Merwin L. Weed (Iota Beta), who cast seventeen emblems--one for each campus of Pennsylvania State University--and has served as adviser to Iota Beta at McKeesport campus.

During the course of a year changes occur among advisers. To those who have served devotedly and have left their positions, I express thanks and appreciation: Professor Robert Ward (Epsilon Beta), Dr. Kuan-Chong Ting (Zeta Alpha), Professor J.E. Turner (Zeta Beta), Professor Bryant Boyd (Lambda Gamma). Dr. Richard Roberds (Mu Beta), Dr. RobertC.Thornton (Xi Beta), ProfessorMaryAnneWright(Pi Alpha), Professor H.J. Bestervelt (Rho Gamma), Professor Henry D. Davison (Sigma Gamma), Professor Kenneth G. Merkel (Phi Alpha), and

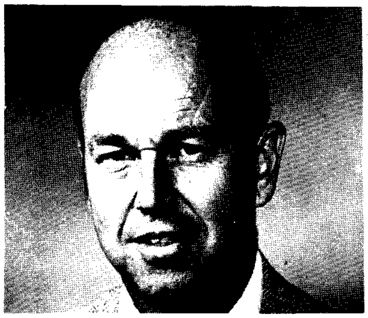
To those who have accepted the role of adviser; I send greetings and thanks: Professor Franz Monssen, Professor Gaetano A. Giudici, and Dean Russell K. Hotzler (Beta Gamma); Professor Stella Lawrence, Professor Herbert Tyson, and Dr. Manuel Stillerman (Beta Delta); Professor Eric W. Hansberry (Delta Beta); Professors Lenine Consalves and Fryderyk E. Gorzyca (Delta Delta); Professor Terence Freeman (Epsilon Beta); Professor Ronald C. Par~ (Zeta Alpha); Dr. Michael Parten (Zeta Delta); Professor Carole M. Lundeberg (Lambda Gamma); Professor Ralph Bailey (Lambda Delta); Professor Ronald J. Kopczyk (Mu Beta); Professors Timothy N. Capagna, Martin F. Ehrenberg, Leonard J. Gels, and Steve Waterman (Nu Gamma); Professors Ralph H. Preiser and John Murphy (Nu Epsilon); Professor Peter Giambalvo (Xi Delta); Professor Gerald Lewis (Omicron Beta); Professor F.W. Emshousen (Pi Alpha); Professor Richard E. Pfile (Pi Beta); Professor Ray L. Sisson, Dr. Frank Chen, and Professor Ward L.
Holderness (Rho Beta); Professor Brad Jenkins (Sigma Gamma); Professor Gordon Nelson (Upsilon Beta); ProfessorJohn M. Bonsell (Phi Alpha); Professorjoseph Moore (ChiAlpha); Professors Neal F.Jackson, Leslie W. Carlson, Robert L. Douglas, Leon E. Drovin, and Morris R. Gabriel (Psi Alpha); Professors Rhonda Hill, Dave Knott, Stanley L. Love, and Richard H. Williams (Omega Beta); Professors William Clark and Harvey L. Robinson (Beta Alabama); Professor Lawrence Mayan (Alpha Delaware); Professor Frederick J. Hoppe (Alpha Kansas); Professors Alex Bartus and Mohammed H. Hosni (Gamma Louisiana); Dr. Michael F. Kavanaugh and Professor Dimitri Diliani (Alpha Michigan); Professor Robert A. Strangeway (Alpha Wisconsin).

To those advisers who continue to serve I express thanks and appreciation. Among these, to Dr. Lilian Gottesman I express thanks also for ably assisting in the preparation of this Journal.

To those students who during the year wrote to thank me for my assistance or to share with me what Tau Alpha P1 means to them, I express gratitude. Such letters have been numerous, to~ numerous to cite. One, for example, contained the following last paragraph: “I would also like to express that serving as president of Beta Gamma chapter was definitely an enriching experience due to the interaction with all facultyand student members involved. Most important of all, it gave me the experience of quality leadership.”

To two members of Tau Alpha Pi who most recently have been recipients of the coveted James H. McGraw Award I offer my congratulations. I note with pride that in 1984 the award winner was Dr. Stephen R. Cheshier, President of Southern Technical Institute; in 1985, Professor James P. Todd, Chief Administrative Officer of Westland College, Clovis, California. Perhaps a word about the McGraw Award is in order. The award was established in 1950 by the McGraw-Hill Book Company in honor of James H. McGraw, who laid the foundation of the

largest industrial publishing organization. The purpose of the award is to recognize outstanding service in engineering-technology education.



Professor James P. Todd Dr. Stephen R. Cheshier

Students are, of course, graduated and become alumni of their respective institutions. Tau Alpha Pi should, therefore, maintain an updated roster of alumni members. More than just keeping rosters, chapters should organize their alumni members in structured local units or "alumnus chapters." Alumni can contribute meaning fully both financially and as resource persons in the job market. My impression is that not enough has been done by most chapters to keep an active and contributing alumni membership.

Scholarship, character, and leadership are referred to repeatedly in Tau Alpha Pi. Excellence in scholarship, nobility of character, and qualities of leadership are not only eligibility requirements for election to Tau Alpha P1. They remain the goals which members continuously strive to attain and maintain. They are what may be called nobility of ascent to becoming a better person and making a better world. Perhaps never before has there been so much scholarship to master. Hardly ever before ha~ there been such crying need for outstanding leadership. Almost never before have humanity and civilization depended more upon the balanced blending of these elements. There is no question that members of our honor society will be intellectual leaders. Their responsibility to believe and practice the principles of Tau Alpha P1 is both real and ideal.

Executive Director-Secretary

Microcad
The New Cadd on the Block

Introduction

It was not until the 1960's that baccalaureate programs in engineering technology became a reality. Previously, receiving a degree in engineering was considered a professional designation. People trained in technology were considered, at best, paraprofessional. Generally technicians had one or two years of formal educational training with minimal theoretical exposure and heavy exposure in the practical and problem-solving skills.

Engineering, though, evolved into a highly theoretical discipline where practical training was minimized, even discouraged. The evolution to a theoretical engineering education allowed existing two-year technology programs to establish four-year baccalaureate programs. The baccalaureate programs still emphasized practical skills but interjected broad theoretical coursework.

Today, American industry is experiencing a concerted revitalization not seen in many years. Both engineers and technologists are at the forefront of this revitalization. As Richard J. Ungrodt states, "The shortage of engineering manpower...is a major factor that ensures a strong demand for four-year technology graduates in the years to come. Over the next decade as more computer-driven technologies move onto the factory floor, technologists will fill more and more positions now filled by engineers."[1]

To meet this need, engineering-technology programs are rapidly evolving from a traditional hands-on approach to include application of high tech compUters and computer driven machinery in new and existing courses. One of the more visible high tech topics to be embraced in engineering-technology education has been Computer-Aided Design and Drafting.

The term Computer-Aided Design (CAD) may bring to mind~irnages of complex full color, three-dimensional objects rotating on a CRT in real time animation. Others envision CAD being a process planning tool utilizing block diagrams. Some see CAD as an electronic drafting board to produce mechanical detail and assembly drawings. These and many, many other applications ranging from sublimely artistic to austere functionality can all be realistically termed computer-aided design when computers aid in the development, process, or output of design. As diverse as these applications are, the common thread among all is the innovative use of computers as tools to aid human problem solving.

CAD technology today has proven benefits in engineering and technology. Systems available throUgh major vendors offer power and features practically unheard of ten years ago. Routinely CAD work stations allow users to design, dimension modify, dynarnicallytest, plan

assembly, produce bills of material estimates and production costs, control machine tools, and much, much more. All bf this can be accomplished from the user's work station. Typically, these CAD systems are composed of multiple work stations linked to a proprietary minicomputer or mainframe computer. Mass storage of drawing data bases is kept on centralized magnetic tape and/or disk for ease of sharing data.

International Resource Development, Inc., predicts that CAD and other high tech systems represent a market that will exceed $28 billion by **1994.2** These high stakes and a pervasive atmosphere of technological expansion have driven major CAD vendors seeking a greater market share into seemingly weekly updates, revision releases, and improvements of computer hardware, operating software, and documentation. Overall costs have moved dramatically downward for the major CAD systems during the past few years. Prices now rangefrom approximately $60,000 for a two-work station system to well over $1,000,000 for some top-of-the-line eight-to sixteen-station CAD configurations. Large multinational manufacturers, the ultimate end users of most of the full-feature CAD systems produced today, are proving these systems to be cost effective in manufacturing, engineering, and design. They maintain the staff, facilities, and capital to benefit from the enhanced productivity full-feature CAD systems promise.

Ironically, though, the manpower shortage particularly in engineering-technology fields is not primarily due to the traditional lag time between industrial manpower training needs and subsequent redirection of academic technology programs. Rather, much of the delay is caused by the very nature of technology programs--emphasis on practical hands-on education.

Industry and government support for advanced laboratory equipment has historically gone almost exclusively to support research in engineering programs, particularly post-graduate studies. The rationale was that the research ultimately benefited the research supporters. Technology programs, on the other hand, typically received little or no external funding eitherin grants or gifts because very little research takes place in technology departments. This bent has been perpetuated by the hiring (and promoting) of faculty with solid industrial backgrounds or with strong teaching credentials, but who have had minimal interest in research. The phrase "researchers need not apply" has appeared in more than one position advertisement. With few grants or gifts, what high tech equipment is used typically must be purchased or funded through internal sources.

Thus, the trend of declining prices coupled with increasing capabilities may not be occurring rapidly enough for the bulk of engineering-technology programs on whose shoulders ultimately rests the training of many of the future users and doers in the high tech

industries of tomorrow. Educators are faced with the dilemma of needing to train students for the high tech marketplace with insufficient resources to equip high tech laboratories. One alternative to teaching on expensive full-feature CAD systems may be the application of microcomputer-based CAD systems in computer-aided design and drafting (CADD) and related courses.

Microcomputer-based CAD systems have become a much discussed topic in the last year or so. Not only is this the case in educational settings, but also in industries that have been the exclusive marketplace for the major full-feature CAD vendors. The reason for the excitement is simple. Microcomputer-based CADD is on the brink of becoming a major competitor both in price and in power to the full-featured major CAD systems. Confident of that imminent occurrence, International Resource Development, Inc. projects that by 1994 the $28 billion high tech market will be dominated by microcomputer-based systems. **2**

Untapped Users

Despite interests in the educational applications of microcomputer-based CAD, educators represent only a small fraction of the CAD marketplace. The needs of several categories of untapped industrial users will ultimately drive the marketplace into the refinement and acceptance of the infant microCAD product line. Chiefly, these untapped users fall into two distinct classes.

Major Manufacturers: Large manufacturing concerns are generally already on line with and productively using high-end multiuser dedicated CAD systems. These proprietary hardware/software systems from the major CAD manufacturers have vast drafting, design simulation, and NC interfacing capabilities. Most of these CAD users are aggressively pursuing ultimate integration of CAD and CAM (computer-aided manufacturing) technologies.

The ultimate gameplan, though, would be to decentralize the "CAD room" by placing an inexpensive stand-alone intelligent CAD workstation on each engineer's desk and directly on the shop floor. As, needed, these work stations would allow totally independent design development, alteration of existing drawings, and NC programming capability. Design data base information would be compatible with, and linked transparently to, the larger CAD system. Additionally, the work stations would run industry-standard microLomputer software.

At present, there appear to be few, if any, microcomputer-based systems offering the speed or capabilities needed in such a scenario. Support for stock microcomputer-based work stations by major CAD vendors has been slow in coming. Simple economics have determined this strategy. Major CAD vendors make significantly greater profit selling high-priced dedicated work-stations using proprietary computer equipment. Independent microcomputer-based systems that have come on the market in recent years have had data bases incompatible

with major CAD system data bases or have nad insufficient features such as the critically needed NC programming support.

Some major CAD vendors are finally reacting to this situation. Computervision, for instance, recently introduced a stock IBM AT-based software package entitled Personal Designer AT. Promoted primarily for educational use, Personal Designer does' **3t** yet have NC capabilities or two-way interactive links with current Computervision CADDS 4 work stations. Intergraph, another major CAD vendor, is rumored to be introducing a similar system. Also, MCS, the developer of the powerful ANVIL mainframe CAD software, is now offering a smaller IBM AT version through Numeridex, an NC turnkey system vendor.[3] Most major CAD systems producers will follow suit.

Small Firms: Few local or regional design, engineering, architectural, and other small independent companies can justify the expense, facilities, and personnel commitment necessary for the installation and successful operation of a dedicated full-feature CAD system. Being effectively shut out of the major CAD user pooi, these potential users have eagerly awaited the introduction of inexpensive stand-alone CADD capabilities based on their existing personal microcomputers. These companies p!ace less emphasis on compatibilities with larger major CAD systems and are primarily interested in design, documentation, and problem-solving capacity. Having for the most part already successfully mainstreamed microcomputers for word processing and personal computations, they envision microcomputer-based CAD as potential "picture processors" with as much cost-effectiveness as their wordprocessing has proven. Typically, these companies look for microcomputer-based CAD systems to be cost-effective tools in three major areas of concern.

1. Accuracy: Small manufacturers and other concerns who deal with sub-assemblies, fabrications, and other situations requiring repetition and precision documentation look to the library functions and consistency inherent in CAD. Once data bases of often used parts and assemblies have been established, complete assemblies can be developed quickly and without the repetitive drudgery drawing detailers abhor. Some microCAD systems will additionally generate automatic bills of materials based on repetitive use of libraries,

but may ignore non-library constructions.

2. Revisions: While revisions are accomplished relatively easily in microCAD systems, small companies are still paper drawing bound. CADD use results in a dual documentation system. Revisions on CAD drawings usually result in replotted paper drawings. MicroCAD software is typically written to drive single or multiple pen plotters and/or dot matrix printers. Once revisions have been accomplished on the CADD system, paper drawings are then revised. This calls for the entire drawing to be replotted, no matter how small the revision. The difficulty is that not only are these plotters and printers very slow by

today's standards, but in the case of the plotters, they are somewhat unpredictable. Rarely do plots come out exactly the way planned. Pen skips, inconsistent lines, and other irregularities may negate any net time-saving. Not only is this wasteful of paper, but it may result in a bottleneck so great as to nullify any cost-saving aspects of the whole CAD system. Worse, it may tempt some users occasionally to skip the paper revision completely, effectively breaching the integrity of the dual documentation system.

3. Drawing Speed: Experienced draftsmen still produce finished paper drawings faster than microCAD systems with pen plotters. This drawback will continue until independent microCAD software houses or others write drivers for microcomputer interface to the newest technology in ink-jet, laser printers, and electrostatic printers. Until that time, the speed discrepency between hand drafting and microCAD-toplotter will persist. Other factors influencing microCAD drawing speed are operational and systems constraints traceable to the computer itself.

Another drawback to microCAD on stock personal computers is that they generally are used with a standard monitor which is limited in both screen size and resolution. When we attempt to view all of a large drawing, the limited resolution prevents detailed work on small sections without zooming in for clarity. Zooming in and zooming out repeatedly on microcomputer systems take considerable time as the whole screen is repainted each time. The more complex the drawing, the longer it takes to repaint the screen when a zoom is executed. Complex drawing requires copious zooming, many times slowing drawing time down to a pace less than manual drafting. Additionally, large amounts of lettering as required for a complex drawing s!ow the repaint process even more. Some systems, though, allow text to be selectively turned off and on to minimize this problem.

An additional factor affecting potential time saving, especially in 8-bit microcomputers and some 16-bit machines, is lack of sufficient memory. To minimize memory limitations on stock microcomputers, microCAD software developers use floppy disks or hard disks as modular memory extenders. Without such memory management technique, much of the CAD program and perhaps most of the drafting itself would not fit into the computer's main memory. These modules, when needed for key applications, are not resident in RAM, but are assessed from the disk by the main program as needed. Help files and other less frequently accessed modules are typically retrieved in this fashion. Thus additional time is lost because of increased disk accessing, which is two to ten times slower than direct memory-tomemory transfer. These difficulties, coupled with constraints mentioned earlier, perhaps indicate that presently available microCAD systems can be useful in a smaller design organization, but might net no labor savings at all.

Microcad in Engineering Technology

Much of the interest in stockmicrocomputer-based CAD has been in the educational community. Interests range from technical high schools desiring to teach advanced computer literacy to major universities evaluating microCAD as a potential research tool. Many institutions are meeting the challenge of high tech instruction with the resources and personnel required to operate successfully full-feature CAD installations for undergraduate instruction. Other institutions additionally have facilities for directed CAD research in addition to post-graduate instruction. In any event, these installations represent major capital equipment outlays or sizeable industrial donations plus a significant and re-occurring maintenance and operations expense. Rarely does donated eqUipment include this continuing overhead which often exceeds 10% to 20% of the initial cost of the equipment per year.

Regardless, with the exploding emphasis on CAD/CAM technology, most engineering-technology programs are experiencing enrollment pressures heretofore unseen. Laboratories must be equipped and manned. The resources of even major university engineering-technology programs are, or will be, severely strained by the attempt to provide meaningful CAD instruction for the demand.

As with any major computer installation, dedicated CAD systems require significant allocations of space and usually specialized systems personnel. While hardware and software costs are decreasing, systems from major CAD vendors still represent a major investment before, during, and after installation. Ironically, in today's high tech marketplace this investment may be based on a technology which can be obsolete before the system is fully debugged and readyfor students. Ultimately, microCAD as an instructional device may soon be the application of choice among the vast majority of educators. The concept of microcomputer-based CAD may offer engineering-technology educators a potential solution to increasing demand outstripping available faculty and resources, providing cognizance of its limitations as well as its attributes.

Specific Attributes: MicroCAD does appear to deliver much of what engineering-technology educators need. Specific attributes of interest to educators are:

A. Cost: Stock Microcomputer systems equipped with CAD capability can cost less than one-tenth the expense of even bottom-of-the-line major full-feature CAD systems. While obsolescence is still a problem, it is much more palatable to scrap or cannibalize obsolete parts of a $3,000 modification to a stock microcomputer than to deal with obsolete hardware and/or software in a dedicated major CAD installation. Many microsystems require only a digital table of joystick and perhaps an auxiliary math processor chip, a plotter or printer, plus the appropriate software. Total cost for CAD software and required

accessories, in addition to the stock computer, can range from $2,000 to $10,000 per work station. As paper plotting is usually accomplished after drawing is complete, a single $2,500 plotter can be shared among several work stations to reduce further the cost per station.

B. Efficiency: Drawing efficiency as it relates to time saving in an instructional setting is important. However, instructional needs differ from those important to industry. Most educational institutions have a limited number of student-per-work station contact hours. A CAD system's ability to allow students to gain meaningful experiences in one or two instructional periods is critical. Students in a CADD course may never, by industrial standards, become cost efficient CAD users, even on an easy-to-learn system. The learning curve is too steep for the limited time a class meets.

Furthermore, in engineering technology, rarely is student use of a CAD station directed at the subtle machine-specific skills vital for optimal efficiency. Rather, the emphasis is on students gaining broad generic CADD capabilities. In a semester's time a student may be expected to gain mastery of roughly equal depth of material on either micro-based or full-size CAD systems. Microcomputer CAD systems tend to be more "user friendly"; that is, their features are generally easier to learn than larger major CAD systems and generally being "stand-alone," do not have complex operating systems to conquer. As a result, in an instructional sense, microCAD systems may be more efficient than larger systems. Efficiency, then, may have to be addressed as a factor of ease of basic mastery of the CAD system rather than work completed.

C. Capability: Without extensive after hours' use, undergraduate students can not be expected to master a small fraction of the vast power of a major CAD system in one, or even several, semester courses. MicroCAD systems have many of the features engineering-technology students need to be exposed to on any CAD system. Additionally, advanced property calculations features are beginning to be released for microCAD applications requiring them.

Industry also recognizes the capability of microCAD, and recently the use of microCAD was reaffirmed by our Industrial Advisory Committee representing General Electric, General Motors, Alcoa, Caterpillar, Inland Steel, Hewlett-Packard, Digital Equipment, and a number of others. The committee felt that microcomputer-based CADD in instructional use was more appropriate for technologists than specific training on a Computervision system.

Specific Liabilities: While some shortcomings were covered in Untapped Users, some microCAD limitations may be especially

important in engineering-technology instruction applications.

A. 3D Vs. 2-D Systems: Most major CAD systems generate a two-dimensional data base. Many CAD systems runningon microcomputers offer three-dimensional capability as a standard or as an option. However, the power of these systems and their instructional strength in engineering technology lie in their 2-D drafting capabilities. Some microcomputer CAD systems develop a 2-D data base but allow 3-D display. MicroCAD systems supporting both 2-D and 3-D capabilities tend to have fully implemented 2-D and marginal 3-D capacity. Other systems with significant 3 D implementations and displays usually have minimal 2-D features; 2-D or 3-D is a factor and must be considered.

B. Equipment Required: Some microCAD programs demand a rigid hardware configuration. The software and optional hardware accessories may or may not be able to be physically moved (cannibalized) to another like model computer or another brand of computer. With some systems the computer and its required or optional input devices, auxiliary processor, output devices, etc. cannot be addressed by other programs even when the CAD software package is not being used. Some microCAD systems require proprietary hardware installation between a required peripheral and the computer--effectively negating the use of that device (a digital tablet, for instance) by any other software program.

C. Market Factors: Computer hardware industry shakeouts are occurring daily. The computer which is required to run the CAD software may be no longer manufactured, or the manufacturer may not exist five years hence. Some vendors offer a turnkey system (CAD software and stock computer hardware with options). Pricing the hardware separately at a local computer store may save limited capital funds if dealing with multiple vendors (and guarantees) is not uncomfortable.

D. CADD Software: Most microCAD software houses are small organizations. In today's market the potential of being left with an orphan system is always a possibility. Because microCAD hardware and/or software are small and easily mailed, few vendors offer on-site maintenance or repair. A toll-free help line can be a tremendous selling point. Updates may not be included in the package purchase price. Update regularities and cost may be a factor. As with much microcomputer software, the source code is rarely provided and may be copy-protected. Warranties are usually three months. Purchasing the complete hardware from a vendor other than the CAD software vendor inevitably raises the question,"Who is responsible for what if something goes wrong?"

Equipment Configuration

What, then is microcomputer-based CAD (microCAD) and perhaps more important, what is it not? Strictly speaking, microCAD systems are configured to run on a stock personal computer with little or no enhancements. While there are copious "CAD type" software packages on the market, most are computer graphics programs designed for visual presentation or entertainment and aimed at the popular market. Computer-aided-drafting and design programs as desired by engineers and technologists are more technically oriented but ideally will still run on a stock microcomputer.

Typical CAD systems now available usually require a stock microcomputer to have hardware accessories added to the system to enhance ease of use, speed, accuracy, plotting ability, resolution, etc. Most modifications do not interfere with the general purpose operation of the computer. Some accessories, though, can be used only by the specific CAD package unless special drivers are installed. These accessories, modifications, and changes fall into several broad categories.

The Computer: While an ever-increasing variety of personal computers can be configured as graphic work stations, four major categories fall out:

1. Apple, Atari, and other proprietary operating systems computers usually require an auxiliary central processing board for accelerated math processing.

2. S-i 00 multibus units using 7-80, 8086, 8087. and other microprocessors.

3. IBM PC, iBM ~T. and iBM clones using the 3088 type microprocessor with the 8087 or 80287 math processor.

4. MC68000 microprocessor machines in UNIX-like or Macintosh environments.

Input Techniques: While most systems allow direct keyboard input, digitizers, trackballs, mouse devices, joysticks, and light pens speed up and simplify the process of data input.

The mouse, digital tables, and pens allow users to emulate drawingboard techniques by specifying beginning and ending points for lines, arcs, etc. with the program connecting the points. Light pens interact directly with the screen by touching the points on the screen. Trackball and joystick input move the screen cursor in proportion to the

movement of the device. Digital tablets utilizing a crosshair “sight” moveable around the grid plate can be used to trace existing drawings. Most systems accept input from a combination of these devices as well as direct coordinate input from the keyboard. In a given drawing situation, no one input device can be used allthe time. A system’s ability rapidly to toggle between inputs, say, from keyboard to digital tablet and back is a positive attribute.

Input and Output Resolution: Resolution can be deceptive. Screen resolution may have no bearing on the resolution of the finished paper plot. Screen resolution does have a relationship to clarity of the working view. Coarser resolution requires more zooming in and out to see detail. Ideally, resolution on the CRT should be fine enough (more dots per inch) to give the appearance of solid lines. Output resolution on plotters is based on a coordinate system usually resident in the computer’s RAM. As such, drawings from a low resolution screen can produce plotted drawings with a .001 in. resolution. This occurs because a vector coordinate system in the graphics processing module of the program records lines as beginning and ending points, circles as center, and radius,étc. rather than each individual pixel shown on the screen. Most systems use real world coordinates. Data points making up this system dictate the ultimate resolution possible by the system. Non-vector coordinate systems use pixel-based coordinates. Resolution on plots, therefore, results in little more than screen dumps. Even on plotters, lines are broken up in an attempt to represent individual pixels.

Central or auxiliary processors utilizing integer math can have the capacity to record a matrix of 6.5 x 10 by 6.5 x 1 U~ data points, the ultimate resolution of the system. Systems utilizing floating point math processors yield a 1.0 x 1015 by 1 .0 by 1015 data point matrix.[4] Floating point processors, while capable of greater resolution, also require more memory overhead and process at a slower rate than integer math processors.

Future Trends

Microcomputers in the 1980’s are maturing far beyond their initial conception. Many of the newer microcomputers have the power to rival the proprietary computers used forfull-feature CAD installations. Major CAD vendors are finally awakening to both the potential market for CAD in the millions of existing microcomputers and the need for self-contained microCAD systems in industry. Major CAD software installed in microcomputers should soon have all of the major features of larger systems at a much more favorable cost/performance ratio. MicroCAD will claim a significant percentage of the CAD/CAM market while large computer installations will decline. This and the radical improvement in ease of use of both hardware and software as evidenced by the Apple Macintosh and other innovative systems will create additional pressure on CAD vendors to re-think their present

cryptic operations systems. Microcomputer-based CAD is still in its infancy; maturity will soon follow.

Conclusion

In many instances, microcomputer-based CAD (microCAD) may be an acceptable teaching tool in engineering technology. While not yet featuring some of the more advanced powers of a major CAD system, the basics are there, and few of the advanced powers are ever used in introductory instructional application. Very acceptable CADD experiences can be accomplished on microCAD equipment at an attractive cost/work station ratio. The equipment is light, portable, quickly set up, and easy to learn and use. An added benefit is that the computer may continue to be run for stock microcomputer applications.

Engineering-technology programs have traditionally valued instruction utilizing "real" industrial tools. With industry's growing interest in and encouragement of microcomputer-based CAD, those educators who chose microCAD for cost, portability, or other practical reasons may also have chosen the first generation of tomorrow's "major" and "real" CADD system.

Bruce A. Harding
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Robot Controllers The Choice Isn't Simple

In recent years the public has been subjected to a barrage of misinformation about industrial robots. Even the manufacturing professional/trade periodicals have published many erroneous and unsubstantiated claims.

Much of this confusion stems from an inadequate understanding of robot controllers. The popular press equates robotics with computers while trade publications herald the robot as a major component of the automatic factory. Actually, a fairly small proportion of robots sold today are computer controlled (IDD of 1ST, 1982); most jobs now performed by robots require neither intelligence nor frequent reprogramming (Ayres and Miller, 1981) and veryfew are linked to an integrated control system (IDD of 1ST, 1982). A brief review of controller technology will, perhaps, clarify some misconceptions and permit potential robot purchasers/users to better evaluate the available spectrum of industrial robot controller technology.
The most widely accepted definition of a robot has been proposed by the Robot Institute of America, an organization of manufacturers of robots and ancillary equipment: "a reprogrammable niulti-functional manipulator designed to move material, parts, tools, and specialized devices through variable programmed motions for the performance of a variety of tasks" (Tanner, 1981). Industrial robots consist of three "major components: the manipulator or mechanical units, the controller or brain and the power supply which provides energy to the manipulator." More specifically, the controller has a "three-fold function: first, to initiate and terminate motions of the manipulator in a desired sequence and at desired points, second to store position and sequence data in memory and third, to interface with the outside world." (Tanner, 1981).

Controller Characteristics

Open Loop Control Systems

Limited Sequence Type
Power: Hydraulic and pneumatic
Controller Technology: Mechanical drum timer, air logic, programmable controller
Feedback: Limit switches, proximity sensors
Applications: Material transfer, machine loading/unloading
Programming: Manual
Examples: **Prab,** Pickomatic

These machines, often described as "low" technology robots, have high accuracy and operating speeds, difficult reprogramming, and relatively low cost. The control systems sense position only at the end of

stroke and merely "step" the machine through the next movement sequence. Truly unintelligent, open loop limited sequence controllers are generally incapable of decision making, except at the rudimentary level (e.g., part presence/absence) but are rugged and reliable.

Open Loop Continous Path Type

Power: Electric Stepper motors, electric servo motors
Control Technology: Microprocessor/microcom puter interfaced through motor controller boards
Feedback: None or position transducer
Application: Arc welding, education/modelling/simulation, material transfer
Programming: Manual, off-line, or teach mode
Examples: Unimation Apprentice, Microrobot, Rhino

This type of controller is infrequently encountered because of the low power capacity of stepper motors. It is, however, an inexpensive technology very suitable for educational and simulation purposes. The low cost and ease of interface make linkage to a variety of computers a common occurrence. Consequently, rather powerful controllers and sophisticated software are available for some of these devices.

Closed Loop Control Systems

Record Playback Non-computer Type
Power: Hydraulic and electric servo drives
Control Technology: A variety of non-computer devices with provision for mass storage of sequential data
Feedback: Position transducers
Applications: Spot welding, material transfer, machine loading! unloading, painting, arc welding
Programming: Teach mode, either walk-through, or lead-through
Examples: Unimation Unimate 2000, DeVilbiss

Distinguished from true computer controlled robots, these record/playback devices exhibit the most common controller technology. Depending on make, they are capable of both point to point and continuous path movements. A sequential record of the path is stored during the walk-through or lead-through teach mode and then played back in the same sequence to actually perform the task"taught." Although some of these robots are equipped with microprocessors, they are not truly computer controlled in "real time," that is, their computational power or logic capability does not control the manipulator movement. ~Easily programmed and quite reliable, this "medium" technology controller is similar to machine tool numerical controllers.

Closed Loop Controlled Path Type

Power: Hydraulic and electric servo drives
Control Technology: A variety of minicomputers capable of operating in real time and often programmable in high level languages.
Feedback: Position, velocity, and force transducers
Applications: Virtually all
Programming: Teach mode, on-line and off-line
Examples: IBM RS 1, Cincinnati Milacron 13, Unimation Puma

Although these machines account for a fairly small percentage of robots sold, they represent the highest level of technology available and are the focus of most research and development in the area of robot controllers. Since they can be controlled in computer real time, they are capable of adaptive adjustment to a changing environment. Data inputs from vision, tactile, or other force sensory devices can be processed in the context of controlling manipulator movements. Machine intelligence can be used to decide among various option,s, to decode inputs and encode outputs, and to do mathematical computations. Far more complex than non-computer controlled robots, these intelligent machines present unique and difficult maintenance problems but also represent a significant inroad by computers into the factory environment. Although this high level of control sophistication is available from several different manufacturers, it is only infrequently used to its potential.

Given these general characteristics of industrial robot controller technology, how can a potential user evaluate the myriad options? Two general cTiteria are proposed:

1. How does controller technology impact on the physical! psychological nature of the task to be performed?
2. What is the degree to which the robot is or will become a part of an information network?

The first criterion should be used by considering the following elements of a task being scrutinized for possible robotizing:

a. Accuracy required
b. Need ***for*** adaptation to the environment by robot (e.g., inconsistent workpiece orientation)
c. Safety concerns
d. Frequency of reprogramming

e. Number of programs required by robot and is random access necessary
f. Required physical and data interface
g. Speed, acceleration/deceleration control required

h. Possible use of visual/tactile senses
i. Environmental problems affecting robot performance and/or maintenance
j. Need for worker-machine information interface
k. Type and compexity of motions required

This analysis should result in a decision for robot controller technology appropriate for the task. Often a simple controller (or hard automation) will be adequate for the task, but decision makers can be attracted by “high” technology in the rush to automate. When the controller technology selected is inconsistent with the actual performance requirements, excessive expenditures, unacceptable job execution, and complex maintenance problems may arise.

The second criterion must be used in the context of long range goals:
Will the robot simply do an isolated job or become a component in an integrated system? Taylor (1982) suggested that the factory **of the** future is the only factory **with a** future and that short term decisions regarding automation must be made with long term goals of total computer integration.

Nonetheless, all sizes of enterprises must evaluate robot controller technology in the context of 1) the increasing pressure to substitute intelligent capital goods for labor to remain competitive and 2) the trend to more frequent model changeover and greater reliance on batch production in the discrete parts manufacturing industries. The following factors associated with the second criterion may be useful in this analysis.

a. Is decision making or mathematical computation required by the robot or can it take place elsewhere in the system?
b. What are the data communication needs to and from the robot?
c. Does the robot need to react to its environment and adapt in real time?
d. Is high level programming required (e.g., frequent editing complex mathematically defined geometry, loops, branches)?
e. Does the safety system require an intelligent controller? (See Kilmer, 1 982)
f. What are the company’s long term plans for CAD/CAM or CIM? Is evolution along this line likely?
g. What is the current status of development of intelligence machines’ involvement in an information network?
h. Is reprogramming done often? Is product changeover frequent?

The selection of robot controller technology is a complex and multifaceted problem involving both the short and long term goals of production management. This decision should be made using more

complex criteria than are used in “normal” (non-computerized) machine selection because of the robot’s potential as an intelligent member of a computer integrated system. The fundamental goal of computer integration is access and control of information and the degree to which the robot controller is capable of participating in this information exchange should be a major criterion in its selection. If, however, the robot is viewed in the short **and** long term as a relatively independent device which is infrequently reprogrammed, the lower technology controllers are an obvious choice.

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Chapter News

Name of Chapter

College
Advisor: ________________ Telephone: Home ______________
Business _____________

New Officers: President: _________________ Secretary:

Vice President: _______ _____________ Treasurer: _______________________

Newsworthy Chapter Activities (since those published in 1985)
Future Plans of Chapter:

A Perspective of Engineering Technology

The field of engineering education has grown rapidly during the past four decades ,and with that growth specialization became increasingly evident. As specialization became more pronounced, competition among the various fields of engineering also became more noticeable.
Engineering education includes a broad spectrum of disciplines which are interrelated and claim as a foundation the "practical application of the fundamental laws of physical science." While some of the engineering disciplines are strongly application-oriented, others are more theoretical and lean towards research and creative endeavors. Both facets are valuable to all areas of engineering education.
The history of engineering education reveals that there was very Little nationwide control of engineering programs, with the result that in some instances programs in crafts and trades were labeled "engineering." Clearly, such lack of standardization required control procedures. In response to this need, the Engineers Council for Professional Development (ECPD) was formed in the early 1930's. Those engineering programs judged worthy of membership in the council were accredited, and by the 1940's standardization of the engineering curriculum was occurring.
World War II and the "space race" of the 50's and 60's had a significant impact on engineering-industrial developments. Scientific achievements during the 40's and 50's were unprecedented. The "hi~ tech" advancement, which is an outgrowth of the technology begun during these decades, has had an incalculable effect on society.
Because of the acceleration of technical knowledge and the need to inclUde new fundamental principles in the engineering curriculum, engineering education has experienced extensive change. The principles of the 30's were not adequate to prepare engineers to work with the new technology of post World War II. New concepts were introduced into engineering education, and many old requirements, especially laboratory-type courses, were assigned a lower priority.
Engineering faculty of the 1950's were divided on the issue of curriculum change. Some were strong advocates of retaining the traditional principles and practices while others werc rea~ly and willing to discard the "old" to make way for the new concepts and a more theoretical emphasis. Engineering programs became longer, with graduation requirements often exceeding 140 semester credit hours for a baccalaureate degree. Other options included the five-year curriculum and the master's degree as the first professional degree.

The concept of engineering technology became increasingly popular. Although ET programs were very few at the close of World War II, accreditation criteria for associate-degree ET programs were in place, and the first ET program accredited by ECPD in 1 946 paved the way for

the greater interest in engineering technology which followed. The emphasis of the ET program was application, and the growth of this discipline was substantial during the 50's and 60's. The baccalaureate program in ET evolved in the late 60's, thus providing the separate disciplines of engineering--the more theory-oriented engineering program and the strong application-oriented engineering-technology program. The evolution of the separate disciplines has continued with both associate-degree and baccalaureate-degree programs in engineering technology. The Accreditation Board of Engineering and Technology (ABET), formerly ECPD, has developed accreditation criteria for each category.

The relationship between the four-year engineering and the two-year engineering-technology programs seemed well defined in the 50's and 60's. The graduates of the two-year programs were typically assistants to graduate engineers from four-year programs. The development and rapid growth of four-year ET programs resulted in greater confusion in that graduates of the *four-year* programs in engineering and engineering technology have been absorbed by certain technologically oriented industry and assigned similar titles, responsibilities, and salaries, in fact, their role distinction in many cases is blurred, if it even exists. The BSET achieves competence in engineering application while the BS engineering graduate has been successful in a more research and development (R and D) oriented program.

There are some who say that ET graduates were to play a subordinate role to the engineering graduates. Such feelings are not prevalent in many of the industries that employ graduates from both disciplines. While some employers may apply title and role distinction between engineers and ET's, many use graduates from both programs in the same positions.

The efforts ot ABE F and the professional technical engineering societies such as NSPE to clarify the distinction between graduates of ET programs and those of engineering programs are viewed by some as to build a hierarchy within the field of engineering. ABET adopted the policy that requires ET program administrators clearly to identify that their programs are not "engineering." The National Society of Professional Engineers (NSPE) whose membership requirement is professional registration has suggested special requirements for the professional registration of four-year ET graduates over and beyond those of four-year engineering graduates for licensing. Although ABET and NSPE have influenced the public to view engineering-technology programs as subordinate to engineering programs, the employers of the graduates of these programs have in many instances counterbalanced that effect by placing graduate ET's in positions of responsibility as "application-oriented engineers." Many ET graduates take the EIT and PE exams and become registered.

The academic community, however, still remains split on whether or not BSET graduates are, or should be, engineers. The marketplace recognizes the value of graduates of strong programs in all fields of engineering. The positive influence of ABET has been the greater care and acumen in assuring quality in FT programs. The result of stronger ET programs is the greater acceptance of graduates and less hesitancy to use them in positions of responsibility with appropriate engineering titles.

Engineering technology is a part ot the field of engineering. The focus on application in FT programs and the emphasis on theory and development in engineering programs underscore a reasonable distinction. It seems inappropriate to subordinate one program to the other. Hopefully, ET and engineering programs can play more complementary roles.

Thomas F. Creech
President
Kansas Technical Institute

P.E. Registration of Engineering Technology Graduates

Many engineering-technology students and graduates and their employers are interested in the availability of and requirements for state registration as a Professional Engineer. Thirty-eight of the fifty states allow registration of graduatesfrom four-year Bachelorof Science or Bachelor of Technology programs in engineering technology. State requirements for registration are here summarized. There are also publications available which summarize state laws concerning professional registration, e.g., the "State-by-State Summary of the Requirements for Engineering Registration" by the National Society of Professional Engineering. Most state laws, however, aim at B.S. graduates of engineeringand/or science programs, and interpretation is often needed when applying these laws to engineering-technology graduates. To provide information to engineering-technology graduates, state registration requirements were gathered from the fifty states. The co-operation of each State Board of Registration is greatly appreciated as is the assistance of Michael Kyger, a recent engineering-tech nology graduate of Southern Illinois University. The requirements here stated were obtained in 1983 and were updated whenever new information became available.

State requirements for registration as a Professional Engineer of four-year engineering-technology programs are summarized in Table 1. Requirements for each state are listed first for registration as an Engineer in Training (FIT) and then for registration as a Professional Engineer (PE). FIT exam refers to an eight-hour Principles of Practice exam. All states require successful completion of both exams. The FIT exam can be taken after completing up to eight years of experience following graduation from a four-year engineering-technology program. Nine states allow engineering-technology graduates to take the FIT exam directly upon graduation. The PE exam can be taken after passing the FIT exam and completing additional experience. The experience requirements cited in Table 1 are the minimum number of years needed to take the FIT exam or PE exam (after Eli certification). The required experience, however, may be accumulated before taking either exam. The appropriate State Board should be reached to obtain specific requirements. It is important to note that most boards provide alternative paths Iead~ng toward registration as a Professional Engineer. Table 1 pertains only to four-year engineering-technology graduates. Interested individuals should communicate with the appropriate Board for detailed requirements and answers to specific questions.

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Table 1
State Requirements for Registration as a Professional Engineer
as Applied to Four-Year Engineering-Technology Graduates

	Sit for EIT Exam			Sit for PE Exam		
State	Degree(1)		Experience (2)	Status		Experience(2)
Alabama	BSET		2 years	EIT		4 years
Alaska	BSET		4 years	EIT		4 years
Arizona	BSET		2 years	EIT		4 years
Arkansas	BSET		2 years	EIT		4 years
California	BSET		None	EIT		4 years
Colorado	BSET		6 years	EIT		2 years
Connecticut	BSET		4 years	EIT		3 years
Delaware	BSET		None	EIT		8 years
Florida		Not admitted			Not admitted	
Georgia	BSET		None	EIT		7 years
Hawaii		Not admitted			Not admitted	
Idaho	BSET		2 years	EIT		4 years
Illinois		Not admitted			Not admitted	
Indiana	BSET		2 years	EIT		5 years
Iowa	BSET		2 years	EIT		4 years
Kansas	BSET		4 years	EIT		4 years
Kentucky		Not admitted			Not admitted	
Louisiana		Not admitted			Not admitted	
Maine	BSET		None	EIT		6 years
Maryland	BSET		4 years	EIT		4 years
Massachusetts	BSET		None (3)	EIT		4 years
Michigan		Not admitted			Not admitted	
Minnesota		Not admitted			Not admitted	
Mississippi	BSET		2 years	EIT		4 years
Missouri		Not admitted			Not admitted	
Montana	BSET		None	EIT		4 years
Nebraska	BSET		2 years	EIT		4 years
Nevada	BSET		2 years	EIT		4 years
New Hampshire	BSET		4 years	EIT		4 years
New Jersey	BSET		2 years	EIT		4 years
New Mexico	BSET		2 years	EIT		4 years
New York	BSET		8 years (4)	EIT		
North Carolina	BSET		4 years	EIT		4 years
North Dakota		Not admitted			Not admitted	
Ohio		Not admitted			Not admitted	
Oklahoma	BSET		1 year	EIT		5 years
Oregon	BSET		2 years	EIT		4 years
Pennsylvania	BSET		None	EIT		4 years
Rhode Island	BSET		8 years	EIT		4 years
South Carolina		Not admitted			Not admitted	
South Dakota	BSET		None	EIT		5 years
Tennessee		Not admitted			Not admitted	
Texas	BSET		6 years	EIT		4 years
Utah	BSET		2 years	EIT		4 years
Vermont	BSET		8 years	EIT		4 years
Virginia	BSET		2 years	EIT		4 years
Washington	BSET		2 years	EIT		4 years
West Virginia	BSET		2 years	EIT		4 years
Wisconsin	BSET		1 year	EIT		4 years
Wyoming	BSET		2 years	EIT		4 years

(1) The degree can be a four-year Bachelor of Science (BSET) or Bachelor of Technology (BET). (2) Experience can also be accumulated before taking either the EIT or PE exam. Individual State Boards should be reached for specific requirements. (3) EIT certification issued only after four years of experience. (4) The EIT and PE exams can be taken concurrently after eight years of experience.

TAU ALPHA PI KEY-MONUMENT

The Tau Alpha Pi key, which was taken from the emblem, may be called the working tool of the society. It consists of the Greek letters T A TT, which embody the society's motto, plus the gear and dividers. The key, also symbolic, is presented to each initiate as a reminder of the qualities, both personal and intellectual, to which each member is expected to aspire.

As we can see in the photo in the centerfold of this Journal, the key can be constructed as an enlarged replica. Each chapter should make its priority the construction of the enlarged key as a monument to be erected on campus in order to enhance the society's visibility, identify the engineering-technology complex, and encourage students. to become scholastic achievers.

The monument should be placed on a rock or stone or concrete pedestal. The engraved inscription should include the chapter designation of the Tau Alpha Pi National Engineering Honor Society, the university affiliation, and the date of chartering.

TAU ALPHA PI-KEY MONUMENT

CONSTRUCTION OF TAU ALPHA PI KEY-MONUMENT
PREPARED BY UPSILON BETA CHAPTER
ARIZONA STATE UNIVERSITY

TAU ALPHA PI EMBLEM

CASTING OF TAU ALPHA PI EMBLEM
FIRST CASTING PREPARED BY THETA BETA CHAPTER
OLD DOMINION UNIVERSITY

TAU ALPHA PI EMBLEM

The Tau Alpha Pi emblem contains symbolic significance that is known only to members of Tau Alpha Pi. As we study this emblem, we can, however, ascertain some of its meaning. Clearly, the color green suggests youth and life while the color gold suggests a lasting and precious quality. The dividers are a measuring device. The gear suggests work and the will to create working tools. The shield has been used for protection, and we logically conclude that the shield in the emblem implies the protective quality of an informed mind. The plumes are decorative, symbolizing perhaps the finesse that we hope to find in persons of intellect, character, and qualities of leadership.

As we can see in the photo in the centerfold of this oulnal, the emblem lends itself to construction as a plaque to be mounted in the engineering-technology building. Each chapter should make its priority the preparation of such plaque in order to promote the society's visibility and encourage students to achieve scholastically.

1985 Page 29 ***Tau Alpha Pi***

Chapter News

ALPHA ALPHA (Southern Technical Institute): During 1984 the chapter held three initiation ceremonies. Each was followed by a reception for members and their guests.Future plans include (1) issuing a Tau Alpha Pi certificate to members who achieve a 4.00 index, (2) adding to the Tau Alpha P1 display case in the library an engraved listing of-the yearly recipients of the Tau Alpha P1 award for highest scholastic average, (3) looking into the feasibility of constructing arc enlarged replica of the Tau Alpha P1 key in conjunction with much new
construction on campus. Officers: Can Pless (President); Neal Cordle (Vice-President); Gail Dean (Secretary); Teresa Davis (Treasurer).

ALPHA BETA (DeVry Institute of Technology, Decatur): The chapter instituted an internal restructuring in order to achieve better awareness and communication among students. More meetings were held, and committees were established. The chapter has a column in the school newspaper devoted to Tau Alpha P1 functions and events. It also maintains an updated bulletin board. A future undertaking includes a Bulletin Board System, a computerized system of information about Tau Alpha Pi. Officers: Forrest Gorman (President); Paul Glover (Vice-President); John Barnes (Secretary-Treasurer); Brooks Johnston (Sergeant-at-Arms).

BETA GAMMA (Queensborough Community College, CUNY): The chapter held its spring initiation and dinner on May 10, 1985. The guest speakers were Executive Director Frederick J. Berger and Dr. Lillian Gottesman. Prior to this date, members participated in a field trip on April 1 7 to Brookhaven National Laboratories. Other scheduled activities included technical services and a series of lectures:
“Application of CAD/CAM in Technology” by Dr. Valentino and Professor Reid; “Oscilloscope Operations in Conjunction with Disk Drive Alignment” by Mr. Sitbon; “Fiber Optic Concepts and Applications” by Professor Zanger;” Applications of Laser in Technology” by Dr.

Engelberg;"Applications of Interactive Computer Graphics" by Robert Packer. Chapter members volunteered time on a regular basis to tutor students. The chapter hosted the mini-transfer day for engineering-technology students and co-sponsored the mini career day. Fund-raisingis on the agenda of future activities, and alumni will be reached and invited to contribute to a fund for the construction of the large Tau Alpha P1 key. Officers (1984-85): David J. Wong (President); Tze Ki Chang (Vice-President); Laura Moy (Secretary-Treasurer). Officers (1 985-86): Ronnie J. Gusmano (President); James J. Di Blasi (Vice-President); Joseph J. DeZarlo, (Secretary); Gilberto Palencia (Treasurer).

Front, left to right: Executive Director Prof. Frederick J. Berger, Silvano Salvatici, Gilberto Palencia, Peter Fillippone, Dr. Lillian Gottesman, Prof. Gaetano A. Guidice, Laura Moy, Prof. Franz Monssen, Prof. Brigitte Meuller, Ronnie J. Gusmano, Prof. Norton E. Reid. Back row, left to right: Robert Granau, Joseph De Zarlo, Jr., Ronald Clark, TzeKi Chang, James J. DiBlasi, Dean Russell K. Hotzler, David J. Wong, Faculty Adviser Prof. John F. Hennings.

BETA DELTA (Bronx Community College, CUNY): The chapter held initiation ceremonies in December, 1984, and in April, 1985. Each induction was followed by a luncheon in honor of the initiates. During the 1984-1985 academic year, members of Beta Delta chapter continued to tutor and to assist as ushers at commencement. They also investigated the feasibility and costs of preparing a replica of the Tau Alpha Pi key to be erected on the campus. As in the past, three outstanding Beta Delta graduates were the recipients of commencement awards: the Morris Meister Medallion in memory of the founding president of the college, the Morris Meister Scholarship, and the FrederickJ. Berger Scholarship. One Beta Delta graduate--Sarun Pin--brought honor to himself and Tau Alpha Pi by competing successfully with many applicants from all units of the City University to win the coveted Belle Zeller Scholarship, which is awarded annuallyto a student of high scholastic achievement and community service.
Officers: Adeyinka Adesokan (President); Leacroft E. Hall (Vice-President); Maria Rivera (Secretary).

BETA IOTA (Rochester Institute of Technology): The chapter held initiations on February 1 **2, 1** 985 and on May 7, 1985. Each was followed by a luncheon. In addition, chapter members conducted an informational meeting forall students earning a technology degree who were interested in options for graduate study. During the fall or winter quarter of 1985 another informational meeting is planned concerning the Professional Engineering examination. Engineering-technology students enrolled in the CCE School are now eligible for election toTau Alpha Pi,-and those who qualify will be inducted. Officers: Michael Sciocchetti (President, A-Block); Susan Sawyer (Vice-President, A-Bock); Daniel Miller (President, B-Block); Kevin Marks (Vice-President, B-Block).

BETA ZETA (College of Staten Island, CUNY): Beta Zeta sponsored the following guest speakers: K. Kowald of Con Edison spoke on "World Energy"; H. Morganstin of General Electric, "Field Engineering"; M. Novakowski of Cognitronics, "Laser Scanning"; E. Loeb of Polarad, "Synthesizers"; H. Foglino of Grumman, "Mapping Techniques"; J. Lew of IBM, "Modern Printing"; R. Sirkassian of Tektronix, "Scopes"; D. Ettelman of PMI Motors, "Stepping Motors"; J. Williams of Bell Labs, "Fiber Optics"; Y. Tamir of CUNY, "QualityAssurance"; J. Antonapalous of CUNY, "Osha." In addition, the chapter sponsored tours of Edo Corporation and Grumman. Officers: C. Hanley (President); E. Matteo (Vice-President); L. Loftin (Secretary); T. Clowery (Treasurer).

GAMMA EPSILON (DeVry Institute of Technology, Columbus, Ohio):
The chapter voted to offer honorary membership to the mayor of Columbus--Dana Rinehart--and initiate him in September. Officers: Thomas Miller (President); Todd Berger (Vice-President); Craig Bjorndahl (Secretary); Dan Powell (Treasurer).

DELTA ALPHA (Wentworth Institute of Technology): The chapter held initiation ceremonies in

April and inducted seventy new members--a record number. Two members of the chapter were named the firstjoint recipients of the Carl Swanson Scholar-athlete trophy: Mark Tompkins (President) was captain of the volleyball team, and Irene McSweeney (Vice-President and Secretary) was the most valuable player on the women's basketball team. Mr. Tompkins also organized and ran a tutoring program in physics and mathematics, staffed largely by chapter members. Miss McSweeney was also named to be the student speaker at commencement exercises in September, 1985. The chapter treasurer Karen Soltesz continued her outstanding service to Wentworth's blood drives, which were supported by other members.
Officers: Mark Tompkins (President); Irene McSweeney (VicePresident and Secretary); Karen Soltesz (Treasurer).

DELTA BETA (School of Engineering Technology, Northeastern University): The chapter has opened a dialogue with appropriate university officials to institute a special instructional program that would prepare BET graduates for M.S. programs rather than for only advanced placement in the B.S. program. These efforts will continue as will public relations with industry to improve the BET "image" in industry. Officers (1985-86): Lawrence D. Van Leaven (President); Bernard Clark (Vice-President); Peter Kounavelis (Secretary); Michael H. Chernaik (Treasurer).

Officers (1 984-85), left to right: Bernard Clark (Vice-President); Kevin Biggs (President); Steven Small (Secretary); Joseph Taylor (Executive V.P.); Matthew Manes (Treasurer).

DELTA GAMMA (Franklin Institute of Boston): The chapter conducted initiation of twelve new members and two faculty advisers on March 24, 1985. A banquet followed to honor the initiates. Honorary membership was awarded to Mary Landrigan, the registrar. Officers:
James H. Prentice (President); Kenneth J. Gilbert Ill (Vice-President); Montgomery R. Combs (Secretary); Antonio Ruscitti (Treasurer).

DELTA EPSILON (Central New England College): Delta Epsilon was chartered on April 26, 1985. Executive Director/Secretary Frederick J. Berger was the guest speaker. Officers were elected and charter members were inducted. A banquet followed the initiation ceremony. An immediate plan is to identify eligible students and graduates to be initiated. Officers: Louis Desy (President); Gayle Kenney (VicePresident); Lucille Ayers (Secretary); Kerry Monast (Treasurer).

ZETA ALPHA (University of Houston-University Park): The chapter held a spring initiation and banquet. The guest speaker was Mr. David Dyer, a graduate of the University of Houston College of Technology. At present, Mr. Dyer is a technical marketing engineer in the Microprocessor Division of Texas Instruments. Future plans include continued participation in Technology Day, an annual event designed to acquaint business and industry with the technology programs of the college, and active participation in Honors Week, a campus-wide series of events to promote academic excellence. Officers: John A. May (President); R. Lynn Kohler(Vice-President); DaleJ. Cooper (Secretary-Treasurer).

Left to Right: R; Iyná **Kohier (Vice President), Dr. Harold E. Hoelshear, Dale** J. **cooper (Secretary-Treasurer),** John .& **May (President).**

ZETA DELTA (Texas Tech University): The chapter conducted teaching and course evaluations and an appropriate opinion poll. It provided feedback to the Industrial Advisory Board, an important group that serves as a connecting link between industry and the Engineering Technology

department. Short-range and long-range plans include collecting various computer programs for use by students and faculty.
Officers: Bobby Sledge (President); Manuel Quinones (VicePresident); Tim Vaughn (Secretary-Treasurer).

THETA BETA (Old Dominion University): The chapter held its annual initiation and banquet on November 27, 1984, inducting twenty-six new members. Professor Broadus Cecil Dickerson was awarded honorary membership in recognition of his over forty years of excellent service to the field of engineering technology. He was instrumental in the early development of ODU into the technical institute that it is today. Among its activities the chapter, in conjunction with the Virginia Gamma chapter of Tau Beta Pi, co-sponsored aThanksgiving Food Drive to help the needy in the Tidewater area. As future activities, the chapter plans to continue the Thanksgiving Food Drive, fund-raising functions, and outstanding faculty awards. It is planning, also, the construction of a large replica of theTau Alpha Pi key near the Engineering buildingand in proximity of the Tau Beta Pi key. So far, a sum of $360 was raised to be used toward the castingof the key. Officers:John W. Turner(President); Raymond W. Good,Jr. (Vice-President); John D. McDonald (Secretary-Treasurer).

KAPPA BETA (Anne Arundel Community College): The chapter had its initiation on December 8, 1984 and inducted Professor Erik Liimatta as an honorary member. Among its activities during the 1984-85 academic year was a series of lectures sponsored byTau Alpha Pi and open to the public. The first lecture was delivered by Dr. John Decaire of Westinghouse Electric Corporation on February 21, 1985. The second in the lecture series on March 20 was a talk by Captain C.N. Calvano of David Taylor Naval Ship Rand D Center. On April 18, the lecture was presented by B.L. RettererofARlNC Research Corporation. In the near future, Kappa Beta hopes to sponsora chapter of theJunior Engineering and Technology Society for high-school students in the Anne Arundel county schools. Officers: Andrew K. Haines (President); James Scott (Vice-President); Robert P. Rubilotta (Secretary).

Standing, left to right: James Scott, Robert Liley, Andrew Haines (Chapter President), Prof. Will Mumford (Faculty Adviser), Dr. Anthony Pappas, Jr. (Dean of Students), John Kohiheff, Edison Teano, Raymondee Jones, Tony Handy, Cliff Willey. Seated, left to right: Dorothy Breitstein, Christopher Devine, Jeanene Dugas, Thomas Ervin, Prof. Erik Liimatta.

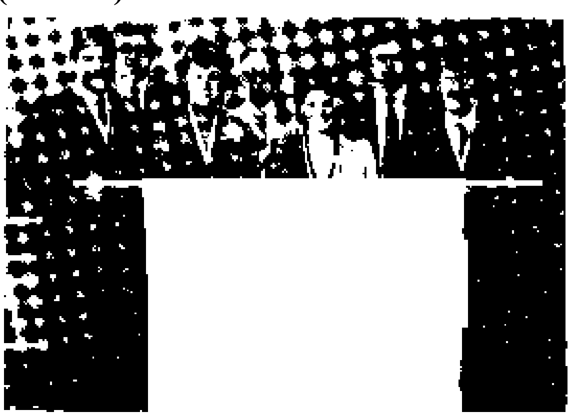
LAMBDA ALPHA (Norwalk State Technical College): The chapter's major activity is its tutoring program which is available to the entire student body at no cost to the students. During the 1985-1986 year, the chapter will develop, in addition, an adviser program whereby members will serve as advisers to incoming freshmen in their own technologies. Officers: Peter Binkley (President); John Karpowich (Vice-President); Robyn Anne Owen (Secretary); John Venobles (Treasurer).

LAMBDA BETA (Thames Valley State Technical College): Among its activities, the chapter includes tutoring services and the establishment of an award to the student who shows the most academic improvement. One Thames Valley graduate and member of Lambda Beta, Norman Picard, wrote to say that his achievements at Thames Valley and membership in **TaLl** Alpha Ri "were the foundation of a very successful academic career." In May, 1985 Mr. Picard received his M.S. degree in Organizational Management. Officers: Cynthia Ennis (President); Sandy Desjardin (Vice-President); Judith Kenneally (Secretary-Treasurer).

LAMBDA DELTA (Greater New Haven State Technical College): The chapter held its initiation ceremonies for new members in the fall of 1984 and again in the spring of 1985. During the spring ceremonies, Professor Ralph Bailey was inducted as a faculty adviser and Professor Ann Manner as an honorary member. In the near future efforts will be directed to make students more aware of Tau Alpha Pi and its significance. Officers: Katherine Dellisola (President); David Roden (Vice-President); Maria Ramadei (Secretary); Steve Tessler (Treasurer).

LAMBDA DELTA CHAPTER

Front row, left to right: David Roden (Vice-President), Katherine Dellisola (President), Maria Ramadei (Secretary), Steven Tessler (Treasurer). Back, left to right: President Edmund Sobolewski (Sponsor), Prof. Ralph Bailey (Adviser), Prof. Ronald Lostritto (Adviser).



NU BETA (Southern Illinois University, Carbondale): Initiation was held on October 24, 1984. The chapter's major activities were the distribution of over 400 computer diskettes to users of the Microcomputer Lab and the tutoring sessions on a weekly basis for technology students. Socially, chapter members held a get acquainted party for new members on October 6, 1984, at the home of Professor Pagano and a Christmas party on December 7 at the home of Professor Lindsey, which was attended also by Dr. Kenneth Templemeyer, Dean of Engineering and Technology. Officers: Edward Chalupa (President); Gary Knapp (Vice-President); Philip Armbrister (Secretary); Dean Engelman (Treasurer); John Schmidt (Engineering Joint Council Rep).

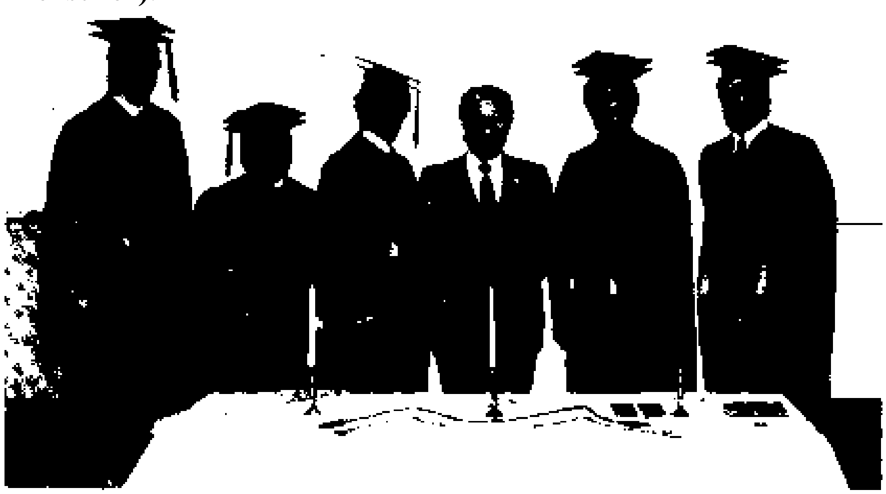
NU **GAMMA** (DeVry Institute of Technology, Lombard, Illinois): The chapter was chartered on November 17, 1984. Initiation was held on this date and again on January 25, 1985. Dr. Dimitrios Kyriazopoulos (Adviser, Nu Delta), representing Executive Director FrederickJ. Berger, assisted in the chartering ceremonies and delivered the keynote address. During 1984-1985 the chapter organized the Academic Advisory Committee to serve as a link between academic departments and students. It set up a Nu Gamma Educational Software Library and a Scholarship Society which will be able to assist outstanding students in financial need. These groups are expected to be fully functional in the near future. Officers: Paul Arnone (President); Clifford Riordan (VicePresident); Donald Brunner (Secretary); Wayne Brandt (Treasurer).

Left to right: Paul Arnone, Clifford Riordan, Don Brunner, Wayne Brandt.

NU DELTA (DeVry Institute of Technology, Chicago): In addition to initiating deserving students, N u Delta sponsored a variety of activities and fund-raisers, including several bake sales and a Christmas carnation sale. The chapter held election of officers and an elegant trimester award banquet. A new development this past year is the "President's Award for Outstanding Scholastic Achievement in Engineering Technology," which each trimester is to he awarded to the deserving student. In the spring of 1985 Nu Delta members visited the DeVry Columbus campus to exchange friendship and ideas with Gamma Epsilon members at Columbus, Ohio. Officers (1 984-85):John Sennett (President); John Mulkey (Vice-President); Hahn Nguyen (Secretary); Ed Putlack (Treasurer); Jeff Utterback (Sgt./Arms). Officers (1 985-86):
William Morton (President); Melodie Janjya (Vice President); Paul Wolfson (Secretary); Shabbir Ahmad (Treasurer); Melvin Slater (Sgt./Arms).

NU EPSILON (Illinois Valley Community College): Chartering ceremonies were held on April 19, 1985. Ten members in course, three alumni, and two faculty advisers were initiated. Professor Frederick J. Berger, Executive Director, was the guest speaker. The chapter thanks Professor Berger for attending; his presence "dignified this event and made it a complete success." Future plans include casting and mounting an enlarged Tau Alpha Pi key, tutoring, helping to maintain the college's laboratory equipment and facilities, sponsoring guest speakers, and providing technical assistance and services to local

left to right: Jeff Utterback (Sgt./Arms), Hahn Nguyen (Secretary), John Sennett (President), Dr. D. Kyriazopoulos (Adviser), John Mulkey (Vice-President), Ed Putlack (Treasurer).



industry. Officers (Spring '85): Richard Liesse (President); Gary Ritchie (Vice-President); Kevin Sampson (Secretary); Anthony Campbell (Treasurer).

Front, left to right: Prof. Ralph Preiser (Adviser and Sponsor), Gary kitchie (Chapter Vice President), Sherman Raines, Executive Director Frederick J. Berger, Richard Liesse (Chapter President), Dale Chalkey, Prof. John Murphy (Adviser). Back, left to right: Thomas Van Buren, Rodney Vickers, Kevin Sampson (Secretary), Anthony Campbell (Treasurer), Scott Sondgeroth, Clayton Foster.

XI ALPHA (California State Polytechnic University, Pomona): OnJune *7,* 1984 the chapter held its annual banquet at Sir George's restaurant. New members were initiated, and the chapter attained its largest membership in the history of its existence. New officers were elected. The keynote talk was given by Bill Donovan, the chapter's previous president, who spoke about the role of the engineering technologist in today's technological society. On January 1 7, 1985 the chapter held its second induction ceremony of the academic year at Eric's restaurant. Among the chapter's activities was the casting of a nine-ipch brass replica of the Tau Alpha Pi key, prepared by Matthew Sellers, the chapter's president. The key was presented to the Engineering Technology department. An ongoing activity among members is the assisting with add-drop procedures on the first day of each quarter. For the future, the chapter is looking into the establishing of a scholarship to be awarded to a niember with the highest average. Officers: Matthew Sellers (President); Myron White (Vice-President); Dana Cohen (Secretary); Nicholas Scalero (Treasurer).

Xl BETA (Northrop University): The chapter conducted initiation ceremonies on May 29,1984, and the initiates were honored ata dinner given during the summer. Officers (1984): Robert H. Blechen (President); Daniel J. Meadows (Vice-President); Richard Garcia (Secretary); Louis DiCioccio (Treasurer). Officers (1985): Jose R. Martinez (President); Kacey Christie (Vice-President).

OMICRON BETA (Union County College, New Jersey): An initiation breakfast was held at the Scotch Plains campus on April 30, 1985. Thirty outstanding students were inducted. Also present at the breakfast were Dr. Nunney, President of Union County College, and Dr. Leonard Kreisman, Vice-President for Academic Affairs. The chapter plans to invite guest speakers from local industries. Officers: Paul Zurka (President); Fred Petersen (Vice-President).

OMICRON EPSILON (Middlesex County College): The chapter sponsored as guest speaker Dean Stan Thomas of New Jersey Institute of Technology, who spoke on "Technology-Engineering, a Comparison of Both Fields." In addition, chapter members visited the Princeton Plasma Labs to see the fusion reactor facility. Officers: James T. Heal (President); Gary S. Heyer(Vice-President); Linda Slonksnes (Secretary-Treasurer).

P1 ALPHA (Purdue University): The chapter held its initiation and banquet on March 24, 1985. Dr. Steven Beering, President of Purdue University, was the guest speaker. The chapter presented for the first time two awards for excellence in teaching--to Professor Glenn Blackwell (electrical engineering technology) and Professor Hal Roach (mechanical engineering technology). Included in future plans is a showcase inside the new Technology building to make Pi Alpha chapter more visible. Officers: Keven Furiya (President); Lindsay J. Klebenow (Vice-President); Luther Chao (Secretary-Treasurer).

Standing left to right: Prof. Fred Emshousen (Adviser), Linsday Kiebenow, Michael Huggins, Terry Echard, Brian Meyer, fom Wallace, Phillip Steinhofer, Daniel Showalter, Keven Furiya, Michael Jankoviak, Steve Shell, Bob Petri, Prof. Eugene Nix (Adviser). Seated left to right: Jim Clark, Andrew Berger, Mark Heaps.

P1 BETA (Indiana University-Purdue University at Indianapolis): The chapter held initiation and banquet on April 11, 1985. In the future the chapter will sponsor guest speakers from industry and hold a fund-raising event. Officers: Marjorie Normington (President); Loretta Mahoney (Vice-President); Michael Fleming (Secretary).

Former and new officers, left to right: Loretta Mahoney (Vice-President), Melvin Matchett (former President), Bobbie Jo Laughter (former Secretary), Michael Fleming (Secretary), Prof. Richard Pfile (Adviser), Marjorie Normington (President).

P1 EPSILON (Indiana State University): The chapter proudly reports that three of its member-graduates are in graduate school and feels certain that Tau Alpha Pi membership helped them to be accepted. Pi Epsilon this past year initiated a Tau Alpha Pi scholarship to be awarded to the student with the highest GPA. The recipient was Alan C. Wahlstrom. In order to raise funds for the scholarship, Professor Gross donated electronic game machines. Officers (1984): David Hodges (President); Daniel Weese (Vice-President); Gary Norman (Secretary); Jeffrey Erwin (Treasurer). Officers (1985): Ronald Aust (President); John Esarly (Vice-President); Debra Simpson (Secretary); David Graper (Treasurer).

RHO ALPHA (Colorado Technical College): On June 9, 1985 the members of Rho Alpha attended a dinner and theater party in honor of new inductees. The chapter holds one honors dinner during each quarter and plans to continue to do so. Officers: Mike Schaffer (President); David White (Vice-President); Candice Skiff (SecretaryTreasurer).

RHO GAMMA (Metropolitan State College): During the academic year there was much discussion concerning the recognition of the college.

The participation and efforts of Tau Alpha Pi members helped prevent the weakening of the programs of the School of Engineering Technology. Officers: Russel Jent (President); Richard May (Vice-President); William Alan (Secretary); Gary Morrison (Treasurer).

SIGMA GAMMA (St. Petersburg Junior College): The chapter held initiation on February 22, 1985. Among its projects, the chapter arranged tours of local industries, invited guest speakers, and sold mathematical handbooks. Fund-raising events included a car wash and a laser show at the Bishop Planetarium. Tutoring service continued, and an on-line computer registration system for students requesting tutoring was implemented. The chapter plans a trip to Kennedy Space Center to view the shuttle launching. It plans to paint a large Tau Alpha Pi emblem in front of the College Library, to obtain high technology product demonstration tapes to be viewed at meetings, and to have jerseys with screen printing of TauAlpha P1. Officers: Michael R. Freifeld (President); Timothy M. Smith (Vice-President); Sarah A. Howard (Secretary); Kelly Jo Caffery (Treasurer).

UPSILON ALPHA (Northern Arizona University): The chapter held initiation and a banquet on December 10, 1984. Its major project has been the sponsoring of the NICET test for technologists. Tutoring and field trips will continue to be among the chapter's activities. Officers:
Steve Becker (President); Joe Provenzola (Vice-President); Keith Schick (Secretary-Treasurer, 1984-85); Charles Weddle (Secretary-Treasurer, Spring, 1984).

UPSILON BETA (Arizona State University): The chapter held its initiation banquet on April 27, 1985. Meetings were held during the academic year, and guest speakers from the university and from professional organizations were invited. Fund-raising has continued in order to establish aTau Alpha Pi excellent service-scholarship award to be presented to a deserving member, and industrial backing for this scholarship is also being investigated. Since Arizona State celebrated its centennial this past year, Tan Alpha Pi participated in many centennial activities, presentations, fairs, and banquets. Officers: Sheila Payne (President); Kent Home (Vice-President); Norma Ponce (Secretary-Treasurer).

UPSILON DELTA (DeVry Institute of Technology, Phoenix): The chapter inducted new members on May 29, 1985. On June 1, it had a catered picnic. Chapter members assisted at commencement. Among its projects, the chapter designed a certificate of recognition to be awarded to officers and members who contribute significantly to the chapter's activities. Plans include tours of local industries. Officers:
Gordon Hamlin (President); Robert Bielby (Vice-President); Bruce Jesperson (Secretary); David Monfore (Treasurer).

CHI ALPHA (Vermont Technical College): The chapter held meetings on a regular basis.lt initiated Professor Joseph Moore as an honorary member. It also sponsored a ceremony in honor of Edna Braun of the Registrar's office for her efforts in behalf of students and for serving as an inspiration to students. Officers: Bruce Therrien (President); Mark Willette (Vice-President); James Kraft (Secretary); Jeffrey Zack (Treasurer).

CHI BETA (Norwich University): Initiation ceremonies were held on April 3, 1985. Future plans call for making Tau Alpha P1 more visible on campus by designing and mounting a plaque bearing the names of Chi Beta members. Officers: John Perreault (President); Robert O'Brien (Secretary); Michael Brank (Treasurer).

PSI DELTA (State Technical Institute at Knoxville): On April19, 1985 the chapter held initiation ceremonies, inducting eighteen new members. Chapter members have been tutoring students and will continue this activity. Officers: Allan Fite (President); Curtis Roden (Vice-President); Jim Shropshire (Secretary); Jim Amburn (Treasurer).

Left to right: Michael Brank (Treasurer), John Perreault (President), Robert O'Brien (Secretary).

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OMEGA BETA (University of New Mexico): Chartering ceremonies were held on October 20, 1984. Seven members were initiated. Professor FrederickJ. Berger, Executive Director, was the main speaker at the initiation banquet. Two persons were given special recognition and hnors for their efforts in developing the electronics technology program--Dr. Richard Williams, associate dean, College of Engineering, and Mr. Stan Love, supervisor, Education and Training at Sandia National Laboratories. On April 13, 1985 the chapter held its spring initiation banquet. The main speaker Mr. Herb Pitts, director of Sandia's Personnel department, spoke on the importance of education. The chapfer recognized and honored Mrs. Vivian Kent, staff assistant in electronics technology. The chapter instituted a tutoring program and as a future undertaking, it plans to establish a full tuition scholarship for an outstanding student in electronics technology. Officers: Leonard Martinez (President); Robert Evans (Vice-President); Alan Emord (Secretary-Treasurer).

Front row, left to right: Alan Emord (Secretary-Treasurer), Robert Evans (Vice-President), Leonard Martinez (President), Executive Director Frederick J. Berger. Back, left to right: Prof. Rhonda Hill (Advisor), Alan Carlson, Sam Hindi, David Knott (Advisor), Greigh Gordon, John Benecke.

ALPHA D.C. (University of the District of Columbia): The chapter held its initiation and dinner on April 19, 1985. The guest speaker was Mr. Raymond Paul, manager of Combat Systems Effectiveness Engineering for the Naval Sea Systems Command. He spoke on “Success and the

Competitive Advantage in the World of High Tech.” In his address, Mr. Paul commended the students on their scholastic achievement and encouraged them to “exemplify the courage, the wisdom, and the strength that good leaders need” as they “strive for continued excellence in engineering and technology.” Mr. Paul emphasized that there is need to realize that strength, power, and capabilities are within ourselves. Future plans of chapter include tutoring and continued contact with university officials to obtain scholarship funds to ease the tuition burden of deserving Tau Alpha Pi members. Officers: Charles A. Williams (President); William A. Caldwell (Vice-President); Lenwood Washington (Secretary); Michael J. O’Connor (Treasurer).

ALPHA KANSAS (Kansas State University): Chapter members participated as team captains for the Engineering Technology department in the all universitytelefund. Theyalso presented a display at open house to promote engineeringtechnologyand show students at work in labs and class on projects illustrating engineering theory and application. Officers: Steve C. Otter (President); James Young, Jr. (Vice President); David Novotny (Secretary); Kraig Nunn (Treasurer).

ALPHA MICHIGAN (Lake Superior State College): The chapter held its first chartering ceremonies on May 1 7, 1985. At a subsequent meeting, plans were discussed to participate in the college’s winter carnival, to tutor students, and to raise money for plant trips. Officers : Michael B. Hawn (President); Lon B. Ricker (Vice-President); William Buehler (Secretary); Thomas H ulsher (Treasurer).

Front row, left to right: Dr. Michael Kavanaugh, William Buehler, Guy Archambeau, Michael Hawn, Ion Ricker. Back row, left to right: Patrick Cox, Tom Hulsher, Gerald
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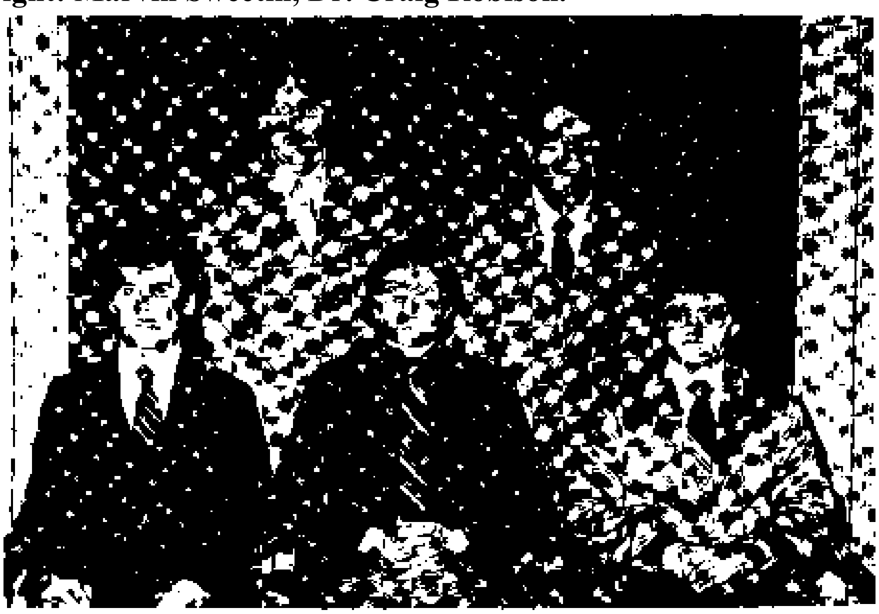
ALPHA OKLAHOMA (Oklahoma State University): The chapter held its initiation banquet on April 19, 1984, initiating eleven new members. The Tau Alpha Pi Outstanding FacultyAward was presented toJames K. Shelton, associate professor of electrical power technology. On the agenda of future activities is the updating of a display case to illustrate the meaning and responsibility of Tau Alpha Pi membership. Officers:
Bryan Olmstead (President); Gary Prophet (Secretary); Lee Jackson (Publicity Chairman); Marvin Sweetin (Membership Chairman).

Front row, left to right: Bryan Olmstead, Gary Prophet, Lee Jackson. Back row, left to right: Marvin Sweetin, Dr. Craig Robison.



ALPHA WISCONSIN (Milwaukee School of Engineering): On May 9, 1985 the chapter held its initiation and inducted new members. The chapter experienced some reorganizing under the

guidance of Professor Ray Palmer, to whom gratitude is expressed. It plans to hold future initiations followed by banquets and possibly guest speakers.
Officers: David .1. Schmocker (President); David E. Knoll (Secretary); Kurt Stoebs (Activities Coordinator).

GAMMA LOUISIANA (Southern University, Baton Rouge): The chapter held initiation of new members on March 29,1985. As one of its current activities, the chapter sponsors a speech seminar on a weekly basis. Future activities include tutoring services and fund-raising. Officers:
Paul Bridgewater (President); Karl Scienaux (Vice-President); Alfrenetta Cooper (Secretary); Leslie Wilford (Treasurer).

Honor Roll

The officers and members of Tau Alpha P1 National Society hail and greet the following affiliate chapters newly elected during the year of 1 984-85. We congratulate the institutions for having the foresight to initiate aftiliate chapters of Tau Alpha Pi at their respective campuses. We congratulate these charter members and say to them that they should be proud of their designation, for Tau Alpha Pi National Honor Society for students in Engineering Technology is the most selective of all honor societies, accepting only the top 4% of all technical students enrolled at a college or university.

We hope that the charter members will establish a solid and firm foundation so that those who follow them will be able to build upon it. Our best wishes for success in the endeavors of Tau Alpha P1.

Frederick J. Berger
Executive Director/Secretary
Tau Alpha Pi

DELTA EPSILON CHAPTER
Chartered April 26, 1985, Central New England College: Dean Paul L. Ryan, Sponsor; Mr. Patrick A. Rossi, David W. Eaton (Dean of Students), Advisors.

Charter Members
Christopher Logan Louis Desy Lucille Ayers
Kerry Monast Gayle Kenney Lena Ktistakis

NU **GAMMA CHAPTER**
Chartered November 17, 1984, DeVry Institute of Technology: Timothy N. Capagna (Dean of Students), Sponsor; Martin F. Ehrenberg, Leonard J. Geis, Steve Waterman, Advisors.

Charter Members

Paul A. Arnone	Lawerence Nielsen	Wayne Brandt
Donald Brunner	Clifford Riordan	John Chramowicz
Kenneth L. Rinehart	Paul Niessen	William Pyritz
Andrew H. Linstad	Robert Cynowa	Laurie Lamantia
Joseph A. Jasmin	Joseph C. Ghislain	Rona Barron

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NU EPSILON CHAPTER
Chartered April 19, 1985, Illinois Valley Community College: Ralph H. Preiser, John Murphy, Sponsors.
Charter Members
Alumni Members
Richard Allen Liesse
Gary D. Ritchie
Kevin John Sampson
Anthony Quinn Campbell
Sherman E. Raines
Rodney L. Vickers
Clayton Foster
Dale Chalkey
Scott Sondgeroth
Thomas Joseph Van Buren
Anthony G. DeVera
Allen Hanson
Jay Harvey
Kim Keutzer
OMEGA BETA CHAPTER
Chartered October 20, 1984, University of New Mexico: Rhonda Hill, Sponsor; Dave Knott, Stanley L. Love, Richard H. Williams (Assoc. Dean), Advisors.
Charter Members
Alumni Members
Allan Frederick Emord Robert Teele Evans
Greigh Gordon
Leonard Ernest Martinez
John David Benecke
Alan Lowell Carison
Samuel Amin Hindi
ALPHA MICHIGAN CHAPTER
Chartered May 17, 1985, Kavanaugh, Sponsor; Dimitri

Charter Members
Lake Superior State College: Michael F.
Diliani, Advisor.
Michael Hawn
Thomas Hulscher

Guy Archambeau
William Buehler
Patrick Cox
James Latulip
Gerald Murdock
[on Ricker

Collegiate Chapters of Tau Alpha P1 National Honor Society for Engineering Technology

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Southern Technical Institute
1112 Clay Street
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Prof. Paul Wojnowiak

ALPHA BETA CHAPTER
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250 North Arcadia Avenue
Decatur, Georgia 30030
Prof. John Blankenship

ALPHA DELTA CHAPTER
Savannah State College
Savannah, Georgia 31404
Dr. Lester B. Johnson

ALPHA EPSILON CHAPTER
Fort Valley State College
Fort Valley, Georgia 31030
Prof. Fereydoun Jalali

BETA ALPHA CHAPTER
Academy of Aeronautics
LaGuardia Airport
Flushing, New York 11371
Prof. Joseph J. Scalise

BETA GAMMA CHAPTER
Queensborough Community College
of the City University of N.Y.
Bayside, New York 11364
Dr. Nathan Chao
Prof. John Hennings
Prof. Bernard E. Mohr
Prof. Franz Monssen
Prof. Gaetano A. Giudice
Prof. Russel K. Hotzler

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CUNY
Bronx, New York 10453
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Prof. Stella Lawrence
Prof. Herb Tyson
Dr. Manuel Stillerman

BETA EPSILON CHAPTER
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80 Vandenburgh Avenue
Troy, New York 12180
Dr. John Nagi

BETA ZETA CHAPTER
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715 Ocean Terrace
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Prof. Sol Lapatine

BETA THETA CHAPTER
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Prof. Robert L. Reid

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Prof. John A. Stratton

Prof. Dave Krispinsky
Prof. Richard Hultin

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Prof. James T. Vize

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Technical Career Institutes
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Prof. Ben Zeines

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Agricultural & Technical College
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Prof. Arthur Hurlbut
Prof. Wayne Ratowski

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Dr. Edward Kafrissen

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Prof. Philip F. Alesso
Dr. William B. Bruce
Dr. Gary T. Fraser

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Prof. David Wells

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Prof. Albert E. Staub
Prof. Robert L. Mott

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Dr. James D. McBrayer
Prof. Donald Paul Moore

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Prof. Ira Jay Scheer
Prof.. Barry Brey

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Ms. Kordi Heidel
Prof. Eric W. Hansberry

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Dr. Richard P. D’Onofrio
Dr. Murray Shapiro
Prof. Carol F. [lehman

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Prof. Alden W. Counsell
Dr. Dean J. Schmidlin
Prof. Lenine Consalves
Prof. Fryderyk E. Gorczyca

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Central New England College
768 Main Street
Worcester, Massachusetts 01610
Prof. Paul L. Ryan
Prof. Patrick A. Rossi

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Prof. Richard A. Bain
Dr. Leslie Thede

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Prof. Terrence Freeman
Prof. Carl H. Dietz
Prof. Vincent J. Cavanaugh

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Houston, Texas 77004

Prof. Ronald C. Pare’

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4250 North Beltline Road
Irving, Texas 75062
Prof. Allan Eschser

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Texas A and M University
College Station, Texas 77843
Prof. George B. Wright
Dr. Russell E. Puckett

ETA BETA CHAPTER
University of North Carolina
UNCC Station
Charlotte, North Carolina 28223
Prof. Pao Lien Wang
Prof. Edward M. Willis

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Roanoke, Virginia 24015
Dr. Martin Levine

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Norfolk, Virginia 23508
Prof. Leonard A. Hobbs

IOTA BETA CHAPTER (17 Chapters)
of the Commonwealth Campuses of Pennsylvania State University Worthington Scranton Campus
120 Ridge View Drive Dunmore, Pennsylvania 18512 Prof. Frank Yatsko (Coordinator)

Altoona Campus
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Prof. Mervin H. Hostetler

Beaver Campus
Monaca, PA 15061
Prof. Alfred D. Talvola

Behrend Campus
Wesleyville, PA 16510
Prof. Howard T. Wilson

Berks Campus
Reading, PA 19608
Prof. Arthur P. Hill

Delaware County Campus
Media, PA 19603
Prof. John Sidoriak

Dubois Campus
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Prof. Ross A. Kester
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Dr. Michael Parten
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CODE OF ETHICS OF ENGINEERS

THE FUNDAMENTAL PR!NCIPLES

Engineers uphold and advance the integrity, honor and dignity of the engineering profession by.

I. using their knowledge and skill for the enhancement of human welfare;

II. being honest and impartial, and serving with fidelity the public, their employers and clients;

Ill. striving to increase the competence and prestige of the engineering profession; and

IV. supporting the professional arid technical societies of their discip1 i nes.

THE FUNDAMENTAL CANONS

1. Engineers shalt hold paramount
the safety, health and welfare of the public in the performance of their professional duties.

2. Engineers shall perform services only in the areas of their competen ce.

3. Engineers shall issue public statements only in an objective and truthful manner.

4. Engineers shall act in professional matters for each employer or client as faithful agents or trustees, and shall avoid conflicts of interest.

5. Engineers shall build their professional reputation on the merit of their services and shall not compete unfairly with others.

6. Engineers shall act in such a manner as to uphold and enhance the honor, integrity and dignity of the profession.

7. Engineers shall continue their professional development throughout their careers and shall provide opportunities for the professional development of those engineers under their supervision.
Approved by the ECPD Board of Directors, October5, *1977*