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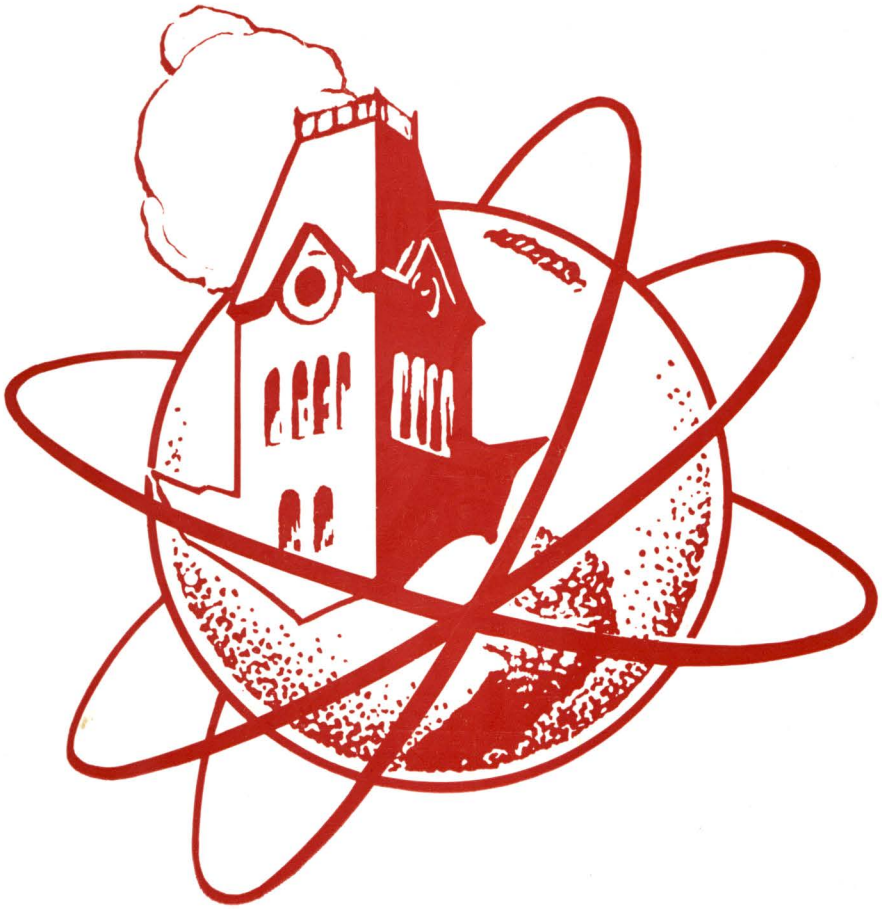
Mrs. Johnson

the JOURNAL

WORCESTER POLYTECHNIC INSTITUTE



Pride in Our Past:
Faith in Our Future
1865-1965

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1964

TOTAL WEAPONS COMPONENT FORGING CAPABILITY

IN ORDNANCE ARMAMENT EXPERIENCE — as a supplier to defense systems contractors, Wyman-Gordon has forged parts for virtually every plane, missile, satellite, spacecraft and booster in our aerospace fleet as well as many ground military vehicles. Long experience with stringent quality and metallurgical requirements of such weapons and vehicles has permitted this organization to contribute significantly in allied fields of nuclear, avionic, vessel and propulsion systems forgings as well.

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IN APPLIED RESEARCH — Wyman-Gordon research laboratories — best staffed and largest facility in the forging industry — continuously pursue basic studies in all areas of metallurgy and techniques of forging. Findings are substantially extending the scope of forgeability in numerous areas — from beryllium components to all-titanium missile motor cases — placing ever more desirable properties in the hands of armament designers.

IN PRODUCTION VERSATILITY — as one of the country's outstanding forge shops, in both multi-plant facilities and hot-working capacity, Wyman-Gordon is equipped to handle any production tonnage — in any state from forgings through rough machining. In die sinking and metalworking facilities, both conventional and numerically-controlled, this organization is without rival. Capabilities include special handling of developmental-run and prototype forgings of any size and specification.

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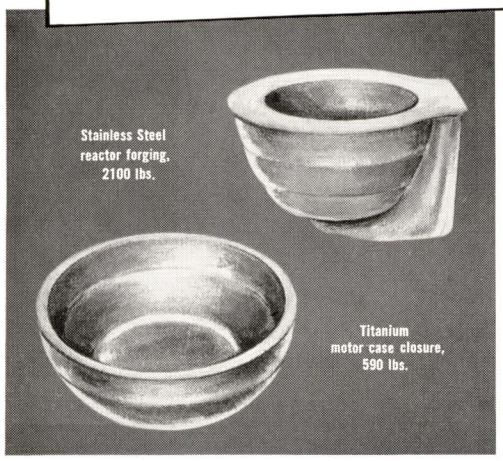

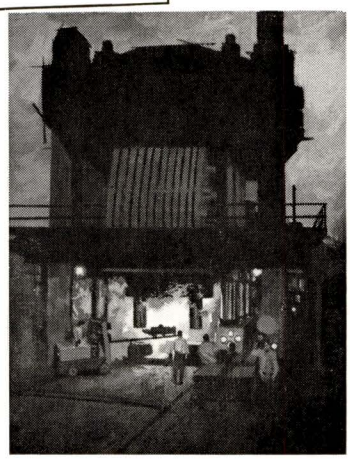

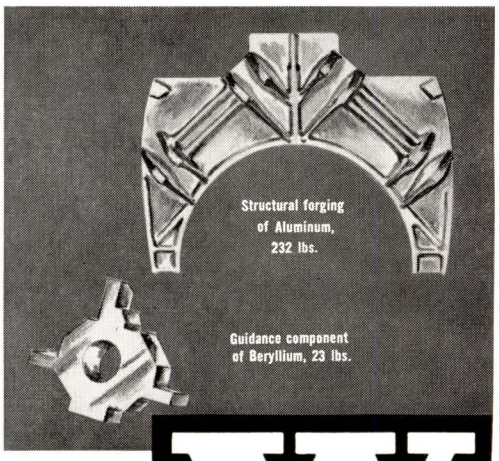

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The JOURNAL

WORCESTER POLYTECHNIC INSTITUTE

VOLUME 68

September-October 1964

NUMBER 1

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EDITOR'S NOTE—A new cover for a new century. For the past year we have been planning this change, consulting with a local advertising agency and subsequently with the Alumni Council. We hope you will like this new format.

The JOURNAL

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IN THIS ISSUE

CENTENNIAL YEAR OPENS

"Engineering and Science—Partners in Progress" is theme of a two day series of symposia

"Engineering and Science — Partners in Progress." This was the theme of the Centennial celebration marking the first 100 years of engineering and science education at Tech. The events began with a luncheon on Thursday, October 8, in Morgan Hall, followed by an afternoon address in Alden Memorial, a banquet at Pleasant Valley Country Club, and a convocation on Friday, October 9, in the Worcester Memorial Auditorium.

The opening luncheon was presided over by Milton P. Higgins, chairman of the Convocation, who introduced President Storke as the opening speaker. Following the President's introduction, the Honorable Endicott Peabody, Governor of the Commonwealth of Massachusetts, was presented. The Governor stated, "Massachusetts is proud of Worcester Tech and I am proud as governor to look back to Boynton, Washburn and Goddard— to look admiringly at the productive present — and to contemplate a flourishing future under the presidency of General Storke."

The main speaker at the luncheon was Dr. Harry J. Goett, who was introduced by J. Norman Alberti, '24, chairman of the Centennial Committee. Dr. Hugh L. Dryden was to have addressed the opening session but was unable to attend because of illness. In his address, entitled "Our Current Efforts in the Scientific Exploration of Space and Its Challenge to Education," Dr. Goett first described the progress currently being made in our space effort and then noted three distinguishing features. First, he said, "The new era . . . connotes a return to what was once called natural philosophy . . . It represents a redirection of interest away from the increasingly narrow specialization which has characterized the physical sciences in the last decades.

"The second distinguishing feature of the scientific research in space is the fact that the various scientists have only been able to make their observations . . . by virtue of the hardware developed by the engineer.

"The third and possibly most imposing challenge of the Space Age is the potential feed-back of its developments into the civilian economy. In the long run, the justification of our space budget must stand on this 'fall-out.' "

Dr. Goett concluded by stating "These three developments of the Space Age present a new challenge to our educational process. They are the interdisciplinary collaboration of various scientific specialists . . . and suggest a re-examination of the educational process and its curriculum by those competent in this field to see whether they think it has been properly adjusted to meet these new challenges of the Space Age."

The afternoon program began at 3:00 p.m. in Alden Memorial with a short welcome by President Storke. Dean M. Lawrence Price introduced the speaker, Ronald B. Smith, senior vice president of the M.W. Kellogg Company and immediate past president of the American Society of Mechanical Engineers.

"Engineering — A Profession of Change" was the title of Smith's address. Citing three challenges — Excellence, Purpose, and Foresight— Smith stated that the support of industry is necessary to meet these challenges.

"If engineering as an art, is to serve mankind by combining disciplined intuition with judgment, courage with responsibility, and scientific competence with economic sense, then its internship must not only be realistic but orderly. It had best begin early, under the rational environment of academic life, fully exposed to professional purview." Smith's address is printed in this issue on page 8.

That evening the spotlight shifted to Pleasant Valley Country Club, where the Centennial banquet was held. Before an audience of 500 alumni, faculty and friends, Dr. J. Herbert Hollomon, assistant secretary of commerce for science and technology, delivered a provocative address entitled "Engineering and the Great Society."

"Can we reasonably expect science and technology in the next two decades, for example, to produce milestones comparable to unlocking the secrets of the atom and opening the doors to exploration of the universe? Without question, we can, if we can preserve the very society that nurtures our science. We can expect life itself to be created, aging to be understood and perhaps eliminated, thinking processes and creativity to be understood and simulated, the outer reaches of space explored, the origin of nuclear forces understood."

Dr. Hollomon, noting that much of this progress depends upon engineering, stated that significant changes in engineering would have to occur if it is to play its proper role in the society of the future.

Also at the banquet, Philip M. Morgan, chairman of the Centennial Fund, announced that the goal of this, the first phase of the Ten-Year

The Centennial Convocation, held in Worcester Memorial Auditorium, was attended by a large number of students, alumni, and faculty.

Plan, is $15 million. He stated, "Although we formally kick off the Centennial Fund tonight, we do so with quite a running start. It is my pleasure to announce that through the great generosity of trustees, alumni and friends of Worcester Tech, we begin our efforts with a head start of $3,085,869.90."

The Centennial Fund is a three-year program during which alumni, friends, corporations and foundations will be asked to contribute to Tech. During this three-year period, the Annual Alumni Fund and the Centennial Fund will be combined. An alumnus contributing to the Centennial Fund will receive credit for contributing to the Alumni Fund during *each* of the three years.

Mr. Morgan stated, "We note the pride we feel in our past—from these gifts we are reminded of the faith of many in our future. A faith we know is shared by many more throughout this land. It is in this faith that we turn now to the task before us and to the education of succeeding generations of students who will climb Boynton Hill in the next 100 years."

The Centennial Convocation on Friday, October 9, at the Worcester Memorial Auditorium was unquestionably the major event of this Centennial celebration. The representatives from over 140 colleges, universities and learned societies, marching together with the faculty and trustees in the procession, provided a colorful spectacle for those who witnessed this event.

The awarding of four honorary degrees was a highlight of the program. Receiving honorary doctor of engineering degrees were Mr. Ronald B. Smith and Dr. J. Herbert Hollomon, while Dr. Vannevar Bush and Dr. Hugh L. Dryden received honorary doctor of science degrees. (Dr. Dryden's degree was accepted by Dr. Goett.)

Mr. Higgins introduced President Storke, who then delivered his Centennial message. "With good conscience and considerable satisfaction we review the past. And to meet the challenge of the morrow, we depend on the alert *mind*, the skillful *hand*, the sturdy *spirit*, and the understanding *heart*. With these resources . . . our future is assured," he said. The full text is printed in this issue starting on page 4.

The Centennial Convocation address was delivered by Dr. Vannevar Bush, honorary chairman of the corporation of Massachusetts Institute of Technology. Dr. Bush was introduced by Wayne E. Keith, '22, chairman of the Board of Trustees.

Addressing himself to the question, "What is an Engineer?" Dr. Bush stated, "The engineer is concerned with both things and men, and they call for equal emphasis in his affairs. On the one hand he needs to understand broad ranges of science sufficiently so that he can, on need, acquire a workable grasp of a segment which is applied. . . . On the other hand he deals with all sorts of men's relationships so that he can analyze costs of manufacture or construction, plan sequences of operations, practice systems engineering, grasp and operate within the framework of great industries." The full text of Dr. Bush's address is printed beginning on page 14.

Pride in our Past, Faith in our Future—on this keynote Tech entered her second century.

THE CENTENNIAL YEAR

by President Harry P. Storke

I hasten to add my warmest welcome to that of Mr. Higgins — we are most happy to have such a fine gathering of our friends here at our Centennial Convocation this morning.

Yesterday, we were fortunate in hearing congratulatory greetings of the Commonwealth of Massachusetts from Governor Peabody, and addresses that were inspiring, thought-provoking, and challenging — from Dr. Goett, Mr. Smith, and Dr. Hollomon.

Then, last night, as you have probably noted in the morning papers, Mr. Philip Morgan, National Chairman of the The Centennial Fund, formally launched this intensive three-year capital funds campaign for *fifteen million dollars* as the first phase of Worcester Tech's ten-year development program. Over these three years The Centennial Fund will bring to Tech the much needed resources for strengthening our endowment and providing essential new facilities, most notably a new central library and a new multi-purpose auditorium. I am pleased to repeat the announcement of last evening that we begin this ambitious but vital new undertaking with gifts and pledges already in hand of over *three million dollars*. With such a demonstration of faith in our future our confidence knows no bounds. We invite each and every one of you to join with us in this magnificent adventure.

Governor Peabody (left) was greeted by President Storke (center) and Chairman Keith.

Now, this morning I ask you to take a moment and roam with me through fancy.

"In this mountain region of Germany there is a strange sight which most travelers sooner or later manage to see. It is a phenomenon of fearful portent to the superstitious villagers. The traveler is led by the awe-struck peasant guide, towards evening, to a certain secluded spot, where he may take in at a single glance an extensive and beautiful valley. But he is startled, as he gazes on the quiet scene, to see a human figure of marvelous size stretched at full length on the ground. *This* is the Giant of the Hartz Mountains. The figure is perfect. For an instant the dreams of Homer are realized. There, in very truth, is the Titan. So perfect is the illusion that the beholder can hardly be made to realize that the giant is *himself*. The slanting rays of the setting sun are so disposed by the surrounding hills as to throw his own image in miraculous proportions into the valley below him.

"Here let us find a figure of our work at the school. The traveler is the student — the giant, the man of the future. We see only the caprices of the boy — the future will see and feel the matured power of the giant. It is not the boy we are training, but the giant. Let us toil at our work, patient . . . full of faith and hope, and we shall see, across the far-stretching valleys of the future — the image of the giant before us."

So concluded Charles Oliver Thompson, the first principal of our school, at the dedicatory service for Boynton Hall, Worcester Tech's first building, in 1868.

After all these intervening years, I would speak across the valley of time to say to Principal Thompson: Sir, we have kept your faith. We have concentrated not only on the young men to be trained, but also on the giants they were to become. And today, because of

the dynamic pace with which our generation moves, this is not easy. To us, it often seems more difficult than it was a hundred years ago to visualize the final measure of our giants and to prepare our young men to step into their great shoes. But never fear, sir, we are just as eager — just as dedicated — as were you when first this school was started so long ago. For the task we are materially better equipped. Our friends are more numerous, our supporters more dedicated and wholehearted. And, all those assets considered, we believe that our results are almost comparable to all that you accomplished so well, with so little.

School had been in session for only one short day before the impressive day-long dedication ceremony from which my opening remarks were borrowed. At that time there were still many persons who were dubious about the "hazardous experiment" about to begin on Boynton Hill.

There have been many other significant dates in the history of Worcester Tech — its incorporation, the formal acceptance of its charter, the two first buildings — for that matter, our most recent building — or a new course (the list is long) — or another entering class of freshmen. But the date I particularly like to think about is that fall day in 1864 when this school we know as Worcester Tech first began to take shape in the mind of a lonely man in a neighboring town — John Boynton. This date was the most important, I contend, and most precarious, moment in the school's existence. Long before the thought became a campus, that plan spent considerable time as nothing more than a dream.

Yes, it would appear that that fall day in 1864 — a hundred years ago — was when the story really began. But of course there were other factors — of timing, of persons, of ideas. And so, in this as in all human stories, beginnings are nebulous. Cause and effect have muted and tangled fringes that defy our unravelling. Human experience has few boundary lines, and seldom does life divide itself neatly into chapters.

Because experience has this lack of measured pace, we resort to dividing time into segments. We portion off our years into days and hours and minutes. We even go further and mark our birthdays, our anniversaries. It is perhaps understandable, then, that when a Centennial comes along, we can do no less than greet it with full panoply.

As Sidney Lanier once suggested — there are times when the "future dares not forget the past." This, I believe, is one of those occasions.

This occasion today is a sort of monument—of sentiment, intangible — a monument to our founders and to the ideals and dreams for which they lived — an occasion when we may justifiably say to the world: This is how far we have come. This is where we stand, after a hundred years of constant journey.

J. Norman Alberti, '24 (left), and Milton P. Higgins confer on last minute details.

The concept of what kinds of giants our young men are to become has changed, and for their training the school has had to undergo a constant shifting of emphasis. In that elusive thing called progress — and of this we claim our full share in this Centennial year — we have been aware that treasuring and cherishing is just as important as changing and discontinuing. We have done a proportionate share of both keeping and discarding — deferring to the past, but never becoming preoccupied with it. The past, as has been said so often is to learn from, not to live in.

Our history is full of evidence that Worcester Tech has consistently moved ahead. And, if apart from quality, as Aristotle put it, there is no value, Worcester Tech deserved full prerogative and prestige in the world of education. Our uniqueness of achievement has come with a price, a price paid by hundreds of loyal persons who have served our institution in various capacities — persons who periodically have had the courage to reexamine their convictions and make decisive decisions for self and society.

With good conscience and considerable satisfaction we review the past. And to meet the challenge of the morrow, we depend on the alert *mind*, the skillful *hand*, the sturdy *spirit*, and the understanding *heart*. With these resources our past has prospered. With them, our future is assured.

Yes, we can truly say that we have PRIDE IN OUR PAST and FAITH IN OUR FUTURE.

Our Current Efforts in the Scientific Exploration of Space and Its Challenge to Education

Excerps from an address by Dr. Harry J. Goett,
Director of the Goddard Space Flight Center

It is a privilege to be with you in these halls which sparked the mind of the father of the Space Age, Dr. Robert H. Goddard. We see in him the embodiment of the curious and far-seeing scholar who best exemplified the theme of this convocation—the partnership of engineering and science in progress. Two generations ago, well ahead of his time, he gave us the theory and tools with which to reach into the universe in our never-ending quest for knowledge. Those who read his reports cannot help but be impressed by the fact that it was due to the unique combination of the scientist and an engineer in a single individual, that enabled Dr. Goddard to be as far ahead of his time as he was.

We are now on the threshold of the Space Age which will require the same combination of the vision and practical application which characterized Dr. Goddard's work. Just as some 500 years ago man ventured beyond the Mediterranean, leading to the discovery of the new world, so today, man is breaking his earth-bound shackles to venture into space. Aside from the technological advances to which we are witness today, we must expect possibly even greater changes to our political, social and educational concepts.

Those earlier explorations extended the horizons of the times in a literal sense, but even more important, they opened up new possibilities and concepts. They forced the people out of their established patterns of thought and produced an intellectual ferment and interest in new ideas necessary for the scientific revolution and for the political and social advances of the 18th Century. These explorations were the most important events of that time; now some 500 years later, the space program is destined to play that same role.

The challenge posed by the Space Age is therefore addressed not only to the scientist and the engineer who are directly engaged in its projects. More importantly, it is a challenge to our society and, in particular, to its educational processes. The physicist, the astronomer, the geodesist, and mathematician, the geologist and the astrophysicist, all have new frontiers open to them. Their job as scientists is to bridge the gap between the known and the unknown. Are they being educated in such a manner as to prepare them to do this job in that new laboratory of space that has been opened up to them?

The job of the engineer, in contrast to the scientist, is to use the resources of nature for social ends—to bridge the gap between the known and the desired. The laboratory of space has already opened up a new "known" to the engineer in the field of communications and meteorology. The experimental communication satellites — Syncom, Relay, Telstar and Echo — have answered many of the questions that used to exist relative to the use of satellites for communication. The job of the engineer now is to translate this knowledge into a system that will be better than the under-ocean cables.

The experimental meteorological satellites — Tiros and Nimbus — have demonstrated the utility of cloud pictures taken from satellites as an additional operational tool for weather forecast. The job of the engineer is to translate this knowledge into a practical and economical operational system.

Is the engineer being educated in such a manner as to enable him to exploit these new developments in space?

We have seen the changes made during the past 30 years to adapt engineering education first to the new field of aeronautical and guided-missile engineering, later to the use of radar, still later to the adaptation of nuclear energy to practical uses. Space exploration will continue this trend. I think that even closer collaboration than heretofore is going to be required between the scientist and the engineer. There is growing a need for closer interdisciplinary collaboration between scientific specialists in various fields. Have our universities who are now training these scientists and engineers reacted to this trend?

The new era promised by the Space Age perhaps con-

notes a return to what was once called natural philosophy. The unifying element of these developments of the space program is a general spirit of inquiry into the nature of the external physical world. It represents a redirection of interest away from the increasingly narrow specialization which has characterized the physical sciences in the last decades.

The second distinguishing feature of the scientific research in space is the fact that the various scientists have only been able to make their observations that I have discussed by virtue of the hardware developed by the engineer. This is in distinct contrast to the biologist who could invest in a good microscope and do research comparable with the best.

The control equipment which enables the pointing of instruments with precise accuracy at the sun, the solar cell power supplies which supply the energy to run the experiments, the communication devices which bring back the information from outer space, all are developments which must come from engineers. In one sense, the situation has been reversed. Generally, the engineer exploits and puts to practical use the knowledge acquired by the scientist. But in space, the scientist seems to be particularly dependent on the engineer to develop new devices and techniques. Engineering, in this context, has become a more creative and trail-blazing profession.

The third and possibly most imposing challenge of the Space Age is the potential feed-back of its developments into the civilian economy. In the long-run, the justification of our space budget must stand on this "fall-out".

Everyone knows the drive for miniaturization of electronic components to reduce weight and size of space applications. We can foresee the pressure for electronic components to operate at very high temperature. There is a need for new developments for electronic apparatus to operate in the hard vacuum of space. New materials must be developed for the space environment. There are applications for cryogenics and new power sources. There is a special need for insuring long periods of unattended operation of mechanical equipment in space. The development of methods of lubrication in high vacuum, the creation of new sensing and control devices. Medical research for space will aid in the protection of man in other environments.

These are some of the most immediate returns of space exploration. In due course, they will surely be exploited by our civilian economy. But I submit that the engineering profession is confronted with a new challenge in its job of converting the known to the desired.

These three developments of the Space Age present a new challenge to our educational process. They are

Dr. Harry J. Goett addresses the opening symposium.

the interdisciplinary collaboration of various scientific specialists. The leadership of the engineer is needed in developing new techniques to enable the scientist to make his objectives in space and the creative thinking is required to apply the new development of space to our civilian economy.

If I were an educator, I would conclude this talk by suggesting some solutions. However, I claim no competence in the educational field; my job is to try and produce reliable satellites. Therefore, I will terminate my discussion by suggesting a re-examination of the educational process and its curriculum by those competent in this field to see whether they think it has been properly adjusted to meet these new challenges of the Space Age.

Engineering
—*A Profession of Change*

An Address by Ronald B. Smith
Senior Vice President
M. W. Kellogg Company

Sometime before the political conventions, President Lyndon Johnson, in stating his goals for the American way of life, postulated not only a rich and powerful society, but a Great Society — one in which "there is a challenge constantly renewed, beckoning us toward a destiny where the meaning of our lives matches the marvelous products of our labors."

Here in a few words is a tribute to the accomplishments of technology in the past, its challenge for the future. For, to the amazement of many, and surely to the wonder of those Olympian Gods who view our civilization with classical perspective, the meaning of our lives and the products of our labors are ever more closely bound to the innovations of modern technology. Despite the fact that in the eyes of most people the dynamic influence of technology is relatively young and often appalling, Society is not yet overly concerned that it has gone too far too fast, but only, as President Johnson has implied, with how its benefits can be more widely distributed and more evenly shared. The concept that technology can now be harnessed for the social, cultural, and economic benefit of mankind is enthusiastically embraced by the public and amply supported by the tax dollar.

The alchemy that has resulted from the modern-day union of science and engineering has wrought profound change. It has captured the imagination of the layman and professional as much as it has influenced the lives of both. Within nations, foreign policy and domestic policy, military policy and peace policy, business policy and leisure policy, are increasingly affected by the contemporary pattern of technology. Modern technology is no longer solely concerned with the physical needs of man, or with the forces and materials of nature. Because its influence on human relations is of significance, it is now in the limelight, where its accomplishments are weighed, perhaps superficially but often with finality, by a public whose interest is understandably selfish.

A new dimension has thus been added by which one will gauge the stature of the engineer. While this vector has the appealing scale of humanism, it points toward a more uncertain tense — the future. While it gives purpose to our efforts, and a vastly-broadened meaning to professional service, it has been applied with such suddenness that it has altered even the life of a profession whose purpose has been to effect change itself. The challenge of accelerated change is now ours; how we adapt ourselves and our services will determine whether we remain vital and vibrant under circumstances more dynamic than Toynbee envisioned when he said that "civilization is a movement and not a condition; a voyage and not a safe harbor."

As the Industrial Age has developed, nurtured in an enviroment of free government and free enterprise, engineering and its institutions, educational and professional, have increasingly directed their attention to organization oriented — analysis dominated — endeavors. These are the fields of Management, Operations, Sales, Manufacture, Production, and Construction, which represent the form and the order of a maturing civilization. Until World War II, the process of change was so sedate, and the cycle of innovative gestation so long and unemotional, that the field of design and development — the spiritual basis of engineering itself — attracted only those relatively few minds in which the creative urge was irresistible.

This sudden transfer of professional need as well as purpose, has sorely taxed the quality of engineering talent, and at times even its availability. But a corrective reaction at the educational level has been quick and proper — a re-emphasis in breadth and in depth upon scientific fundamentals, and reaffirmation that modern engineering is in itself a lifetime of intellectual growth. While the response has been rapid, it has not always been ideal, for in satisfying the demands for a broadened background in fundamentals, we have often permitted the teaching of engineering didactically rather than clinically; more often as a science than as an art. And in professional circles we have allowed our public image to tarnish while we have temporized with technical obsolescence within our ranks. We have failed to appreciate that a learned profession bears the social obligation of policing itself, and that a continuing appraisal by one's peers must always be the cherished badge of distinction. In short, we have been reluctant to embrace the concept that one's adaptability to change involves a never-ending process of intellectual regeneration that with maturity becomes ever more individual than institutional.

With the sum total of knowledge doubling at a fantastic rate, it is clear that a body of learning must always be bursting its bounds, and that at any point in time it is but a necessary and not a sufficient condition of professional excellence. To those who face forward, habits of thought are often more significant than historic fact. Just as Medieval Technology forced the experimental approach into Aristotelian philosophy, Modern Technology has re-emphasized the role of reason and logic in present-day culture. And simultaneously, it may have altered the relative emphasis between classical scholarship and professional experience in the teaching of engineering.

While these changes may be emotionally disturbing to a profession in security, they are healthy and exhilarating to a profession in transition. They mark the coming to age of a learned art which has often been too narrowly materialistic in its outlook, without adequately realizing the social implications of its efforts. But technical alchemy is such a strong elixir that social consequences can no longer be put aside. There is now a spirit of human understanding that must run through all of engineering. A thread of human compassion, so to speak, which binds together the bifurcation between the organization-oriented and the design-oriented branches of engineering, while it traces for both a new and more vital scheme. As Dean J. Douglas Brown of Princeton University said in his address at the dedication of their engineering center:

"The profession of engineering must seize the initiative in acting as a bridge between science and human needs. The Scientist is not asked to supply his findings through design. The businessman or the politician does not know what science offers or how to apply it. The engineering profession is the channel by which science can greatly improve our way of life providing it assumes the initiative of leadership rather than the passive role of the hired consultant."

This is not the voice of technology pleading its own cause; this is the voice of arts and letters exhorting technology to assert itself. It is a call for the profession to interpret for Society, in the language of society, the objectives of Science. To do so at a time in world affairs when the premium on scientific understanding is high and the desire for creative application urgent. Truly, this is the moment to add meaning to the lives of all, by binding technology not only to the material but to the spiritual needs of man.

Briefly, this is the backdrop — blurred to be sure by its continuing forward movement — as Worcester Polytechnic Institute enters its second century of service to the profession of engineering. Conceived in frugality and dedicated to the capitalistic proposition that the economy of a region is responsive to its technological preparedness, you have a proud heritage. Yours has been an ingenious reaction in private enterprise, as many of New England's industries have been sired by your influence; yours has been a breeder reaction in engineering education, as schools East, South and West have successfully followed in the footsteps of your academic plan. The profession salutes you, pays you its gratitude, as it pledges its help in the challenging years ahead.

Your first and great challenge, one you have met so often in the past, is the challenge of *Excellence:* excellence, within the framework of a new and vastly-broadened influence of technology, in the social, political, and economic aspects of a life in which Society at large not only understands more, but expects more. In view of the stakes and the conditions, now as never in the past, there is a need for wisdom and virtue by those who would practice the art of engineering. Because engineering in transition is increasingly in the hands of the young, theirs must be a wisdom of maturity which transcends age, and a sense of morality which transcends precept. Here is the unending challenge to those in teaching who know that by inspiration and exposition, intellectual growth can be accelerated while its horizon is extended, and that character and human value can be profoundly influenced by example and association.

This is a kind of educational idealism — epitomized by Mark Hopkins at one end of the bench and the student at the other — that becomes less practical as engineering enrollment increases; less feasible as engineering is but a part of an academic complex; less realistic as engineering is taught as a science by those who have never practiced it as an art. Increasingly, it is the kind of idealism the profession sorely needs if wisdom, integrity, and character are to balance the appalling power of alchemy now in human hands. Because now we do know how to build a silk purse from a sow's ear, and bring about events of near-ultimate destruction as well, the precious value of the intimate, independent, high-quality, professional college appears even more sharply etched. Seldom has the premium on

". . . this is the moment to add meaning to the lives of all, by binding technology not only to the material but to the spiritual needs of man."

teaching within the context of principle, judgment, and scientific awareness been so urgent; seldom has there been a time when the inward satisfaction of teaching within the spirit of an education for the whole man, so possible.

The second challenge is one of *Purpose:* do not be confused by the popular transposition of engineering science with engineering, for the difference between them is not just semantic; it is dynamic. Creative engineering is the art of skillful approximation, of decision-making at the earliest time for the maximum good. In the end, engineering is generally not even the solution of complex single-valued problems, but rather the early optimization of men, money, and material, within a scientific framework of the possible and not the perfect. Since engineering is studied by those who intend to practice it as an art, do not fail to portray the grandeur of its purpose and the exhilaration of its gamesmanship. The task of modern technical education is not just the teaching of engineering science within the shadow of a space-ship; it is also teaching the philosophy and the process of responsible decision-making reasoned from a background of up-to-date theory and fact.

The preparation of young people to be new men for a dynamic age involves more than the acquisition of knowledge. In the formative years there must be implanted in their minds and hearts the temperament which is the spirit and purpose of engineering. This is a process which can be accomplished only within a favorable atmosphere — only then through the efforts of great teachers whose hallmark of quality involves not only academic attainment but a background of accomplishment in the realm of professional practice. Let this be a characteristic by which Worcester Polytechnic Institute is distinguished from other institutions of higher learning in its second century of service.

Third, is the challenge of *Foresight:* foresight to break with tradition and to do today that which will be necessary tomorrow if excellence and purpose are to prevail in an environment of dynamic change. To some of us the moment seems opportune to match the moving parade of technological activity with an educational plan in which the creative art of synthesis as well as analysis and experimentation are adequately emphasized, and all three are portrayed as the means by which engineering fundamentals find their way to ultimate use. A plan wherein the iteration process of system and component design is exposed, at the same time the interface between the engineering disciplines is penetrated. A plan in which the gap between theory and practice is bridged by teachers of professional maturity, with engineering taught as a method, a temperament, and a philosophy broad enough to tame the unknown.

This may well involve the development of a clinical approach to engineering education, with its full impact undoubtedly reserved for the graduate years. It is a step beyond even great laboratories, such as the Alden. To achieve vitality, the situations as they are posed must be realistic, with the economic constraints of free, competitive enterprise prevalent. Clearly, we need a new concept of coordinated education, an increased use of adjunct professors, and possibly the integration of clinical development centers like the Mellon and the Armour, as a vital arm of technical college life.

To develop such an educational pattern, the understanding and the support of Industry is necessary. This coordinated plan is viable in a clinical sense, only to the extent that certain segments of industry contribute their talent, while others contribute their problems. These are talents not by moonlight, but by daylight; these are problems not in prototype, but in reality. Let there be no hesitancy in asking for this support. American industry is too vitally concerned with a continued flow of technically-prepared and emotionally-conditioned young people to remain aloof. If engineering as an art, is to serve mankind by combining disciplined intuition with judgment, courage with responsibility, and scientific competence with economic sense, then its internship must not only be realistic but orderly. It had best begin early, under the rational environment of academic life, fully exposed to professional purview.

But in the end, the ritual is always less important than the doctrine — the people more vital than the plan. A century ago, Worcester Polytechnic Institute was founded within the concept of a new and powerful understanding between Industry and Education. It is singular that this union was joined under conditions of creative possibility and national need which parallel those of today. The resulting balance of reality and vision established a criterion of excellence often imitated. With this beginning, the evolution of a new plan of clinical education in engineering appears not only possible, but as tradition-shattering as the dreams of a hundred years ago.

In conclusion, let us remember that Engineering is forever a challenge — not of the furrowed brow but of the agile mind — a great profession, a process of continuous learning, a dynamic force of change. Herbert Hoover, writing of us and for us, has said, "to the Engineer falls the task of clothing the bare bones of science with life, comfort and hope. It is his privilege to look back on occasion at the unending stream of goodness which flows from his efforts with a satisfaction that few professions may ever know."

To Worcester and its Great Men, look back on occasion with satisfaction justly earned. But look forward more often in the glowing light of success, with the curiosity and the vigor that are forever the marks of continually self-renewed superiority.

Engineering and the GREAT SOCIETY

An address by Dr. J. Herbert Hollomon
Assistant Secretary of Commerce
for Science and Technology

The accomplishments of science and technology during the past 100 years, the first century of existence of Worcester Polytechnic Institute, when viewed from the perspective of all recorded history, show a phenomenal advance. At its beginning, Worcester taught the skills of engineering, largely based on the science of mechanics and electricity — derived from Europe, and needed for the growing industrialization of an almost rural America. Today it teaches science taken from all the great laboratories of the world.

The advances in science and technology during my lifetime, and even during the life span of the students here, roughly the period from World War II to the present, are startling. Revolutions have been wrought in medicine and public health, in chemical synthesis, in energy generation, in space science, in communications, and in air transportation. When we look back 10, 20, or 30 years at the fantastic increase in man's knowledge of the world about him, at the vast changes that have been made in the material world, we might ask if this pace can continue. Can we reasonably expect science and technology in the next two decades, for example, to produce milestones comparable to unlocking the secrets of the atom and opening the doors to exploration of the universe? Without question, we can, if we can preserve the very society that nurtures our science. We can expect life itself to be created, aging to be understood and perhaps eliminated, thinking processes and creativity to be understood and simulated, the outer reaches of space explored, the origin of nuclear forces understood.

But science and technology cannot be considered without regard for their implications for mankind, that is, their effects upon man in his world. And they cannot be considered without looking to the way they serve his needs and fulfill his aspirations. Science and technology will continue their great advance if they also turn their full power to the needs of the world in which we live, and to the preservation of our society and its values. They can continue on, making steady advances as they have done during this past century. Or, they can make a quantum jump into a new golden age, if they purposefully direct their energies toward meeting the great unsatisfied needs of modern society. This is not to say that the nation as a whole has not benefited from both science and technology. Far from it. The United States, the entire world has derived great benefits from the efforts of scientists and engineers, for example, the telephone, the radio, the vacuum tube. However, the processes by which these benefits have occurred, if not random, certainly leave something to be desired in terms of a rational approach to the world's problems. Science, as a national endeavor, is relatively new to us. Surely beginning during World War II, we exploited science to meet urgent needs arising from national defense. We are doing the same now in the exploration of outer space. This approach, however, tends to leave behind some of the older problems associated with our society. We are more interested, or so it would appear, in getting energy from atoms than we are in improving the quality of urban life.

The capability of science and technology is great. The needs of society are great. The expectations and the hopes of the people are great. People are no longer content to accept tribulations with passive indifference. They expect a cure for cancer. They expect to travel to outer space. They expect an eventual world peace. They expect to lead lives of high quality in dignity and satisfaction, in clean, attractive physical environments. These expectations are even held by the teeming populations of the under-developed nations. We must take a fresh look at what we are, what we need, how we may attain our goals and how science can be used to meet them.

Ours is an urban society. I am certain that this is not startling news to you, but will you consider for a moment, just what this statement says. The nature of our population has changed in the past 100 years, and is continuing to change. Not so long ago the majority of our population lived on farms — today it lives in cities. Then, it took most of our work force to provide food for our total population. Today, only about six percent of our work force is engaged in agriculture, and even one-third of it could probably produce all the food and fiber needed by the country. Within the next few years, the number of scientists, engineers, and technicians will exceed the number of farmers in this country. It is interesting to note that the shift of workers has been from agriculture to manufacturing to services, and the service industries today employ the

largest number of people. Typically, they work with information, rather than with materials, machines or energy. They are concerned with education, medicine, recreation, and government.

So great have been the changes within our nation that they have effected significant and dramatic changes in our relationships with other nations in the world. When Worcester Polytechnic Institute was founded, we were engaged in an internal struggle to determine whether we were, in fact, one nation or two. At the turn of the century, we were tottering hesitantly on the edge of involvement with international problems. Today, our impact is felt in every nation in the world, and we feel with increasing sensitivity the actions of other nations.

We compete with nations that do not share our political or economic philosophy, and there is much more at stake than merely to demonstrate the superiority of one system over another. We share many common interests and close ties with a diversity of nations. The emergence of a modern, industrialized Japan allied with us has shown that the ties of technology are so mutually helpful as to soften the cultural differences between oriental and occidental societies. There is the great challenge posed by the developing nations of the world. This challenge is faced by all the industrialized nations, regardless of their political or their economic philosophies, and it is set in its proper, sobering perspective by the realization that these developing nations comprise a majority of the world's population. The challenge presented by the have-not-yet-arrived nations, and the manner in which the more forward nations respond to it, will have a more decisive effect upon the future of our world than any change since the Renaissance in Europe.

A peculiarly dominant element in our new relationships with the other nations of the world has great relevance for us here today. Our world relationships are irrevocably intertwined with our scientific and technological capability. Science and technology have enabled us to assume our present position of leadership in the world, by contributing to our economic strength, our military power and to the imagination and vision of our people. They are in modest ways tools in our program to help other nations to advance themselves.

"The challenge presented by the have-not-yet-arrived nations . . . will have a more decisive effect upon the future of our world than any change since the Renaissance in Europe."

They provide answers to the most pressing problems facing developing nations. It is not a lack of manpower, or raw materials, or natural resources which keeps the developing nations from jumping the poverty gap. It is primarily the lack of know-how which makes the difference. One can no longer measure the international position of this or any country without weighing its scientific and technological strength.

It should be useful to have a look at the needs of this urban, technologically dependent society. They are not so different from those of the past except in their vastly greater complexity. They are more broadly social and more likely to require the application of a large science and technology for their satisfaction, rather than small scale, single-minded efforts.

For example, there is a need right now for entire new cities to be built, and for great sections of existing cities to be rebuilt. I am not referring here to housing developments or subdivisions. The task is much bigger than that. By the year 2000, urban population in this country will double, city land will double, and we will have to build homes, highways, and facilities equal to all those built since this country was first settled. Here is a task to stagger the imagination. But this is not all. In a highly mobile urban society, comprehensive transportation systems must be conceived and developed to move people from place to place. But where are the companies engaged in the business of producing and selling entire cities or producing and selling comprehensive transportation systems? Where are the engineers who are working on these problems as I have described them? Where are the schools of engineering teaching engineers to work on these problems within the framework I cited? They should be well versed in the social, political, and economic limitations to the effective use of science. We know that these tasks will have to be done. To paraphrase a Great President, it is not enough to ask what you can do for science, but what science can do for you.

Our educational systems and facilities must be made more responsive to the changing and developing needs of the times. This is true at all levels, and is true of vocational training as well as graduate education. We cannot afford to make a massive investment in education, and then turn out people well-equipped to meet the challenges of *yesterday*. The challenges and problems of yesterday are already receiving enough attention from one prominent public figure, so we can stop worrying about them.

In trying to meet these needs we must not assume that brick and mortar, steel and glass, or chemicals and regulations will provide all the solutions. For we are not simply seeking a better material world. As President Johnson has pointed out, the Great Society is a place where men are more concerned with the quality

of their goals than with the quantity of their goods. This means that the interaction of man with his physical environment is more important than the physical characteristics of either the man or the environment. It means that man must derive satisfaction out of dreaming and striving and doing.

What role should Government play in all this? We reject, out of hand, the idea that Government should or could lead us into a better life by simply issuing edicts. We also reject the notion that Government has no proper role at all in this endeavor. A more useful answer lies somewhere between these extremes.

The public accepted some share in responsibility for the settlement and civilization of our country. This took the form of public support for waterways for transportation, research aimed at stimulating the exploitation of the mineral wealth of the nation, spectaculars such as the Panama Canal, and the development of American agriculture. In all of these cases, the great advance came about through a combination of private initiative and public interest. The ability to merge these two dynamic forces has always been a mark of the special genius in the United States' political system. No massive program designed in Washington can possibly arrive at solutions to the problems facing us today. By the same token, the strained resources of local institutions cannot hope to cope with the great demands which face them.

The challenge today, then, is to develop new mechanisms for cooperation between the national capitol and the local communities. We must assume, I believe, that the realization of our goals is intimately involved with science, technology, and education, and that these are national assets, national resources, to be mobilized and used for the public good. If a working partnership between private initiative and public interest is to succeed, we must look for new ways to encourage the active and enthusiastic participation of private initiative, for this has always been the key to success for such great and broad undertakings. If we can devise a new type of creative Federalism to meet the challenge facing us, it should lead us well to a renaissance in state and local governments. In the final analysis, the re-working of our society will be done at a local level, and the success of it will, in large measure, depend upon the inventiveness and genius of private initiative.

In view of the magnitude of the tasks, and the importance of this movement to society as a whole, private interests must be given real assistance by those responsible for the public interest. This could take many forms: financial aid, advice and consultation, technical studies and information, etc. What we must recognize is that those responsible for representing the public interest would be derelict in their duty if they did not participate in the great endeavor.

"We cannot afford to make a massive investment in education, and then turn out people well-equipped to meet the challenges of yesterday."

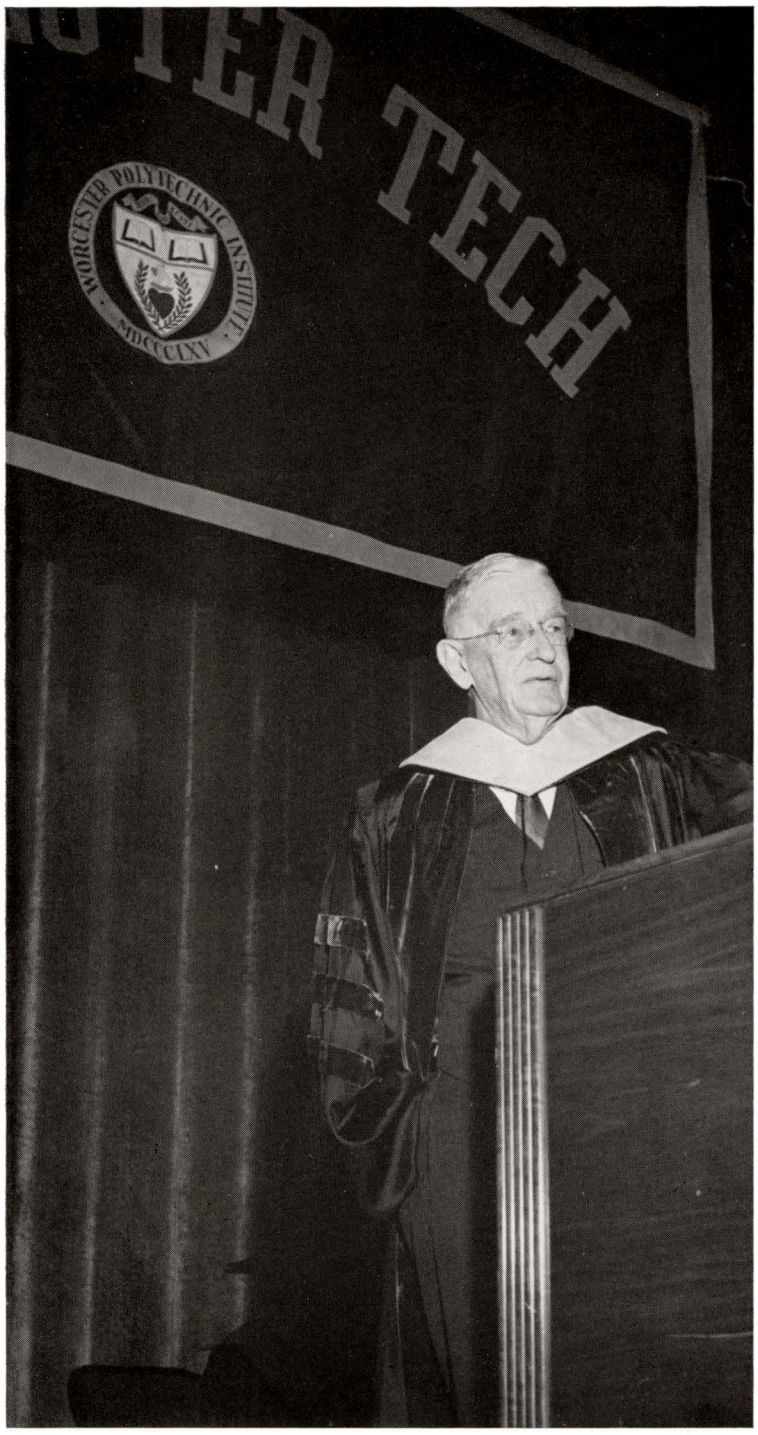
It is obvious from what I've said that engineering has an especially high potential to help in building the urban society of the future. Engineering applies knowledge of the physical world to the solution of society's problems. Engineering is the great synthesizer, the problem solver, the discipline which brings rational approaches to bear on the problem. Engineering is the doer, the changer, and these are essential to progress, but it must gear itself to the needs of society.

If enginering is to play its proper role in the society of the future, however, some significant changes will have to take place. Engineers will have to become professionals, in the true sense of the word. They will have to think of themselves as professionals, in the way that doctors and lawyers do now. They must see themselves as broad-gauge problem solvers, designers of complete systems from start to finish, oriented to the needs of society, the capabilities of science and technology, and the real limitations on the application of existing knowledge to existing problems.

Engineers, of course, are the products of engineering schools. The next few decades must see the emergence of engineering schools with the following characteristics: they will, first of all, teach at the very frontiers of science. But they will be intimately tied to the communities which they serve. I use the word *serve* advisedly, because the new breed of engineering school *will* serve its community. Teaching, research, and practice will be carried on as they are now carried on in the great medical centers of today.

These new professional schools of engineering will also serve as bridges; bridges between science and society, between what *needs* to be done and what *can* be done. They will be bridges in the new relationships which must be formed between the Federal Government and State governments, between public interest and private initiative, between educational circles, industrial organizations, and local communities.

I do not believe I overstate the case one bit when I predict that the engineering school of the future can become the dominant institution in transforming the America of today into the great urban society of tomorrow. And I have absolutely no doubt that Worcester Polytechnic Institute can be in the forefront of this movement.



Dr. Vannevar Bush

What is an Engineer?

An address by

Dr. Vannevar Bush,
Honorary Chairman
of the Corporation,
Massachusetts Institute
of Technology

"Much of the misconception of the engineering profession, which still abounds, is the engineers' own fault"

If you pick up the newspaper these days you are likely to find the statement that the scientists have just launched a new satellite into space.

However, if you visited the men, many hundreds of them, who built and launched that satellite you would hardly find a fundamental scientist among them. You would find some applied scientists. You would also know that some fundamental scientists are anxious to learn and interpret facts about space that the satellite is planned to transmit back. But primarily you would find engineers, for the design, construction, and lauching of a satellite is primarily an engineering job.

Why, then, is it reported as a scientific accomplishment? Is it because the reporter does not know the difference between scientists and engineers? This is undoubtedly true in some cases. In more cases it is because the reporter thinks his readers do not know the difference, and he is right, in general they do not. Even when his readers are professional men, or studying for the professions, they often do not know the difference. But there is a reason for glorifying the scientist that goes deeper than this.

A survey was conducted a while ago to find out how the public rates the professions, in general standing, prestige, and the like, and the results, while open to criticism, were interesting and revealing. The highest rank was accorded to atomic physicists. Somewhere below came other scientists. Presumably a man who dissects an atom is on a higher plane than the man who dissects a bacterium. Well down the list appear the engineers.

How does this come about? Much of it is due, no doubt, to the reaction which followed the appearance of the atomic bomb. It startled the world, and quite properly caused a great fear. It was far apart from conventional experience. Hence the men who produced it must be supermen.

Indeed the scientists who produced our modern knowledge of the atom were great. There were hundreds of them, extending back for 50 years or more, doing ingenious experiments, finding strange facts, producing complex theories, and largely ignored by the general public. Those who produced the knowledge of fission were of this company, and deserve the recognition finally given to them.

But this ignores the fact that, once the physics was known, the development and production of the bomb were primarily an engineering job. The really toughest parts of the undertaking were in the hands of the chemical engineers, electrical engineers, and mechanical engineers.

Now I hasten to remark that scientists, especially applied scientists, can fairly readily become engineers if they wish to do so. The converse is also true, and engineers sometimes become scientists.

There was an excellent example of the former during the war. The Radiation Laboratory, which produced many new forms of radar, and which incidentally cut rings around the Germans in so doing, was manned primarily by physicists. Yet the job they did, in developing, adapting for use in the field, introducing into production, such devices as centimeter radar, loran, and so on, was to a very large extent an engineering job. Many a physicist became an engineer in the process, and a very effective engineer.

The tendency to downgrade the engineer goes far back in history. When engineering first started as a profession it involved only military engineers. When groups appeared outside the military organization they were known as civil engineers. There was a natural inclination to regard the General as in some strange way superior in quality to the man who merely built bridges or fortifications for him. The trend persisted. In our own Navy, a generation ago, those officers who were qualified for engineering duty only were not regarded as properly equipped for high command. There is a distinction even today.

In this country we have never suffered much under the disability of regarding the engineer as somehow a second-class citizen, for we have always been a practically-minded country, in fact too much so, for we lagged behind Europe in appreciation of and furtherance of fundamental science. The opposite occured in England, and was a great handicap from which they are only now fully recovering.

The engineer was likely, at times, to be found wearing rubber boots and walking about in the mud. Now a gentleman might properly walk in the mud when fly fishing for salmon on a Scottish stream, accompanied by his gillie, but no gentleman would walk in mud as a part of his professional activities. Gentlemen quoted Latin at one another, and reveled in the classics. An engineer was likely not to know who sulked in his tent at Troy or why. Obviously the engineer did not belong. Fortunately most of the snobbery involved in this sort of thing has disappeared, not quite, and it left its mark.

Much of the misconception of the engineering profession, which still abounds, is the engineers' own fault. The profession has never had a central organization to represent it, to speak for it. Scientists have the National Academy of Science, which incidentally includes a few engineers, and the large and democratically organized American Association for the Advancement of Science. Physicians have the American Medical Association. Now, true, the utterances of these bodies sometimes seem to reflect the thoughts of a permanent staff, rather than of the profession generally. But at least they speak, and they are intended to represent the whole profession. Engineering organizations are fragmented.

The glamour of science is today intense. This has its fine aspects for it draws into science many a keen youngster. We need plenty of scientists in this country. One unfortunate aspect is that the glamour is unevenly and inappropriately distributed. Some of the most fascinating fields of science today, those that I would be strongly tempted to enter if I were a young man, are seldom mentioned, for they are difficult to discuss in lay terms. So there is an unbalance of interest, and young men flock together unduly. Still we should not regret the keen attention now devoted to scientific matters.

We should regret the lack of keen attention to the profession of engineering. Much of this is due to the fact that the profession is not fully understood, even by many of those about to enter upon it.

Many attributes distinguish the professions. Some, notably the medical profession, perpetuate some of the characteristics which became emphasized in the days of the Guilds. There is secrecy, exemplified by the use of Latin in prescriptions, the inculcation of the professional attitude, as in the Hippocratic oath, the long apprenticeship, the exclusiveness exercised against those who have not followed a prescribed path. But the medical profession also exhibits another characteristic, and this is central and determining.

This is ministry to the people, exercised with pride and authority. No group can readily aspire to the status of a profession unless and until it embodies in its professional philosophy this basic idea. This means that the central objective of the profession is to contribute to the welfare of the people it serves, by advancing their knowledge, by advising them in areas where they lack confidence, by lifting burdens from them, making decisions for them in crises. This involves no vow of poverty; the professional man rightly aspires to a high standard of living, for one reason because only thus can he perform well. The concept of service need imply no aura of servitude; the professional man rightly takes pride in his profession of special knowledge and skills, acquired by arduous labor and early sacrifice.

There are many professions. The ancient ones, the law, medicine, and the clergy, retain some of the trappings of the Guilds. The new professions, of science, business management, engineering, have little or none of these. They are not necessary, yet are sometimes salutary. The essence of the profession does not reside in these elaborations.

No profession is perfect. In all of them charlatans are to be found, exploiters of public credulity, fakes. There are formal and legal means of dealing with these in the old professions. In the new, and in the old as well for that matter, the primary safeguard against

"I would say to the young engineer, things and men, that you may rise to

their depredations lies in ostracism by their professional colleagues.

Long ago most professional men operated as individuals. Today with increasing complexity of affairs they more often operate within organizations, in the small partnership, the institute or university, or the great corporation. This sometimes makes it more difficult to preserve the professional spirit. But it does not alter the necessity for its preservation.

I recite all these things, that we may understand what it means to be a member of the engineering profession. But we need to proceed a bit further to grasp the real difference between the scientist and the engineer.

An engineer is often defined as a man who applies science in an economic manner to meet peoples' needs and wishes. This is not a bad definition, but it can be rendered somewhat clearer.

There are two great classes of subjects which men seek to understand and apply in their attempts to lead successful lives. The first includes all the phenomena of nature, from the evolution of the stars to the habits of the smallest virus. The second includes the interrelation of men in their organizations, from the elemental clan to the subtle affairs of international finance. We may call these two classes things and men.

Professional men differ widely in the emphasis which they place on these two classes. At one extreme is the fundamental natural scientist. As a citizen he is concerned with the relations of men in political life; as a member of a university faculty or the staff of an institution he is concerned with relations with his colleagues. But as a professional scientist he is concerned entirely with things. His aim is to extend knowledge, and in order to do so he necessarily divorces his thoughts from concern with the implications new knowledge may have in men's relationships. He is not concerned with possible applications. Note that I do not include here the social scientists. Also that I consider the chemical and physical functioning of the human organism as a part of natural phenomena.

At the other end of the spectrum we can consider the professional lawyer. Except in such specialities as patent or maritime law, he is little concerned with things. Rather his concern is with the ways in which men's relations are controlled by law and custom, and by business organizations, corporations, trusts, foundations. His attention is directed not merely to the

roam widely and dig deeply on both true eminence in your profession"

formal mutual obligations specified on pieces of paper, but also to the ways in which men act under special circumstances, especially under stress.

The engineer is concerned with both things and men, and they call for equal emphasis in his affairs. On the one hand he needs to understand broad ranges of science sufficiently so that he can, on need, acquire a workable grasp of a segment which is applied, or which admits of being usefully applied. On the other hand he deals with all sorts of men's relationships, so that he can analyze costs of manufacture or construction, plan sequences of operations, practice systems engineering, grasp and operate within the framework of great industries. He may himself perhaps create new industrial units capable of surviving in a highly competitive environment. He collaborates continually with men engaged in sales, production, finance. He must also, in these days, operate with or within the complicated structure of the government.

The man who neglects this second aspect of professional attainment will not be a full-fledged engineer, any more than he will if he neglects to provide himself with a sound basis in the natural sciences. He may become an applied scientist, but if he starts toward engineering and then neglects the broader aspect of his professional life he is more likely to become a technician. The career of professional applied scientist is an interesting and important one, but it is best entered from the path of the scientist. The sound path for the engineer is to expand, throughout his professional life, his understanding of both things and men.

There are difficulties here. The young engineer, on his first job, is not likely to be called upon to present a plan to the Board of Directors. Rather he will be engaged in detailed design and testing under close supervision. Some years of this may well cause him to forget that he is practicing only one-half of his professional function.

In college, in fact, he may well exhibit an unbalance in attitude. Some of this is due to the tendency to classify courses of study into hard and soft categories. Now there is nothing soft about a well taught course in economics, or psychology, or history — quite the contrary. The ways of men are fully as mysterious as the structure of the nucleus of the atom. The true difference between the study of things and of men lies in the fact that the former may often be soundly approached by rigorous logical reasoning, whereas the latter more often calls for skill in reasoning by balance of evidence. One is not hard and the other soft. One is straightforward and the other subtle, and, when well done, far more difficult. Students are not often motivated to exercise the severe mental application necessary to understand the ways of men.

Important though they are, the years of formal study are only a part of the development of professional men. Throughout their lives those who rise to eminence continue to learn from all their experience and contacts. Especially is this true in regard to the ways of men. No amount of formal study can equal the experience of action, where the motivations of colleagues and competitors must be understood, and where one learns that very subtle skill, the ability to recognize and enhance competence in subordinates, and judgment as to those in whom one may place trust. These are the things a boy learns on the playground, and a mature man continues to learn every day of his professional career.

The engineer is unique among professional men in the broad range of his interests, and the wide spectrum of skill and understanding he requires for professional success. This becomes even more demanding as the scope of science enlarges exponentially, and as human contacts multiply under the spur of modern transportation and communication. The profession of engineering is indeed extreme in its requirements, and correspondingly satisfying in its opportunities. We need in this country many more highly skilled engineers. I believe we will have them, if the youth of the land really grasps what the profession is all about.

Finally, let me say a word lest I be misunderstood. I have dealt, very briefly and superficially, with the skills a man needs for success in the profession of engineering. This is a pragmatic approach, aimed at accomplishment which will result in a very practical way. Every professional man, throughout his life, is bound to labor assiduously to acquire the knowledge and the art of its application, in the field of his choice. It can result in the satisfactions which should accompany material reward, the respect of fellows, and contribution to the public welfare. But this is not all there is to life. More is involved than just making a good living. No man lives fully unless he steps beyond this, and finds joy in those intellectual accomplishments which transcend the merely useful. I would say to the young engineer, roam widely and dig deeply on both things and men, that you may rise to true eminence in your profession. But I would also say there are matters of the spirit, aspects of the aesthetic appreciation of a complex environment, which you should not neglect if you would lead a life of full and genuine satisfaction and accomplishment.

Mrs. Tymeson

The reason for the writing of *Two Towers*, the history of W.P.I.'s first 100 years, is simply that it had to be done. The incidents that have become legend, the names that have become but a dim recollection—they needed to be saved from obscurity.

So the college commissioned Mrs. Mildred McClary Tymeson to write the book. On this page you will find Mrs. Tymeson's thoughts on her work. After you have read them we know you will want to purchase *Two Towers*.

To facilitate this purchase, all you need do is send your order along with $5.00 plus $.50 for postage and packaging to *Two Towers*, Worcester Polytechnic Institute, Worcester, Massachusetts.

The Centennial History of Tech is published

TWO TOWERS

by Mildred McClary Tymeson

The name of the book is *Two Towers*, in deference to the two buildings with which Worcester Tech began and to the two ideas which they represent — the theoretical and practical.

But the book tells the story three ways, in pictures, in quotes, and in text.

The principal problem in writing Tech's Centennial story was not of search but of selection. So much to tell. So little room to tell it. I soon realized that the most I could do was to suggest many things by the telling of a few. Once I had accepted this limitation, thousands of persons began to pass before me in a kaleidoscope of a hundred-year-long pageant. Periodically I reached out for an incident to form the thread of my own story.

I could almost hear these persons speaking, they became so real. It suddenly occurred to me that I was making a collection of their statements, their observations. Why not, I thought, share these direct quotes? I was also finding scores of pictures which made the story come all the more alive. Again, why not share them?

And so a scheme was devised to correlate all three, the text, the quotes, and the pictures. The story itself marches along in true historical style, broken by nothing more than the turning of a page. In the wide margins, however, the men and what they said have been placed in close juxtaposition with my story.

As a result, there are innumerable quotes and more than three hundred pictures in *Two Towers*. Furthermore, each chapter is introduced by a picture of the campus, and separating the chapters there are whole sections of pictures, as if to give the story time to catch its breath.

So, you see, *Two Towers* has been designed to fit the careful taste of an engineer. At the same time, I hope there is a spontaneity of expression to indicate the perpetual surprise of my encounter with Tech's complexity.

In addition to its ten chapers, *Two Towers* also has a prologue and an epilogue. Read them if you want to know what happened before the story began and if you want to know what I thought when it was finished.

Otherwise, just read the story itself, or look at the pictures.

But whatever you do — *do* read those quotes.

M. M. T.

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Worcester, Mass.

Alumni Fund Up 12 Percent

Total of $108,864.10 is highest ever

Everywhere an alumnus looks today he finds examples of the nation's expanding economy. Whether it be in the rising value of his common stock portfolio or in the rising rate of real estate property tax, he recognizes that the nation is progressing at an almost steady rate. He is also well aware that the needs of his Alma Mater are increasing, both in terms of the demands placed upon her by modern technology and the eagerness of a student body seeking knowledge.

Anticipating demand is the hallmark of any successful business enterprise. By this standard the Alumni Association is a success, for again the Alumni Fund has had another year of climactic growth.

The annual Fund has reached a record high each year since the 1956–57 Development program, and the 1963–64 Fund has the highest total of $108,864.10 from 3396 contributors. This represents a 12 percent increase over the previous year when the Fund totaled $92,315.80.

More importantly, this is the first time the annual Fund has totaled over $100,000. As W.P.I. is entering her Centennial Year, this figure becomes even more significant.

In last year's moonshooter article entitled "The Money Behind Our Colleges" (see March-April issue of The Journal), a spokesman for a private liberal arts college was quoted as follows: "We must seek gifts and grants as we have never sought them before. They are our one hope of keeping educational quality up, tuition rates down, and the student body democratic. I'll even go so far as to say they are our main hope of keeping the college, as we know it, alive." The article further pointed out that "Alumni support has an importance even beyond the dollars that it yields to higher education. More than 220 business corporations will match their employees' contributions. And alumni support — particularly the percentage of alumni who make gifts — is frequently used by other prospective donors as a guide to how much *they* should give."

All Tech alumni can take pride in the record. Whether it be in dollar total, percentage of alumni contributing, or corporation matching gifts, the annual Fund continues to meet the needs. To lend added weight to this statement, the Fund received honorable mention in the U.S. Steel Alumni Giving Incentive Award Competition for the second year in a row. At the American Alumni Council national convention in Denver this past summer, Warren B. Zepp, '42, secretary-treasurer, accepted on behalf of the Association a certificate and check for $125 in recognition of the 1962–63 Fund's improvement among specialized schools. The 1961–62 Fund received honorable mention among specialized schools for sustained performance.

The achievements of the past year were made possible through the efforts of more than 500 alumni who worked for the Fund. The leadership of Raymond J. Forkey, '40, who retired as president of the Association last June, and Robert S. Schedin, '43, former chairman of the Fund Board, who also retired last June, was of great help. The new chairman is Carl W. Backstrom, '30, who has been a member of the Board for two years. His specific job last year was chariman of solicitation in the Worcester County Chapter. As a result of the work of many local alumni, the Worcester County Chapter increased 33 percent in dollar total over the previous year.

Members of the Fund Board during the past year in addition to Schedin and Backstrom were: E. Carl Hoglund, '27; Edwin B. Coghlin, '23; Robert E. Higgs, '40; and James J. Clerkin, '45. Newly elected at the June meeting was Luther C. Leavitt, '34, of Cleveland, who will join his predecessors, with the exception of Schedin, in working for the Centennial Fund during the coming year.

As many already know, the annual Alumni Fund will be combined with the Centennial Fund for the next three years. During this three-year period any alumnus making a gift to the Centennial Fund will also receive recognition as having contributed to the Alumni Fund. Thus the Fund Board will be intimately involved in planning a successful Centennial Fund.

In the final analysis, the success of the 1963–64 Alumni Fund cannot be attributed to any one alumnus or group of alumni. Warren C. Whittum, '30, newly elected President of the Alumni Association, has said, "Other colleges continually ask us how we have achieved such a remarkable record of solid support. We can only answer that it is a team effort in its truest sense, with literally thousands of alumni helping to make the Fund a success."

DISTRICT TOTALS

District	10/1/63 No. in District	No. Solicited*	No. of Gifts	Amount Received	% Participation	1963–64 Average Gift	% Effectiveness	1962–63 % Participation	1962–63 Average Gift
Berkshire	62	56	26	$970.00	41.9	$37.31	46.5	44.4	$50.26
Boston	652	638	309	7,904.94	47.4	25.56	48.4	47.5	24.02
Central New York	99	98	56	1,114.82	56.6	19.91	57.1	60.2	16.69
Chicago	92	92	37	1,491.00	40.2	40.30	40.2	39.8	24.16
Cincinnati	46	46	19	287.00	41.3	15.12	41.3	30.8	13.91
Cleveland	112	112	72	4,341.00	64.3	60.29	64.3	60.7	50.52
Connecticut Valley	317	314	122	3,168.50	38.5	25.97	38.8	39.1	23.55
Detroit	71	69	35	758.00	49.3	21.66	50.7	43.8	21.31
Hartford	457	445	254	4,734.50	55.8	18.64	57.1	57.7	21.50
Hudson-Mohawk	92	90	40	756.00	43.5	18.90	44.4	35.5	22.09
Los Angeles	180	179	60	1,128.00	33.3	18.80	33.5	35.7	19.92
New Haven	308	303	127	3,076.00	41.2	24.22	41.9	41.5	20.98
New York	547	538	217	6,686.50	39.7	30.81	40.3	42.5	22.85
North Shore	260	258	114	2,229.00	43.8	19.55	44.2	—	—
Northern California	122	118	61	3,739.00	50.0	61.29	51.7	51.4	31.11
Northern New Jersey	438	426	242	6,255.64	55.3	25.85	56.8	58.4	30.91
Philadelphia	304	293	136	3,132.00	44.7	23.03	46.4	46.8	25.05
Pittsburgh	93	92	59	2,370.00	63.4	40.17	64.1	60.2	31.47
Rhode Island	260	250	121	3,074.00	46.5	25.40	48.4	45.9	31.11
Rochester-Genesee	78	76	48	1,227.00	61.5	25.56	63.2	46.1	24.21
Washington	265	263	119	2,495.50	44.9	20.97	45.2	41.1	24.65
Western New York	87	83	40	1,763.00	45.9	44.07	48.2	43.2	16.80
Worcester	1397	1380	541	19,652.93	38.7	36.33	39.2	34.5	31.67
Out of District	1059	1047	513	21,927.64	48.4	42.74	49.0	43.6	33.95
Others	—	—	28	4,582.13	—	—	—	—	—
TOTALS	7398	7266	3396	$108,864.10	45.7	$32.05	46.7	44.7	$28.82

*Includes contributing non-members.

CLASS TOTALS

Class	Contributors	% Participation	Amount
1873	1	—	$10.00
1889	1	—	10.00
1895	1	.33	2,000.00
1896	2	.50	12.00
1897	1	.50	30.00
1898	2	.29	275.00
1899	1	.33	50.00
1900	5	.56	288.00
1901	11	.69	495.00
1902	5	.38	240.00
1903	9	.64	347.00
1904	10	.63	405.00
1905	5	.36	62.00
1906	9	.53	169.50
1907	21	.70	2,275.00
1908	21	.62	516.00
1909	24	.64	530.00
1910	22	.54	1,545.99
1911	18	.47	637.00
1912	29	.45	1,514.00
1913	43	.71	2,327.00
1914	43	.74	12,146.20
1915	43	.67	1,915.00
1916	38	.54	3,942.00
1917	42	.51	1,437.00
1918	26	.52	513.26
1919	27	.60	1,677.00
1920	46	.61	5,898.26
1921	42	.57	4,155.00
1922	48	.59	1,457.00
1923	41	.55	1,070.00
1924	48	.62	1,567.88
1925	33	.43	2,015.0 0
1926	65	.59	2,054.00
1927	46	.50	1,087.00
1928	65	.58	1,891.00
1929	60	.65	1,704.00
1930	61	.48	1,647.00
1931	56	.41	1,326.44
1932	55	.46	1,765.00
1933	68	.53	1,852.00
1934	62	.51	1,224.00
1935	65	.46	1,295.50
1936	49	.42	956.00
1937	56	.48	1,353.00
1938	60	.43	1,219.00
1939	65	.45	2,809.50
1940	68	.42	1,468.00
1941	69	.42	1,342.00
1942	80	.47	1,836.82
1943	67	.46	909.00
1944	64	.41	1,317.00
1945	60	.45	1,345.00
1946	43	.32	668.00
1946B	29	.26	657.00
1946C	6	.50	72.00
1946D	26	.42	433.50
1947	26	.35	350.00
1948	90	.50	1,280.00
1949	95	.38	1,654.00
1950	91	.43	1,334.00
1951	96	.49	1,866.50
1952	66	.38	1,079.00
1953	75	.42	1,204.50
1954	64	.44	1,528.75
1955	58	.43	791.00
1956	63	.40	815.00
1957	81	.37	1,284.00
1958	80	.37	1,048.00
1959	104	.42	1,297.50
1960	105	.40	1,320.00
1961	97	.33	1,331.00
1962	54	.24	518.50
1963	62	.30	516.00
1964	1	—	100.00
Hon. Alum.	2	—	20.00
Others	23	—	5,762.50
TOTALS	3396	.45	$108,864.10

Contributors to the 1963-1964 Alumni Fund

Italic type is used to commend those who have contributed annually since the beginning of the Alumni Fund in 1924, or since their graduation. Italics are not used for the first contributions of the Class of '63.

Percentages listed refer to Alumni Association members only. Gifts by non-members are not included in percentage calculations. Late contributors are recognized in this listing, but their gifts have not been shown in the totals.

Gifts made in memoriam appear at the end of the individual class listing.

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In Memoriam, Harold J. Gay, George H. Haynes, Walter M. Monroe.

1873

In Memoriam, Willard T. Hatch.

1889

In Memoriam, Louis H. Harriman.

1893

In Memoriam, Ernest W. Marshall.

1895 3 Members 1 Contributor ***33%***

George C. Gordon.

1896 4 Members 2 Contributors ***50%***

Clifford R. Harris, Ernest Mosman.

1897 2 Members 1 Contributor ***50%***

Ellery B. Paine.

1898 7 Members 2 Contributors ***29%***

Frank C. Harrington, Raymond R. Smith.

1899 3 Members 1 Contributor ***33%***

Herbert H. Ferris.

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Centennial Fund Goals Defined

As W.P.I. approached the end of her first century, the faculty, administration and trustees undertook a series of studies designed to answer certain critical questions. Involved was the existing interaction between the Institute and the community, state and nation. Also there were some questions of far greater significance involving Tech's past, present and future role in providing responsible and intelligent leadership.

Hardly had these studies been started before it became clear to all concerned that, despite the tremendous progress in the last 10 years, the Institute would not be able to maintain and improve her program of engineering and science education without an even greater forward thrust. In the breakthroughs of the early 1960's, institutions of higher learning were being faced with the greatest challenge in their histories. The spectacular increase in scientific and engineering knowledge, the vastly increased demand by industry and government for creative manpower, the recognition by the country of a responsibility for the political and economic destiny of all mankind—these and other swift developments were all converging to place hitherto unthought of burdens on the leaders of higher education.

At Tech, where there has been 100 years of fulfilling such responsibilities, the recognition for meeting these obligations was immediate. It was at this juncture that the continuing curriculum studies by the faculty took on an added impetus and an investigation of the financial status of the Institute was undertaken. From the beginning it was evident that additional financial resources would be necessary if Tech were to keep her commitments. The future direction of the courses of instruction, however, was not so clear.

Fundamental to the study of the educational goals was a realization that the successful engineer or scientist needs not only a complete understanding of basic scientific and technological principles, but must also be trained in a wide spectrum of social, economic, industrial, engineering and scientific philosophy and experience. Obviously, with the accelerating information explosion, this posed some definite problems, not the least of which was that although knowledge has expanded, the four-year undergraduate time-span has not.

Further analysis and careful examination of past and existing curricula at Tech and other colleges, however, resulted in one firm conviction. The essential aspect of the transference of information and moral values rests, in the end, upon the man in the classroom—the faculty member. It was decided, therefore, that in the next decade the faculty of the Institute must be maintained at its present high standard.

Another conclusion of equal importance was the determination to increase the size of the student body. "What is a 'small college'?" "What constitutes optimum class size?" "What responsibilities does Tech have, together with her sister colleges, to educate the vastly increased population?" These were among the questions that, when answered, showed that an increase in the number of students would be an asset to the Institute and the country.

In regard to a specific curriculum, all agreed that it was difficult to predict what changes would be taking place a decade hence, but everyone concurred that it was easy to predict that many changes would be taking place during *each* year of the next decade. Existing courses will be strengthened or dropped. The recently adopted or currently emerging programs will be nurtured and brought to full fruition. New courses, based upon scientific principles not now known or thoroughly understood are certain to develop within the next few years.

Recognizing the need for maintaining a forward-looking curriculum and a superior faculty was not the total answer, for as course content becomes more sophisticated, so must methods of teaching. Thus another major conclusion was that Tech must remain abreast of the progress being made in improving teaching techniques. Therefore, the implementation and development of these educational goals will involve not only expanded course and program offerings but also improvements in the methods of instruction and counseling by means of which the student is motivated toward maximum scholastic attainment.

Finally, there came recognition that the facilities of the Institute must also be strengthened. Foremost in this category was a library. For many years the central library has been located in Alden Memorial, supplemented by departmental libraries scattered around the campus. However, the number of volumes in the central library is

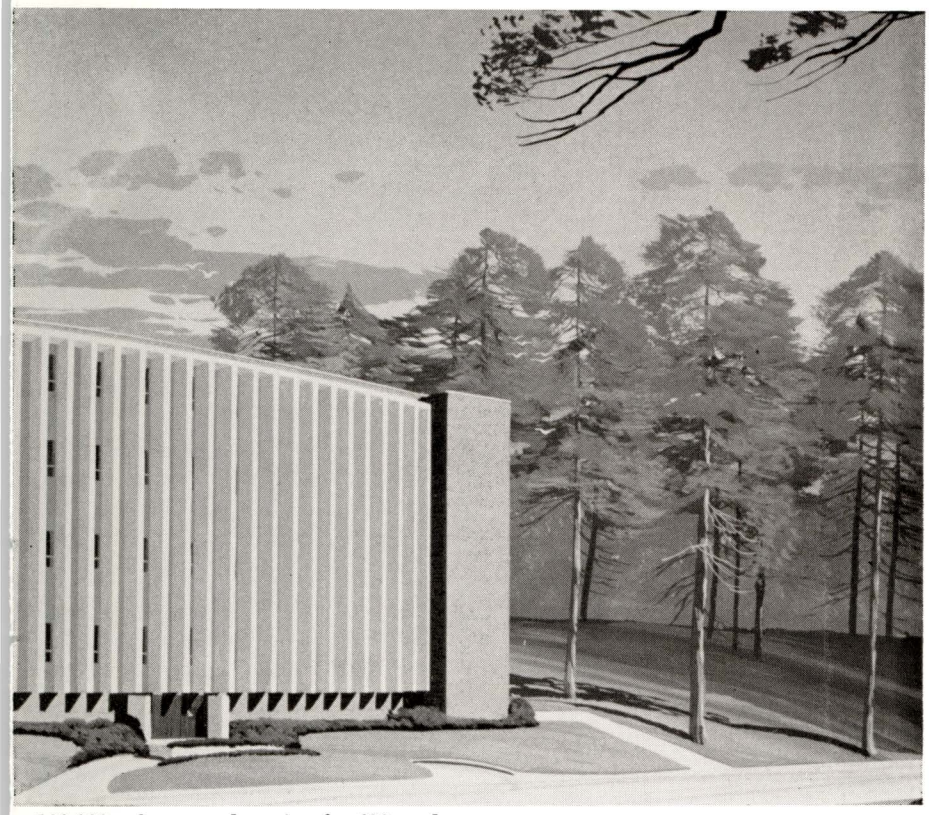
rapidly outgrowing the stack space available and the interdisciplinary nature of the present and future curricula is making the departmental library concept outmoded. For these reasons, and a host of others, a new central library building was obviously needed. The new library, to be built at an estimated cost of $1.8 million, will have shelf space for 100,000 volumes, seating capacity for 600 students, and such cultural advantages as a "browsing room" for extracurricular reading, a music listening room, and gallery areas for art exhibits. The departmental libraries will remain, serving as depositories for the useful reference resources which are needed in conjunction with laboratory work.

A humanities building will become more and more necessary in the years ahead. Even today, because of the increasing size of the student body, the classes in this field are scattered around campus in rooms not designed for this purpose. A new building will solve not only this problem, but more importantly, also provide a 500-seat theatre-lecture hall. Included in the building will be seminar rooms for small groups, a badly needed electronic language laboratory, a music room, and a reading improvement laboratory. All rooms will be wired for audio-visual equipment.

Not overlooked in these detailed studies was Alden Hydraulic Laboratory, too long an orphan in past plans of the Institute. Recognized internationally for its research in the design of harbors, dams, and power installations, the problem-solving facilities at Alden can be duplicated by very few governmental or educational institutions. In addition, the courses of study at the laboratory, combining as they do the practical with the theoretical, have served effectively the students at Tech. Therefore, it was decided to add to the educational-administrative facilities at Alden by constructing a $900,000, two-story building to

The new Central Library will have space for

The Humanities Building will also house a 500-seat theatre-lecture hall.



100,000 volumes and seating for 600 students.

The Harrington Auditorium—an invaluable addition to the campus.

include additional classrooms, a lecture hall, and offices for both graduate students and administrative personnel.

Finally, the decision to build an auditorium addition to the gymnasium was made. The proposed building will seat 2500 in "roll away" bleachers and 3500 when used as an auditorium. The principal facility will be a large gymnasium floor with a full-size basketball court. Associated facilities such as a varsity wrestling room, handball and squash courts, a steam room and additional locker and shower rooms are also included. As this issue went to press, President Storke announced that gifts from the Charles A. Harrington Foundation and Frank C. Harrington Foundation would make the building a reality. The new building will be known as the Harrington Auditorium.

The Institute estimates that the total cost for facilities including needed renovation of existing buildings, will be nearly $10 million.

In the dynamic arena of ideas, however, the cost is more. In order to attain the educational goals already outlined, an estimated $9 million is needed immediately for endowment, and a further $5 million must be provided in the next 10 years. These funds are essential for the endowment of professorships, fellowships, scholarship aid, and general use.

Thus the Centennial Fund goal of $15 million in the three-year period and an added $8.8 million over the 10-year period result from the studies and conclusions. In the world of education, the faculty and students, with their interaction of ideas, represent the major means by which our country can meet the challenge of the coming decade. There is no doubt that this ambitious undertaking will provide all alumni with *Pride in Our Past: Faith in Our Future.*

Centennial Homecoming Big Success

Large turnout of alumni celebrate Tech's 100th birthday

The Centennial Homecoming on Saturday, October 10, was a fitting climax to Tech's 100th birthday celebration. Alumni and their wives and children began to register early that morning and, as fate would have it, the weatherman cooperated completely with the planning committee.

During the morning hours groups of alumni were gathered in the lounge at Morgan Hall where four members of the Alumni Wives Club acted as gracious hostesses. Coffee and doughnuts were the bill of fare as old times and new developments at Tech were discussed.

Also during the morning hours the Executive Committee of the Alumni Council and the Fund Board were having a joint meeting. The discussion waxed hot on several items but they were able to join everyone in Morgan Hall by 11:30.

The Homecoming Luncheon began at 12:15 in Morgan Hall with Warren C. Whittum, '30, president of the Alumni Association, presiding. After the invocation by Winthrop G. Hall, '02, the more than 300 alumni, wives and guests settled down to a fine example of Tech dormitory food, isolated undergraduate opinion to the contrary. With the introduction of the head table guests, the speaking program began. Greetings from President Storke followed by a message from Norman S. Blodgett, '44, president of the Worcester County Chapter, were first on the agenda. The president welcomed everyone and then recapped the events of the past two days. He noted that judging by the tremendous response already evident in the Worcester Alumni Chapter, the Centennial Fund goal of $15 million is assured. Norman Blodgett read a message from Norman A. Wilson, '42, Worcester's Centennial Fund Chairman, who was unable to attend because of business.

The speaker for the luncheon was Prof. B. Leighton Wellman of the Mechanical Engineering Department. Known for his humor and especially his limericks, Professor Wellman regaled the gathering with his good-natured spoofing.

By 2:00 the stands at Alumni Field were filled to capacity as the football game began. The Bobcats of Bates College took the opening kick-off and marched 60 yards to pay-dirt for an early 6–0 advantage. The Tech eleven stormed right back, however, and marched all the way to the Bates' one-foot line where they were finally held.

The Engineers threatened again in the second period when a poor punt by Fortine of Bates put the ball on the Bobcat 25-yard line. Freshman quarterback John Korzick got the Boynton Hillers rolling when he pin-pointed Gallant with an aerial on a fourth and 14 situation. Gallant raced to the eight-yard line for the first down. Fullback Flynn picked up three and Gallant bucked up the middle for two yards. However, with the ball on the three-yard line, halfback Ron Crump fumbled on a reverse and Bates recovered.

Early in the third quarter the

The Homecoming Rally bonfire on

President Storke checks the score. Everyone felt the same way.

Bobcats scored their final touchdown, making the final score 12–0 in favor of Bates.

On the soccer field it was a different story as Tech trounced A.I.C., 5–1. Dominating the play during the entire game the booters scored one goal in the first quarter, two in the third and two in the fourth.

The Cross Country team also won, defeating a highly regarded Bates team, 23–32. In first place was freshman Cary Palulis, who set a new record of 21 minutes and 17 seconds over the four-mile course.

There was one more athletic event to be held that afternoon—the Rope Pull. The freshmen and sophomores gathered at Institute Park as a late afternoon chill settled on the pond. As the starting gun fired the Class of '67 quickly pulled a surprised freshman class towards the waiting waters. The Class of '68, however, quickly gathered forces and soon had the sophs teetering on the pond's edge. The seconds dragged by. Finally the first splash occurred and the sophs began that longest of journeys through the waters.

Friday night started the weekend.

After the Rope Pull, the alumni and students gathered in their fraternities and at Morgan Hall for refreshments and dinner.

At nine the Homecoming Dance began in Alden Memorial with music supplied by the Boyntonians. The highlight of the evening was the announcement that Phi Sigma Kappa was the winner of the Homecoming Award for the best decoration. Many hours of work and preparation on the part of the fraternity chapters had made this year's decision particularly difficult.

Your Class and Others

1906

Franklin C. Green and *James E. Smith* teamed up last spring to visit *Raymond S. Hall*, '07, in McLean, Virginia. Both Hall and Smith live in McLean, but Green is from Astoria, Oregon.

1907

Wilbur C. Searle was presented a scroll saluting his 55 years of membership in the American Society of Mechanical Engineers at a meeting of the Worcester Chapter in May. The scroll was presented by W.P.I.'s Prof. *Kenneth G. Merriam*, MS '35.

1908

Donald D. Simonds presided over the September and October meetings of the Tech Old-Timers, as he began his second term as president. . .After 51 years of association with Norton Company and 39 years as a director, *Clarence W. Daniels* has resigned. He had retired from active service as plants engineer in 1949. . . We are sorry to report that Mrs. *Gilbert C. Lamb*, the former Miss Florence P. Allen, passed away in July.

1912

James J. Shea, president of Milton Bradley Company, was elected to the board of trustees of St. Anselm's College last June, and to the board of associate trustees of Holy Cross College in October. Also a trustee of A.I.C. and a former trustee of W.P.I., he holds an honorary doctorate from St. Anselm's.

1915

Charles B. Hurd, professor emeritus of chemistry of Union College, spends summers in East Hampton, Connecticut and winters in Anna Maria, Florida. Some of his hobbies are gardening, fishing, and collecting shells. . .In mid-May, a letter from *Carl F. Palmer* recounted some months of travel. Last October, he and his wife flew to Los Angeles to visit their son's family. Spending four months in Pasadena and Newport Beach, they enjoyed several trips and visits with Mr. and Mrs. *George P. Halliwell*. February was spent in Florida, where the Palmers talked with *Ralph M. Johnson* and visited Mr. and Mrs. *Charles B. Hurd* several times. Their next destination was Dayton, Ohio to visit with their youngest son, then on to Rochester, New York for several weeks with their oldest daughter. Finally they returned to Massachusetts, where their two other daughters reside. "All the '15 men we contacted seemed to be well and busy with many interests," he said.

1916

The 1964 Upper Cape Cod United Fund workers list among their ranks Dr. *Arthur Nutt* as Falmouth town chairman. Retired and living permanently in Falmouth since 1959, Dr. Nutt has also been active in the Heart Fund and Cancer Fund campaigns, and civic affairs.

1917

Raymond M. Hicks retired from government service in June 1963 after 22 years at the Naval Ordnance Laboratory, Silver Spring, Maryland. He was supervisory patent advisor. Prior to 1941 he was manager of the systems development department at The Tele-register Corporation.

1918

After 46 years of public service, *Iver G. Schmidt* retired July 1 as head of the Engineering Bureau of Akron, Ohio, a post he has held for the past two years. His previous position was head of the highway department.

1920

Norman H. Willby, now retired from Westinghouse Corporation, spends November through April in St. Petersburg, Florida; June through September in Naples, Maine; and May and October in Addison, Pennsylvania. . . *Winthrop S. Lawrence* is going home to roost after 44 years away. He and his wife have bought a home and plan to reside in his native Falmouth, Massachusetts year round. He retired in 1961 as director of research of the Kaumagraph Company.

1921

Lincoln Thompson can justly be proud of Raymond Engineering Laboratory, Inc., of which he is president. In May Raymond received the Navy/Industry team flag for its work on the Polaris Missile System. The news release read in part, "Noteworthy is the fact that Raymond is one of the few so-called small business organizations to receive this distinguished recognition." . . *John S. Nason* has retired from J. S. Nason Company, Westboro, Massachusetts and taken a home in Otis, on Cape Cod.

1922

Norton Company received an award of merit for excellence in advertising featuring the importance of industrial distributors in the marketing of abrasive and grinding wheels by the American Supply and Machinery Manufacturers' Association and the National and the Southern Industrial Distributors' Associations. After all that, it is time to inform our readers that *Russel A. Reed* deserves some credit for this award, as he is general advertising manager of Norton.

1923

Philip W. Linnell has moved to a Cape Cod home following his retirement from the Stanley Home Products Company in the Connecticut Valley. . .Colorado Fuel & Iron Corporation has sent *Raymond S. Worth* from Buffalo to Trenton, where he is assistant to the director of operations of the Eastern Division.

1924

Prof. *Leslie J. Hooper* returned in July from Tasmania, an island off Australia, where he conducted a performance test on a hydraulic turbine. A recognized authority on this type of test, Prof. Hooper uses a technique developed at W.P.I.'s Alden Hydraulic Laboratory, of which he is the director.

1926

Elmer Hansen of the Pennsylvania Power & Light Company has been appointed head of the Generating Station Engineering Section.

1927

Frederick C. Pomeroy moved to Springfield, Massachusetts in August following an assignment with New England Tel. & Tel. Company of Boston.

1928

Francis H. King, after serving a term as second vice president, has been elected first vice president of the American Public Power Association at the annual meeting in Washington, D.C. Frank and other officials of the group met with President Johnson to discuss various public power problems during their stay in Washington. (Frank is not the only alumnus to meet with President Johnson recently. See the Class of 1955.)

1929

Halbert E. Pierce, Jr. was re-elected president of the Boston Council of the Boy Scouts of America in May. Holder

ot the Silver Beaver Award, Hal has been a scout since 1919. Professionally, he is an engineer with New England Power Company. . .*Francis Wiesman* joined the National Association of Parliamentarians this year, as he finishes his third year as parliamentarian for the Educational Association of Worcester. Says he, "Thrilling and extremely gratifying experience." A further word says that his daughter began her second year at Mount Allison University in Canada in September.

Born: To Mr. and Mrs. *Arthur E. Gilbert, Jr.*, their fifth grandchild, Frederick Arthur Kurz, on June 7, 1964. Art notes that three of the grandchildren belong to his son, Dr. *Richard E. Gilbert*, '54.

1930

Dr. *Philip M. Seal*, professor of electrical engineering at Norwich University, returned to his Alma Mater for a brief teaching stint this summer to give a course in advanced electromagnetic field theory at the summer institute for college teachers. . .*Stanley H. Fillion*, chief engineer of Waugh Equipment Company, has moved his offices to Chicago from New York. . . Dr. *Ellis H. Whitaker* retired July 1 from the biology staff at the State University College at Oneonta, New York after 23 years' service there. On September 1 he joined the faculty of the Southeastern Massachusetts Technological Institute. A new institution, SMTI is the merging of the New Bedford and Bradford-Durfee Technological Institutes.

1931

U.S. Steel Corporation has made *Russell J. Libbey* a liaison engineer and sent him to Pittsburgh after service with the American Steel & Wire Division in Cleveland. . . Another transferral occurred when *Henry H. Terry* was made plant engineer for The Martin Company at Orlando, Florida. He was previously in Washington. . .Lt. Gen. *Robert H. Terrill*, USAF, can now add "Ret." after his name. He makes his home in Shalimar, Florida. . .Mr. and Mrs. *Roger H. Lonergan* were "surprised" by relatives and friends on August 1 in honor of their 25th wedding anniversary. Roger has been a selectman of Oakham, Massachusetts for the past 11 years and chairman for 10. Mrs. Lonergan is active in PTA work. Their son John, the oldest of four children, was graduated from Tech this June. . .The new academic year brings *Richard G. Marden* a position as a physics teacher at the Falmouth, Maine high school. Dick leaves the Worcester School System, where he taught at Classical High. . .*Warren N. Doubleday* left the Raytheon Company in favor of the Springfield Armory, which makes necessary a move from eastern to central Massachusetts. The Doubledays are now residing in East Longmeadow.

1932

George T. Barks has been serving as resident superintendent of Gering Plastics Company, a department of the Monsanto Company, in Anaheim, California. He had been living in New Jersey before moving out west.

1933

U.S. Steel Corporation called *Emil C. Ostlund* to Pittsburgh to serve as manager of standards systems after a Cleveland position with the American Steel & Wire Division.

1934

A letter from the *J. Boylston Campbell* family begins: "Dear Kith and Kin: The occasion of a move into a new home seems to be a good opportunity to write a long letter. . ." He goes on to relate news of the family. Janet, the oldest, is married and provides Jack with a granddaughter to boast of. Kathy graduated from Tufts University in 1963 and is now in the Peace Corps. Donald, the youngest, finished eighth grade at Cathedral Choir School in New York City and spent the summer at Camp Pasquaney in New Hampshire. As for the "old man," he's happy at The Franklin Institute in Philadelphia, which is "the finest outfit he's ever worked for.". . *Julius L. Gould* was launched into the local fund-raising activities of Auburn, Maine this year when he was appointed to head the solicitation team for shoe firms in the United Fund effort. He is now the other half of Amrhein & Gould, a business and consulting firm in Auburn. . .It is reported that *Harold Narcus*' first book, "Metallizing of Plastics," is selling all over the world within the industry. President of Electrochemical Industries Inc. of Worcester, Harold presented a technical paper at the Weizmann Institute of Science, Israel, in May.

1935

Douglas L. Watkins, formerly of Morristown, New Jersey, is serving in the new post to which he was appointed in May by U.S. Steel Corporation. In June he and the family moved to Worcester, where Doug began duties as chief product engineer of the Electrical Cable Division, Worcester Works. . .Clinton H. Smith, son of *Kingston C. Smith*, has enrolled in the W.P.I. class of 1968. KC's older son, Kingston, Jr., is attending The King's College in Briarcliff Manor, New York. . . *Eugene S. Henning* has returned to Huntsville, Alabama from an assignment in California for NASA's Marshall Space Flight Center.

1936

Married: Ray D. Wells, Jr. and Mrs. Carol V. Oliver of Florida. . .

Alexander L. Gordon has been named to the newly-created post of product development manager of The Vellumoid Company, a subsidiary of W. R. Grace & Company, in Worcester. He was formerly research manager. . .*Walter G. Dahlstrom* is serving in a new post to which he was appointed in April by U.S. Steel Corporation. He is division chief of electrical cable in the Applied Research Laboratory. . .The Florida Engineering News reports that Dr. *Paul M. Downey* became chairman of the Industrial & Systems Engineering Department at the University of Florida on September 1. Paul, known throughout the state for his work in quality control, has been a faculty member since 1953. . . *Harold C. Whitman*, who now lives in Northboro, Massachusetts, is an administration manager at Raytheon Company in Wayland.

1937

Principal speaker at an all-day session of the 50th annual meeting of the Massachusetts Federation of Planning Boards in May was Prof. *B. Allen Benjamin*. A city planning consultant, he is an adjunct professor of that subject at W.P.I. . . *Howard W. Osborn* is now district engineer, Pacific District, Maintenance Division, of the Panama Canal Company. His unit performs a multitude of functions: it maintains roads, sewers, public and private buildings on the Pacific side of the Isthmus, operates a quarry, central concrete mixing plant, asphalt plant, and several large air conditioning and refrigeration systems. . . *A. Hamilton Powell* entered a unique field when he organized Electro-Mechanical Mission Aids Inc., a non-profit corporation to produce a hand-crank operated tape playback/recorder unit with battery powered transistorized circuits. "Totible Teecher," as it is called, was "developed especially for missionaries to use in teaching and spreading the Gospel." Ham, manager of ancillary engineering at General Electric Company in Syracuse, was elected a Fellow of the IEEE this year. . . General Electric has awarded the post of manager, power transmission sales operation, to *John R. Casey*, who was previously in Schenectady and now works in New York City. . .*Walter H. Holt* became manager of engineering for the Buffalo Forge Company's Air Handling Division in July. Walt has been with the firm since

graduation, most recently as manager of new products. . . Prof. *Ray K. Linsley*, head of the civil engineering department at Stanford University, is on a sabbatical leave for the 1964–65 year to be with the U.S. Offiice of Science & Technology as a special assistant. He will be in Washington, D.C. as water resources research coordinator.

1938

The promotion of *Hans P. Peterson* to chief engineer of the Refrigeration, Heating & Air Conditioning Products Division of Tenney Engineering, Inc. was announced in May. Pete, formerly sales manager of the division, has moved his family from their New Jersey home to Wilmington, North Carolina, where the division's main plant is located. . .One of the nation's top plastics engineers, *Fred E. Wiley* has been promoted to the vice presidency in charge of engineering at DeBell & Richardson, Inc. of Hazardville, Connecticut, a firm of plastics consulting engineers. Fred has brought international recognition to the firm, where he has worked for 12 years, for his technological innovations in the plastics industry. His most recent project, for example, was the development of the thermoformed Paxton cigarette package for Philip Morris. The newspaper report says, "The results of his work are documented in dozens of U.S. patents, granted or filed, as well as a host of their foreign counterparts in every industrialized country in the world."

1939

Eugene L. Gravlin is now with Knapp Bros. Shoe Company and makes his home in Hartsdale, New York. . .A Heald Machine Company employee and a World War II veteran, *Norman W. Stewart* is the new commander of the Massachusetts Department of the American Legion. He was elected at the annual state convention at Pittsfield in June.

1940

We are happy to have discovered the whereabouts of *S. Merrill Skeist* and pass the information on to his classmates. He's director of marketing for the General Applied Science Laboratories in Westbury, New York and is a resident of Roslyn Estates, New York. . .The Rodney Hunt Machine Company of Orange, Massachusetts announced in late June that *Howard G. Freeman* had been elected to the board of directors. Howard is president of Jamesbury Corporation, Worcester, which he founded in 1954 . . . *David B. Zipser's* promotion to assistant general manager of the Refrigeration, Heating & Air Conditioning Products Division of Tenney Engineering, Inc. was announced in July. Dave's home is Wilmington, North Carolina, where the division's main plant is situated. . .A massive $16 million public works project in Providence, Rhode Island, under construction since December 1960, and other Rhode Island, Connecticut, and Massachusetts projects as well, do not fail to keep *Charles F. Sullivan* well occupied. Although he prefers obscurity, a "Name in the News" story in the Woonsocket Evening *Call* dubs him a key figure and points up his important position as area engineer for Rhode Island with the New England Division of the Army Corps of Engineers. As such, he is in charge of supervision of contract construction for the $16 million Fox Point Hurricane Barrier, Providence; the $9.2 million Woonsocket Flood Control Project; the $4.5 million West Thompson (Conn.) Dam; modifications to Nike sites in Bristol and North Smithfield, Rhode Island; recreation facilities at the Sturbridge-Southbridge (Mass.) Westville Dam; and will be supervising the $280,000 construction work for a Rhode Island Air National Guard at Green Airport.

1941

Col. *Warren S. Bradford* retired from the Air Force on June 30, ending a 20-year career. He was assigned to Patrick AFB in July 1963 to assume duties as deputy director, range program office, Air Force Eastern test range. The colonel holds an M.B.A. degree from Indiana University, earned in 1958. It appears as though he will begin a new career. . . *Ralph W. Stinson* came down from the north country, where he worked for a firm in Maine, to become industrial engineer for the Hartford (Conn.) Division of Emhart Manufacturing Company. . . At the annual meeting of the Auburn (Mass.) Co-Operative Bank, *Leonard H. White*, vice president of R. H. White Construction Company, was elected to the board of directors. He is also vice president of the Milford (Mass.) Water Company and president of the Whitinsville (Mass.) Water Company. . .Rev. *Edward G. Jacober*, a missionary in Gujarat State, India, is on a year-long furlough in the states, and is staying in Dayton, Ohio. . . This is truly the jet age for *Hilliard W. Paige*. He's zoomed through so many positions and promotions with General Electric Company that we now find him a vice president. He continues his duties as general manager of the Missile and Space Division, which employs approximately 9,000 people.

1942

Rodney G. Paige, brother of the above, received a transfer by Chas. Pfizer & Company to New York City to become assistant director of engineering. He had been serving as assistant plant engineer in charge of maintenance and operations at Groton, Connecticut. Rod resigned the chairmanship of the Groton Planning Commission upon his promotion and transfer. . .*Lester A. Bolton, Jr.* continues in his position as a sales representative for Welch Scientific Company, and is now in the field in California. He was formerly attached to the company at Greenfield, Massachusetts. . . *John Ford, Jr.* has returned to Ben C. Gerwick, Inc., which he left in 1961 as a superintendent for a position in Virginia. He's back in San Francisco now as a project manager.

1943

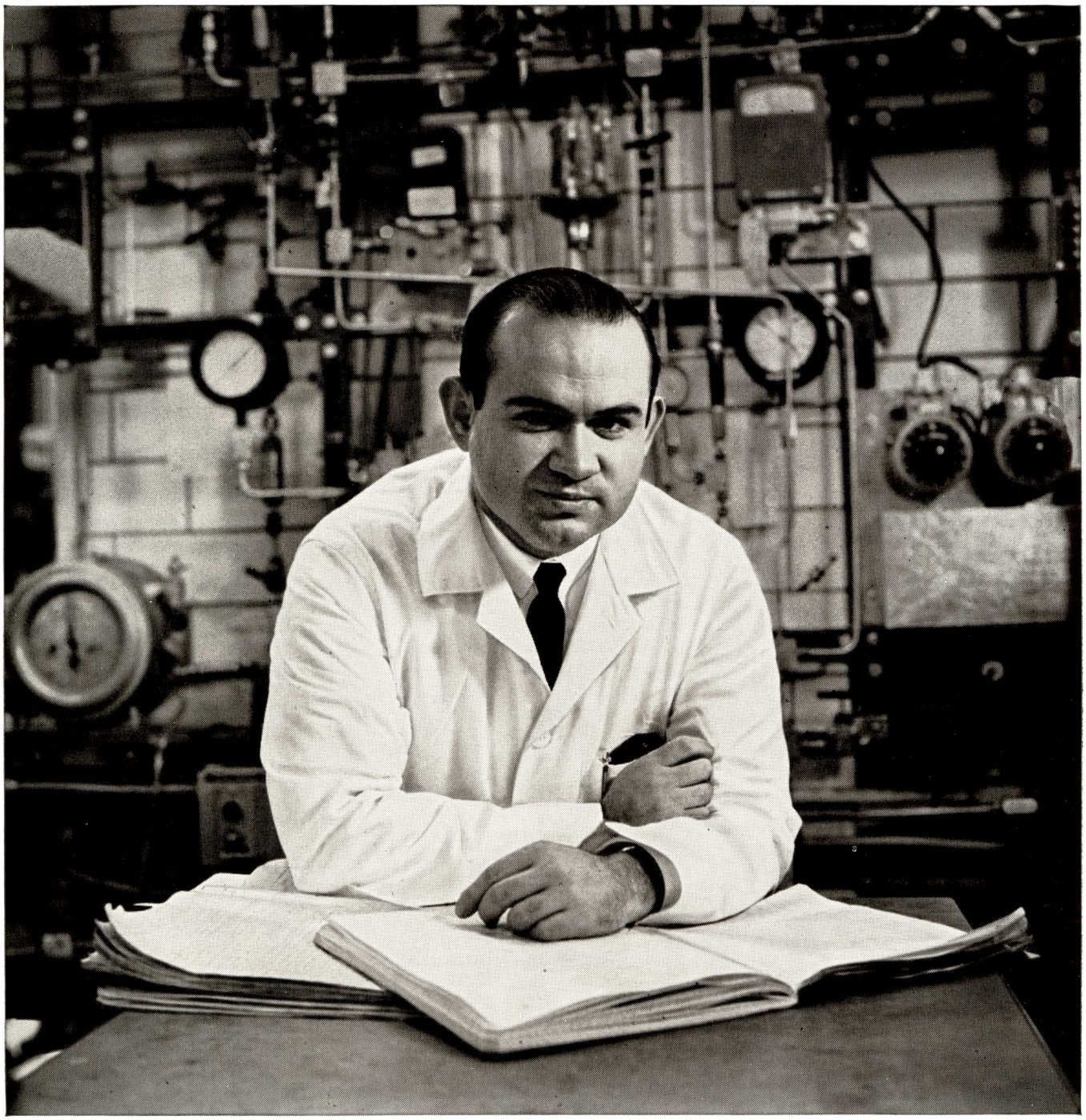
Three years as vice president of engineering at Surprenant, Inc., Clinton, Massachusetts, preceded *Donald C. Alexander's* recent appointment to a similar capacity of larger proportions. Surprenant and the Royal Electric Corporation of Pawtucket, Rhode Island, divisions of International Tel. & Tel. Corporation, have been consolidated to form the new Wire and Cable Division, which he serves in the vice presidential post.

1944

The Physical Review has published another article co-authored by Dr. *Lloyd G. Mann*. It appears in the May 11 issue. . .*Charles E. Cannon* is a member of a group of 10 Metcalf & Eddy engineers retained by the U.S. Army Corps of Engineers to advise the Alaskan District Engineers on how to best rebuild Anchorage after the Good Friday earthquake. Charlie's experience on a project in Greenland qualifies him to work in northern areas. He is a professional engineer in five New England states, New York, and Florida. . .*John E. Bigelow* has joined General Electric Company's Advanced Technology Labs at Schenectady as information engineer. A major move from Wisconsin followed his appointment. In Milwaukee he was manager of the X-Ray Department's Advanced Engineering and Consulting Labs. He holds 14 patents with eight applications pending and is author of many technical papers. . .Former Westinghouse employee *Douglas G. Noiles* has become product manager at the AEL Systems Division of Automation Engineering Laboratory, Inc. at Stamford, Connecticut.

1945

A news release from Worthington Corporation announces the appointment of



Anyone for hydrodesulfurization?

How about it? Want to hydrodesulfurize? Hydrodesulfurize oil, that is. Fuel oil. Dr. James Mosby, Purdue, '64 does. He experimentally optimizes the commercial procedure for removing sulfur. He's been working on hydrodesulfurization ever since he joined the American Oil Company as a chemical engineer last January. That's his pilot plant behind him.

Even if you'd rather not hydrodesulfurize, there are literally scores of other science and engineering opportunities at American Oil. If you're interested in a career in the petroleum industry, write to J. H. Strange for information. His address: American Oil Company, P. O. Box 431, Whiting, Indiana.

AMERICAN OIL COMPANY AMERICAN

Harold Fleit as manager of sales for the Worthington Air Conditioning Company. His promotion falls on a reorganization and consolidation of the Climatrol and Air Conditioning Division's sales organization. His former position was division manager of sales for the latter.

1946

Richard C. Lawton sent us the following note: "My company, Gates Albert, Inc. (of Rochester, New York) is growing rapidly, having expanded 50 percent since 1959. Specializing exclusively in Davenport automatic screw machine products, we now cover the entire country and export to Europe as well.". . Having joined the Kemper Insurance Group early this year, *Allan B. Johnson* was appointed this summer a senior executive in the Chicago home offices of Lumbermens Mutual Casualty Company, a division of the Kemper organization. . . *Douglas S. Miller* has been transferred from Naugatuck (Conn.) Chemical Company's Naugatuck plant to Painesville, Ohio, where he now serves as maintenance and construction engineer. . .*Ernest S. Hayeck*, an attorney since 1955, has formed a partnership with Worcester's Mayor Paul V. Mullaney. They have opened offices as Mullaney & Hayeck.

1946B

Delbert E. Walton has pulled duty in Honolulu as sales representative for Graybar Electric Company, Inc., for which he held a similar post in California. . .Former Connecticut resident *Foster Jacobs* has moved to New Jersey and now serves as assistant superintendent of grounds and buildings at Princeton University. . .Having formerly occupied a managerial post with General Electric Company in Syracuse, *Richard C. Brown* has been sent to manage a part of the Houston operations. . . *Joseph F. Pofit* left the Worcester area and Rockwood Sprinkler Company when he became president of P. J. Hydraulics, Inc. in Myerstown, Pennsylvania some time ago.

1947

Harold L. Cole of Lynnfield, Massachusetts is serving as corporate manager of development and design engineering for Raytheon Company, it was reported in a Boston newspaper. . .Dr. *Morrel H. Cohen* is the author of two articles which appeared in the June 15 issue of *Physical Review Letters.*

1948

Norman J. Jardine left his three-year post as manager of technical services for the Southern Pump & Tank Company to form his own firm, Equipment Associates, Charlotte, North Carolina. He is a manufacturers' representative for liquid or pneumatic equipment for the oil marketing, automotive and industrial fields presently covering Virginia, North Carolina, and South Carolina for four companies. . .Having been with Texas Instruments, Inc. for the past two years, *David L. Anthony* is manufacturing superintendent in the Silicon Small Signal Transistor Department. . .*Arne A. Kellstrom's* sales post with Ingersoll Rand Company has taken him to Los Angeles from his former location in Denver. . ."Essentials of Electricity," described as a readable book for students or laymen, is available at the Arlington (Mass.) Robbins Library. The book first appeared in 1913 but has now been thoroughly brought up to date by Prof. *Arthur L. Pike* of Tufts University. . . *William A. Beers'* promotion in July to engineering manager of transmission for the northern New England states, New England Tel. & Tel. Company, followed on the heels of his appointment last fall to engineering manager of equipment and transmission of New Hampshire. . . *Clark L. Poland* and General Foods Corporation have agreed that he should be industrial business manager at Dover, Delaware. Clark consequently moved from Dorchester, Massachusetts, where he was operations manager.

1949

William G. Sloane moved his family from Pickens to Anderson, South Carolina this fall, where he has taken up duties as general manager of The Singer Company's Motor Products Division. He left the post of plant manager of the Power Tool Division in Pickens for the new job. . . *Max E. Underwood* is back home in the States after serving as manager of the London Office of Worthington Corporation, and is now associated with the Badger Company, Cambridge, Massachusetts. . . Dr. *Sidney Baldwin*, who has been a professor of management at New York University, was selected in June as vice president and a director of the National Metal Specialties Company. . .*Henry J. O'Donoghue* claims the title of national sales manager, Electronics Division, of Dielectric Products Engineering Company Inc., Littleton, Massachusetts, to which he was appointed in August.

1950

Francis W. Norton left New York state for Dixieland, where he is senior construction engineer for Chemstrand Company in Decatur, Alabama. . .*Thomas B. Andrews* didn't go so far as Frank, but he did leave New York and now lives in New Jersey, where he is a member of the technical staff at Bell Telephone Labs, Whippany. . .It has been reported that *Glenn E. From* is now with Lockheed Aircraft Corporation. . .Now engineering manager responsible for space power systems, *George S. Barna, Jr.* is still with RCA. The family, including the three children, has moved into a new home in Princeton, New Jersey. . .Foster Grant Company, Inc. assigned *Saul Gordon* to the main plant in Leominster, Massachusetts recently, after he had served in the Manchester, New Hampshire plant. . .Solar Division of International Harvester Company announced the appointment of *Robert A. Padgett* as manager of manufacturing services. The announcement said that he will now be in charge of Solar's industrial engineering, plant engineering and tooling activities. The Padgetts are now parents of a little girl, Robyn Amy. . .An August letter from Dr. *John C. Slonczewski* reports that he will be on an assignment to the I.B.M. Research Laboratory in Zurich, Switzerland until July 1965. . .*A. Kenneth Stewart, Jr.* is renewing his efforts on behalf of the United Fund in Greater-Lowell, Massachusetts, this year as chairman. He served as vice chairman last year and has been active in various positions for UF for the past several years. . .*Ralph C. Young*, who completed nine years of teaching in June, has been granted a year's leave of absence from the Robbins Junior High School in Farmington, Connecticut. He has accepted an international educational exchange grant for this year and will teach in Wallasey, England.

1951

Married: James B. Kalloch and Miss Mary L. Blanchard of North Haven, Connecticut, August 22, 1964. In addition to attending Northeastern University's evening school, Jim is a civil engineer with the Massachusetts DPW.

Chas. Pfizer & Company, Groton, Connecticut has announced the promotion of *Carl E. Johansson* as assistant head of the Organic Fermentation Department. He was previously a production supervisor . . . *Thomas G. Stack*, transferred to Baton Rouge, Louisiana in 1963, has been named chief chemist of the Baton Rouge and Scotts Bluff plants of U.S. Rubber Company's Naugatuck Chemical Company Division. . .*Harvey L. Howell* has been advanced by Potter Instrument Company, Inc. He was appointed controller of Transducer Corporation and

International Data Products, Inc., Puerto Rican subsidiaries of Potter, in 1963, and now becomes vice president and general manager of both. . .Union Carbide Corporation transferred *Eric L. Peterson* from the Production Engineering Department to the General Engineering Department of the Consumer Products Division. Eric's family moved to a new house in June to make more room for Christian, Allen, Kurt and John. . .*Dick van den Berge* arrived on the Hill this fall to complete requirements for an M.S. degree. . . *Robert K. Walker* (MS), an engineer at the General Electric Company electronics lab in Syracuse, has been elected vice chairman in the Central New York section of the American Institute of Aeronautics and Astronautics. Bob is presently working toward a Ph.D. degree at Syracuse University. . .*William F. Dewey, Jr.* has become a sales engineer for Stedfast & Roulston, Inc. of Boston upon leaving Wyman-Gordon Company.

1952

Harold F. DeCarli was called from Miles Laboratories, Inc. in Indiana to the parent firm, Miles Chemical Company in Clifton, New Jersey, to serve as a process supervisor. . .Monsanto Company made *Charles R. Holland* a technical superintendent and sent him to Kearny, New Jersey from Indian Orchard, Massachusetts. . .*Kenneth M. Wright*, now a resident of North Syracuse, New York, has become a construction estimator for Dygert Construction Company of Syracuse.

1953

Born: To Dr. and Mrs. *Michael N. Hoechstetter*, their third child and second daughter, Lisa Gay, on April 20, 1964.

Francis W. Madigan, Jr., treasurer of F. W. Madigan Company, Inc., has been elected a director of the Associated General Contractors of Massachusetts. He is also chairman of the AGC safety and insurance committee and former secretary of the Worcester General Building Contractors Association. . .*George E. Saltus* delivered the principal address at the New Bedford (Mass.) High School graduation exercises in June. George is with Bell Telephone Labs in Whippany, New Jersey. . .*William G. Mears* and *Paul W. Snyder, Jr.* have been promoted at Socony Mobil Oil Company, Inc., Paulsboro, New Jersey. Bill's new position is that of supervising automotive engineer in the engine test section of the Research Department. Paul has been promoted to engineering analyst and transferred to Rifle, Colorado, where he will take part in the oil shale research program. . . Dr. *Herbert Slotnick* (MS) earned his Ph.D. last June from the University of Connecticut where he studied under United Aircraft Corporation's Graduate Education Program. Herb is at Pratt & Whitney's CANEL operations in Middletown. . .If you live in the Springfield (Mass.) area, you know of Abdow's Hi-Boy Restaurants, the third of which was opened in August. What you might not know is that the brothers Abdow consist of *George T. Abdow* and his brother Ronald. Their first venture into restauranting began in 1959, when they opened with "a pile of hamburger rolls, a cash register, a big mortgage, and the willingness to work hard.". . *Daniel R. Hoch* is taking a technical staff assignment as manager of power development for I.B.M. Corporation in Kingston, New York. In addition, he will continue to manage the Endicott, New York application group from Kingston.

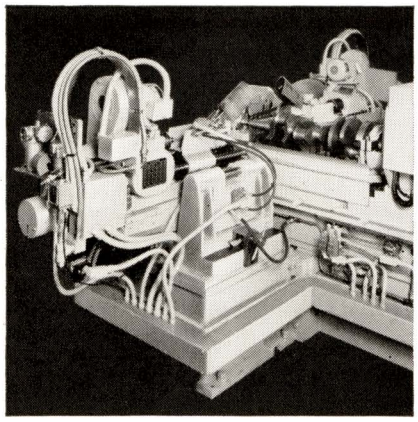
HOW MUCH CAN YOU DO WITH ONE DRILLING MACHINE?

Before you decide that automatic methods are too costly or complicated, ask Leland-Gifford for their solution.

For maximum output of mixed production, look to Leland-Gifford for drilling machines that will do the job quickly, accurately and at lowest cost.

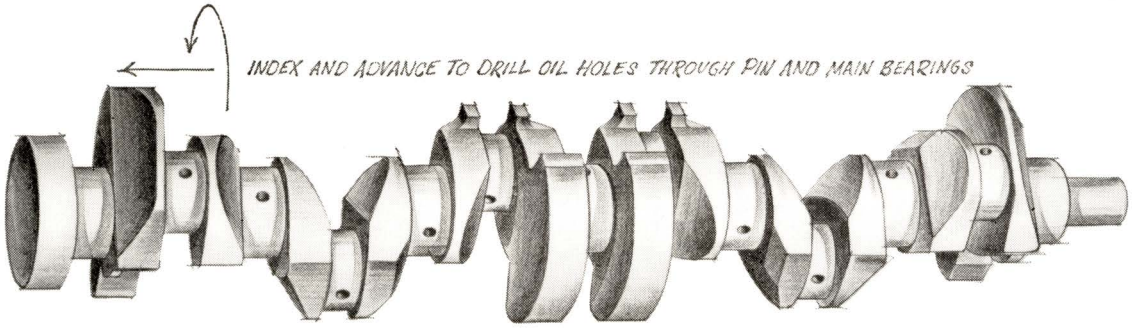
As an example, this Leland-Gifford "special" gun drills oil holes in a variety of heavy duty crankshafts — 4's, 6's, and V-8's. Holes are precisely located on pin and main bearing surfaces, and are drilled at exact angles to intersect gallery holes.

Shafts require as many as twelve deep precision holes, and each model involves a different pattern of radial indexes, longitudinal advances and spindle strokes. The six cylinder model shown weighs 175 pounds yet floor-to-floor time averages only fifteen minutes per shaft. Automatic sequencing is initiated by push-buttons and adapted to different crankshaft types by interchangeable limit switch index bars.



The capability that developed this crankshaft gun drill is a reflection of Leland-Gifford ability in a broad area of standard and special drilling machines designed to produce more holes at high accuracy and low cost.

Write for complete information or ask to have an experienced sales engineer call.



LELAND-GIFFORD
WORCESTER 1, MASSACHUSETTS
SPECIAL DRILLING MACHINES

1954

General Electric Company has lost *Leonard V. Mello* to Lithonia Lighting, Inc., Conyers, Georgia, where he is a methods and time standards engineer. . . Word has been received from the New England Telephone Company that *Jerome W. Kilburne* will be serving as personnel staff supervisor, handling college recruiting . . . Dupont has transferred *David F. Gilbert* from West Virginia to the Chambers Works in Penns Grove, New Jersey, where he is now a production supervisor. . . Granger Contracting Company's project manager is *Eugene J. Dragon*, who has worked there since 1956 and previously for the Massachusetts DPW. Gene lives in Northboro with his wife, daughter and two sons . . . The Federal Aviation Agency has sent *Melvin H. Holmgren to* Anchorage, Alaska as an electronic design engineer. Mel previously lived in Cedar Rapids, Iowa.

1955

Married: Prof. *Hartley T. Grandin, Jr.* and Miss A. Diane Smith of Sterling, Massachusetts.

Born: To Mr. and Mrs. *Charles F. McDonough*, their second child, a daughter, Barbara Lynn, on August 24, 1964. Charlie was promoted to group leader in charge of pilot plant operations at American Cyanamid Company's Bound Brook, New Jersey plant last December. He had been on a three-year assignment at the New Castle, Pennsylvania site earlier. Charlie was the recipient of an M.B.A. degree from Kent State University this August.

Dr. *William R. Taylor* is performing his duties as a Fellow in child psychiatry at St. Christopher's Hospital in Philadelphia . . . *Joseph K. Ryan, Jr.* has formed with a friend the General Fuel Corporation to supply fuel oil and heating services to Fairfield County, Connecticut residents . . . *Richard A. DeLuca* was one of three W.P.I. graduates to receive master's degrees at the University of New Hampshire this June . . . *Robert K. Neunherz's* appointment to the Regional Vocational School District Planning Committee in Westminster, Massachusetts was announced in July. Bob, vice president of manufacturing of Gem Crib and Cradle Company of nearby Gardner, has been very active in civic affairs of the area . . . Dr. *Howard J. Dworkin* is a staff member at the University of Michigan Hospital, studying for his Ph.D. degree in nuclear medicine. A result of his current research work was a paper revealing new techniques for diagnosing cancer of the lungs, kidneys and thyroid glands by employing radioactive isotopes. . . *Peter H. Horstmann* is with Coppus Engineering Corporation of Worcester following receipt of an M.B.A. degree from Western New England College this year. . . *Kenneth H. Russell* and an associate performed a production engineering study at the Picatinny Arsenal on the M86 propelling charge for the Army's new 175mm gun. The study led to the use of 23,000 pounds of excess propellant stocks. The result: a $5 million saving for the U.S. Government. Their achievement was cited by President Johnson and Defense Secretary McNamara, who presented them Certificates of Merit at ceremonies in the Pentagon on July 21 for making outstanding contributions in the Cost Reduction Program. A member of the Picatinny staff since graduation, Ken was the recipient of a sustained superior performance award two years ago. He is married and the father of seven children.

1956

Married: Edward A. Blakeslee and Miss Irene J. Horner of Madison, Connecticut, July 11, 1964. Ed is at the United Aircraft Corporate Systems Center in Farmington, Connecticut . . . *Philip P. Bedard* and Miss Mary J. Morua of San Antonio, Texas, August 22, 1964. Phil is at the Narragansett Marine Laboratory of the University of Rhode Island.

Arthur G. Kennard, Jr. relates that he has remained with I.B.M. Corporation, and now works on developing computer programs for circuit design and analysis as a staff engineer. Art and Dee's twin sons, Bruce and Bobby, were six years old in October, and Lisa was three in April . . . *William A. Johnson* has been transferred by Shell Oil Company from Norco, Louisiana to a recently purchased refinery in Odessa, Texas. His new post is senior technologist in charge of economic and scheduling functions at Odessa and at a refinery near Gallup, New Mexico. . . R.P.I. awarded *Donald N. Lathrop* M.S. degree in metallurgy this June.

1957

Born: To Mr. and Mrs. *Herbert C. Stohr*, their second child and first son, Erich Charles, on May 11, 1964. Dad is presently an engineering leader in the Research Division of Xerox, Inc. . . To Mr. and Mrs. *Alvin C. Lanson*, their first child and daughter, Sheri Lyn, on August 9, 1964 . . . To Dr. and Mrs. *Adi Eisenberg*, their first child and son, Elliot, on October 12, 1963 . . . To Mr. and Mrs. *Spiro L. Vrusho*, their first child and daughter, Kimberly Sue. Formerly a sales engineer with the Bristol Company, Spike completed a 14-month period of studies in Syracuse University's M.B.A. program and on September 1 joined I.B.M.'s Data Processing Sales Division in New York City.

Richard F. Moore has left General Motors' New Departure Division in favor of Norma Hoffman Bearings Company in Stamford, Connecticut as a project engineer . . . Continental Can Company's Overseas Division sent *Gilbert P. Fauteux* from New York City to Chicago to continue as technical sales engineer . . . Burroughs Corporation's Control Instrument Division is the new employer of *Leland H. Baker, Jr.*, senior development engineer . . . Dr. *Edwin R. Ahlstrom*, physicist at the U.S. Army Electronics R & D Labs at Fort Monmouth, was awarded a $200 cash honorarium for a paper written by him and a colleague. The award was presented at the Army Science Conference for their paper dealing with the ruby laser with vibrating reflector . . . Dr. *Alexander Vranos* is one of three scientists who received the Silver Combustion Medal, given biennially by the Combustion Institute, on August 17 in England. Dr. C. William Shipman, professor of chemical engineering at W.P.I. and Dr. Norman M. Howe of the University of Virginia were also cited. The award is in recognition of a paper written by the three and based on a research project performed at Tech in 1962 . . . *Robert W. Franklin* won the rank of lieutentant commander recently in the U.S. Coast & Geodetic Survey. A member of the Survey since his graduation, Bob has been assigned to flight training at Fort Rucker, Alabama. . . *Oscar O. St. Thomas* of Wyman-Gordon Company, formerly district sales manager in Dayton, Ohio, has been brought back to Worcester to serve in that capacity . . . *John H. Atchison, Jr.* of the M.I.T. Lincoln Labs has taken a year-long assignment at the field site at Camp Parks, Pleasanton, California. John and Deanna are now residing in Pleasanton. . . *Richard A. Barlow* is taking time out of his career to attend the Harvard Graduate School of Business. . . *John O. Stinson* has been progressing, prospering, and propagating unpublicized for the past three years. We'll try to make up for it now. The Stinsons now have three sons and three daughters and make their home in Saugus, Massachusetts, where John has been town manager for almost three years. He became a registered civil engineer in 1962 and does consulting work. A senior member of the International City Managers Association, John enjoys his work very much.

1958

Born: To Mr. and Mrs. *Bernard V. Ricciardi*, their third child and first son, James Bernard, on March 27, 1964.

Ralph E. Sellars, Jr. migrated to North Canton, Ohio from New Hampshire upon accepting the post of plant security supervisor for The Hoover Company. . . *Roger A. Jolicoeur* returned recently to Southboro, Massachusetts and Sylvania Electronic Systems after an assignment "on site" at the White Sands Missile Range. . .*Bernard M. Campbell, Jr.* was awarded an M.S. degree by Lehigh University this year. . .An M.S. degree in management was won at R.P.I. this June by *Robert J. Bugley*. . .*James J. Johnson's* work at New Jersey Bell Telephone Company is that of plant service supervisor of repair at Red Bank. Former residents of Trenton, the Johnsons now live in Lincroft. . .*Larry Dworkin* was promoted to departmental staff member at the U.S. Army Electronics R & D Labs at Fort Monmouth in July. During the same month, Larry was one of 23 to receive the Army Research and and Development Achievement award. Larry is currently studying for a Ph.D. degree at Brooklyn Polytechnic Institute . . .*John E. Darling* reports that he is presently employed by The Borden Chemical Company as a process-project engineer in Leominster, Massachusetts.

1959

Married: *Donald R. Nelson* and Miss Judith C. Sund of Worcester, May 9, 1964. Don is chief engineer for Goddard Valve Company Division of Goddard Industries, Inc. . .*Michael A. Hertzberg* and Miss Della R. Berger of Spring Valley, New York, May 31, 1964. . . *William F. Curran* and Miss Cynthia A. Woodis of Putnam, Connecticut, September 5, 1964. Bill is with the New York Housing Authority. . .*James S. Tyler, Jr.* and Miss Karen L. Abrecht of Newburgh, New York, September 1964. Jim is a candidate for a doctorate at Yale University.

Born: To Mr. and Mrs. *Carl M. Frova*, their second child and daughter, Louise Ann, on February 25, 1964. The family resides in Malverne, Pennsylvania, and Carl is with the Foxboro Company, Philadelphia Sales Office . . . To Mr. and Mrs. *John D. Bonk*, their first child and son, John David, Jr., on June 4, 1964. Still with Bell Telephone Company of Pennsylvania in Philadelphia, John has been promoted to planning engineer in executive operating . . .To Mr. and Mrs. *Eli J. Dworkin*, their second child and son, Jeffrey Glenn, on March 30, 1964. Eli is currently employed as a reliability engineer at the U.S. Army Electronics R & D Labs at Fort Monmouth and is studying for a Master's degree at Newark College of Engineering. . .To Mr. and Mrs. *Richard P. Keats*, their second child and daughter, Leslie Susan, on July 20, 1964.

Dr. *Kent A. Healy*, who received his Ph.D. degree at M.I.T. in 1963, accepted an assistant professorship at UConn this fall. Kent had been conducting research work for a consulting firm before receiving the appointment. . .Dr. *George P. Rizzi* is still with the test tubes, having taken a position with Proctor & Gamble Company's Miami Valley Labs in Cincinnati. . .M B Electronics of New Haven has sent its sales engineer, *Robert J. Kaye*, into the state of New Jersey, where he now lives in Pennsauken. . .A former instructor at Wentworth Institute, *Winthrop M. Wassenar* accepted the assistant directorship of the physical plant at Williams College. . .*John W. Davis, Jr.* was awarded a doctorate of dental surgery from Seton Hall College of Medicine and Dentistry last June. . .In May, *Robert L. Bourget* was advanced to operating supervisor of Lustrex Department 62 at Monsanto Company in Springfield, Massachusetts. . .When Cal Tech was passing out degrees this year, *David A. Evensen* was in line for a doctorate. He has taken a position with NASA and is now located at the Langley Research Center in Hampton, Virginia. . .*David A. Sawin* accepted in May a position as application engineer with Hobbs Manufacturing

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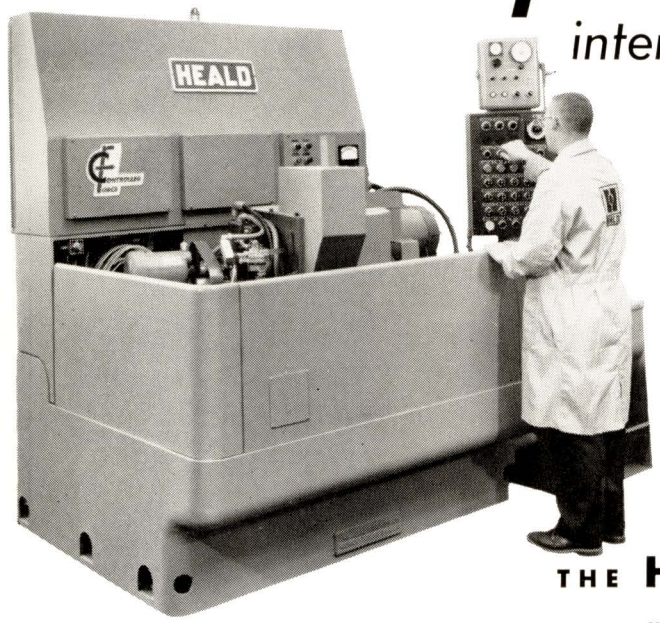

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Company in Worcester. Dave's son, James David, was one year old on July 12. . .*Edward A. Saulnier, Jr.* and family returned in July to their Wappingers Falls, New York home from England, where they had been living for eight months in connection with Ed's temporary assignment at the I.B.M. British Labs. . . *Anthony E. Engstrom*, having completed a tour of duty with the Navy, goes into sales engineering work at the Electric Boat Division of General Dynamics Corporation at Groton, Connecticut. . . The grapevine has it that *Joseph D. Bronzino* began a teaching career this fall in the electrical engineering department at the University of New Hampshire . . .*Marshall P. Krupnick* has left Sylvania Electronic Systems to enter Seton Hall to study for a law degree. . .Capt. *David A. Bareiss* completed the officers advanced course at Fort Monmouth and has reported to Fort Bragg, North Carolina for his next assignment. . .*Anthony J. Aukstikalnis* has returned to his home in Pennsauken, New Jersey after completing a tour of duty with the Army. He's also returned to RCA as an associate engineer at Hightstown, New Jersey. . . *Peter A. Nelson* became a registered professional engineer in Massachusetts on August 31. . .Having gained experience in the traffic division of the Connecticut Highway Department, *Richard J. Ronskavitz* became Hartford's traffic operations engineer in September.

1960

Married: *Edward C. Stone* and Miss Penelope J. Hyde of Kensington, Connecticut, June 6, 1964. Ed is with Fafnir Bearing Company of New Britain. . . *Stuart P. Roberts* and Miss Mildred P. Koskinen of Maynard, Massachusetts, August 30, 1964. . .*Bernard L. Tetreault* and Miss Karen E. Boston of Toledo, Ohio, October 3, 1964. Bernie was appointed assistant to the city manager of Rockville, Maryland in late September. . . Capt. *Ronald L. Letteney* and Miss Verna Engelbercht of Germany, September 10, 1963. The couple were married in Fontainebleau, France. Ron will remain in the service another year and will then return to the States to continue his studies. . . *Chester W. Stanhope* and Miss Carolyn Leland of Northboro, Massachusetts, September 12, 1964. He is an instructor at the University of New Hampshire.

Born: To Mr. and Mrs. *George G. Wilson*, their second child and first daughter, Karyn Elizabeth on March 17, 1964. . .To Mr. and Mrs. *Warren T. Munroe*, their first child and daughter, Wendy Alison, on August 20, 1963. . .To Lt. and Mrs. *William J. Firla, Jr.*, their first child and daughter, Susanne Margaret, on July 22, 1964. Bill is now a first lieutenant and has been transferred from Wiesbaden to Hanau, Germany, where he is his batallion's adjutant.

Prof. *Edward E. Lindberg* of Western New England College attended a Ford Fellowship program for engineering faculty at M.I.T. this summer. . .Dr. *Robert C. Bearse* earned the title from Rice University in Houston this year, after four years of graduate study in physics. . . *Ozden Aslan* (MS) is on a leave of absence from Norton International, Inc. for two years while he completes his military service in the Turkish Army. . .A position at the O.C. White Company of Worcester has been filled by *Lawrence W. Cochrane, Jr.*, a mechanical engineer . . . *Richard Long's* new assignment with Lockheed Electronics Company takes him to Webster, Texas, where he is a senior engineer. North Plainfield, New Jersey was his former location. . .*John B. Clark* left the Waumbec Mills, Inc. for a position at Jones & Lamson Machine Company, Springfield, Vermont. . .*Albert R. Scansaroli*, who has won two superior performance awards from the Air Force, co-developed a new device for the four-engine jet KC-135, thereby saving the Air Force $3,900. . . *David B. Haley* reports a change from Sprague Electric Company to Technifax Corporation, a firm in Holyoke, Massachusetts. . . *Raymond J. Fugere, Jr.* has returned to Pratt & Whitney Aircraft at East Hartford, Connecticut after a tour of duty with the Army. . .An appointment with Monsanto Company followed *Myron H. Smith's* receipt of an M.B.A. degree from Northeastern University this June. . . *Joshua C. Alpern* accepted a temporary two-year transfer to Bangkok in connection with his position as project engineer for the U.S. Army Scientific Liaison and Advisory Group at the Pentagon.

1961

Married: *Walter E. Pillartz, Jr.* and Miss Mary Ann Bradsnyder of Stratford, Connecticut, May 9, 1964. The groom is with Southern New England Telephone Company. . .*Roger B. Smith* and Miss Shirley M. Sampson of Shrewsbury, Massachusetts, August 22, 1964. Roger is with the Travelers Insurance Company in Hartford, Connecticut. . .*Robert N. Ruberti* and Miss Sharon M. McNamara of Rome, New York, June 6, 1964. *David R. Baker* served as an usher. Bob is with the Rome Air Development Center at Griffiss Air Force Base. . . *Rudolph E. Croteau, Jr.* and Miss Margie Walter of Dorchester, Massachusetts, June 6, 1964. Leaving the FAA in New York City, he took a position in New London with the U.S. Navy Underwater Sound Lab, and the new couple is living in suburban Niantic. Also, he began part-time graduate studies at UConn in September.

Born: To Lt. and Mrs. *Bruce W. Woodford*, their first child and daughter, Laura Ellen, on August 15, 1964. . .To Mr. and Mrs. *Joseph N. Wrubel*, their second child and first son, Morris, in June 1964. Joe also received a master's degree from Newark College of Engineering in June.

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James R. Duca has been sent to Puerto De Santa Maria, Spain in connection with his duties as field engineer for Sperry Gyroscope Company. . .Separated from the Army last March, *Walter H. Johnson* is an experimental engineer with Pratt & Whitney Aircraft in East Hartford. . . *Joseph W. Simonis* was commissioned a second lieutenant in the Army upon his graduation from West Point in June. . . *Arthur W. Kroll* received top honors in June when he was named "Jaycee of the Year" at the 10th annual installation of the Enfield (Conn.) Chapter of the U.S. Junior Chamber of Commerce. He had served as chairman of the Youth in Government Committee, which sponsored Enfield's first Student Government Week. He also received his SPOKE, an award given to outstanding first-year Jaycees, and was presented a Committee of the Year award. A project engineer for Dynamic Controls, Inc., he is married and has a son and a daughter. . .Since his release from the Army last November, *Stephen B. Brody* has been with Heald Machine Company, Worcester. . .First Lt. *Gerald A. Mullaney* has been awarded his silver wings upon graduation from navigator training at Connally Air Force Base, Texas. He then attended the Survival and Special training School at Stead AFB, Nevada. Gerry is now assigned to a MATS unit at McGuire AFB, New Jersey. . .Ens. *J. Warren Alford*, after training at the Navy's Nuclear Power School, is on board the USS *Long Beach*. . .*Charles R. Lehtinen* left Long Island for New Orleans, where he works for the Boeing Company's Aero-Space Division. . .New England Tel. & Tel. Company has assigned *Paul J. McCarthy* to Boston after an assignment in Providence. . .*Charles E. Godfroy* is on the move again. Morrison-Knudsen Company & Associates has sent him to Grand Forks, North Dakota from Cheyenne, Wyoming. He has also served in Boise and in the L.A. district office... Lt. *Leonard E. Pickens* received new orders in August to Woods Hole, Cape Cod. Slim's previous base with the U.S. Coast & Geodetic Survey was Savannah, which he was happy to leave before "dog days" set in. . .His tour of duty completed, *S. Leon Gazoorian, Jr.* was discharged from the Army and sent home from Germany. He is back to work with the Public Service Electric & Gas Company in New Jersey. . .*Albert R. Thomas* was among 25 electrical engineers to complete a unique workshop at Northeastern University this summer in connection with his work at Public Service Company of New Hampshire. The four-week course supplements the college education of engineers in the electric power industry. . .*Lawrence L. Israel* resigned his position with Minneapolis-Honeywell Regulator Company in midsummer and accepted a position with Scientific Data Systems in Santa Monica, California. . .*Stephen W. Klein* was separated from active Army duty in January and now works at the electronics labs at Fort Monmouth. . .*Kenneth R. Engvall*, a civil engineer, is with Thompson-Liston Associates, Inc. of Worcester. Ken had been serving in the Army. . . *Ralph F. Guertin* sailed in September on the Italian ship *Aurelia* from Hoboken, en route to England. There he spent a week before crossing the Continent visiting the main cities of France, Germany and Italy. Next destination — Istanbul, then on to Ankara. Actually, all this travel was a preliminary to settling down to some research work at the Middle East Technical Institute in Ankara. After serving an assistantship and completing his work and studies there, he will be awarded a Ph.D. degree in physics from Yale University, where he received a master's degree last year.

1962

Married: Richard A. Scott and Miss Mary M. Puffer of Braintree, Massachusetts, June 20, 1964. Dick was a recipient of a master's degree on June 5 from Tech . . . *John J. Grocki* and Miss Judith A. Dixon of West Springfield, Massachusetts, June 20, 1964. After receiving his master's degree at Cal Tech this June, John enters Stanford's Graduate School of Business this September . . . *Anthony F. Szwarc* and Miss Charlene A. Makowski of Webster, Massachusetts, June 13, 1964. The groom received his master's degree from Tech last June . . . *James L. Forand, Jr.* and Miss Paulette A. Nemeth of Munster, Indiana, August 29, 1964. Jim is another recipient of an M.S. degree at Tech . . . *Alfred B. Orr* and Miss Nancy R. Calder of Manchester, Connecticut, June 13, 1964 . . . *Marvin B. Cramer* and Miss Joyce A. Jacobs of Worcester, August 30, 1964. The couple has settled in New Haven. . . *Robert C. Schmidt* and Miss Sandra Nebolini of Schenectady, New York, July 26, 1964. Bob is still with Air Reduction Company but has been transferred to Alton, Illinois in connection

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with a new air separation plant now being built. When it is completed he will remain there as plant engineer . . . *Peter C. Albertini* and Miss Gail J. Henderson of Dover, Massachusetts, June 19, 1964. Pete received his M.A. degree from Babson Institute in June . . . *Donald R. Marcy* and Miss Alberta M. Shea of Glastonbury, Connecticut, August 1, 1964. Don is studying at Drew University . . . *Richard J. DiBuono* and Miss Suzanne Tufts of Kingfield, Maine, September 12, 1964.

A number of '62 men received master's degrees this year. Among them: *Vaidotas Kuzminskas, Michael A. Davis, Barry J. Dworman, Ronald C. Gagne, Franklin S. Pooley, Jr.* and *Harold C. Reynolds, Jr.*, all W.P.I.; *David J. McGuinness*, Case; *Robert P. Wilder*, Dartmouth; *Robert C. Clark*, the University of Delaware; *Laurent A. Beauregard* and *David W. Cohen*, UNH; *Thomas H. Morrill*, Lehigh.

Carmine A. Carosella, who now works for the Naval Research Lab, Washington, D.C., is a physicist in the Solid State Division . . . Following service with Riley Stoker Corporation of Worcester, *Louis A. Castriotta* began duties as engineering inspector on the sewer installation project in East Providence, Rhode Island. . . *Michael A. Davis* spent the summer at the Savannah River Lab operated by the Dupont Company for the Atomic Energy Commission in Aiken, South Carolina. Mike is now at Harvard's School of Public Health . . . General Electric Company has moved *Albert C. Andrews*, a manufacturing trainee, from Cleveland to Lynn, Massachusetts . . . After completing the M.B.A. course at Cornell last June, *Joseph W. Fitzpatrick, Jr.* became a financial analyst at Standard Oil Company (New Jersey) at Houston . . . *Stephen B. Osterling*, recipient of an M.B.A. degree from Dartmouth this year, became a quality improvement engineer at Chicopee Manufacturing Company upon graduation. He resides in nearby West Springfield, Massachusetts . . . Having spent two years in the Army, *John M. Samborski* was discharged in August. The following month he accepted a position with Wyandotte (Mich.) Chemical Corporation . . . Having completed Massachusetts Electric Company's training program, *Daniel G. Webster* has been appointed technical assistant in the distribution engineering department.

A former employee of Boston Edison Company, *Paul L. Westerlind* has been commissioned a second lieutenant in the Army and has been assigned to duty at Fort Gordon. . . Lt. *William A. Krein* is serving in the Signal Corps after taking his M.B.A. degree at Babson last June . . . In other Army news, First Lts. *James P. Swicklas* and *Edwin Weber, Jr.* were promoted to their present rank during the summer. Jim is serving in Wilmington, Ohio and Ed is at Fort Huachuca, Arizona . . .Lt. *Harry T. Rapelje* is presently stationed at Munich, Germany, where he serves as signal officer for a HAWK missile batallion . . . Lt. *Martin L. Gross* completed the Fort Gordon course in September.

1963

Married: David E. Woodman and Miss Judith C. Halter of Pittsburgh, Pennsylvania, September 1964. . . *Stephen W. Nagy* and Miss Denise A. Gobiel of Willimansett, Massachusetts, June 6, 1964. Steve is working toward his master's degree at UConn . . . *Lawrence R. Proulx* and Miss Jean A. Benoit of South Grafton, Massachusetts, June 6, 1964 . . . *Henry P. Torcellini* and Miss Dorothy L. Buell of Eastford, Connecticut, May 23, 1964 . . . *Robert E. Maynard, Jr.* and Miss Judith A. Praskiewicz of Upton, Massachusetts, June 13, 1964. Bob reported to Fort Gordon on June 29, leaving New England Tel. & Tel. Company . . . *Michael A. Littizzio* and Miss Carol A. MacDonald of Athol, Massachusetts, June 20, 1964. Mike is with General Electric Company in Lynn, Massachusetts . . . *Roger W. Read* and Miss Barbara A. Lundgren of Wollaston, Massachusetts, June 27, 1964. The U.S. Underwater Sound Lab at New London employs Roger . . . *Marvin F. Woodilla* and Miss Patricia L. Goodwin of Augusta, Maine, May 23, 1964. Marv begins graduate study at Northeastern this fall . . . *Ralph D. Gelling* and Miss Marilyn C. Davy of Franklin Square, New York, June 13, 1964. Ralph's position is with the Underwriters Laboratories, Inc. in Melville, New York . . . *Andrus Niiler* (MS) and Miss Elsie M. Zajac of Ware, Massachusetts, August 24, 1964. The groom is a doctoral candidate here at W.P.I. . . *Joseph J. Mielinski, Jr.* and Miss Paula A. McGrady of Worcester, July 11, 1964. Joe and Paula are residing in Niagara Falls, where he is with Dupont . . . *Gary Adams* and Miss Rosemary Redlinski of Montville, Connecticut, June 20, 1964. Gary teaches at the Norwich (Conn.) Free Academy . . . *Jay Kaminsky* and Miss Donna H. Zabarsky of Worcester, June 21, 1964. Jay is a recipient of a Yale master's degree and is now with Pratt & Whitney Aircraft in West Hartford . . . Lt. *Donald B. Robertson* and Miss Roberta C. Jones of Chicago, September 19, 1964. Don is stationed at Fort Belvoir, Virginia . . . *George B. Hunt* and Miss Judith E. Malm of Worcester, August 15, 1964. After a trip to the west, the Hunts settled in Pleasant Valley, New York. George is with the New York State DPW in Poughkeepsie . . . *Roger C. McGee* and Miss Joan E. Rasmussen of Huntington, New York, September 5, 1964. *John Machonis, Jr.* was best man and *Robert D. Behn* and Lt. *John H. Goselin* were two of the ushers. Roger has received a master's degree from the University of Wisconsin. . . *Arthur P. Andersen* and Miss Nancy R. Aho of Fitchburg, Massachusetts, July 3, 1964. The newlyweds live in Fitchburg.

Born: To Mr. and Mrs. *James D. Keating*, their first child and daughter, Mary Margaret, in April 1964. Jim's training program at the Norden Division of United Aircraft was completed and he he is now a cost estimator in the industrial engineering department.

Henry B. Schroeder, Jr. of the U.S. Weather Bureau's Polar operations is stationed at the South Pole. His mother says he may be home in March. . . *Richard A. Garvais* finished requirements for an M.B.A. degree in production management at Syracuse in June and is scheduled to go on active duty in the Army in January. . .*Kenneth C. Benton*, who held a teaching assistantship in chemistry last year, was awarded a National Science Foundation scholarship totaling $5100 at the University of Akron. Ken also received a letter of commendation from the dean of the graduate school for maintaining a 4.0 average. He has been further honored by being initiated into Alpha Chi Sigma, an honor fraternity, and was elected a delegate to the annual conclave on Long Island in June. . .The first part of September saw *Roger M. Winans* move to Champaign, Illinois, where he expects to be living for the next four years while he'll be working toward a Ph.D. degree in economics at the University of Illinois. . .Lt. *Edward J. Polewarczyk* is due to terminate active duty with the Army and will return to his position as experimental engineer with Hamilton Standard in Broad Brook, Connecticut. . .*James W. McKenzie* and *Richard A. Iacobucci* are among the many other recent W.P.I. graduates heading back to campuses all over the country. Jim is attending Cornell and Dick is at the University of Pennsylvania . . . *Albert D. DeLima* has left Pelham, New York and returned to his native Trinidad.

Lt. *J. Paul Stakun* is now stationed at Fort Carson, Colorado. . . Lt. *Thomas M. Owens* has been sent to Taejon, Korea as a microwave radio officer and headquarters commandant. . .An interesting duty fell upon Lt. *Robert J. Craig* in June. He accompanied Maj. Gen. David P. Gibbs to Tech as his aide when the general

presented commissions to 40 seniors. . . Lt. *James D. Clark* completed his Fort Gordon course in July. . .Meanwhile Lt. *Stanley P. Skola, Jr.* is serving at Fort Bragg and Pvt. *Arthur B. Pratt* at Fort Sill. . .The Army tells us that Lt. *John H. Goselin* "achieved the highest academic standing within his class. . .and possesses a high degree of leadership ability." John finished his course at Fort Gordon in June.

1964

Married: *Robert G. Bennett, Jr.* and Miss Gail F. Clement of Freedom, Maine, June 20, 1964. Bob is with Farrel Corporation, Ansonia, Connecticut. . . *Kenneth C. West* and Miss Norma D. Berglund of Auburn, Massachusetts, June 14, 1964. Ken and his wife reside in his native Honolulu, where he works for the Hawaiian Electric Company. . . *Dennis K. Briefer* and Miss Linda W. Monroe of Worcester, June 6, 1964. Denny works for Raytheon Company. . . Lt. *Dennis A. Kosciusko* and Miss Barbara A. Parker of Brookfield, Massachusetts, June 13, 1964. . .*James J. Krusas* and Miss Regina A. Engvall of Worcester, August 1, 1964. Jim and his bride are residing in Snyder, New York after their trip to Bermuda. He is employed by Factory Insurance Association. . .*Harry L. Owlett* and Miss Elaine Burnell of Rochester, New York, June 13, 1964. Harry is with Delco Appliance Division of General Motors Corporation. . .*Frank E. Stone* and Miss Nancy Nagle of Stratford, Connecticut, June 6, 1964. Frank took a position as a chemist with Manning, Maxwell & Moore, Inc., Stratford. . .*Charles R. Ennis* and Miss Theresa F. Perreault of Danielson, Connecticut, August 1, 1964. Charley has begun his career as a Rogers Corporation engineer . . .*James C. Dunham* and Miss Bonnie C. Becker of Valatie, New York, June 20, 1964. Jim is with the New York State DPW in Poughkeepsie. . .*Anthony W. Bantly* and Miss Laura J. Tomlinson of Glastonbury, Connecticut, June 20, 1964. Tony will be working for Sprague Electric Company in Concord, New Hampshire. . .*Anthony Croce* and Miss Charlotte Bernat of Jewett City, Connecticut, September 5, 1964. Tony took a position with Western Electric Company in Kearny, New Jersey. . .*David T. Signori* and Miss Nancy McClafferty of Boston, July 11, 1964. Dave is in graduate school at Michigan State University. . .*Brian Sinder* and Miss Elaine Fedor of Westbury, New York, June 7, 1964. The couple spent the summer in Newport, Rhode Island, where Brian had summer employment. They are now continuing their studies at Stanford University, where Brian holds an assistantship. . . Lt. *David J. Usher* and Miss Carol A. Shuber of Milford, Massachusetts, June 29, 1964. Dave will be leaving Fort Gordon in December. . . *Eugene E. Niemi, Jr.* (MS) and Miss Margaret R. Johnson of Leominster, Massachusetts, July 12, 1964. The couple has settled in Leominister and Gene works for Raytheon in Bedford as an aeronautics engineer. . . *Paul J. Keating II* and Miss Barbara A. Italia of Winsted, Connecticut, August 8, 1964. . .*M. Stephen Lajoie* and Miss Rita Riccardi of Somerville, Massachusetts, August 1, 1964. Steve has taken his bride to live in Niagara Falls, New York. He works for F.M.C. Corporation in Buffalo as a process engineer . . .*William R. Phillips* and Miss Kathleen V. French of Holden, Massachusetts, August 1, 1964. Bill is a graduate student here at the Institute. . .*William E. Ferguson* and Miss Deidra F. Finni of New Bedford, Massachusetts, June 20, 1964. Bill is with Naugatuck (Conn.) Chemical Company. . .*Marshall W. Cross* and Miss Nancy M. Nahlik of Providence, Rhode Island, June 20, 1964. Presently field engineering for Western Union, Marshall will begin an Army hitch in January. . . Lt. *Ronald P. Klay* and Miss Linda K. Mega of Monson, Massachusetts, September 5, 1964. Ron entered the Army in September. . .*Eugene N. Sprague* and Miss Shirley A. Herring of Leicester, Massachusetts, June 20, 1964. Hamilton Standard in Windsor Locks, Connecticut claims Gene's services as a mechanical engineer . . .*Carl R. Pearson* and Miss Christine A. Johnston of Huntington, New York, June 6, 1964. Carl begins his career with NASA's Langley Research Center in Hampton, Virginia. . .*Robert A. Frenette* and Miss Martha A. Cote of Ashburnham, Massachusetts, June 20, 1964. Bob began studies at Clark University this fall. . . *Robert A. Peura* and Miss Carol L. Gustafson of Worcester, June 13, 1964. Bob left I.B.M. Corporation this fall to begin graduate work at Iowa State, where he holds a National Defense Education Fellowship. . .*Paul S. Ramsden, Jr.* and Miss Cynthia M. Faria of Bristol, Rhode Island, June 13, 1964. . .*Benjamin*

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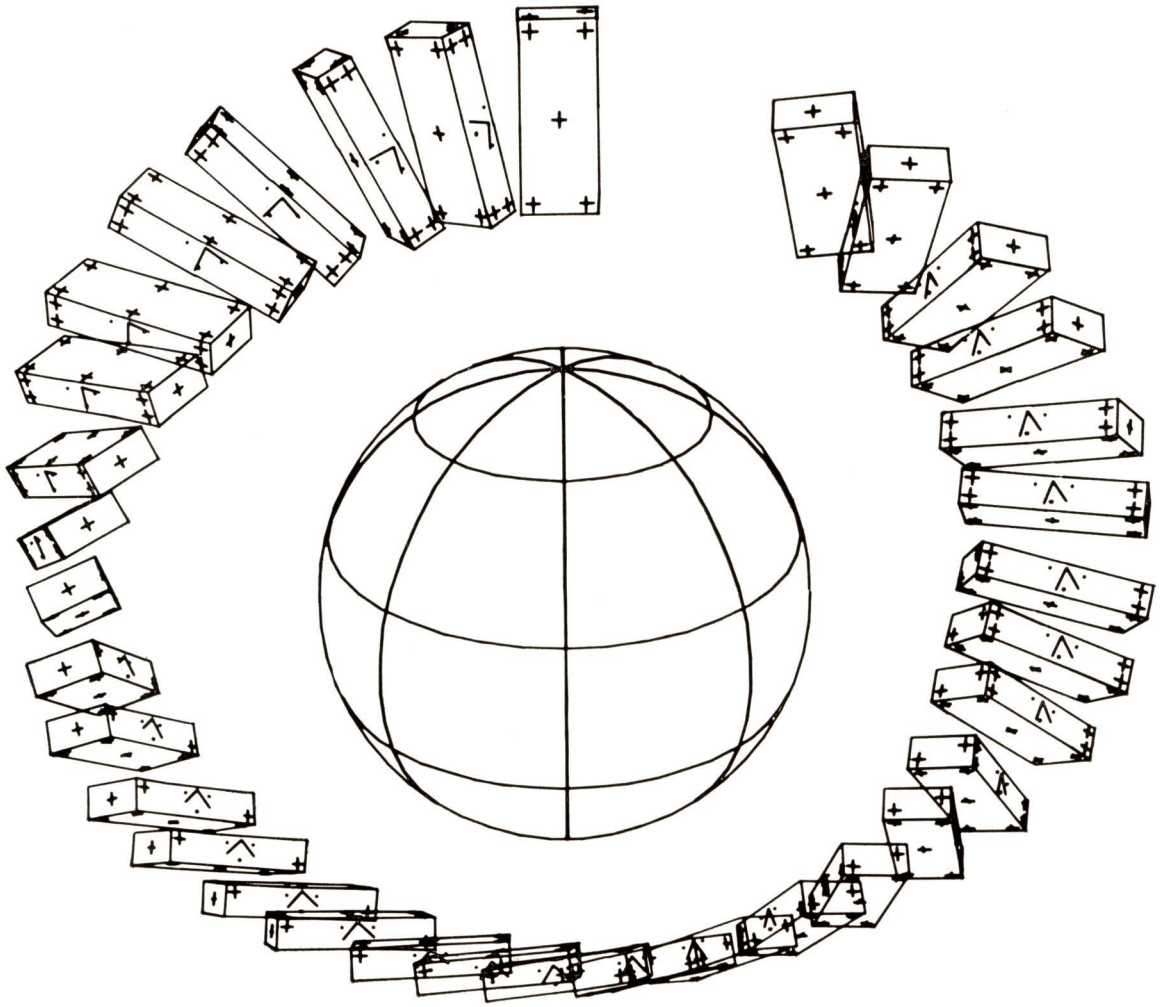
D. Brunell and Miss Geraldine Spiezio of Mansfield, Massachusetts, June 13, 1964 . . .*J. Richard Lundgren, Jr.* and Miss Linda C. Valonen of East Longmeadow, Massachusetts, June 13, 1964. The groom is with New England Tel. & Tel. in Boston . . .*Myron G. Meyers* and Miss Susan R. Kransberg of Wenham, Massachusetts, June 14, 1964. Myron began studies at Brown University in September. . . *Robert J. Geiger, Jr.* and Miss Joan D. Somers of Woodbury, Connecticut, June 27, 1964. The Whitlock Manufacturing Company employs Bob as a sales engineer. . . *Richard H. Ryczek* and Miss Linda H. Scheele of Windsor Locks, Connecticut, August 29, 1964. Dick is with the Niagara Mohawk Power Corporation in Syracuse. . . *Walter E. Lankau, Jr.* and Miss Colette C. Styffe of Portland, Maine, September 5, 1964. After a trip to Puerto Rico and the Virgin Islands, the couple took up residence at Amherst while Walt attends UMass.

Continuing their studies: *David O. Adams* was awarded a NASA pre-doctoral traineeship for three years at Columbia University. . .Also attending Columbia this fall is *Bernard Baron* and *George T. Razelos*. In the same general area are *Charles F. Schoenmann, Barry J. Kadets* and *Frederick H. Siff* at N.Y.U. and *Paul J. Sroka* at Brooklyn Tech. . . For the next two years, *Christopher R. Almy* will be a graduate assistant in metallurgy at Tech. . .*Walter W. Massie* is returning to the Hill as a graduate assistant at Alden Hydraulic. . . *Thomas M. Boyle* is the recipient of a teaching fellowship from Harvard, where he will study for his doctorate. . . Bell Telephone Labs in Holmdel, New Jersey is sponsoring a year's study for *Joseph L. LaCava* at Harvard. . . *Alfred R. Potvin* will be studying at Stanford for the next few years, along with *Steven B. Sacco* and *David H. Wait*. . .Employed for the summer by Minneapolis-Honeywell, *Alan R. Gross* is now at Northeastern studying under the co-op program. . .Also enrolled at Northeastern are *Larry G. Hull, Mason H. Somerville,* and *David H. Laananen*. . .*Peter R. Fenner* entered Northwestern to continue his studies under a teaching assistantship. . .*Robert L. Garrison* is attending UNH following a summer at RAD Avco in Wilmington, Massachusetts. . .*David L. Gendron* became a graduate assistant at M.I.T. this fall. . .After a summer in Delaware, *Edward P. Iaccarino* is attending graduate school at the University of Wisconsin. . . UMass. accepted *William A. Coté, Eugene S. Killian,* and *John R. Lonergan* for advanced studies. . .*Paul A. Lilienthal* entered the University of Illinois for graduate work in mechanical engineering, *Martin R. Barone* for civil engineering, and *John A. Spencer* for chemistry. . . *David J. Stone* and *Richard G. Carle* are returning to W.P.I., not for graduate work but for their second B.S. degrees. A physicist, Dave is working toward a degree in electrical engineering. He will be married next June to Miss Nancy L. Gowell of Fitchburg, Massachusetts. Dick is working for a degree in math after taking one in electrical engineering. . . A summer at Pratt & Whitney Aircraft preceded *Paul B. Watson's* enrollment at R.P.I. this fall. . .*Kenneth D. Allard* is Tech's representative at the University of Vermont this year, as is *Robert Drean* at Kansas University, *William J. Museler* (MS) at the University of Florida, *John T. O'Keefe* at Babson, and *Roger L. Arko* at Harvard. . .*Steven D. Mittleman* is enrolled at Brown, *Robert W. Palmer* at Michigan State and *Bruce S. Maccabee* at The American University.

Those embarking on careers: *Thaddeus Betts*, DuBois & King, Consulting Engineers, Randolph, Vermont; *Stuart P. Bowen*, Metcalf & Eddy, Boston; *Frederick O. Borgeson*, Raytheon Company, Norwood, Massachusetts; *Terry A. Briggs*, U.S. Navy Underwater Sound Lab, New London; *James R. Davis*, Standard Brands, Inc., New York City; *Peter L. Dornemann*, Farrel Corporation, Ansonia, Connecticut; *Harold J. Erickson* and *Robert F. White*, Southern New England Telephone Company, New Haven; *Robert M. Barned* and *William S. Ingalls, Jr.*, Newport News (Va.) Shipbuilding and Drydock Company; *Raymond G. Johnson*, Sikorsky Aircraft, Stratford, Connecticut; *Daniel S. King* and *George V. Spires II*, Stone & Webster Engineering Corporation, Boston; *Paul S. Krantz, Jr., Victor A. Dushku, John C. Macko,* and *Robert E. Parker*, Pratt & Whitney Aircraft; *Bruce W. Larsen*, New England Tel. & Tel. Company, Manchester, New Hampshire; *Peter Marston*, Connecticut Light & Power Company, Hartford; *Sterling R. McFee*, Marathon Oil Company, Findlay, Ohio; *Thomas G. McGee*, Esso Research & Engineering Company, Florham Park, New Jersey; *Albert J. Metrik*, Western Union Telegraph Company, Boston; *Robert H. Morse*, M B Electronics Company, New Haven; *Thomas B. Newman, Jr.*, Sylvania Electronic Systems, Waltham, Massachusetts; *Bruce A. Ochieano*, California State Highway Department; *Richard S. Parzuchowski*, Whitfield Laboratories, Bethel, Connecticut; *John H. Schmidt* and *William S. Shurbet*, Grumman Aircraft Engineering Company, Bethpage, Long Island; *Andrew Skeie* and *John F. Wetherell*, Westinghouse Electric Corporation, Pittsburgh; *Daniel Turner*, Ebasco Services, Inc., New York City; *Adrian B. Wells* and *Kurt D. Anderson*, New York State; *Peter P. Burkott, Jr.*, Norden Division of United Aircraft Corporation, Norwalk, Connecticut; *Allen W. Case, Jr.*, Allis-Chalmers Manufacturing Company; *Charles W. Flugel*, UAC's Hamilton Standard Division, Windsor Locks, Connecticut; *Donald A. Ghiz*, American Agricultural Chemical Company, Carteret, New Jersey; *Arthur N. Luhtala*, U.S. Soil Conservation Service, Baker River watershed project, Plymouth, New Hampshire; *Robert S. Najaka, William T. Swanson II*, and *Robert J. Varnum*, I.B.M. Corporation; *Michael P. Penti*, Washington State Highway Department, Bellevue; *Richard B. Reynolds*, Worcester County Engineering Department; *James C. Ward, Jr.*, Hartford Electric Light Company, Wethersfield, Connecticut; *Seymour Williams III*, Leeds & Northrup Company, Philadelphia; *Edward N. Santos*, General Electric Company, Philadelphia; *Walter B. Fohlin*, Fay, Spoffard & Thorndike, Boston; *Joseph B. Brinkmann* (MS), Western Michigan University Department of Engineering and Technology.

Upon graduation, some decided to take care of their military obligations: Lt. *Thomas S. Baron*, at this writing, is at Fort Dix, New Jersey. . .Lt. *Ralph F. Bedford* took six weeks of training at Fort Devens, followed by further schooling at Fort Benning, and is being re-assigned to Germany. . .July 6 was debarkation day for *E. James Hanna III*, who entered the Air Force at Lackland AFB in Texas . . .September saw *Richard F. Healing* enlisting in the Coast Guard OCS after summer of touring Europe. . . Lts. *Clifford M. MacDonald, Jr.* and *Kenneth N. Robbins* decided upon the colors. . . *Frederic C. Schofield III* is with the U.S. Navy Civil Engineers Corps. . . *Peter J. Tancredi* and *Daniel F. Gorman* began three years' active duty with the Navy by attending the OCS in Newport. . . Lt. *J. Michael Anderson* entered the Army and is now serving at Fort Huachuca. . . *Carleton F. Kilmer, Jr.* is serving in the Army at Fort Lewis, Washington. . .Lt. *Thomas J. Modzelewski* is assigned to the Aberdeen Proving Grounds in Maryland. . .Lt. *Maurice R. Silvestris* was sent to Fort Campbell, Kentucky. . .*David Y. Healy*, a Marine since 1955, has reentered active duty as a captain and departed for the Marine Corps Air Station at Cherry Point, North Carolina.



Picture of a satellite in orbit—as drawn by a computer

The domino-shaped box in the drawing above represents a communications satellite orbiting the earth.

The various angles and positions of the box show the relative positions of the satellite during one orbit.

The drawing was made, not by a man, but by a computer at Bell Telephone Laboratories to help scientists visualize how the satellite would behave.

What the computer did is called *simulation*. Working from data given it, the computer calculated, or simulated, the satellite's position at various instants and produced the picture on microfilm. The picture told us what we needed to know.

We use such simulation a great deal to save time and hold down costs in developing and testing new products and services.

Computers help us plan coast-to-coast transmission systems, new switching logic, and data systems. They also help us study problems relating to telephone usage at given times of the day or year.

Not all of our simulation is done on computers. Often we can simulate by other means.

We test new kinds of undersea telephone cables in buried, brine-filled steel pipes that duplicate the pressures and temperatures of the ocean's bottom at various depths.

Ingenious equipment in one of our laboratories sends test telephone pulses racing around an electronic ring that simulates a 6000-mile circuit containing 5300 repeaters to boost voice volume.

Many additional examples of simulation could be cited. Often they help us spend our time and money more efficiently in developing new services and improving present ones—in making sure that America continues to enjoy the world's finest telephone service at the fairest possible prices.

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