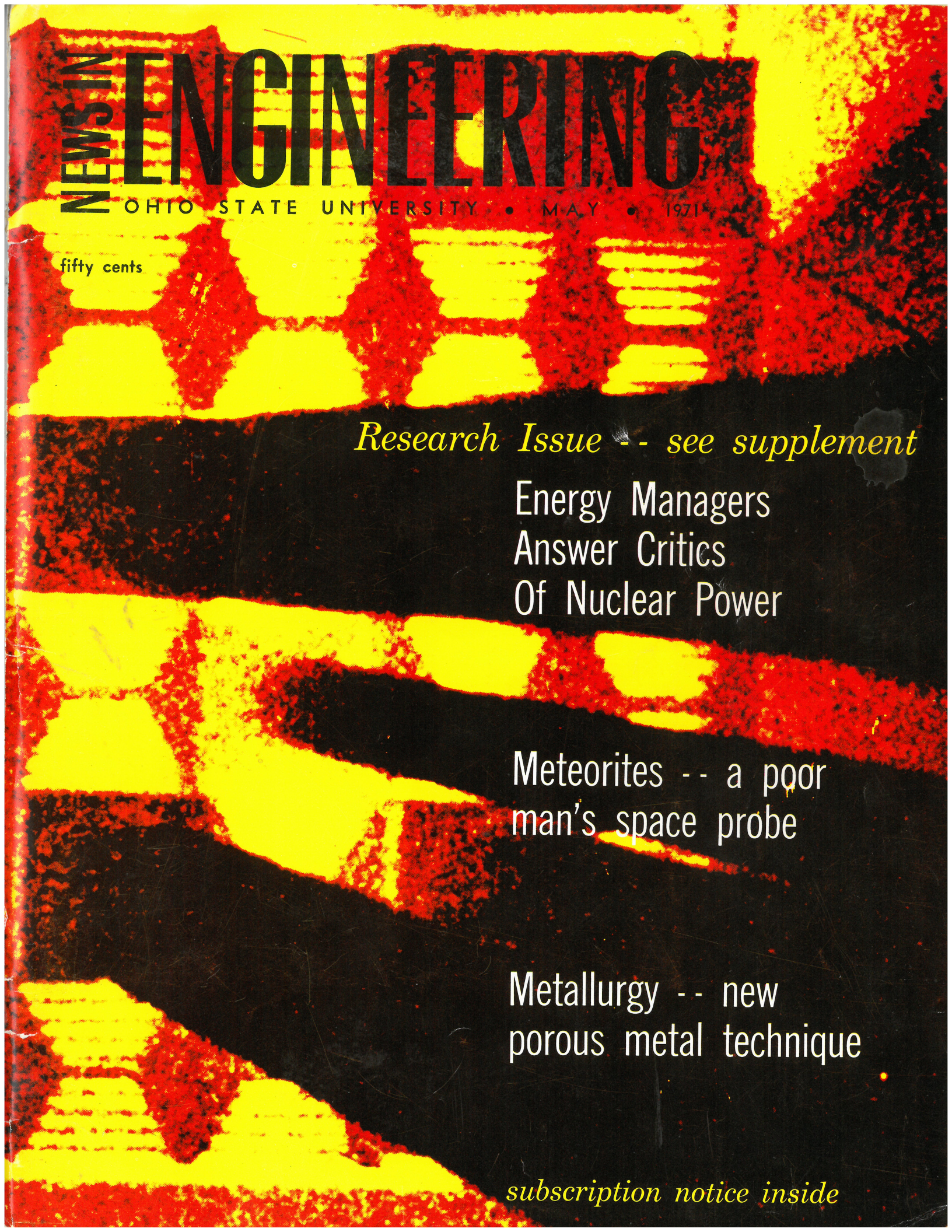
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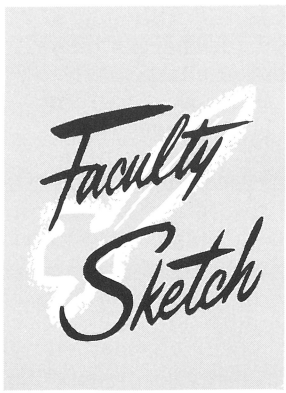
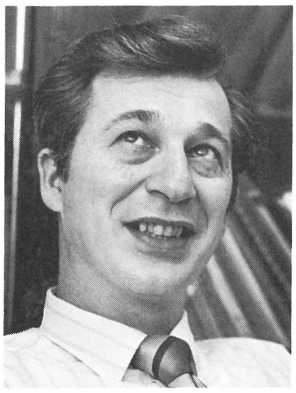
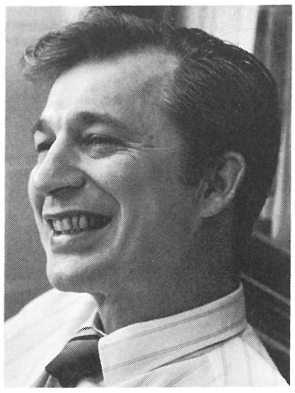
THE RESEARCH of Gerald M. Gregorek is described in this issue's research supplement. The models he holds are part of a high speed land transit study. But for more about the man, see the Faculty Sketch section, page 14.







Gerald M. Gregorek

FUTURE HIGH-speed land transit vehicles won't be running on wheels. Instead, within a decade, masses of people will be moving overland in high-speed air-cushion vehicles. Air-cushion vehicles are more efficient at speeds above 150 to 200 miles an hour. The retarding force of bearings and suspension systems is prohibitive for really fast wheeled travel. Railroads are good freight carriers and should remain so.

This prediction comes from an aeronautical engineer who has, of late, become a specialist in land transport, Dr. Gerald M. Gregorek, professor of aeronautical and astronautical engineering at Ohio State University.

In Gregorek's view, air-cushion vehicles will be travelling at a couple of hundred miles an hour by the 1980's. Probably constructed of aluminum and powered by turbine engines, the vehicles will transport 60-80 passengers a mere two inches above concrete guideways. Short haul vehicles will carry people from city to city and from downtown areas to outlying suburbs and airports. Also, he adds, such vehicles moving at slower speeds could replace wheeled buses for shuttle services in cities.

"There really are no major technical problems," says Gregorek of the system, though engineers must still determine actual power and fuel requirements and also ways to prevent bumping into guideways. "It's just a matter of development," believes Gregorek, "a matter of declaring a national priority to provide needed funds and public acceptance. To date, the Department of Transportation is the prime mover behind the research effort, but little has been done in actual practice with test tracks, manufacture or installation."

Gregorek, 39, grew up in Cleveland, Ohio, the son of a factory machinist. Eleven years old when he started work, Gregorek clerked in a hobby shop for seven years and, for a time, was a page in a Cleveland Public Library. A model airplane buff, he recalls, "From age six or seven, I wanted to be an engineer and design airplanes. Aviation and airplanes intrigued me. I liked to sketch and draw planes, so modeling came quite naturally."

At East High School where his class prophecy read "First Man on Mars," Gregorek won a track letter and was a member of numerous clubs, including the Future Teachers of America. Academically, he was partial to physics, math and chemistry, as well as military and technical history. After graduating in 1949, second in his class of 122, he enrolled in Cleveland's Fenn College.

Money was tight, and Gregorek set any career choice aside, in order to attend college at all. Fenn offered him a co-op program and a tuition scholarship but no chance to study aeronautical engineering. At Fenn two years, he majored in chemical and mechanical engineering and worked in a library, a machine shop and a chemical plating factory. "I switched to mechanical engineering to get a little closer to what I liked," says Gregorek, "but couldn't get enthusiastic over oil pumps and steam power."

GREGOREK enlisted in the Air Force in 1951, hoping to become a fighter pilot in Korea. Too young for pilot's school, he remained stateside for three years, first as a B-36 engine mechanic, then as a B-29 flight engineer and instructor. Military life was "a lot of fun and practical experience," he says, and a lot of KP, "like the time I was part of a team that sawed up 80,000 pork chops."

In 1952, Gregorek hitchhiked home to marry the girl he'd first met in the Cleveland Public Library where both worked. "We were earning $99 a month," he says, "and ate a lot of oatmeal."

In 1954, Gregorek left the Air Force and enrolled

(continued on page 22)

Faculty Sketch (from page 14)
in aeronautical engineering at Ohio State on the $165-a-month GI bill. The program was appealing, he says, and, with a wife and child to support, so was Ohio State's $35-a-quarter fees and low-cost housing in old GI barracks.

To make ends meet, Gregorek worked as a draftsman at Ohio State's power plant and as a junior engineer at North American Rockwell in Columbus. He also spent a summer at Convair in Texas working on structural analysis in the B-58 program. Of the academic program, he reports gleefully, "I studied aerodynamics, the whole thing. It was just what I expected and I really enjoyed it."

In 1958, Gregorek graduated from Ohio State with a bachelor degree in aeronautical engineering, a 3.6 grade average and 30 hours graduate credits. In 1959, after a year of research on hypersonic testing of nose cones and heat protection systems, he received a master degree in aerodynamics. His thesis was an early study of shock wave-boundary layer interaction related to space vehicles, says Gregorek, and included some of the first data on Mach 10 streams at high altitudes to 200,000 feet.

In 1960, Gregorek became an instructor in Ohio State's department of aeronautical and astronautical engineering. He held the teaching job for seven years and describes it as a "ball." During that period he also conducted a two-year research project which called for the design and installation of two wind tunnels at the Wright-Patterson Air Force Base near Dayton, and worked on the Dynasoar project helping to perfect a steerable hypersonic glide vehicle useful for military reconnaissance.

In 1967, Gregorek received a doctorate degree in aeronautical engineering from Ohio State. His dissertation aim was to simulate shock wave-boundary layer interactions at altitudes above 200,000 feet. Mainly, he redesigned gear from past work to get accurate readings and data correlations to predict heat transfer rates and low pressures.

REJECTING industry offers, Gregorek joined the Ohio State faculty as an assistant professor in 1967. "I was doing exactly what I wanted to do at the Aerodynamic Lab," he explains. More seriously, he adds, "But I don't think I've been in an ivory tower, as I've done very practical research work for General Electric, Boeing and North American."

Gregorek teaches what he calls "applied aerodynamics," from the theory of flying to the problems of performance, control and drag reduction. One course with 20-25 students and a few thesis students

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Eight men made up the crew of a Landship. The male model outweighed the female model by a ton. The male landship mounted two "six-pounders" and four machine guns; the female model carried six machine guns only.

Marconi's Miracle of 1895

"It seemed to me that if the radiation could be increased, developed and controlled, it would be possible to signal across space for considerable distances. My chief trouble was that the idea was so elementary, so simple in logic, that it seemed difficult to believe that no one else had thought of putting it into practice." So said Guglielmo Marconi of his thoughts during a summer vacation in 1894 when he first read an article on the electromagnetic wave experiments of Heinrich Hertz and conceived the idea of using Hertzian waves for communication.

An Italian physicist, Marconi was only 20 when he returned from the Alps to his father's estate near Bologna to begin experiments in a third-floor laboratory using an induction coil with a spark discharger controlled by a Morse key at the sending end and a simple coherer at the receiver. From 1894-95, Marconi tested ideas, refined gear and eventually increased signal range to about two miles. His genius was the ability to improve devices invented by other men. With the wireless, he increased effectiveness by grounding the transmitter and receiver and by using a vertical wire or antenna insulated from the earth. He also conducted simple experiments with reflectors around the aerial to concentrate the radiated energy into a beam instead of spreading out in all directions.

In 1896, Marconi received a British patent on his wireless system, and in 1900 on improvements in apparatus for tuning wireless transmitters and receivers so several stations could operate on different wave lengths without interference. He patented a magnetic detector in 1902; developed and patented a horizontal directional aerial during the next three years; and, in 1912, he introduced the timed-spark system of generating pseudo-continuous waves. Among numerous honors, he received the Nobel Prize for physics in 1909.

Moving to England in 1896, Marconi launched his lifelong crusade to promote radiotelegraphy. At first there were historic tests on Salisbury Plain for Army and Navy officials and across the Bristol channel. Then he established a wireless station for 31-mile communication between England and France. In 1899, he equipped two U.S. ships to report to New York newspapers on the yacht race for the America's cup. The stunt aroused worldwide excitement and led to the formation of the American Marconi company. Marconi had already formed the Wireless Telegraph and Signal Co., Ltd. in England, and in 1900 formed the Marconi International Marine Communications Co., Ltd. to install and operate services between ships and land stations.

In 1901, Marconi transmitted signals across the Atlantic Ocean to undermine critics who said earth curvature would limit electric wave communication to 200 miles. The effort created an immense sensation and began the vast developments of radio communications, broadcasting and navigation services that took place in the 20th century. Later, Marconi demonstrated how transmission conditions are sometimes more favorable at night than during the day; sent the first radio signals ever transmitted from England to Australia; and after 1916 conducted pioneer research on shorter wave lengths. This work helped launch the development of short wave wireless communication which, along with the use of the beam aerial system for concentrating energy in the desired direction, constituted the basis of nearly all modern long-distance radio communication.

are normal per quarter. He spends three to five hours preparing new course lectures and always reviews and updates old courses, but he admits he is lax on grading. "I should put in a couple of hours a week but don't." "For me, grading is a chore, going over the same problems time and again."

A good instructor is, according to Gregorek, "a guy who spends 10 hours learning and organizing something and one hour getting it across." Also, he feels, a good teacher must be interested, informed and even a bit nervous. He bristles at the idea of a teacher as an entertainer. "The classroom is no popularity contest," he snaps. "I like to be informal and joke a bit, but I want everyone focused on the problem at hand. I don't want students talking to each other, and a guy sleeping in my class really bothers me."

Gregorek is pleased when students pay attention, when they "light up and register understanding," and when they can communicate to others what they've learned in his class. "I'm also pleased when someone asks a good question, one I hadn't thought of that makes me examine in a new way."

HE PEGS today's college student as "every bit as sharp intellectually" as in the 50's, but observes, "They seem to have a lower pain threshold and to gripe more. It's good that they're more outspoken, but they're not as ready to put out as much effort before speaking out and not as willing to work independently before coming in for help. Certainly my contemporaries were more apathetic than today's concerned student, who is less serious about studies and more vocal on outside affairs such as politics and ecology. But I do wish they'd read a little more history because they act like they were the first generation to discover injustice or polluted streams."

Presently adviser to five masters degree students, he says, "To me, engineering is solving new problems, taking know-how and applying it." He believes aerodynamic principles can and should be applied to a wide range of problems, including high-speed land transportation, blood flow, tornadoes and forest fires.

A research supervisor, Gregorek is a specialist in experimental aerodynamics and high-speed land transit. He is convinced that high-speed land transit — at speeds faster than 300 miles an hour on or below the ground — must be accomplished in tubes evacuated to at least one-hundredth of an atmosphere. He also believes his approach is superior to a rival idea for an air-breathing, jet-powered, non-wheeled vehicle, citing the advantages of motive power, cleanliness and lower tunneling costs.

He recently completed an 18-month, low-budget, "tubeflight" study for the Department of Transportation on the aerodynamics of vehicles travelling through long tubes. To gather data, he converted a three-inch shock tube into a test tunnel and used rocket models to attain speeds of 400 miles an hour in the 250-foot tube. His data was applicable to a 10-foot diameter vehicle scooting through a 10-and-a-half foot diameter vacuum tube and riding on an improved wheeled suspension system.

Gregorek is also investigating another high-speed land transit idea which "looks very promising," a ramwing vehicle which travels above ground. It would have short, stubby wings for upward lift to "fly" one foot above a concrete guideway at speeds between 200-300 miles an hour. While Gregorek believes the ramwing compares well with air-cushion vehicles, he is convinced that air-cushion vehicles will be the operable mass transit system on land by the 1980's.

Gregorek is a member of the American Association for the Advancement of Science, Sigma Xi, Sigma Gamma Tau, and the American Institute of Aeronautics and Astronautics (AIAA). He is on the national student affairs committee of AIAA, is editorial consultant for the AIAA student journal, and was past president and treasurer of the local AIAA chapter. He is also the faculty advisor to the local AIAA student chapter and a member of the International Astronautical Federation's committee on safety and youth rocketry experiments. In addition, he is on the board of trustees of the National Association of Rocketry and is chairman of its standards and testing committee.

OF HIS activism, Gregorek remarks, "I feel its a natural extension of my responsibilities as a teacher and educator and is a way to keep in touch and support professional organizations. I'm quite pleased to do the work, particularly since most of my activities are student related."

Gregorek, who has published articles in professional journals on high-speed ground transportation and hypersonic research, also writes "popular vein" articles on model rocketry for a national magazine and has published a booklet on the aerodynamics design of model rockets for youngsters.

Only modestly active in campus committee work, Gregorek says, "I recognize the importance of committees, but am not eager to take it on. I'd rather work more directly with students."

Off campus, Gregorek is active in the Columbus Society for the Advancement of Rocketry and Columbus' Center of Science and Industry, where he helped organize a paper airplane contest and taught a course on model rockets. Gregorek also speaks often and widely in schools and at clubs on model rocketry, aerospace education and propulsion, and of late, on the SST.

All of his numerous talks are given at no cost to the host. "This is probably why I'm poor," he kids. "I feel its part of my professional responsibility. This is my choice, of course, but I just like to do it and to work with young people."

Predictably, Gregorek builds motor-powered model airplanes and rockets which he flys for pleasure and enters in contests. He's been a consistent winner in such contests for years and has a large collection of trophies to prove it. On five occasions, he won the national futuristic aircraft design contest with his entries. In 1970, he travelled to Yugoslavia as the U.S. representative in international competition with rocket-boosted gliders, placing fifth out of 60. Gregorek is a fan of the Cleveland Browns, is still an active softball player, and occasionally dabbles with color slide photography. His reading habits include technical journals, news magazines and Aviation Week, as well as historical biographies with a preference for "Goddard over Ghandi." Admittedly a "maverick" in one respect, Gregorek reports, "I've never smoked in my life."