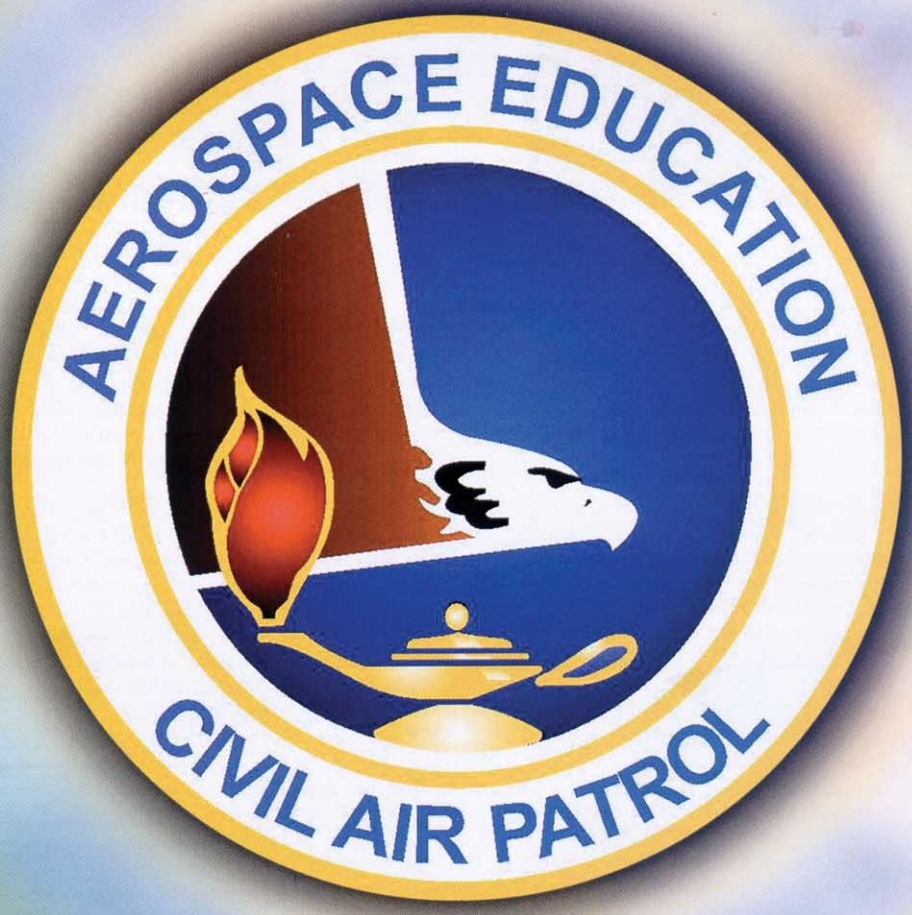
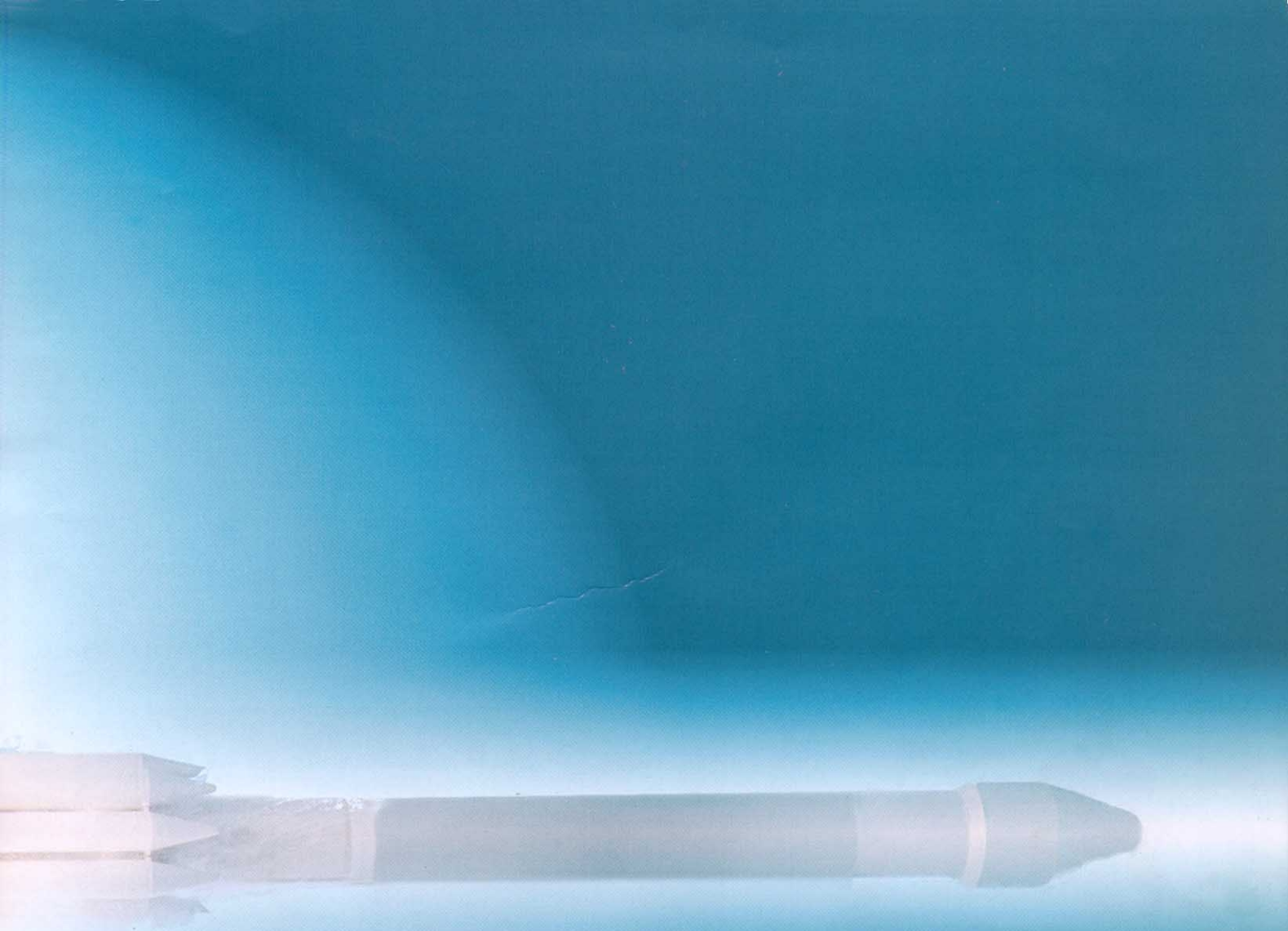
Still Seeking the Final Frontier

Civil Air Patrol Volunteers have never given up on Aerospace

By Melanie LeMay, Public Relations Specialist, CAP National Headquarters





When President George W Bush gave America's space program a shot in the arm early in 2004, he had enthusiastic support from volunteer members of Civil Air Patrol. Bush's vision, manned spaceflights to the moon and eventually to Mars, highlighted the importance of aerospace technology to the nation's future. For CAP, however, aerospace has always been a priority, even during the years when public interest waned.

CAP's involvement in aerospace education dates back to the early 1950s, when America was pushing hard for dominance in space. Americans developed a fascination with space that extended not only to new products and technology, but even to the arts, fashion and design.

Schools encouraged young people to pursue careers in the aviation and aerospace industries, and CAP supported them by developing aerospace-related materials and activities that teachers could use in their classrooms.

"CAP's aerospace education program has continued to grow over the past 50 years," said Judy Rice, who heads up the program for CAP National Headquarters at Maxwell Air Force Base (AFB), Alabama. "We think the industry is vital to the nation's future. Just look at the number of scientific and technological advances that we enjoy today, thanks to the space program."

Twentieth-century marvels like pocket calculators and microwave ovens are spinoffs from the aerospace industry, as are

cardiac pacemakers, high-frequency ophthalmic operating instruments, temperature-resistant metals, super-strong plastics and ergonomic mattresses.

"So much of our technical progress during the latter half of this century has resulted from people who devoted their careers to America's aerospace industry," said Rice. "One of CAP's primary missions is to keep alive that spirit of innovation for future generations."

The 'Graying' Aerospace Industry

"The people who flocked to the aerospace industry in the 50s and 60s are aging now," said Major General Richard Bowling, CAP national commander. "We don't have enough young people following in their footsteps. To continue support for projects like the Mars Rover and the International Space Station, as well as the President's plans for journeys to the moon and to Mars, we've got to help today's young people develop their own fascination with space. Theirs will be a more high-tech perspective, of course, and that's exciting. The next generation will have more potential to unlock the secrets of outer space than ever before."

A teacher at Head Elementary School in Montgomery, Alabama demonstrates principles of rocket flight with some enthusiastic third-graders. The school is one of hundreds nationwide participating in CAP's Aerospace Education Excellence program, encouraging the use of aviation and aerospace themes to teach a variety of subjects.
Photo courtesy of CAP National Headquarters

According to a recent report issued by the Aerospace Industries Association, America is facing a 'major workforce crisis in its aerospace industry,' which makes the promotion of math and science education a vital national interest. The Commission on the Future of the US Aerospace Industry is pressing Congress to create educational incentives for students to pursue aerospace careers and remedy the 'graying' of the industry. Strong national support for aerospace education should be an integral part of any new aerospace agenda.

This focus is nothing new to CAP. Its volunteers promote aerospace education through both its member training programs and through public and private schools. CAP adult and cadet members learn the principles of aerospace as part of their official training. They also recruit teachers in their communities to use CAP educational materials in their classrooms through a special category of CAP membership just for educators. CAP calls its educational program 'MARS,' (Making Aerospace Real for Students).

The Impact of MARS

The future of aerospace reaches far beyond the membership roster for CAP. "If we're to make a real impact, we have to reach out to all those future pilots and astronauts and scientists and engineers who are sitting in America's classrooms right this minute," Bowling said. "That's why we have a special category of membership just for the nation's educators."

Bowling is talking about the CAP Aerospace Education Membership program, which currently has more than 1,500 members nationwide. This program allows educators, schools and even home schoolers to join CAP for only 30 dollars per year. In return, they receive a variety of free and low-cost aerospace education lesson plans and activities to use in their classrooms. They can also work toward the CAP Aerospace Education Excellence Award for schools, which recognizes their incorporating aerospace themes into their curricula throughout the school year.

In 2003, CAP provided more than 30,000 free classroom items to its education members. "The beauty of aerospace education is that it can be very hands-on," said Judy Stone, a former elementary teacher who is now a program manager for CAP.

Another teacher at Head Elementary School in Montgomery, Alabama demonstrates principles of rocket flight with some enthusiastic third-graders.
Photo courtesy of CAP National Headquarters

"Want to illustrate Bernouli's Principle? Make an airfoil out of an old file folder. Want to see Newton's Third Law of Motion in action? Build a pop bottle rocket fueled with Alka-Seltzer. Even kids who don't like school get excited about projects like these."

"You can't imagine how much our teachers value CAP's materials and classroom ideas," said Susan Mallett, principal of Thomas L Head Elementary School in Montgomery, Alabama "We face a huge challenge here in Alabama with funding for education. Having an organization provide us with solid, standards-based materials – free of charge – is a godsend to us." Mallett says her teachers use the aerospace activities provided by CAP not only to teach science, but also math, reading, geography, social studies and history.

CAP also has written and published aerospace textbooks for grades six through 12 and sells them at a cost far below regular market price. "Since it's part of our mission to promote aerospace education, we believe it's our duty to make these textbooks as accessible as possible," said Jeff Montgomery, who develops aerospace education products at CAP National Headquarters. "Aerospace is a niche market that isn't addressed by the major publishers. Our books include not only the science and theory behind space travel and research, but also the kinds of hands-on experiments and activities that make the concepts come alive." Among CAP's publications are *Aerospace Dimensions, Aerospace: The Journey of Flight,* and the just-released *Civil Air Patrol Model Rocketry* book. Book prices are low because CAP directed both research and writing and published most of the books in its own print shop at Maxwell AFB, Alabama.

CAP also has promoted space education for 37 years through an annual conference, the National Congress on Aviation and Space Education. The conference draws educators from various

A CAP cadet concentrates on a model rocketry project as part of his academic training to advance in rank.
Photo courtesy of CAP National Headquarters

grade levels throughout the country. In 2003, CAP touched more than 50,000 students nationwide through the teachers who attended NCASE. "In addition to our traditional educators, we are attracting an increasing number of home schoolers," said Joan Emerson, CAP National Headquarters NCASE program manager. "These families are finding CAP's aerospace education materials ideal for their self-paced programs."

NCASE gives interested educators a chance to see their aerospace heroes up close. During the 2003 conference, which celebrated the 100th anniversary of powered flight, they schmoozed with 'Orville and Wilbur Wright,' who appeared in period costumes, and even had photos taken with the famous pair in front of a full-scale replica of the Wright Flyer. Educators also heard Eric Lindbergh talk about recreating his famous grandfather's legendary flight across the Atlantic Ocean, as well as Lindbergh's X-Prize Foundation, which is offering 10 million dollars for the construction, launch and landing of a reusable spaceship that can transport people to space.

Living on Mars

CAP cadets from the Utah Wing explore 'Martian' terrain during a CAP-Mars Society encampment, which simulated living and working conditions on the planet.
Photo courtesy of CAP National Headquarters

Twelve CAP cadets got a taste of life on Mars in 2002 when they spent a week in a Mars simulation research station in the Utah desert. The unique encampment resulted from collaboration with the Mars Society, an international organization dedicated to the manned exploration of Mars.

The Mars Society allowed the cadets to live and work at its Utah Mars Desert Research Station, which is used by professional researchers from September to May each year to study the lifestyle necessary for living and working on Mars. Leading the cadets onsite was John Barainca, a certified flight instructor who is both a Mars Society member and a CAP colonel and former wing commander, having joined as a cadet himself in 1950.

"I work with the Mars Society in education and outreach," Barainca said. "When asked to do a youth program at the habitat, I suggested using CAP cadets for our first crew because of the organization and leadership structure built into the cadet program. I knew we would have a responsible, self-disciplined and eager aerospace-oriented group."

For the cadets, a typical day 'on Mars' started at 5 am with a breakfast of MREs and personal hygiene. Next was a briefing on the day's extra-vehicular activity (EVA) and an equipment check. The cadets then donned the space suits necessary for any work outside the habitat and worked those missions only during early morning hours before the desert temperatures rose. CAP senior member Robin Hawk was on hand to assist.

Working in teams of three, they collected samples from the desert terrain. "We were looking primarily for endolithic and hypolithic organisms," Barainca said, "which are things that grow inside of and under rocks to survive in extremely dry conditions."

Cadets assembled and deployed a climate-monitoring station provided by NASA to provide ongoing information for habitat researchers. Others discovered a petrified tree high in a sandstone wall and petrified roots in the rocks of a streambed. And on the hill above, they found small pieces of petrified bone, indicating the site of a buried dinosaur.

With their fieldwork completed each day, the cadets returned to the station for lunch and then conducted physical, chemical and biological tests on the samples they collected. Barainca, who has taught high school science and astronautics for 30 years, also held academic classes for the cadets. "We talked about the requirements for long-duration space flight, the environment on the surface of Mars and the realities of living and working on Mars. We also discussed GPS units for navigation and determining location, and principles of astronomy."

Dr Robert Zubrin, president of the privately-funded Mars Society, said "the habitat provides valuable data for future expeditions to Mars. Mars is a vast, uninhabited and geologically diverse planet," he said. "Since a one-way trip to the planet takes some six months, its exploration requires the kind of preparation for long-term living conditions and equipment that can only be achieved in actual simulation."

"The cadets came to the project with built-in group identification and practice in both followership and leadership," Barainca said. "They showed great interest in playing the part of space explorers and learning what it might be like to live and work on another planet."

"It's important to motivate young people to stretch their thinking and learn they can perform in conditions that require more than they are normally accustomed to doing," he said. "It forces them to operate in a team context, where their individual contributions make a difference in the final outcome."

For more information on The Mars Society, go to
www.marssociety.org
Also refer to pages 92 – 103 within this publication.

In 2004, CAP National Headquarters helped establish the first STARBASE Academy in Alabama at Maxwell AFB. The STARBASE program, funded by the Department of Defense, provides at-risk youth who live near military installations with special support in math and science skills, character development and drug abuse education. These academies operate cooperatively with the local school system, which adjusts the schedules of the participating students and provides transportation for them to the base. The program targets grades 4-6, with particular emphasis on grade 5.

"This program opens up a whole new world to students," said CAP aerospace director Judy Rice, "and it catches them at a time in their lives when it can make a real impression. Not only does the program include academics – studying subjects like the four forces of flight, Newton's Laws of Motion, and properties and states of matter. It also introduces to these students the equally important subjects of goal setting, teamwork, using technology and avoiding substance abuse. This is a wonderful way to supplement local public school programs."

Volunteer Commitment

Taking the aerospace message to the public begins with a personal commitment to the cause. That's where membership in CAP, with its universal focus on aerospace, plays such an important role. Whether it's a simulated planet Mars research site or the engineering school at a major university, CAP members have many chances to explore the world of aerospace. "Most people join CAP in the first place because they're interested in aviation," said Ray Bean, a retired Air Force colonel who heads up cadet programs at CAP National Headquarters. "A lot of our training, especially for cadets, focuses on aerospace. They can't get that kind of concentrated instruction in the regular classroom, so they give up their free time on nights and weekends for this specialized training."

Astronaut Eric Boe floats in a space simulation chamber during training at NASA. Boe, part of NASA's shuttle team, was a CAP cadet. He credits a former teacher with sparking his interest in aviation and aerospace and his eventual success as an Air Force pilot.
Photo courtesy of CAP National Headquarters

CAP senior members are not required to complete CAP's aerospace education curriculum, but almost 8,000 members nationwide have done so, earning the prestigious Charles E 'Chuck' Yeager Aerospace Education Achievement Award. "These members follow a self-paced program based on CAP's textbook, *Aerospace: The Journey of Flight*," said Bean. "Once they've completed this training, they often go on to work with cadets or local schools as aerospace mentors. Many of them become very valuable education resources for their communities."

For cadets, aerospace education is the ticket to advancement through CAP's cadet training program. To reach various milestones, cadets must master a significant amount of material in the *Journal of Flight* text. For many, this is ideal preparation for college programs in the aerospace industry or military careers.

CAP summer encampments offer cadet members even more. At the Advanced Technologies Academy, cadets learn to use the CAP Satellite Tool Kit, produced by Analytical Graphics, Incorporated, to track satellite orbits. At the Aerospace Education Academy, they build and launch their own rockets and work as teams to create remote-controlled airplanes. Cadets interested in military careers can immerse themselves in Air Force space operations in the Air Force Space Command Familiarization Course. There, they visit spacecraft control centers, examine actual rockets, and learn about orbital mechanics, surveillance systems, and ballistic missile warning systems. For cadets considering careers in meteorology, the Air Force Weather Agency Familiarization Course provides training in weather interpretation, contour mapping and storm spotting.

Many cadets have experienced their first plane ride through membership in CAP. Some go on to solo and earn their pilot's license. CAP makes a variety of flight training scholarships available to deserving cadets each year.
Photo courtesy of CAP National Headquarters

CAP also exposes cadets to other aerospace-related careers, especially engineering. For the past two years, CAP has sponsored workshops in conjunction with Auburn University's textile engineering department. Dubbed 'E-Tech,' the weeklong engineering technology workshop allowed cadets to attend technical classes, work in the university's labs, and talk to professional engineers about their day-to-day work. They investigated different propulsion systems, designed their own airfoils, and studied satellite flywheels with NASA researchers.

Cadets take a turn in a flight simulator during a week-long E-tech encampment at Auburn University's schools of engineering. Photo courtesy of CAP National Headquarters

"I went to E-Tech to find out if I want to spend my life as an aerospace engineer," said CAP cadet Drew McIlvaine, 16, from Chattanooga, Tennessee. Fellow cadet Brian Doyle, 17, of Philadelphia said the hands-on experience was invaluable. "I liked having the chance to create and test my own airfoil," he said. "I even got to watch a shockwave in the supersonic wind tunnel."

Funding that Makes a Difference

To take such programs to a higher educational level, CAP makes available thousands of dollars in scholarships each year for cadets to go on to colleges, technical schools and flight training.

Among the most coveted are scholarships to the US Air Force Academy Preparatory School, Embry-Riddle Aeronautical University, Texas A&M, Dowling College, the Spartan School of Aeronautics, and Auburn University's engineering school.

Hawaii's Cadet Louis Gabriel, who was CAP's 2003 Cadet of the Year, credited these programs with helping him achieve his personal goal of earning an appointment to the US Air Force Academy. "The doors opened for me by the cadet program – for every cadet – are matched only by the efforts of its mentors who will stop at nothing to help you through them," he said.

CAP also pursues partnerships with many aviation and aerospace organizations to combine resources and better meet the needs of the education community. Partnerships currently

exist with such organizations as the Air Force Association and the Aerospace Education Foundation, the National Aeronautic Association, the Experimental Aircraft Association, the Federal Aviation Administration, the American Institute of Aeronautics and Astronautics, the University Aviation Association and NASA.

Applause from the Aerospace Community

CAP's commitment to aerospace education has not gone unnoticed. In 2002, CAP received both the 2002 Air Force Association's Hoyt S Vandenberg Award for Excellence in Aerospace Education and the 2002 Space Foundation Education Achievement Award.

In 2003, the National Aeronautics Association awarded CAP the prestigious Frank G Brewer Aerospace Education Award – the Brewer Trophy. Established in 1943, the Brewer Trophy recognizes significant contributions of enduring value in aerospace education. CAP is the only organization to have won the award twice in its 60-year history. The organization first won the award in 1952 to recognize its outstanding new cadet and teacher training programs.

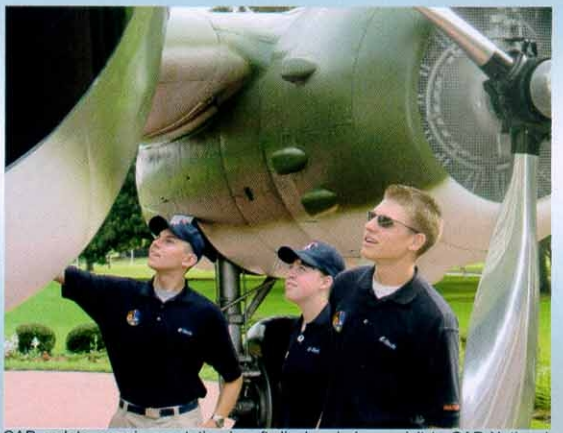
Cadets work as teams to complete projects during the week-long E-tech encampment at Auburn University in Alabama. Throughout the event, cadets explore a variety of career options in engineering through the university's well-known schools of engineering.
Photo courtesy of CAP National Headquarters

CAP's aerospace education Web site at www.cap.gov (click on 'aerospace education') has also been singled out for recognition. Each year USA Today posts sites on its education homepage that contain valuable online resources for educators. CAP's site was chosen in both 2002 and 2003 for its wealth of information on aerospace education.

Global Influence

"Excelling in the aerospace industry requires discipline and attention to detail," said CAP Executive Director Al Allenback, who himself holds degrees in aviation and aerospace management. "Large technical projects require teamwork and commitment, leadership skills and vision. Young people who enter this field are valuable members of society not only because of their technical achievements, but also because of the strength they must develop to succeed. We're living in an increasingly technological age, and the students who embrace technology will be best positioned to lead."

The same is true for America's position in the global aerospace community, Allenback points out. "Our country must set the pace for cutting-edge technology in this field," he said, "and we must work hard to maintain that position. CAP members have believed this fervently for more than 50 years. They've been willing to volunteer their personal time and resources to promote aerospace education and create a better future for the generations to come. It's an exciting mission. And it's a mission that matters."



CAP cadets examine a static aircraft display during a visit to CAP National Headquarters at Maxwell AFB, Alabama, home of the USAF Air University.
Photo courtesy of CAP National Headquarters

For more information on CAP's aerospace education program, go to www.cap.gov