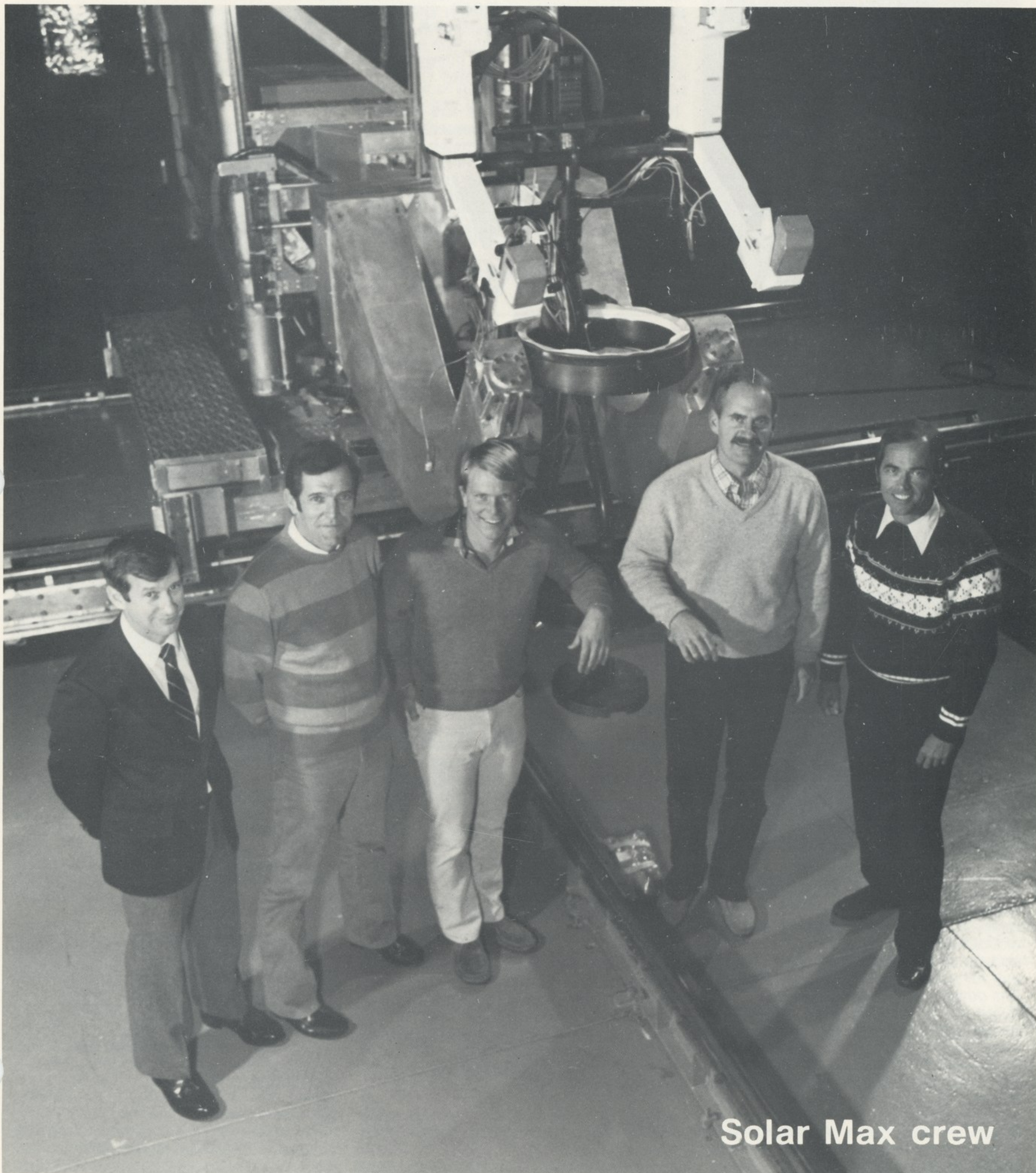


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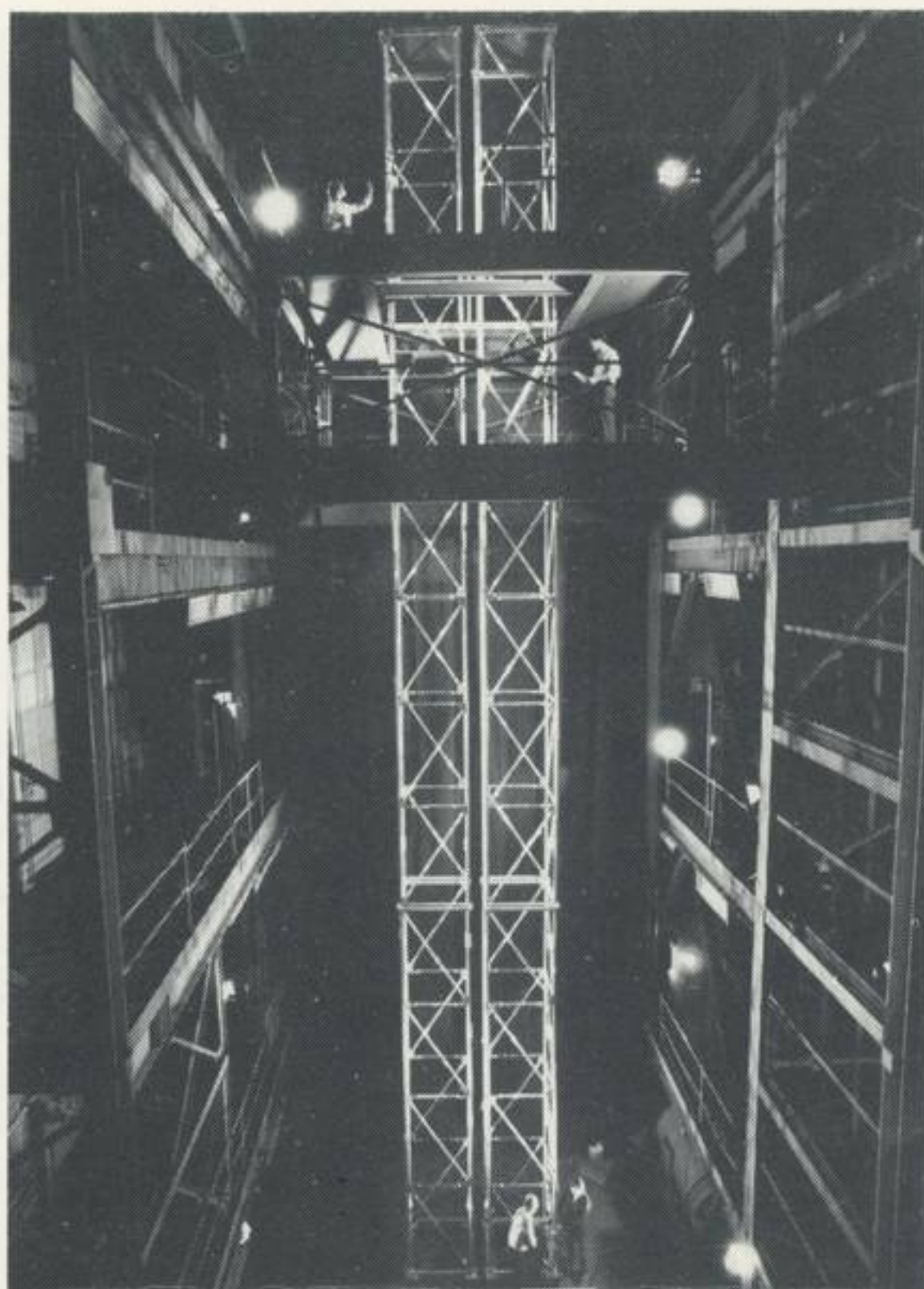
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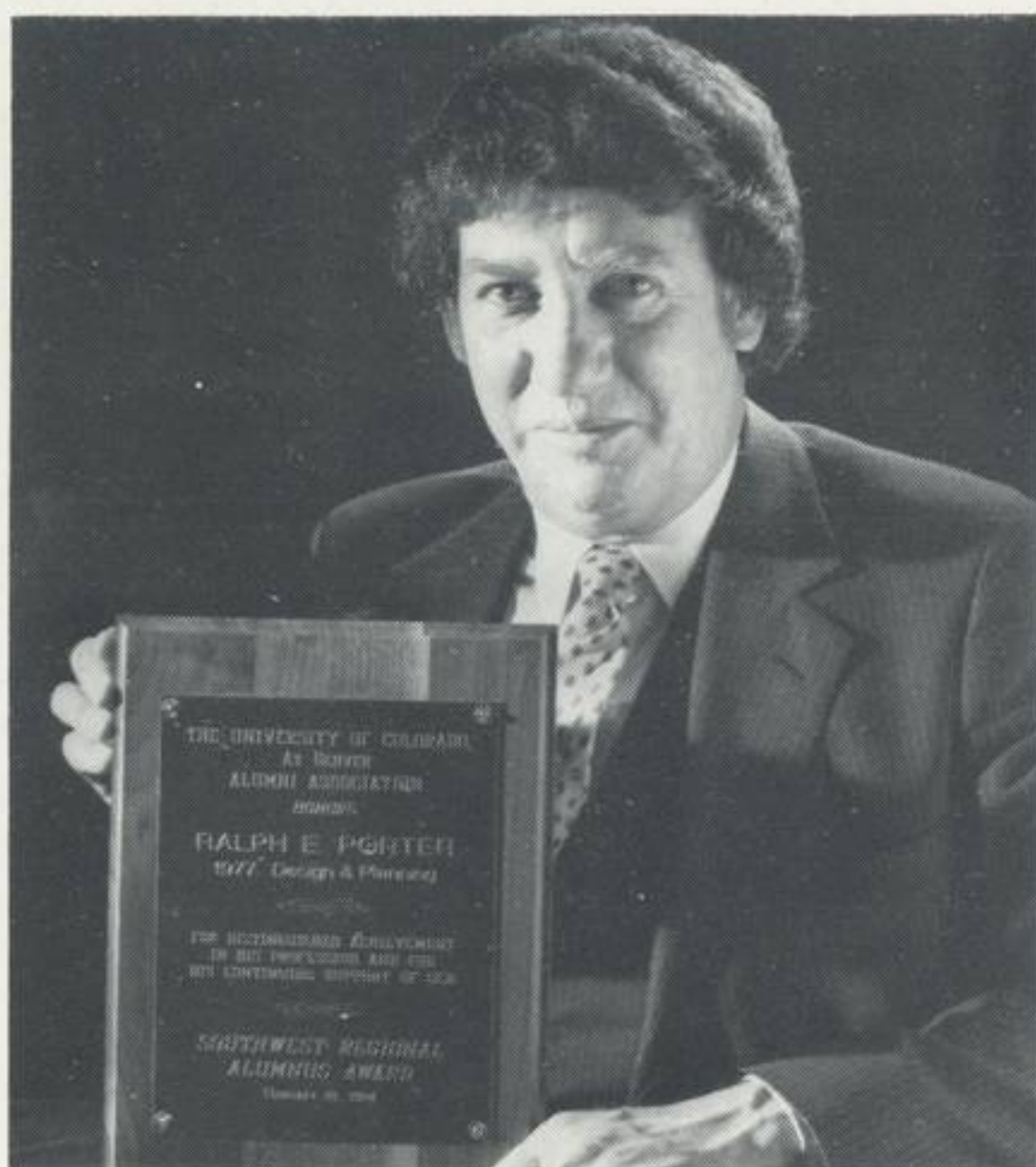
NUMBER 6/1984



Solar Max crew



The passive and active control of space structures (PACOSS) program is intended to produce a highly damped structure for various high-pointing-accuracy instruments, such as space-based lasers and radar antennas for the U.S. Air Force. (A highly damped structure is where jiggling, vibration, and shaking are reduced to the barest minimum.) The 60-foot PACOSS truss, pictured here, is undergoing model survey testing in the vertical test fixture high bay at the main plant's general purpose laboratory (GPL).



Ralph E. Porter, chief of planning for Peacekeeper system engineering at Denver, has been awarded the first-ever regional alumni award from the University of Colorado at Denver (UCD) "for his distinguished achievement in his profession and for other significant contributions to this downtown Denver university." In addition to his participation on seminar panels, the 1977 master's degree graduate has donated his employee finder's fees—which, in turn, have been matched by Martin Marietta Corporation's educational matching gifts program—to the school's scholarship program. He estimates his next "Project Referral" fee will make it possible to establish his own scholarship fund at UCD.

Testing completed on payload integration

About a dozen photographs taken in the space operations simulator (SOS) laboratory will be added to space shuttle flight data file later this year for use by crew members in inspecting Department of Defense (DOD) payloads.

The photos were taken for the Air Force as part of their Defense Satellite Communications System (DSCS III/III) program. Martin Marietta, as payload integration contractor, is assisting the Air Force Space Division with the integration of DOD payloads into the shuttle.

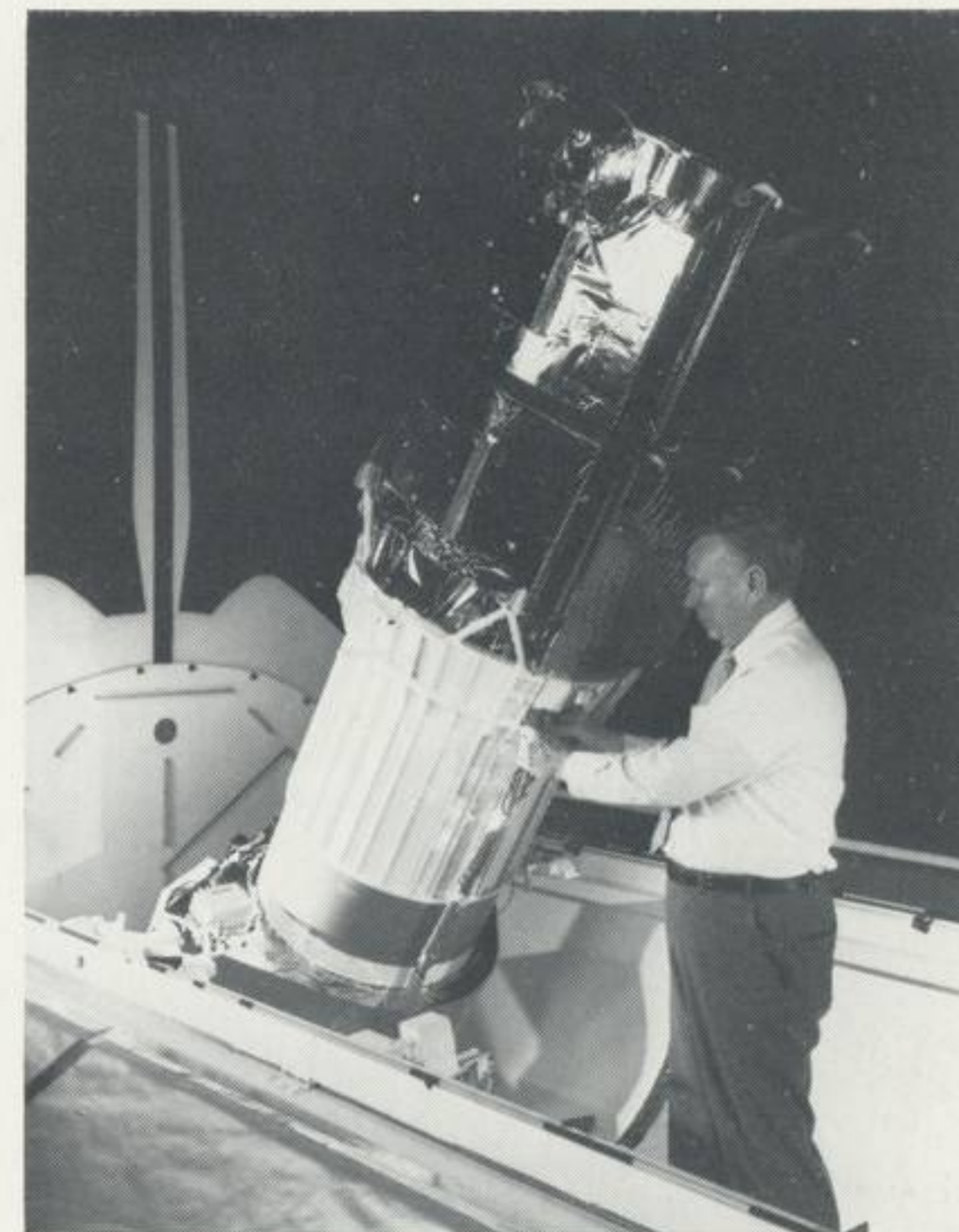
Herschel Smith, chief of the manned space flight engineer support group at Denver Aerospace, said that for the recently completed test, a 1/4-scale model of a DSCS III/III satellite was assembled in the SOS lab. As the satellite was being elevated in a model of the Space Shuttle payload bay, pictures were taken from a variety of angles.

"We took over 500 photos," said Smith. "The purpose was to determine and

document what you can see under various lighting and orbital conditions."

About a dozen of the pictures will be included in the flight data file, allowing crewmen to know what the payloads are supposed to look like as they are being checked out and deployed from the Shuttle.

"The pictures will help crew members know what they should be seeing through the orbiter's four video cameras and through the payload bay windows," Smith explained.



Herschel Smith adjusts a one-fourth scale model of a Defense Department satellite to be photographed during elevation from a model of a space shuttle payload bay. The exercise is part of tests being conducted in the space operations simulation laboratory for the Air Force.

Second 'World of Ada' set for Thursday

Denver Aerospace plans to host another "World of Ada" live video conference via satellite at the main plant. Set for April 5, the latest presentation will feature various vendors.

The company last November hosted a similar down-link transmission from Washington, DC, featuring policy makers from the Department of Defense (DOD) and the commercial sector in a discussion on Ada implementation strategies.

Ada is a new computer programming language and was developed to serve as the single effective language to replace hundreds currently in use. It has been chosen by the Department of Defense (DOD) for all mission-critical applications and embedded computer systems, that is, systems in which the computer provides exclusive support for the overall system in which it operates. Other government and commercial customers also are expected to specify the new language in the future.

Subsequently, Denver Aerospace initiated formation of the Front Range Ada Working Group, which has met three times at company facilities since its inception.

The manager of software education and training at Denver Aerospace, commenting on the latest meeting of the group on March 1, noted: "opinions voiced (by members) are unanimous in complimenting our organization for its foresight, professionalism and aggressiveness in this area."

Robert L. Lewis added: "We are quite pleased with this outcome, but are relinquishing control of the group—while still supporting it fully—to devote time to more

pressing needs, such as developing a vigorous 13-week Ada programming language course, and enhancement of our expertise in the new language."

The company is in its 11th week of teaching its first Ada class, and a second course is scheduled to begin May 14.

The Front Range Ada Working Group currently numbers about 40 persons from the academic, military, aerospace and defense industries.

The agenda for the group's next meeting on June 7, tentatively planned to be hosted by Hewlett Packard at its Colorado Springs facilities, includes discussions on applying for special interest group status with the Association for Computing Machinery (ACM) or The Institute of Electrical and Electronics Engineers (IEEE).

Lewis also noted U.S. Air Force Academy representatives from Colorado Springs have expressed a willingness to arrange for future meetings to be held on that campus.

Denver in forefront of robotics development

Robotics. The word triggers images from science fiction—an automated three-armed contraption doing the job of 20 humans in a factory, perhaps, or weapon-wielding machines replacing soldiers on a battlefield of the future.

Actually, robotics is very real and very much a part of Denver Aerospace's present. The company has been researching and developing a wide range of robotic systems for the past 18 years, in fact, explained Roger T. Schappell, manager, advanced automation technology.

Simply put, robotics is the use of automated systems to perform manual tasks otherwise performed by humans. Initially used in manufacturing applications, robotics is being expanded to encompass other applications, especially space tasks.

The latest robotics development has been artificial intelligence—actually giving an automated system the "brains" to be able to make certain decisions about the task it is performing with a minimum of human intervention. And that, according to Schappell has opened the field to "a whole new effort."

The \$3.25 million advanced intelligence task automation (ITA) contract for the Defense Advanced Research Projects Agency (DARPA) and the Air Force Materials Laboratory at Wright-Patterson Air Force Base, OH, in fact, is aimed at developing that "first intelligent robot."

"Right now it takes a lot of time to program a robot to perform a certain task. We want to be able to walk up to a robot and tell it to do a certain function and have it plan out the entire task," Schappell said.

That "smart" robot, being developed under the advanced ITA program, will be



This timed multiple exposure shows a robotic arm in various phases of checking out an F-15 airplane bulkhead in the robotics laboratory. Gordy White, laboratory supervisor, is at the controls.

used to inspect components for the F-15 fighter aircraft.

Schappell said two elements set the "intelligent" robot apart from its less gifted counterpart—sensory perception (the ability to recognize what it's seeing) and an internal intelligence system that enables the robot to make decisions based on information extracted from its sensors.

A robot also can be endowed with human knowledge through a computer program, allowing it to know all characteristics of what it sees and any available information about the object.

"We would like to have a robotics system that we can put up on a space station, for instance, or on the front end of an orbital maneuvering vehicle and have it perform inspection and repair or refurbishment of

some component of a spacecraft up there," said Schappell. The company currently has NASA contracts to develop the requirements for such a system.

He added there are many other applications for robotics technology, including various military applications and hazardous materials handling.

Under one government study, for example, Denver Aerospace is investigating an autonomous land vehicle equipped with sensory perception relative to its immediate surroundings and a data base about the terrain. The unmanned vehicle could avoid obstacles, moving point to point to perform its human-ordered mission, such as a military surveillance operation.

Schappell was quick to add the fear robots with artificial intelligence would replace humans one day "is unfounded. Robots will always be tools, just like the computer. Think of it this way—people will not be eliminated, they will just move to higher levels of activity. It could make life a lot more enjoyable."

(Editor's note—The end of the first part of a two-part series on robotics.)

49 honored at Vandenberg

Honors night observances at Vandenberg Air Force Base, CA, recently singled out 49 employees for their significant contributions in the operations and technical areas of the ground support systems (GSS) program there.

Those cited were:

R. H. Bailey, H. A. Baker, J. Banerian, D. A. Blankenhorn, R. J. Bonilla, P. J. Brady, M. H. Bremer, J. N. Buzzelli, S. C. Carnahan, R. D. Coughlin, D. J. Courain, W. J. Edwards, D. M. Flenniken, D. G. Fortna, L. W. Gagnon, K. L. Geiler, D. L. Haines, B. A. Handy, D. E. Harris, F. M. Hlavaty, W. L. Kaelber, M. E. Kaylor, J. F. Kephart, H. E. Keys, A. J. Lennox, R. J. Lischka, J. L. Lowman, M. N. Maccan, R. F. Madison, J. W. Nalty, C. D. Niebruegge, D. A. Norfleet, L. E. Owen, G. L. Pestik, S. E. Podlaseck, G. L. Ramsey, J. C. Randolph, D. D. Rohenkohl, R. B. Shellenbaum, B. A. Simmons, L. J. Smith, R. M. Smith, R. G. Sosnay, P. K. Taylor, J. M. Thompson, T. H. Tucker, M. B. Walker, and B. D. Wood.

New technology awards go to 8

The Denver Aerospace New Technology Evaluation Committee has granted cash awards to eight individuals for their new technology disclosures submitted as a result of work on NASA contracts.

Those named were:

Donald L. Hauser, James D. Miller and Connie B. Johnson, Michoud engineering: "Nondestructive Test Method for Determination of Rind Thickness of Urethane Foams;" Murray J. Lirette, Michoud production operations: "Safing System for Robots and Repetitive Motion Machines;" Mohan S. Misra and Frank M. Kustas, engineering mechanics: "Surface Modification of Bearing Steel Components by Ion Implantation to Improve Rolling Contact Fatigue Resistance;" Thomas C. Richardson and John C. Tietz, electronics: "Circuit Finds Point of Light in Television Image at Video Frame Rate;" and John C. Tietz, electronics: "Algorithm Derives Relative Position and Attitude from Television Image."

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DENVER AEROSPACE
P.O. Box 179—Denver, CO 80201

March 30, 1984



Recipients of 1984 Gold Medallion Awards for their outstanding contributions to the aerospace program and operations at Vandenberg Air Force Base, CA, are: (front row, left to right) William Leary, Jr., Virgil Clark, Toni Crabtree, Guy Graham, Walter Hoskins, Eugene Marchbanks, Stephen Homnack, Celestino Sousa; (second row) George Madrid, Sr., William Milden, Loren Strawn, Gregory Martin, John Murphy, Charles Holt, Peter B. Teets (vice president and general manager, who presided at the ceremonies), Timothy Brummer, Rick Burris, Joe Whitman, Andrew Hall, Chester Johnson, Randall Kingsbury, and Lee Brewer. Not pictured: Ron Lewis, Wendell Taylor.

Mobile blood unit visits

The Belle Bonfils mobile blood unit will make its 1984 debut for Denver Aerospace donors April 16 and 17 from 9 a.m. to 3 p.m. in the SSB presentation room.

Appointments should be scheduled through individual department secretaries or by calling ext 6605.

Last year, company personnel donated 841 pints of blood during various Belle Bonfils blood drives at company locations. Persons at the main plant donated a total of 614 pints, 134 at Denver Systems Center (DSC) and 93 at Littleton Systems Center (LSC).

In appreciation "for outstanding community service," the Belle Bonfils Memorial Blood Center recently presented an award to Denver Aerospace for sponsoring the mobile donations program for the past ten years.

The blood mobile will also be at DSC July 19, LSC August 23, and back at the main plant November 14 and 15 this year.

Fourteen retire

Fourteen Denver Aerospace employees have announced their retirement. They are:

From Denver—Elmer E. Koons, 22 years/9 months; Carol H. Cook, 23/9; Stanford Swinton, 23/8; and Stewart Scales, 33/7;

From Vandenberg Air Force Base, CA—William Leary, 20 years/4 months; Richard Givens, 30/5; and Richard C. Williams, 25/3;

From Michoud—Charles Ripley, 6 years/8 months; Raymond Kern, 6; Michael Reggia, 23/11; Don Cox, 5/2; David Alexander, 6; Richard Clow, 14/9; and William Enos, 16/4.

General lauds first MMU EVA

NASA's associate administrator for space flight has roundly congratulated Martin Marietta on the success of its manned maneuvering unit (MMU) during its first extravehicular activity (EVA) in space during February's historic space shuttle mission.

Air Force Lt. Gen. James A. Abrahamson, in a letter to MMU program manager W. W. Bollendonk, wrote: "I want to relay to you the excitement the . . . EVA on STS 41-B has stimulated. The aerospace industry and the public are still expressing congratulations for an extraordinary event . . ."

The general added, "Your development and operational teams have done a great job in contributing to the success of the STS 41-B EVAs, and I wish to express NASA's appreciation. I look forward to our first satellite retrieval and repair mission in April (the Solar Maximum Observatory satellite mission scheduled for April 8 during the STS 41-C flight). Again, the MMUs will perform a significant role in the success of this mission. Keep up the good work and please relate my congratulations to your development and operational teams."

Engineer earns IEEE honors

The seventh International Conference on Software Engineering Outstanding Paper Award from The Institute of Electrical and Electronics Engineers' Computer Society has been awarded to Paul A. Scheffer.

Scheffer, a senior staff engineer in the software department at Denver, co-authored the paper with the Air Force Systems Command.

The paper was titled "A Large System Evaluation of SREM (software requirement engineering methodology)." It was written in conjunction with an Air Force-sponsored contract to evaluate SREM for command and control applications.

Canaveral operations honors outstanding performance

Twenty-three Florida-based employees assigned to Canaveral operations command, control, and monitoring subsystem (CCMS); and solid-rocket booster (SRB) decelerator subsystems were feted during the annual Gold Medallion banquet recently at Orlando.

Cited for innovation and outstanding performance from Canaveral operations were: Theodore H. Allen and Frederick C. Marshall, product assurance and safety; Cathy A. Dalton, Darryl L. Laws and Charles W. Sims, materiel; Charles L. Holloway and Robert C. McBryde, engineering; Madeline H. Johnson, personnel; Sidney J. Warren, business operations; Phillip L. Pendleton, ground support system; and, Roger A. Barickman, Harry F. Hobbs, James N. Wilson, and H. Ritchie McConahy (retired), all test operations. Not in attendance, John G. Krall (retired), business operations, and James E. Coln, test operations.

Also receiving gold medallions and certificates of recognition signed by the individual division vice president were: (from CCMS) Elise M. Armfield, personnel; Charles E. Biby and David C. Hudson, engineering. Not in attendance, Ronald P. Bragg, engineering; (from SRB) Mark E. Faucher, field operations.

Special awards for launch vehicle readiness and launch vehicle flight success went to the following five from Canaveral operations: A. Peter Gaenicke, engineering; Robert A. Pelzel, product assurance and safety; and Kent L. Hawes, Dale E. Polk, and Kevin G. Sloan, test operations. In addition to the medallions and certificates, they also received U.S. Savings Bonds ranging in value from \$500 to \$800.

Robert D. Rhodus, director of Canaveral operations, delivered the opening remarks and presented the awards. Peter B. Teets, vice president and general manager of strategic and launch systems division, made the closing remarks.

Library's new acquisitions

The research library, located in second floor module 226, Engineering Building, has added several new books and technical papers to its shelves.

Technical papers from the American Institute of Aeronautics and Astronautics include: "22nd Aerospace Sciences Meeting," "Shuttle Environment and Operations Meeting," and "Second Flight Testing Conference and Technical Display."

Also among the new listings are the Association for Computing Machinery Design Workshops, numbers 7 through 16, and the following books: *Detecting Codes, Self-Checking Circuits and Applications*; *Foundation Engineer's Handbook*; *Short Fiber Reinforced Composite Materials*; and *Introduction to Very Large-Scale Integration Systems*.

Solar Max 'house call' set for April 8

American astronauts will make the world's first orbital "house call" on an ailing satellite during the Space Shuttle Challenger's April mission.

Wearing the manned maneuvering unit (MMU), George Nelson will fly untethered from the shuttle orbiter, dock with the malfunctioning Solar Maximum Observatory Mission satellite, and stabilize it, using MMU thrusters. Then Solar Max will be retrieved by the orbiter's remote manipulator system (RMS) and pulled into the cargo bay. During two days of extravehicular activity, Solar Max will be repaired by Nelson and James Van Hoften, then reinserted into orbit to continue its solar research. Both astronauts have been practicing for the orbital rendezvous and retrieval at Denver Aerospace's unique space operations simulation facility at the main plant.

The flight will be the second in 61 days for the Martin Marietta-designed MMU. During the last STS mission, two MMUs underwent a total of five hours of flight testing as astronauts practiced procedures February 7 and 9 for this, its first practical use.

Aside from setting a number of firsts for the Space Shuttle, the Solar Max Repair Mission will open a new era in satellite servicing and repair and may influence the future design of spacecraft, satellites, and space stations.

Solar Max was designed to study the physics of the sun's solar flares and magnetic fields. For nine months after its launch on February 14, 1980, it relayed a wealth of information to scientists at NASA's Goddard Space Flight Center, Greenbelt, MD. Then, three small fuses in the attitude control system failed, leaving Solar Max unable to point its instruments precisely at targets of observation on the sun. Also, an instrument used to investigate solar flares, called the coronagraph/polarimeter, failed, and another is malfunctioning.

payload capacity increased

Weight, time, cost cut by new external tank insulation

A new even lighter—and easier-to-apply—insulation foam on the aft dome of space shuttle external tanks has reduced the cost and manufacturing time of each tank at the same time it has increased the payload capacity.

By reducing the insulation's weight Martin Marietta has enabled NASA to add 260 pounds of usable payload weight to the shuttle's capacity.

Manufacturing time has been cut by 33 hours compared to previous insulating processes, and the weight has been reduced by 260 pounds. Net result was a cost savings of \$118,000 for each tank.

The new foam insulation—chemically, a urethane-modified isocyanurate—resulted from two years of development by a team that included NASA's Marshall Space Flight Center, North Carolina Foam Industries, and Martin Marietta. After completing material development, properties of the new foam were verified by wind tunnel tests, cryogenic radiant heating and other combined environment tests.

External fuel tanks require reliable insulation to maintain the super-cold temperatures of the tank's liquid propellants—as well as to protect the metal skin from heat generated by the shuttle's main engines and exhaust plumes of the solid rocket boosters during launch.

First use of the new foam insulation was on the external tank for the ninth shuttle mission in October 1983. The tenth shuttle mission, February 1984, relied on an older tank, but all future flights will use tanks with the new insulating material.

The new insulation is the second weight reduction effort on the external tank. Earlier last year, the tank's weight was reduced some 10,000 pounds through modifications in its design, structure and insulation coating.

The external tank contains the propellants that feed the space shuttle orbiter's three main engines at launch and is the structural backbone of the system in its launch configuration. It is 154.2 feet long, 27.6 feet in diameter, and weighs 1,590,000 pounds when full.

New barber shop at LSC

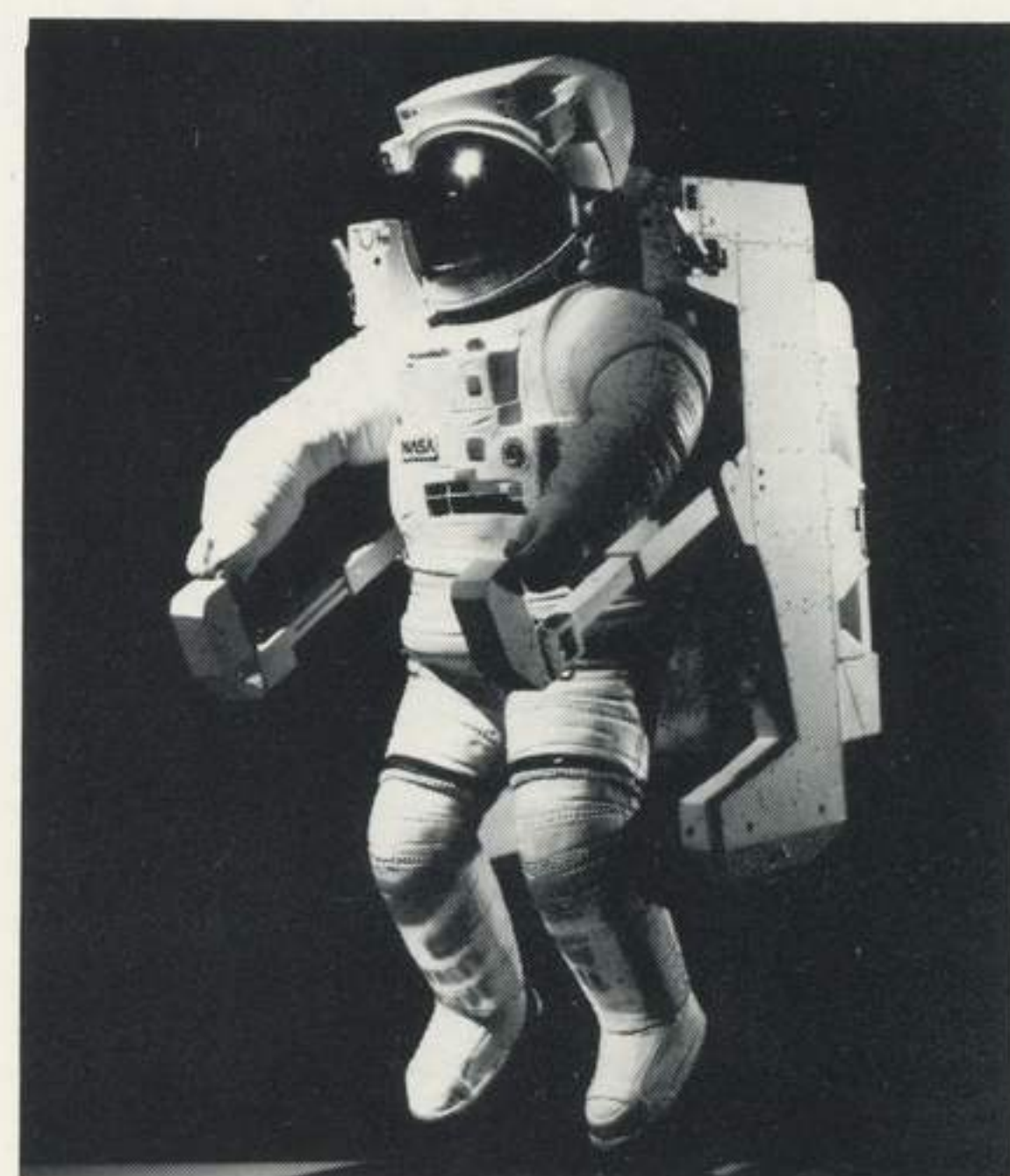
A new barber shop is open in room 124B at Littleton Systems Center every Monday, by appointment only for salaried employees, from 6 a.m. to 2:30 p.m. The extension is 0560.

Locations, hours, and telephone numbers for other barbers at Denver Aerospace are:

- * Plant: Engineering Bldg south basement, 6 a.m. to 2:30 p.m., Tues, Wed, and Thurs; 6—11 a.m., Fri, ext 3029.
- * DSC: basement, 7 a.m. to 5 p.m., Wed, Thurs, and Fri, ext 9157.
- * GCF: Bldg 6050, 7 a.m. to 5 p.m., Tues, ext 1321.

On the cover

The five-member crew of the Space Shuttle Challenger recently struck a casual pose by the manned maneuvering unit (MMU) simulator in the space operations simulation laboratory at Denver Aerospace's main plant. The shuttle's mission, scheduled for launch April 6, will see mission specialists George Nelson and James Van Hoften attempt the world's first onorbit repair of an ailing satellite—the Solar Maximum Observatory satellite—just two days later, April 8. (See story for details.) Pictured, left to right, are: Terry Hart, mission specialist; Francis Scobee, pilot; Nelson; Van Hoften; and Robert Crippen, commander.



Martin Marietta's one-fifth scale model of its manned maneuvering unit (MMU)-equipped astronaut today is probably one of the most widely recognized replicas of modern times. It was seen by literally millions of viewers on all three network morning television programs last month before man's first attempt to maneuver in space without benefit of a lifeline. Astronaut Bruce McCandless performed the history-making event February 7 during the Space Shuttle orbiter Challenger's mission. He was followed that day by another mission specialist, Robert Stewart. Both used the MMU two days later, February 9, during a second day of extravehicular activity (EVA). Their feats were preludes to the world's first onorbit repair of an ailing satellite, the Solar Maximum Observatory satellite mission scheduled for April.

Augustine speaks April 17

Norman R. Augustine, president of Denver Aerospace, will be the featured speaker at a 5:30 p.m. meeting April 17 of the Denver Management Association at the Pinehurst Country Club, 6255 West Quincy Avenue. His topic will be "Denver Aerospace—the Challenge Ahead."

Recreation

Golf—Entries for the Martin Marietta Partner Best Ball tournament May 6 at the Riverdale (Adams County) Golf Course are due at Recreation by April 19. The tournament is limited to 120 golfers on a first-come, first-entered basis. The low-gross scoring woman and man will represent the company in the fourth annual Denver Corporate Games June 2. Golfers are also reminded leagues should be registered with Recreation by April 27. Details are available from the office, Engineering Bldg, module 124, ext 6750 and from flyers in the Recreation racks.

Tennis—The Martin Marietta Spring Tennis Tourney is scheduled May 9, and there will be an organizational meeting for that event in at 5 p.m., April 10, in the SSB cafeteria. Deadline to register for the competition is April 18. Details are available from the Recreation office and racks.

Archery—The Red Rock Bowmen will hold general membership meetings at 4:45 p.m., April 3 and May 1, in the Recreation Area Club House. There will be discussions of archery techniques as well as showings of wilderness survival films. Rental equipment and private introductory coaching will be available for the first night of the Monday night summer indoor league at 7:30 p.m., April 16. See Recreation racks for details or contact Tom Hanson, ext 3419, or Jim Kemp, ext 4203.

Hunting—Skyline Hunting and Fishing Club, Inc., will sponsor a hunter education class next month at DSC, room K-200. The class runs from 7 to 9:30 p.m., April 10, 12, 17, 19, 24, and 26. The fee is \$5. For details contact Dick Benson, ext 4528 or 985-3728. Flyers are available in Recreation racks.

Basketball—Reduced end loge seat tickets are available to Martin Marietta employees and their families for the Denver Nuggets basketball game against the Golden State Warriors at 7:30 p.m., April 5, in McNichols Sports Arena. Order forms for the \$5.50 tickets (regularly \$13.20) are available from the Recreation office and racks. Order forms must be returned to the Nuggets office by April 4.

Nautilus—Exclusive \$100 one-year and \$200 two-year VIP memberships are available to Denver Aerospace employees at the eight Nautilus Fitness Centers for men and women in the greater Denver area. Details available from the Recreation office and racks, or call 988-6220. The offer expires April 30.



Junior Achievement officers and their adult advisors map out sales goals for "Melody Minutes," the Denver Aerospace-sponsored company specializing in the manufacture of wind chimes and a battery-operated wall/desk clock made of polished agate. The products are scheduled to go on sale at the main plant, DSC, and LSC April 20 and again May 18. Pictured, clockwise from the bottom of the table are: Wendy Mannon, president, Heritage High School (HS); Dave Pierson, vice president (vp)/marketing, Englewood HS; Kim Pepper, vp/production, Englewood HS; Wes Bauer, vp/finance, Englewood HS; Mike Hackman, executive advisor, Martin Marietta; Robin Mannon, vp/personnel and corporate secretary, Goddard Junior HS; Tom Elbring, finance advisor, Martin Marietta; and Marge Brooks, production advisor, Martin Marietta.



Pamela Cartwright, a 1982 graduate of Alameda High School and a Littleton resident, will be a contestant in the 1984 Miss Nebraska Pageant at Lincoln April 7 and 8. Currently a sophomore at Nebraska's Hastings College, the 20-year-old coed is the stepdaughter of John Koenig, a Denver Aerospace senior engineer, electronics packaging.

Savings Bond Planning Meet

Department heads should have coordinators' names in to Recreation/Employee Services before the April 18 planning session for the 1984 U.S. Savings Bond Drive at Denver Aerospace. That meeting will be at 9 a.m. in the Engineering second floor presentation room.

The Payroll Savings Plan for the bonds allow for the automatic deduction and investment to make savings easier. Bonds that are five years from maturity and held five years or longer earn interest at 85 percent of the average market yield on U.S. Treasury Securities.

Canaveral Operations Support Junior Achievement

Canaveral Operations recently sponsored the visit of five high school students to the Eastern Space and Missile Center at Cape Canaveral as part of its continued support of the Brevard County (Florida) Junior Achievement (JA) program.

The students, all officers of the Merritt Island High School JA "Imagineering" company sponsored by Martin Marietta, were welcomed by Robert D. Rhodus, Canaveral Operations director and current president of the local JA board of directors.

Junior Achievement, a national program established to engender a more positive attitude on the part of young persons toward the free-enterprise system, has a local membership of more than 200 students.

The Brevard County program set national JA records during its initial year of operation, 1982-1983, for the number of students, educators, and volunteers participating in a first-year program. Martin Marietta, a key contributor to that success, sponsored two high school companies and provided two project business consultants. During the 1983-1984 school year, Martin Marietta will sponsor four high school companies.

Masters bowling scores corrected

Tom Willig, averaging 236 a game, was the recent winner of the Martin Marietta Masters Qualifying Bowling Tournament. An earlier story had him placing second. But that standing was according to pin totals at the end of a 12-game semifinals series. Second place went to Terry Delp with a 226 average. He was followed by John Coan, 209, and Tom Marsh, 208.