



# Viking 1 ends transmissions from Mars

Viking 1 has stopped sending messages home. It now sits on the planet's surface, awaiting, perhaps, an Earthly visitor to follow the trail it blazed almost seven years ago.

Communications with Viking 1 were lost during November 1982. Scientists at the Jet Propulsion Laboratory (JPL) in Pasadena, CA, repeatedly sent commands to the spacecraft in an attempt to reestablish contact, but with no luck. Viking 1 was declared officially inoperative May 5, 1983, when it failed to initiate transmissions to Earth without command, as it was programmed to do if it did not receive signals from the JPL.

Viking 1 landed on the Martian surface July 20, 1976, after completing an 11-month, 400-million mile journey. It was joined by Viking 2, a twin spacecraft, on September 3, 1976. Both spacecraft were built by Denver Aerospace.

Originally planned for 90-day missions, both spacecraft far exceeded expectations. Viking 2 continued to send pictures and data back to Earth until March 1980.

Conducting experiments on opposite sides of Mars, the Viking landers returned more than 4600 photographs (color, black and white, infrared, and stereoscope); collected and examined scores of soil samples; moved surface rocks; recorded weather data; and performed a variety of scientific experiments.

With one exception, the scientific instruments gathered more data than expected. Only the seismometer on Viking 1 would not operate after landing. The seismometer on Viking 2 detected one event that could have been an "earthquake."

"Success of the Viking spacecraft is a tribute to the skill of the people who designed and built them," said Norman R. Augustine, Denver Aerospace president.

"It is that same skill and expertise that will be built into the Venus mapper spacecraft, scheduled to journey to our sister planet in 1988."

At the time of their launches, the Vikings were the most complex planetary spacecraft developed. Each consisted of an orbiter and a lander. The landers were sterilized before launch to prevent con-

taminating Mars with terrestrial organisms. The spacecraft were launched from Cape Canaveral by Titan III space boosters built by Denver Aerospace.

The landers provided the first closeup looks at the Martian surface. Although no evidence of living organisms was found, the landers did detect evidence of chemical activity in the Martian soil, leaving the question of life on Mars still open.



Richard J. Farrell, transfer orbit stage program manager, holds up a model from the Space Shuttle's cargo bay for David W. Thompson, president of Orbital Systems Corp.

## On the cover

The last photograph received from the Thomas A. Mutch Memorial Station (Viking Lander 1) at Chryse Palnitia on Mars is shown on the cover. It was taken 30 minutes after local noon (lander time) November 5, 1982; 2238 Martian days (six years and 108 Earth days) after the Viking lander touched down on Mars. The photo was part of a series designed to survey areas under identical lighting conditions to look for atmospheric and surface changes. Rocks, smooth drift material, and one of the trenches dug by the soil sampler arm are visible. The dark appearance of the ground and the diffuse edges of shadows in front of the rocks suggested to scientists that a dust storm, detected in photographs taken a few weeks earlier, was continuing. Dust storms on Mars have been detected by Earth and spacecraft observation during the Mars autumn in the northern hemisphere.

## \$500,000 to establish basic TOS design

Orbital Systems Corp. (OSC) has provided an initial \$500,000 to Denver Aerospace to establish basic design and future funding requirements for the transfer orbit stage (TOS) for use with the Space Shuttle.

OSC, the company that plans to fund development privately, has contracted with Denver Aerospace to manufacture the stage for a 1986 flight. The TOS will be able

to transfer a 13,000-pound payload from the Shuttle into a geostationary orbit.

The TOS, compatible with the shuttle and the Titan launch vehicle, is intended to keep customers from double booking spacecraft on the Space Shuttle and France's Ariane vehicle.

OSC has reportedly obtained \$30 million to finance TOS development.

## Denver gears up for air traffic control bid

Robert J. Polutchko, vice president and general manager of Space and Electronics Systems division, is on temporary assignment to direct Denver Aerospace's preparation of the air traffic control proposal.

The systems engineering and integration contract bid for the Federal Aviation Administration's national airspace system program is due to the customer August 16. A contract is expected to be awarded during February 1984.

The government request for proposal specifies a five-year basic contract with additional two- and three-year options for a potential 10-year program.

Polutchko described the air traffic control proposal as the most important "must win" for his division and Denver Aerospace this year.

Albert E. Hawkins, vice president for business management, will be acting head of Space and Electronics Systems division.

# Denver Aerospace future bright, challenging

The outlook for new business at Denver Aerospace is quite good.

That opinion is from Richard E. Brackeen, vice president for Business Development. "We will not, however, see the dramatic growth this year we've seen the past few years," added the 1975 Sloan Fellow.

The next few years, according to Brackeen, will be a time of consolidating and stabilizing recent growth into a solid business foundation at a new plateau. However, consolidation does not imply the company will not be working extra hard to acquire new business, he said.

"My job, as Norman Augustine [Denver Aerospace president] is fond of saying, is to get new business at the rate of about a million dollars an hour, every work day. That's about what it takes to maintain our current level of operation."

Toward that end, Denver Aerospace recently signed two major contracts worth more than \$800 million. The awards are for continued work on the Air Force's Space Shuttle launch complex at Vandenberg Air Force Base and other related efforts.

"The route to new business in our industry is often a long one. But, no matter the length, it is always carefully mapped. Our step-by-step procedure for seeking and acquiring new business is one that has worked through the many cycles in defense market conditions. We believe in it and we try to follow it to the letter—even when we are being pushed by deadlines or pulled by other pressures to skip a step or two."

Research—"homework," Brackeen calls it—and design studies are key determinations in all new business acquisition decisions.

Understanding the customer's acquisition plan is also critical. "We have to know what the customer is planning to buy, when the acquisition decision will be made, how much is going to be bought over what period, how enduring is the congressional support for the program, who else wants the business—and the questions go on. We must answer all the key questions before we make a decision to bid for the business."

Two questions always asked are: Can we do the work? Do we want to do the work?

"We do a great deal of soul searching answering those apparently simple questions," Brackeen said. "Our first reaction is probably that we can do any defense/aerospace job and that we want all the business we can absorb and execute in a manner of which we can be proud."

"The resource questions—people, equipment, facilities—are always tough," he said. "We can't base a decision simply on the capacity we have now. We have to know what resources will be available a year from now, five years from now, or even ten years from now."

The same look ahead is required to answer the question, "Do we want the work?"



**Richard E. Brackeen**

"Besides assessing if the work fits our skills and facilities, we have to ask if it will enhance our overall capabilities; will it get us into solid, new business; is the work short-term or long-term; will it require excessive relocation of our people; and a raft full of other questions."

In addition to answering such questions, Brackeen said, "we must be certain our company operates at an efficiency level that assures we are able to compete successfully with other aerospace firms."

Although tabbed with the responsibility for getting new business, Brackeen pointed out that his is not a one-man job.

"We get everyone involved who can make a contribution to the homework process and to the decision. Some sessions are formal, others are informal. All are aimed at arriving at a sound business decision."

There are, however, some new wrinkles in the decisionmaking process, he added.

"More and more, we are being asked to bid on work at a fixed price, even for research and development programs. The risks involved can be great. We have to weigh them carefully. An overly aggressive bid to win a fixed-price job may feel good in the short-run, but may represent an unwarranted risk to our customers, employees, and shareholders."

"We also have some commercial sales opportunities as well as some prospects in international markets. Both of these prospects involve doing business differently than our current structure and approach are designed to accommodate. We are doing our homework so that we can make the proper decisions," Brackeen said.

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## ***Disoriented woman aided by employee***

"Stop where you are!"

That shout from Edward Bailey may have startled the woman, but it also may have saved her from serious injury.

Bailey, assigned to Peacekeeper from the logistics department, was driving into the West Point Facility parking lot when he saw a woman trying to negotiate the hill on the west side of the lot. He suspected she was blind and that she and her seeing-eye dog were disoriented.

Bailey accompanied the woman to the entrance of the Data Systems Center park-

ing lot where she and her dog got their bearings and proceeded toward her office at another company.

Bailey learned the woman usually takes the bus to work with no difficulty. On that particular morning, however, the bus driver had let her out at a different place.

"Ed's concern and willingness to get involved reflects well on him and the company," said E. P. Cook, manager of central logistics engineering and support. "His quick action prevented possible injury and got the woman safely to her job."

## Audits vital part of doing business

"Audit" is a frightening word.

Ask anyone who has received an audit notice from the Internal Revenue Service.

But Walker Fleming says audits conducted at Denver Aerospace should not scare anyone. Fleming is western region manager for the corporate internal audit department. He and his eight-member audit staff conducted 20 audits here last year and will likely conduct that many or more this year.

"Many of our audits are requested by the people who will be audited," Fleming said. "All the audits are done to help the company conduct its business properly."

The audit staff is trained in accounting, finance, and computer science. Generally, audits evaluate the adequacy of accounting records and systems, including electronic data processing systems; verify the adequacy of internal checks and controls; review the means used to safeguard assets; verify the financial position reports and operation results; ascertain compliance with corporate policies and procedures; and investigate suspected fraud or irregularities.

"Our objective," Fleming said, "is to assure management, through the audits, that the company is operating the way it is intended to and that sound business judgment is being used."

"We don't want people to fear us. We want them to see us as people who can help make the business successful."

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## Employees join June graduates

Ten employees received diplomas this spring as a result of company-sponsored college study.

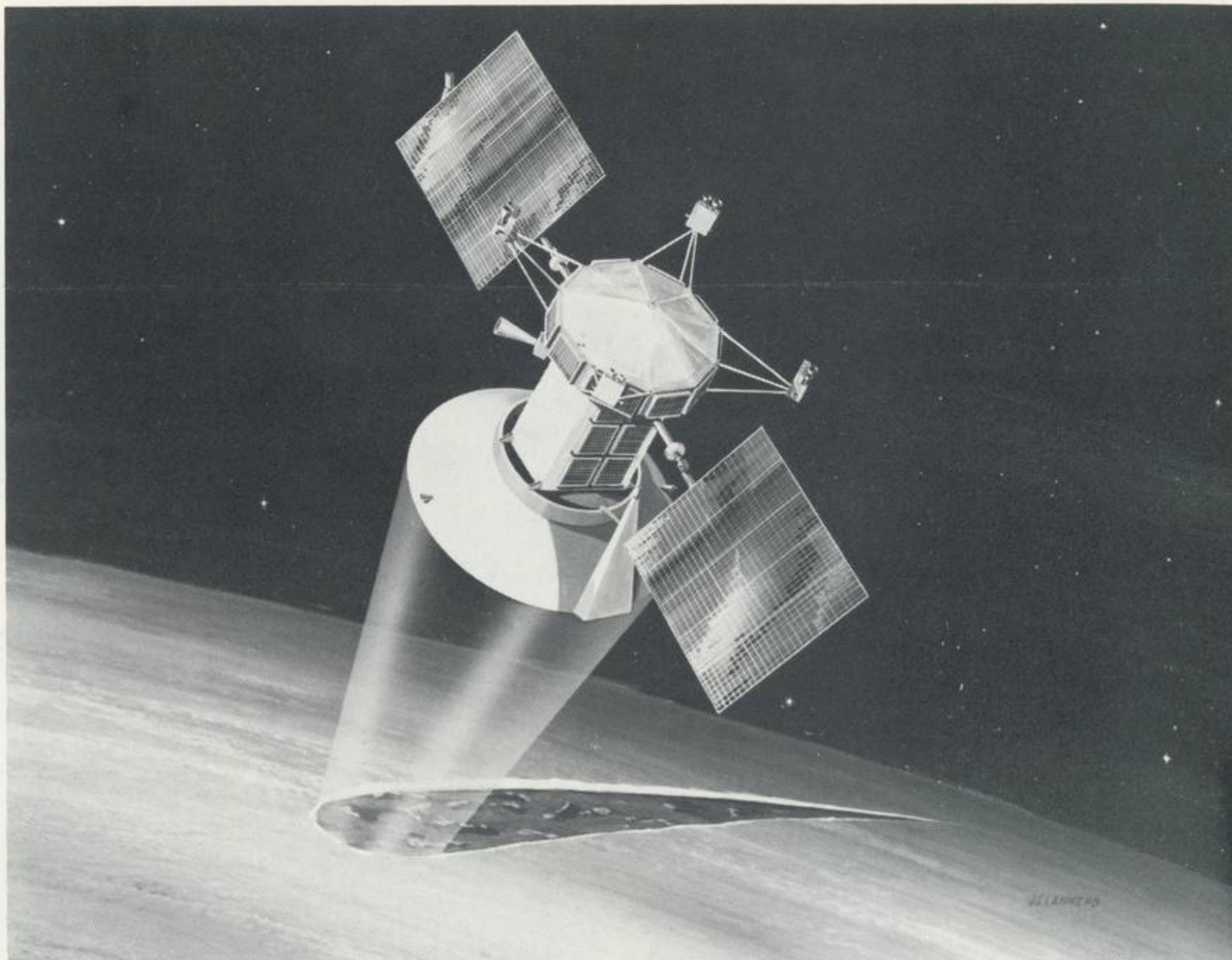
Henry Aliano, solar, earned a master of science degree in industrial engineering under the Colorado State University SURGE program.

Barbara A. Sande, electronics, and Harold R. Feldman, mechanics, earned their master of business administration degrees from the University of Colorado at Denver.

John H. Bitzer, space and electronics systems, earned a bachelor of science degree in quality management from the University of Phoenix.

Earning bachelor of science degrees in technical management in the Regis College RECEP TWO program were: Donald W. Nuce, quality control; James W. Smith, strategic systems; Stanley J. Zielinski, launch vehicles; Henry M. Shannon, business operations; and William R. Howard, space and electronics systems.

Diane C. Snodgrass, space and electronic systems, received a bachelor of science degree in business administration from Regis College.



The Venus mapper spacecraft is shown in orbit around Venus in this artist concept. Images produced by the synthetic aperture radar aboard the spacecraft will be used to map the surface features.

## Venus spacecraft planned for 1988 shuttle launch

An interplanetary mission to map the unknown surface of Venus gained support with the Jet Propulsion Laboratory's \$784,000 award to Denver Aerospace for completion of the Venus radar mapper spacecraft initial design.

The new funding, an addition to a previous \$475,000 concept study award, will cover work through September. Full-scale development of the spacecraft is expected to begin in October if the mission is approved by Congress. The final design, assembly, and testing of the spacecraft will also be performed here.

Currently, the company is developing the basic design concepts for the spacecraft, including propulsion, guidance and control, the instrumentation platform, and communications equipment. Also being developed are software for the spacecraft and ground computers that will control the spacecraft throughout the mission and during preflight testing.

Other work being performed includes planning mission operations for the launch, interplanetary flight, and orbital mapping; and integrating the Venus mapper with the Space Shuttle.

Plans call for the Venus mapper to be launched during 1988 on a half-year journey to Earth's neighboring planet. On arrival, the spacecraft will enter an elliptical orbit and circle the planet every 3.7 hours in a 243-day mapping mission.

An advanced imaging technique, synthetic aperture radar, will pierce dense clouds that perpetually enshroud Venus to produce photographic-like images of the surface. Transmitted to Earth, the images will enable scientists to construct a

map of 90 percent of Venus, showing feature variations as small as 1 kilometer.

Because of thick poisonous clouds of sulfuric acid and carbon dioxide, the planet's surface has remained a mystery. Early probes were able to transmit only a few images before being silenced by the hot, corrosive environment.

Clouds, however, are transparent to synthetic aperture radar, and the radar is expected to provide images that will reveal surface features, including water and wind erosion, volcanic activity, tectonics, and surface faulting. The radar is being developed by Hughes Aircraft.

In addition to investigating the surface, the spacecraft will take measurements of Venus's gravity field and conduct studies of internal density distribution.

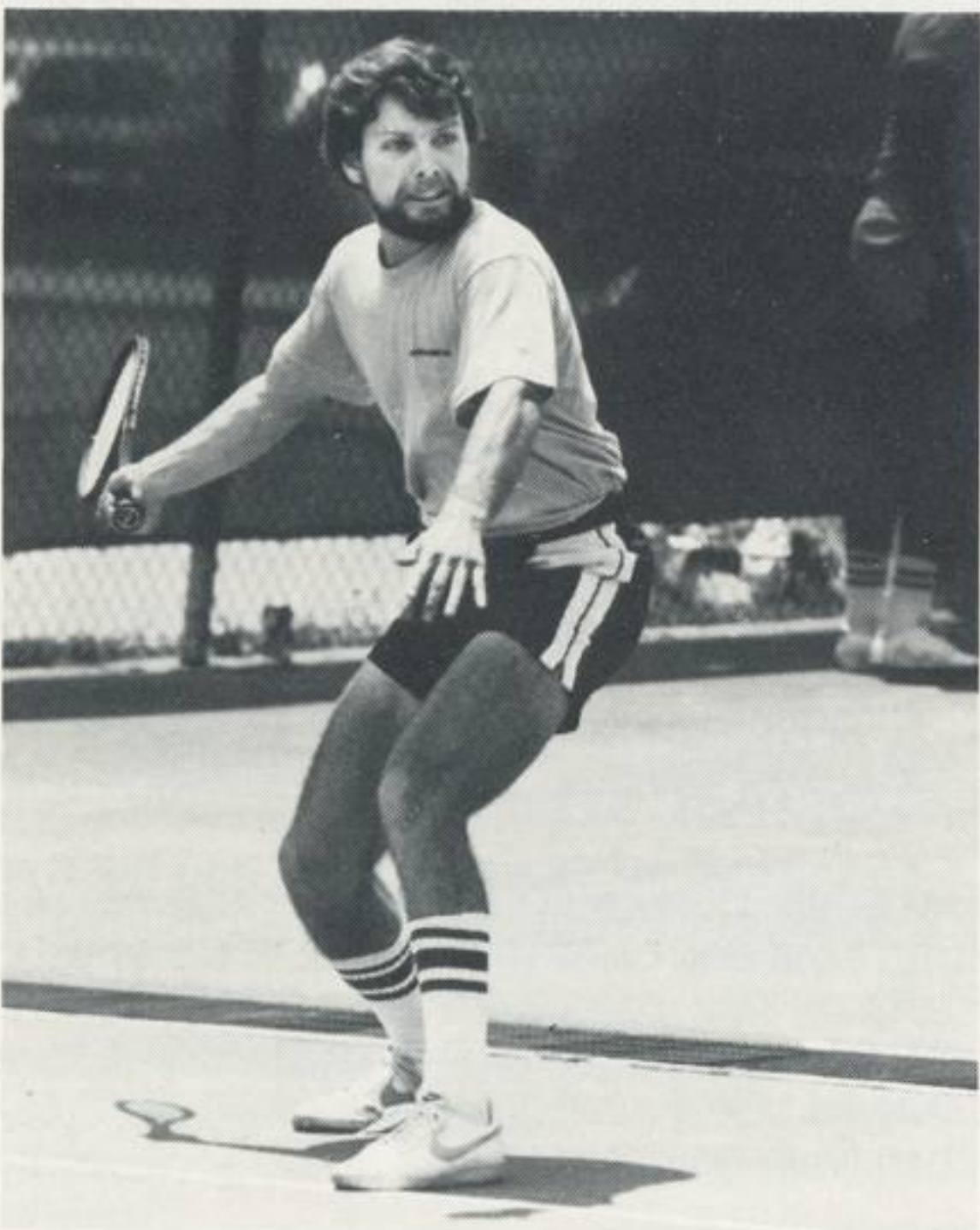
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Denver Aerospace corporate game team members performed well in the one-day event. Cliff Lovejoy starts Joslin Marsaglia in the 400-meter coed relay, top left. Susan Douglass and Mike McTague time teammates, top right. Brian Gallagher returns service in the mixed doubles, lower left. The day ends with a pat on the back for Rita Rosen, who ran in the 200-meter dash and the 800-meter coed relay.

## Corporate games team takes second place

The Colorado Special Olympics, big winner of the 1983 Corporate Games, received an estimated \$8000 contribution, the most collected to date.

When the day's competition was over, twice-unbeaten Denver Aerospace had taken second place to a strong Public Service Company of Colorado team. Storage Technology Corporation was third.

First-place winners from the Denver Aerospace team were Steven Weinstein in the 10-km run 18-29 age group division with a 32:20 time, and the coed volleyball team.

Contributing to Denver Aerospace's team total of 138.25 points, just 18.5 points short of the winning team, were:

Michael McTague, fifth in the 30-35 age group of the 10-km run and Daniel Trujillo, fourth in the 36-40 age group division,

Clare Bena, fourth in the 18-29 age group 5-km run

and Susan Douglass, second in over-40 division.

Marlene Gunther, third in the women's 100-meter dash; Roderic Brunngaber, third in the men's 1500-meter run; Bobbie Maes, third in the women's 1500-meter run. Team efforts yielded a third in the coed 800-meter relay, seventh in the coed 400-meter relay, and fourth in the women's 200-meter shuttle relay.

In swimming: Terry Heggy, fourth in the men's 50-yard freestyle; Kim Meliza, second in the women's 50-yard freestyle; Peter Kunzler, second in the men's 50-yard backstroke; Bob Reilly, fourth in men's 50-yard butterfly; Krista Barker, fifth in women's 50-yard butterfly; and John Miller, second in men's 100-yard freestyle. The coed 200-yard medley relay team of Ronald Johns, Karen Hilmer, Peter Kunzler, and Krista Barker took second.

The bowling team took second place overall.

In tennis: Terry Tyrrell, second in men's singles; Margaret Althoff, eighth in women's singles; Mary Ireland and Pam Clark, eighth in women's doubles; and Brian Gallagher and Rita Smith, fourth in mixed doubles.

## Augustine sets AIAA theme for year at helm

Denver Aerospace President Norman R. Augustine has set "The Aerospace Professional," as the theme for the American Institute of Aeronautics and Astronautics (AIAA) during the coming year.

Installed as AIAA president during last month's annual meeting and technical display, Augustine said programs to support that theme include increased emphasis on quality technical meetings and publications; more support for section-sponsored continuing education; a revamped magazine; increased support to student chapters; and orientation programs for young and mid-career members.

The Martin Marietta exhibit at the record breaking Long Beach, CA event was a showcase for Denver Aerospace systems. More than 8000 aerospace engineers and management personnel were on hand to view the 129 exhibits.

Centerpiece of the company's exhibit was a quarter-scale model of the transfer orbit stage, an upper stage being marketed commercially by Orbital Systems Corp., and the manned maneuvering unit/solar maximum satellite repair mission.

Other models and graphics were devoted to an aft cargo carrier for the external tank, space station concepts, teleoperator maneuvering systems, Venus radar mapper, the tethered satellite system, and team arrangements for the Space Shuttle processing contract—a contract expected to be awarded next month.

## Employee blood drives benefit communities

Employees at Vandenberg and Denver gave 495 pints of blood in two separate blood drives.

During the May 5 blood drive conducted by the Tri-Counties Blood Bank at Vandenberg, 184 pints were given by employees of the Titan, ground support systems, Peacekeeper, and common support departments.

At the Denver main plant, the Belle Bonfils mobile unit collected 172 units on May 24 in the best one-day response ever. The following day, 139 additional units were collected for a two-day total of 311 units.

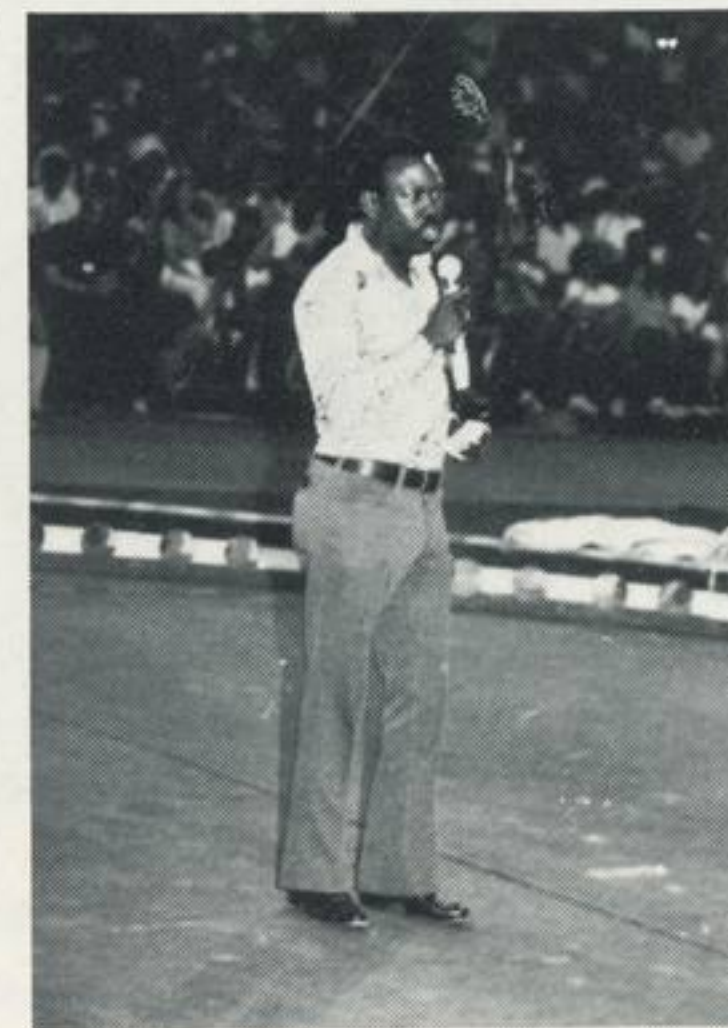
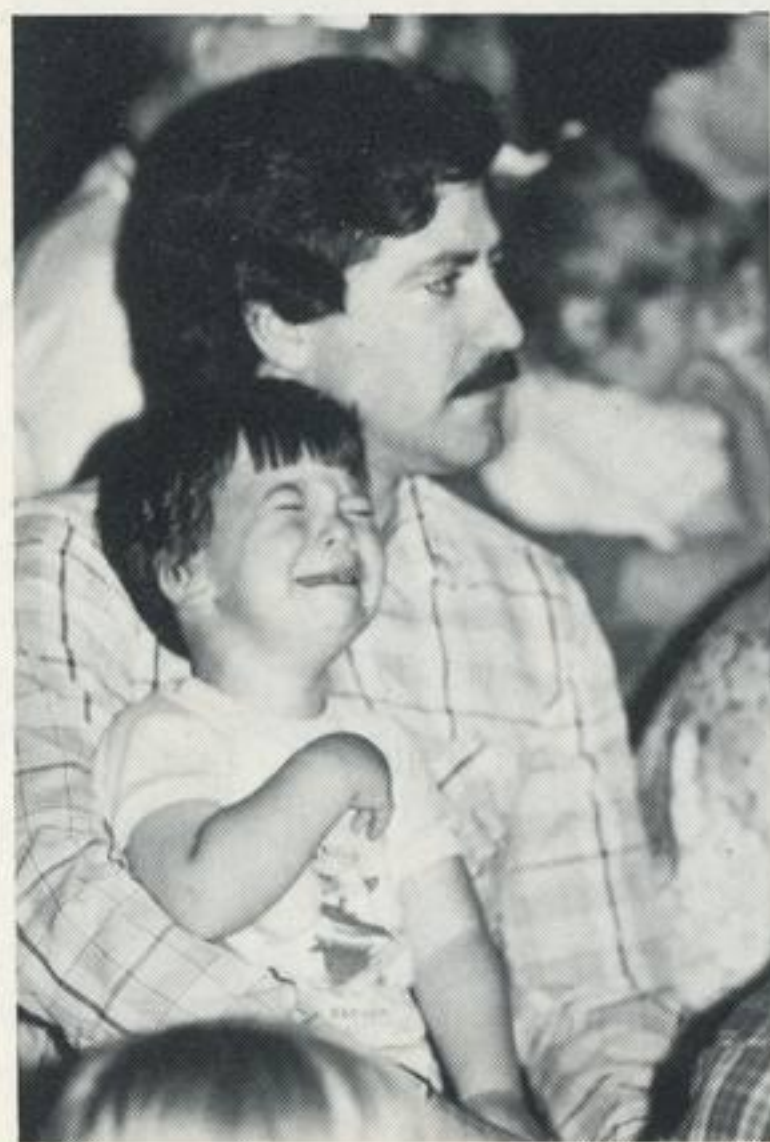
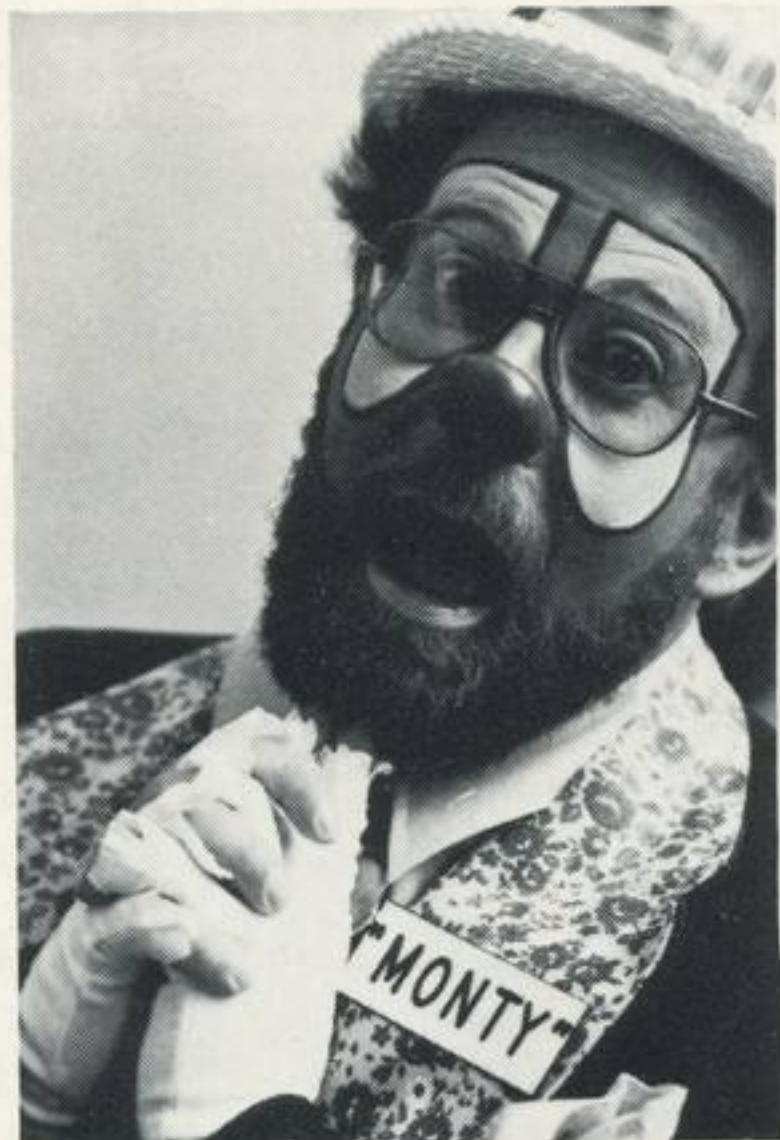
Ten beds were set up in the Space Support Building sixth-floor presentation room, and shuttle bus transportation was provided for donors at the main plant.

"More than 80 units of blood have been used by Martin Marietta families in Denver since January 1, 1983," said Lori Sharp, blood bank coordinator. "That is more than was used by employees and their families in 1982."

"Last year, company blood donations totaled 913 units, making Martin Marietta one of the top ten donor organizations in Colorado," she added.

The Martin Marietta blood bank accounts at Bonfils in Denver and at Tri-Counties in Santa Barbara provide blood at no cost to employees and their families, except for minimal administrative expenses.

# Circus 1983



## External tank is bright spot in shuttle planning

External tank production at Michoud won blue ribbons from results of a panel report investigating the Space Shuttle's ability to reach rapid launch rates.

In their "Assessment of Constraints on Space Shuttle Launch Rates," released recently, the National Research Council said the "external tank appears to be the only major component (of the Space Transportation System) for which firm planning is in place to attain levels of 24, 30, and 40 flights per year." To meet that rate, the Michoud division has relocated major tools in the 43-acre factory, and a new auxiliary facility will be used to apply insulation.

The report, prepared to analyze production turnaround for Congress, stated that "no major technology advances or changes in production are required to provide quality tanks at the required launch rates."

## Vandenberg employee wins fellowship

Daniel K. Melchior, a Vandenberg operations flight control systems engineer, has been awarded a Weyerhaeuser Company fellowship to Washington State University at Pullman.

Melchior joined Martin Marietta during 1980. He served in solar and Titan III space booster central systems and is now assigned to flight systems for Titan at Vandenberg.

He holds a 1975 bachelor of science degree in mechanical engineering from the University of Colorado and a 1980 master of science degree in mechanical engineering from Oregon State University.

## Chess teammates foes in industrial league

The Best Company Team trophy was won by a Denver Aerospace team in tournament play at the Denver Area Industrial Chess League tournament held May 24.

Victors in the 15-round tournament covering master, expert, and serious amateur play were the Martin Marietta I team of Vitali Slucky, George Sowers, Gary McKee, Nick Yeanoplos, Demetrios Glinos, David Hough, Eric Nicolich, and Dan Tyndall.

The Martin Marietta II team finished eighth.

## Recreation

**Radio**—The Waterton Amateur Radio Society holds its annual field days June 25 and 26 at Daniels Park, Littleton. At this national event, sponsored by the American Radio Relay League, radio equipment is set up and operated under simulated emergency conditions, including the use of emergency power generators and portable antennas. All radio enthusiasts are invited to attend. For information, call David Cowdin, ext 1405, or Roger Hansen, ext 8404.

**Baseball and fireworks**—Tickets for the July 2 Denver Bears-Wichita Aeros game featuring the popular Independence Day fireworks display are available through today, June 17, at the recreation office. Upper-level seats cost \$4.50. Un-sold tickets will be returned to the Denver Bears office.

**Soccer**—The soccer club will meet June 29 at 4:30 p.m. in Engineering 234 to organize the fall recreational league. For information, call Duane Cichy, ext 3986, or Brian Gallagher, ext 7281.

**Lakeside**—Discount tickets for Lakeside Amusement Park, 4601 Sheridan Boulevard, are available for use Monday through Friday from June 3 through August 30. Call recreation, ext 6750 for details.

**Country dance lessons**—Lessons taught by Marla Gifford are now discounted \$10 for employees. Registration forms, available in the recreation racks for the six-session courses, should be completed and delivered to recreation by June 21.