

Number 11/1984

MARTIN MARIETTA
news
DENVER AEROSPACE

The 'Games'



Surging into forefront of software engineering technology

Denver Aerospace's increased emphasis on computer systems and software is paired with an equally concerted effort to ensure the company forges into the forefront of software engineering technology development.

Cornerstone of that effort is the Software Center of Excellence, a comprehensive program that involves expanding and upgrading existing computer facilities, increasing and training staff, and setting up new systems to increase productivity.

Parker Stafford, director of software engineering in technical operations, said Denver Aerospace was named the center of excellence for software state-of-the-art advancement within the corporation late last year "to improve our ability to win and execute software-intensive computer system projects." Such projects can include anything from highly automated space stations to increasingly complex information and control systems.

Littleton Systems Center (LSC) recently was selected to house the center. Facility

the "home shop" for all software people in the company, while another 400 will remain in the divisions of major programs.

The company spent \$500,000 during 1983, on Software Center of Excellence, and \$6 million has been budgeted to be spent this year for building modifications and equipment.

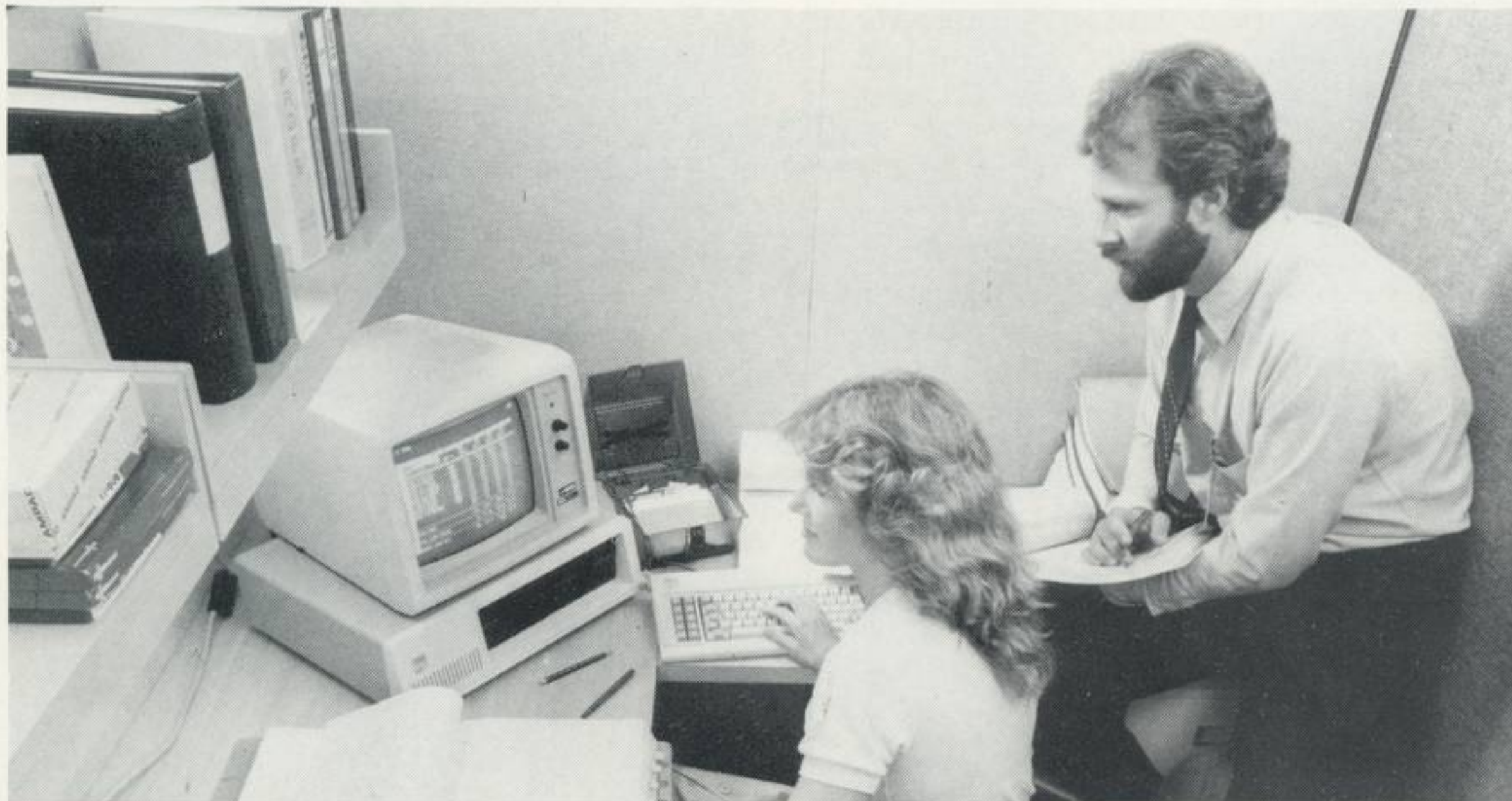
One of the primary objectives of the center, according to Stafford, is to improve productivity of individual software engineers and their managers. "We would like to improve our productivity by 50 percent over the next five years."

That will be accomplished, in part, by setting up state-of-the-art work stations that minimize visual and noise distractions.

Work stations will be linked to a network of existing central mainframe computers, word processing equipment, and extensive computer laboratories throughout the company. Advanced command, control, and communications laboratories also will be linked.



Highest honor for academic achievement in economics at the U.S. Air Force Academy at Colorado Springs—the Maj. Arthur L. Moxon award—was presented to Cadet Scott A. Cain of Coalinga, CA by James W. McAnally, vice president of Denver Aerospace defense systems. Martin Marietta has sponsored the annual academic award to a graduating cadet since 1981. The new second lieutenant will be assigned to active duty in electronic systems at Hanscom Air Force Base, MA. The award is named in honor of the Class of 1968 cadet killed in England during a flight training mission.



Karen Hover demonstrates one of the new modular work stations for software personnel as staff engineer Steve Carlton looks on. Each state-of-the-art work station will include a personal computer. The work stations are designed to increase productivity.

modifications on about 50,000 sq ft in the northwest corner of LSC are scheduled to begin next month, with completion expected early next spring.

Some 100 software employees are expected to be located at LSC, which will be

A second objective, Stafford said, is to have a "visible center to bring in our key customers and demonstrate to them that we have the equipment, software tools, and the trained staff to do computer-intensive work."

Finally, Stafford said the company wants to demonstrate to its employees that it is committed to being excellent in the software profession.

The most visible elements of the Software Center of Excellence are the computer laboratories. Improvements will include addition of a multilevel security lab and creating an advanced command, control, communications, and intelligence lab which can simulate two command centers for interoperability demonstrations or for war gaming.

Training also is a key element. Ada training is underway, and complements the company's ongoing training in modern programming practices and special computer languages, Stafford said.

Election calendar 1984

- June 13 — Earliest day to apply for primary election absentee ballot.
- Aug 8 — Earliest day to apply for general election absentee ballot.
- Aug 27 — Earliest day absentee may cast primary election vote in county clerk's office.
- Sept 7 — Last day to apply for primary absentee ballot; last day absentee may cast primary election vote in county clerk's office.
- Sept 11 — Primary election 7 a.m.-7 p.m.; absentee ballots to be in county clerk's offices by 7 p.m.
- Oct 5 — Last day to register to vote in general election.
- Oct 22 — Earliest day absentee may cast general election vote in county clerk's office.
- Nov 2 — Last day to apply for general election absentee ballot; last day absentee may cast general election vote in county clerk's office.
- Nov 6 — General election 7 a.m.-7 p.m.; absentee ballots to be in county clerk's offices by 7 p.m.

MARTIN MARIETTA NEWS

Published by Public Relations
MARTIN MARIETTA AEROSPACE

Call Ext. 5364 with information or suggestions for articles, or call one of the following coordinators.

Technical Operations:	Floyd R. Teiffel Jr. 6872
Production Operations:	Steven L. Cohen 3369
Business Development:	E. W. Andrews 4619
Space & Electronics Systems Division:	Robert I. Curts 3639
Strategic & Launch Systems Division:	John H. Pond 9165
Business Management:	Daphne R. Gillison 3155
Personnel/Recreation:	Leroy Hollins 6750 Lori A. Sharp 6605
Michoud Division:	Evan D. McCollum 3788
Vandenberg Operations:	Richard L. Kline 2202
Canaveral Operations:	Robert V. Gordon 9108

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

June 8, 1984

Mid-June survey

Suggestions, information, impressions being sought

All salaried Denver Aerospace employees will be participating in a corporate-wide survey later this month aimed at enhancing communication throughout Martin Marietta and to help in day-to-day operations, problem solving and planning, and long-range improvements.

That survey will be the first phase of a program that will be extended to hourly employees as well during the first half of 1985.

Thomas G. Pownall, Martin Marietta Corporation chairman and chief executive officer, stressed the importance of communication in a message about the survey.

Noting "communication is an important part of any business organization...and of life itself," Pownall underscored its positive effects in creating "a climate, an atmosphere, an environment" that is both dynamic and productive and "in which we can all profit."

"Employees views on the company are very significant," said Norman R. Augustine, Denver Aerospace president. "Whether recently hired or more experienced workers, they are valuable sources of information, impressions, and suggestions. We need our employees' ideas to help us if we are to keep pace with our rapidly expanding and more complex business."

Augustine encouraged employees to "be candid and honest in your answers for all of us to gain the greatest benefit from the survey."

Responses will be analyzed so data will reflect group, not individual, opinions. To assure employee anonymity, survey results will not be provided to work groups smaller than 10 people nor will the Genesee Company of Rochester, NY, survey processor, report results in any category with fewer than five responses. The firm also will destroy the survey forms once all have been processed, and no Martin Marietta employees will ever see the completed forms.

Major focus of the survey is organizational and management practices. Results will set the stage for group problem solving. Managers will provide survey feedback results to employees in their units, and will conduct problem-solving meetings with subordinates or their representatives to improve their units.

Administered through Personnel, the confidential survey will be ready by June 18 and is scheduled to be completed by the end of the month. Genesee will have survey results tabulated by late August. Implementation of changes based on results of the survey of salaried employees those findings is expected to start some time after Labor Day.

Employees will fill out the survey forms during one-hour group sessions on company time in various presentation and conference rooms throughout Denver Aerospace. Those sessions will begin

with a short briefing, including videotaped messages from Pownall and Augustine, as well as instructions for completing the survey. Personnel managers and administrators will advise departments of times and places to report to their assigned sessions.

Subsequent editions of *Martin Marietta News* will report survey findings as well as implementation of company, division, department, or unit changes resulting from the survey.

Results of 1980 survey

By the end of this year, more than 3,700 Denver Aerospace personnel will have had management training, within the company or at outside institutions, in areas varying from interpersonal skills to performance supervision.

That ongoing training is a direct result of the last survey taken here during 1980 which indicated one of the 10,000 surveyed employees' greatest concerns at that time was the management question. That survey was conducted solely for Denver Aerospace, as opposed to the upcoming survey encompassing all of Martin Marietta.

During 1981-82, about 65 persons received management training, followed by more than 1,600 last year. More than 2,000 will have received similar management training by the end of this year.

Survey organizers traditionally point out company-initiated changes resulting from any employee survey do not necessarily "happen overnight," although they are addressed ultimately. Factors, such as budget, logistics, and timing have to be figured in.

In addition to management, supervisory training, and improved training and development in professional skills areas initiated after the 1980 company survey, actual changes have ranged widely.

The nitty-gritty of facilitating a day-to-day hands-on chore has resulted in new, improved, and more photocopying machines. Relocation of employees has netted improved physical environments, with less distraction and more privacy, for some departments. Other changes, from company-wide to department area, included the new telephone system, improved maintenance, large staff meetings with four levels of management, increased visibility in the company newspaper, and special executive messages to employees with brochures describing the company's roles in various projects. Even more basic needs were addressed with improvements in the cafeteria system.



Story named business v.p.

Steven E. Story, who has held a variety of positions in Martin Marietta's aluminum, cement, aggregates, and aerospace companies, has assumed the duties of vice president of business management at Denver Aerospace.

Story succeeds Richard G. Adamson, who was named vice president of business management for Martin Marietta Aerospace at Bethesda, MD.

Story has been general manager of Basic Products' Construction Aggregates Division at Charlotte, N.C., since January 1981. He joined the company during 1972 as a financial analyst at Denver Aerospace after 2 1/2 years at McDonnell Douglas.

Story later became assistant treasurer at Bethesda corporate headquarters, then vice president of finance for Martin Marietta Cement.

A native of South Gate, CA, Story has a degree in international relations from the University of California at Los Angeles and a graduate degree in business administration from San Diego State College.

Story, who is 40, is married and has two children.

\$2.1M contract awarded for metal matrix composites

Denver Aerospace has been awarded a \$2.1 million contract to develop a technique for making metal matrix composites for use in building space structures such as space station elements, large space antennas, or space-based laser systems.

The three-year contract was awarded recently by the Defense Advanced Research Projects Agency (DARPA) and the Naval Sea System Command.

The company will perfect a method of making graphite fiber-reinforced magnesium composite structures. Such composites are considered ideal for space structures because they are stiffer and stronger, lightweight, and will not distort under temperature changes.

Mohan Misra, program manager, said graphite/magnesium composites currently are produced in flat sheets and then bent and welded into other shapes, "a difficult way to produce the components needed for spacecraft or space structures."

"But we have been working on a new technique by which graphite fibers are wound into a specific shape, which is then vacuum infiltrated with the magnesium metal matrix."

Extensive new corporate ad program launched

Theme of Martin Marietta's new corporate advertising program—making its debut in the June 11, issue of *U.S. News and World Report* magazine and featuring the manned maneuvering unit—is the corporation's broad technology base.

Principal audiences of the advertising program, which also will include network television commercials—a first for the corporation—are the financial community in general and analysts, brokers and private investors, specifically. Other targeted audiences are Martin Marietta customers, suppliers, communities, and employees.

Subject matter of initial ads will focus on aerospace, data systems and the corporation's diverse technologies in general, primarily as a designer, producer, integrator, and manager of systems which use diverse technologies in aerospace and defense, electronics, communications, information management, energy and materials. Subsequent advertising will include electro-optics, artificial intelligence, advanced materials, interplanetary exploration, communications and air traffic control.

Copies of print ads will be attached to subsequent issues of the *Executive Digest* and also will appear in *Today* magazine.

The new Martin Marietta ads also will be featured in *Forbes*, *The Wall Street Journal*, *Institutional Investor* and *Time*.

The television advertising segment, consisting of 30-second spot commercials, also will be aimed at investors, primarily in audiences for the ABC-produced series of summer golf tournaments, including the U.S. Open, June 15-17; the British Open, July 21-22; the Professional Golf Association championships, August 17-19; the Curtis Cup, June 23, the Women's Open, July 15; and the Men's Amateur, September 2. Those ads also will be seen on CBS' World Series of Golf, August 25-26.

Martin Marietta's da Vinci-style aerospace company advertising program in the trade and professional press will continue.

Martin Marietta

declares dividend

Martin Marietta Corporation's Board of Directors has authorized a quarterly cash dividend of 33 1/2 cents a share on the company's common stock, to be paid June 29, to holders of record at the close of business June 4. The action continues the rate on Martin Marietta common, established during the fourth quarter of 1983, of \$1.34 annually.



Recent quality circle team presentation shows, in white shirts left to right, Glenn Hannan, John Lucero, and Michael Turner, while, seated left to right, C.E. Carnahan, Norman R. Augustine, and others listen to the trio's report.

Quality circle study

EMF quality receiving investment return equals 20 to 1

Average cost of an electrical circuit connector for Peacekeeper is about \$60. Cost of reworking that connector because of an inability to mate runs about \$650 each, and rework can mean a total of 30,200 work hours lost each year.

Now, projected savings just during the next year—based on implementation of an electronics manufacturing facility (EMF) quality receiving quality circle study—will amount to about \$835,033.

The company plans to buy an optical measuring inspection system to allow EMF quality receiving to inspect incoming connectors before work begins, the mismatching is discovered, and reworking is required. Results from other companies using similar equipment show chances of a connector not being able to mate properly are being reduced from an average of 20 to 0.01 percent.

Editor's note—Hal L. Gariety, quality circle coordinator, welcomes enquiries from "those in other areas interested in increasing productivity and quality through teamwork." He can be reached at ext 3198.

Those findings and recommendations stem from a 10-man quality circle study that was presented by EMF technicians

Michael D. Turner, John R. Lucero, and Glenn H. Hannan. Other EMF technicians on the team were: Mark A. Brown, Istvan S. Denes, Jeffrey D. Mack, Jeff A. Maslo, Paul A. Monce, John P. Romero, and Richard J. Wood.

The recent presentation to Richard E. Hannum, director of product assurance and system safety, also was attended by Norman R. Augustine, Denver Aerospace president, and C.E. Carnahan, vice president of production operations.

Augustine later commented that he "was impressed with the thoughtful inputs made by members of the circle. It seems likely that all 18,000 of our employees have good ideas that could contribute to our performance."

The equipment, from Ram Optical Instruments, Inc., of Huntington Beach, CA, costs \$26,400. Add to that \$4,600 to build a test tool and \$14,480 for additional labor inspection, total implementation costs comes to \$45,480.

The bottom line, according to the quality circle presentation, indicates the return on the company's investment will be about 20 to 1. That study also pointed out the \$835,033 savings conceivably could be significantly greater, because of the system's multiple uses beyond Peacekeeper and defense systems.

Company at Zurich space tech show; Brackeen to speak

Denver Aerospace will participate June 19-21, in a conference/exposition on space technology opportunities between the U.S. and Europe, jointly sponsored by the Swiss-American Chamber of Commerce and the U.S. Foreign Commercial Service section of the U.S. Embassy at Bern.

More than 300 conference attendees and 1,500 guests are scheduled into Zurich's Space Technology Conference and Exposition, highlighting U.S. achievements in launch and transportation systems, spacecraft, remote sensing, materials processing, and related scientific and commercial areas.

Martin Marietta's exhibit booth will emphasize the international cooperation theme through its display models of the transfer orbit stage (TOS) and manned maneuvering unit (MMU), as well as information panels on space station, orbital maneuvering vehicle (OMV), orbital transfer vehicle (OTV), and other space-related technologies.

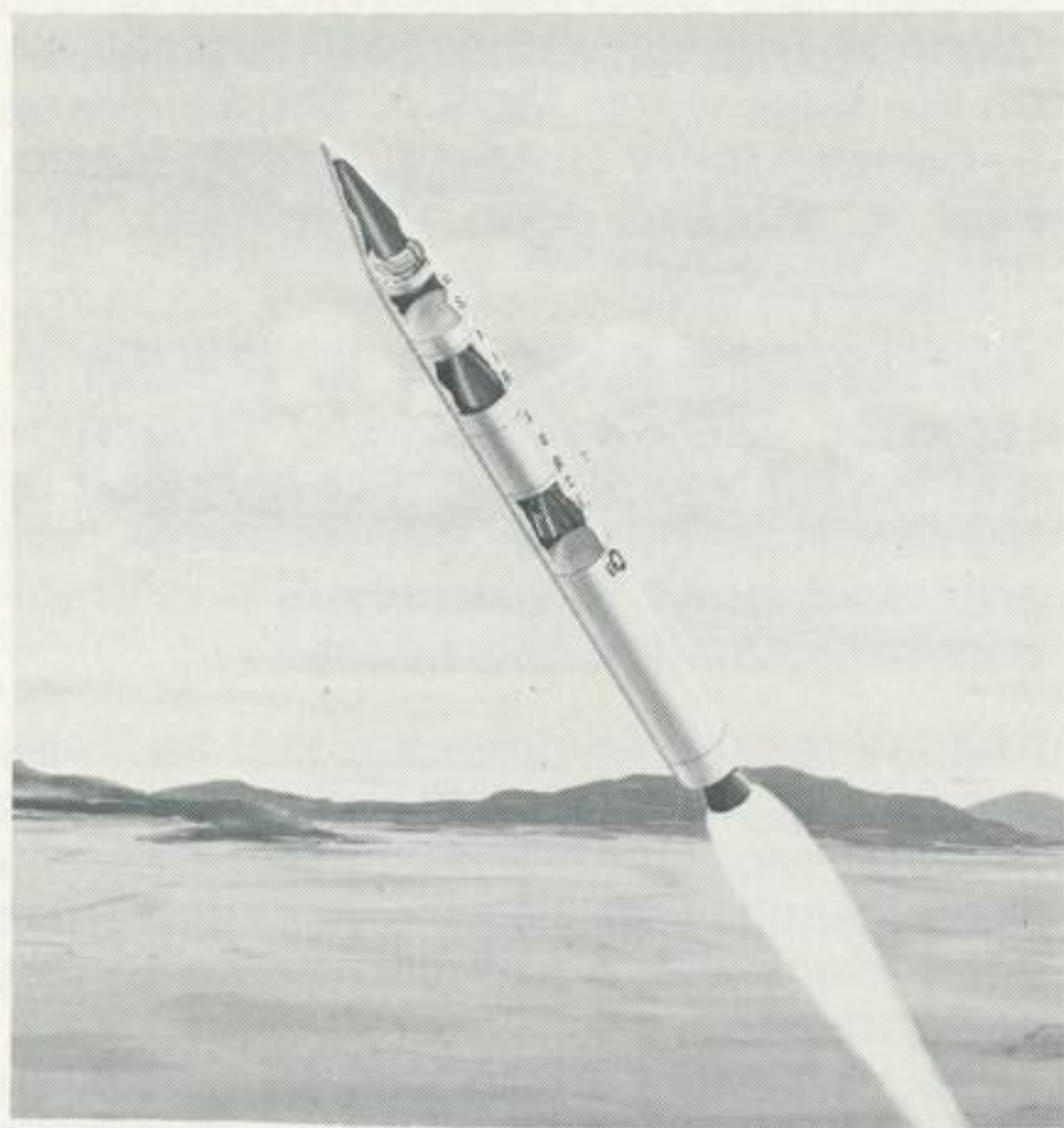
Richard E. Brackeen, vice president of business development, will present a paper on "Titan—Satellite Launcher for the 1980s and 1990s," during a conference session on launch vehicles. Roger A. Chamberlain, manager of program development is coauthor of the paper.

Small ICBM, hard mobile launcher pose 'formidable' challenges

About 110 Denver Aerospace people are tackling enthusiastically one of the most challenging projects in missile design and development—the small intercontinental ballistic missile (ICBM) and its hard mobile launcher.

The challenges are unique in many respects when one considers the missile must:

- ...weigh no more than 30,000 lb, yet be capable of delivering a 1000-lb payload over intercontinental distances;
- ...be flexible enough to accommodate present and planned advances in navigation, guidance, and other targeting systems;
- ...fit into a mobile launch vehicle or superhardened silo.



Artist's concept of small ICBM

As for the mobile launch vehicle, it must be strong enough to survive a close-in nuclear attack, yet, be fast enough to attain speeds of from 30 to 60 miles an hour over semi-improved roads and desert terrain.

Those are only a few of the challenges.

During 1983, the President's Commission on Strategic Forces recommended development of the small ICBM, for deployment during the early 1990s, as a major element to meet the requirement for a survivable ICBM force. The commission concluded a single warhead ICBM would enhance the pursuit of international nuclear arms agreements, thereby, further contribute to nuclear stability. Congress approved the commission's recommendations last year.

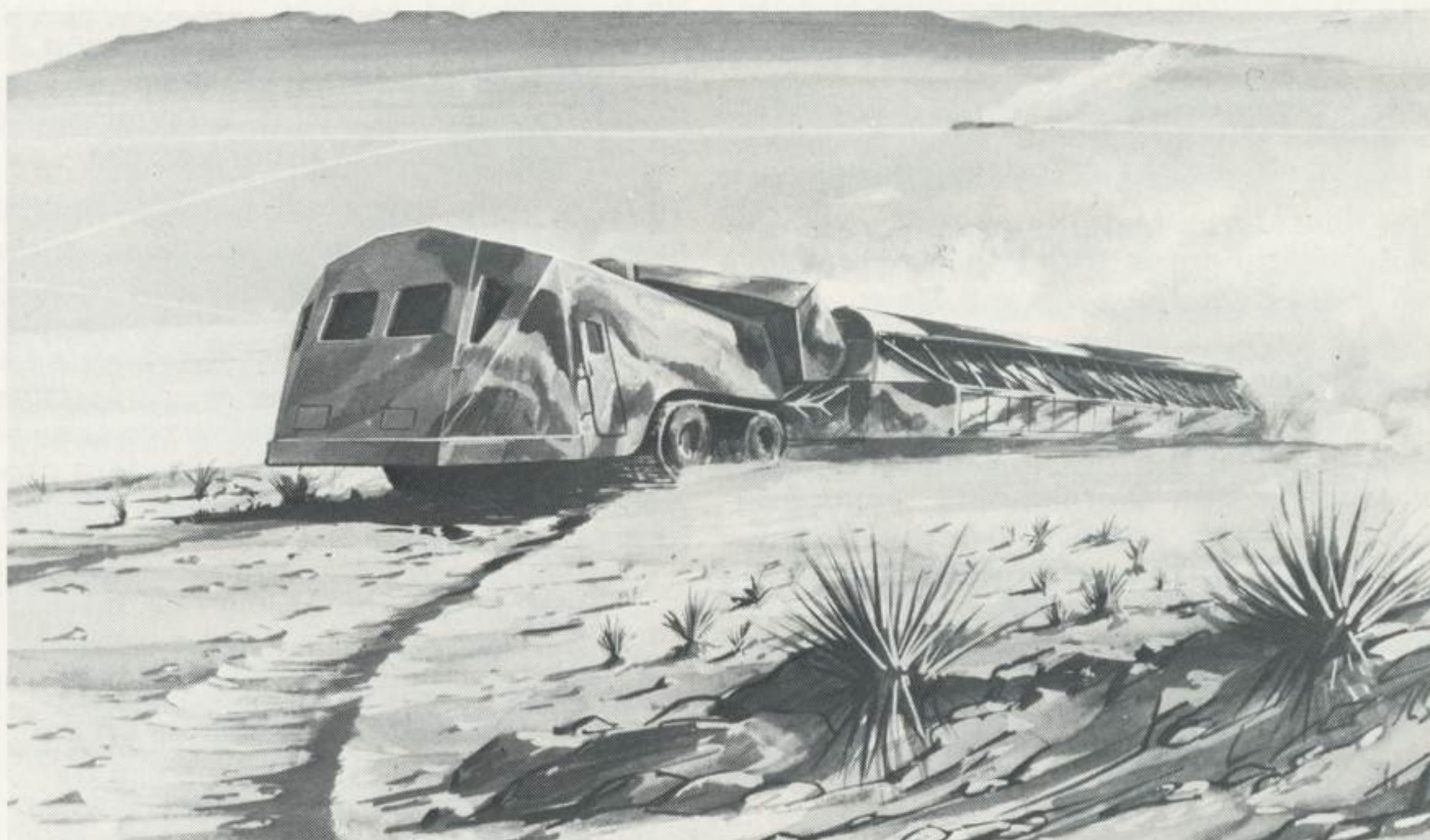
In December of 1983, the Air Force Ballistic Missile Office awarded Denver Aerospace a \$5 million contract to define concepts for the weapon system and develop a preliminary missile design. By April 1985, one of the four companies selected for this initial study will be chosen to continue missile definition and integration activities leading toward eventual deployment.

"The challenges represented by the small ICBM system are unique," noted

Donald Gray, director of the small ICBM program. "We can't just downsize a Peacekeeper or upgrade a mobile tactical weapon system. New designs and new technologies are involved. In addition, the hard mobile launcher poses design and material challenges never faced before."

The small, single-warhead missile will use solid propellants, and is expected to weigh approximately 15 tons, about 1/6th the size of Peacekeeper. Its size will provide flexibility in basing, including the option of mobility, in response to the growing numbers and accuracy of Soviet intercontinental weapons.

Concept definition of the hard mobile launcher was a separate competition, and Denver Aerospace again was one of four companies selected for a \$5 million initial contract. A down-selection from the original four to two contractors is expected by January 1985. The two selected will design, fabricate, and test a large-scale prototype.



Artist's concept of hard mobile launcher

The hard mobile launcher (HML) will protect, transport, and launch the small ICBM. Preliminary designs call for both onroad and limited offroad capability, all on government installations. The launcher would be capable of shielding both the missile and crew from the effects of a nuclear attack, and its mobility will prevent the undermining of U.S. nuclear deterrence by improvements in Soviet missile accuracy.

Because survivability is a key element in the launcher, Denver Aerospace has constructed two blast test fixtures to test designs. The first fixture was an eight-foot diameter tube installed at Waterton to test 1/36th scale model designs before submission of a proposal to the Air Force.

Recently, the company completed the construction of a dynamic air blast fixture to permit evaluations of 1/6th scale designs at overpressures up to 50 lb per sq in. The test fixture, located near Socorro, NM, was built in conjunction with the New

Mexico Institute of Mining and Technology, and will be operated by the Terminal Effects Research Analysis (TERA) group.

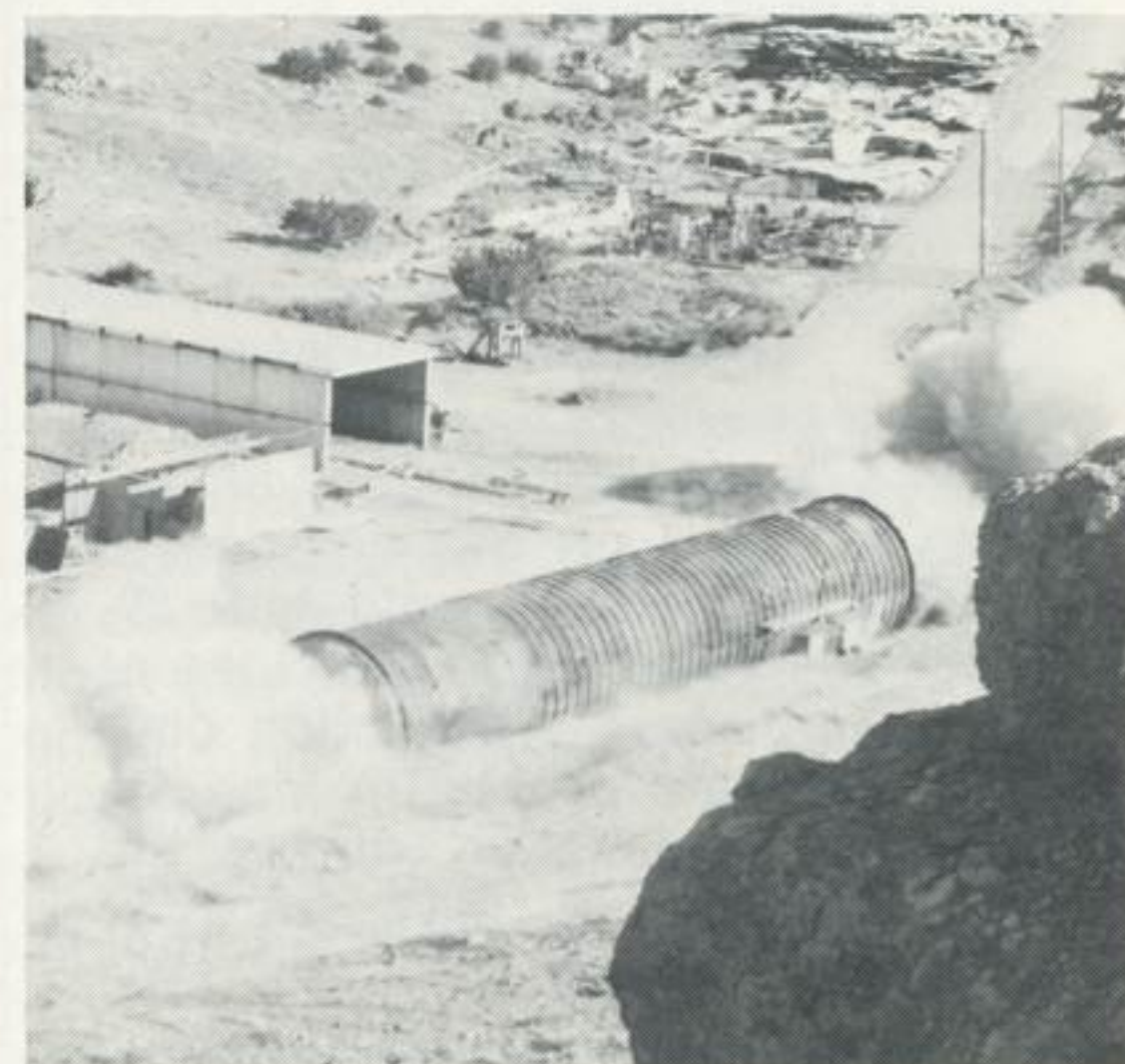
Construction of the blast test chamber began during December 1983. Initial construction was completed March 22, and a series of calibration shots were conducted the following week.

The structure began as a 20-ft diameter by 104-ft long steel tube, and recently was lengthened to 140 ft. The tube is 1 1/2 in. thick at the ordnance end, where from 500 to 700 lb of explosive are ignited. The explosion achieves test conditions of up to 50-psi peak overpressures at 60 milliseconds of airblast.

Launcher models are placed on a table in the blast tube, and data is recorded from 28 channels of pressure instrumentation, and from two Fastax camera positions which operate at 3,000 frames per second.

Another series of blast tests on Martin Marietta's mobile launcher designs is scheduled for late this month.

Denver Aerospace has had a continuing involvement in the definition, design and manufacture of ICBM systems since its inception during 1956, including the Titan I, Titan II, and the Peacekeeper.



Blast testing



On the cover

Denver Aerospace's Kirk Schleuter edges out Rocky Flats to win his 100-meter heat at the fourth annual Denver Corporate Games June 2, to benefit the Colorado Special Olympics. Over 1,600 athletes competed in the nine-sport games—track, road racing, cycling, bowling, golf, tennis, swimming, racquetball, and volleyball. Organizers expect to surpass easily the Games' goal of \$10,000 to benefit physically disabled and mentally retarded children and adults. Last year \$8,500-plus was raised. Martin Marietta repeated last year's performance, coming in a strong second in the division for firms with more than 3,000 employees. The company's team took several individual firsts—in the men's 200-meter dash, women's 1,500-meter, men's 1,600-meter relay, racquetball, men's 5-kilometer cycling, and men's and women's 5-kilometer road race—as well as team seconds in golf and bowling. The team showed its strength and depth with numerous individual second place finishes, particularly in swimming, track, and cycling.

