

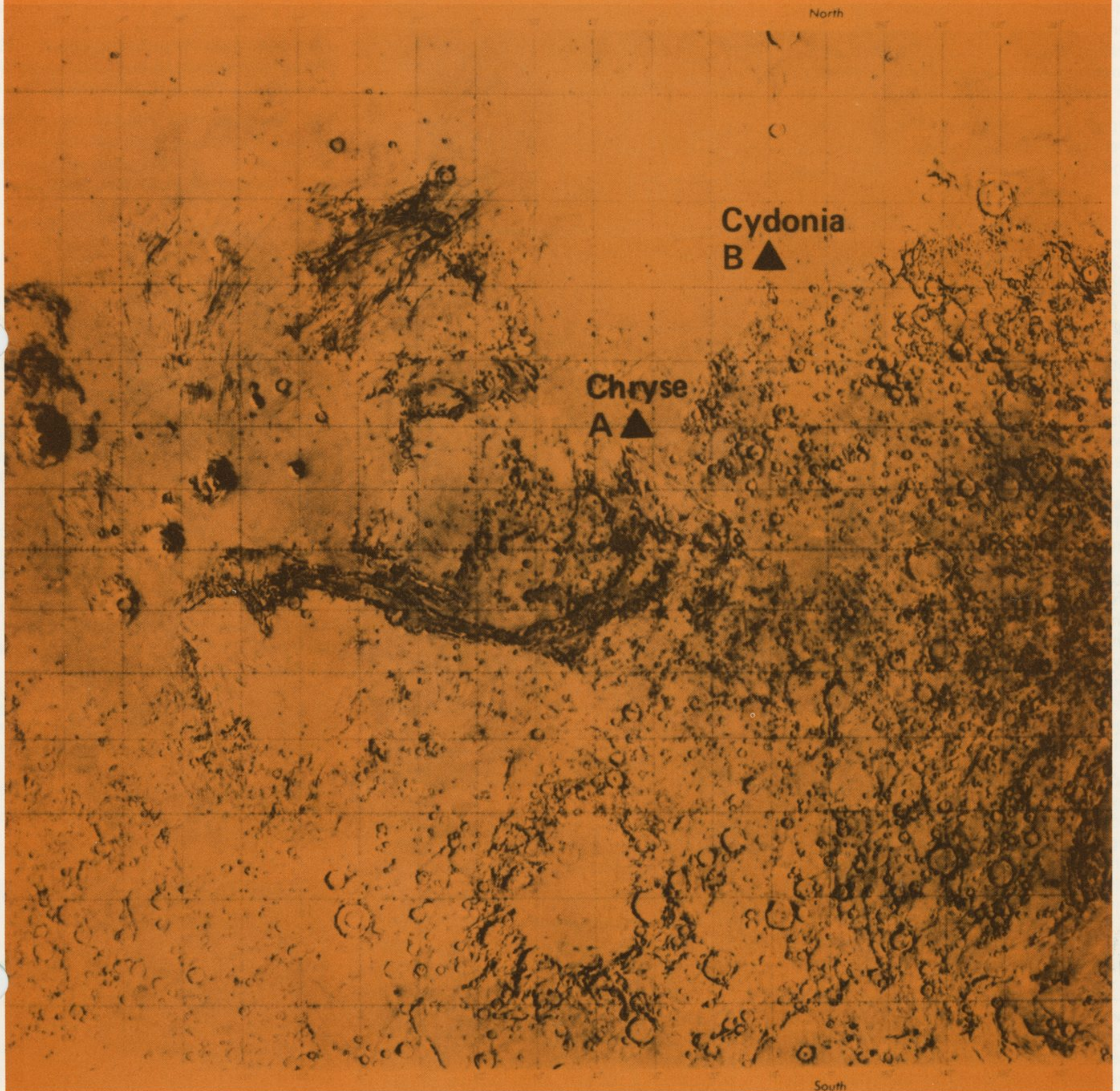
MARTIN MARIETTA

news

DENVER DIVISION

NUMBER 8/1976

Viking Landing Sites



Viking landing site selection crucial

Successful orbit insertion of Viking I around Mars has set the stage for a July 4 landing on the Red Planet. But, before the landing, one of the most crucial decisions faced by Viking scientists will have to be made—the final selection of the spacecraft's landing site.

Although scientists have spent three years scrutinizing 22 possible sites and have selected two—one for Viking I and one for Viking II—the exact location of the landing still can be changed if the orbiter, while photographically and electronically scanning the surface prior to separation, detects evidence of negative conditions.

"The main driving force in the selection of both sites was the question of water," Dr. Harold Klein, Viking biology team leader, said. "The secondary argument in both cases was the possible contribution of these sites to food material."

Other factors in the selection process were attractive geological characteristics and the terrain with features allowing for the least difficult landing.

At the surface, the Mars atmosphere is as dense as the Earth's atmosphere at 120,000 feet. The lower elevations, with higher atmospheric pressures, provide a greater margin of safety for the Viking lander, which uses a unique aerodynamic cone for initial braking, then a parachute and, finally, rockets for its descent to the surface.

Slope of the landing site must not be more than 19 degrees, and the area must be free of extensive smooth-rock surfaces or thick dust layers. Areas which do not hamper communications with the orbiter, which serves as a link to Earth, also were important in the selection process.

Following the analysis of all material, prime and secondary sites were selected. The primary sites are known as the Chryse (rhymes with icy) and the Cydonia regions. Both are distinct from one another in many characteristics, but collectively, are regions most likely to contain a storehouse of material for the scientific investigations.

Dr. Klein described Chryse as a site in a low area of the planet—"an area which from all topographical maps and pictures looks like it is a low point in a rather large basin area which could very well have been at one time a region containing a lot of water."

He pointed out that photographs of Chryse show what appear to be channels.

"Channeling which could very well be river beds leads into the basin area. This first site is at a place where, if the planet were extensively worked by water and the water washed down materials from

the highlands, it would have accumulated in the lowest regions," Dr. Klein said.

The Cydonia region is located at the edge of the north polar hood of Mars—an area scientists believe is covered during the winter by a hazy veil which may contain moisture.

"At the edge of that polar cap (in the Cydonia region) we believe things will condense, and evaporate over the seasons. It would be a good place at the ice cap for the ultimate accumulation of nutrients," Dr. Klein said.

When Viking began its orbit around Mars, the spacecraft, receiving its orders from ground command and pre-programmed computer messages, began completing a long pre-landing checklist. The main item on that list is arriving at the precise location on Mars for landing.

SRB recovery system contract won by division

The division has been selected to develop and deliver the nylon parachute system to be used in the recovery of the solid rocket motors of NASA's Space Shuttle.

And with that selection C. W. "Bill" Spieth will end a long stint of proposal activity and become manager of the project.

"I did not manage this proposal," Spieth said, "but, I am pleased to manage the project. I'm not unfamiliar with the recovery system because it has been a major consideration in the Space Shuttle program since the beginning."

Spieth was involved in the phase A, phase B, and phase C-D Shuttle proposals.

Spieth has been with Martin Marietta and the Denver division 15 years. He had been with Beech Aircraft in Wichita and Boulder before joining the division.

In his early career here, he was working on advanced propulsion concepts and advanced launch vehicle concepts, particularly in designing for minimum cost.

He was involved in systems engineering and configuration design on the Shuttle proposals prepared by the division.

On the new program, he will head a 50-man team responsible for the design, fabrication, test, and delivery of 12 sets of parachutes to be used in the first six Space Shuttle flights starting in 1979.

First airplane drop tests to develop the system will begin in about a year. A B-52, previously used for X-15 and X-24 drops, will drop a 25-ton test vehicle at the

ON THE COVER

Chryse, the primary landing site for Viking I, and Cydonia for Viking II, exhibit distinct surface characteristics but both are likely to have sufficient warmth and moisture to support life. The sites are approximately 1,000 miles apart.

For Sale: Martian soil — \$1.00

Viking won't land on Mars until July, but soil samples from Mars are already available for \$1 a packet.

The tiny bits of ordinary looking brownish gray dirt come attractively packaged in red, white, and blue card, under a plastic bubble.

The soil from Mars is definitely not phony and is indeed dug, packaged, and processed by Martians from Mars.

The Titusville, Pa. *Herald* reports the samples are available in unlimited quantities through the cooperation of the Mars, Pa. Area Chamber of Commerce.



Bill Spieth

National Parachute Test Range in El Centro, California. Thirteen of these drops will develop and validate the design.

Spieth, who has a BS in aeronautical engineering from the University of Kansas, says he wants "no secrets on the program."

"I'm going to encourage and insist on a spirit of candor," he said. "I want everyone on the program to speak up."

Selected for key positions on the program are William R. Woodis, deputy; Robert Shepler, business manager; Dale Massey, manufacturing; William Simonini, quality control, safety, and reliability. Key technical people are Richard Moog and Ronald Drobnik.

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Denver Division

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June 1976

Significant business wins highlight first half of '76

Getting new business and maintaining employment levels have been the top priority tasks of the division during the first six months of 1976—and will continue to have top priority during the remainder of the year.

"We have been successful in getting new business," L. J. Adams, vice president and general manager of the division said. "And, since March, our level of employment has been gradually going up."

Three new business wins were significant during the first half of the year: SCATHA, Tactical Flag Command Center, and Solid Rocket Booster Parachute Recovery System.

SCATHA, a 1400-pound spacecraft, will be flown on a Delta launch vehicle in 1978 to gather information on the phenomena of electrostatic charges on spacecraft at high altitudes.

The SCATHA contract is the division's first for a Department of Defense spacecraft.

Another new customer was added when the division was selected to design the Tactical Flag Command Center (TFCC) for the U.S. Navy. The TFCC will be an integrated information center supplying tactical information to the flag commander.

As development contractor for the Solid Rocket Booster Parachute Recovery System, the division will design, develop, and fabricate 12 recovery systems to be used on the first six Space Shuttle flights.

Major proposals in

Two major proposals are currently being evaluated by the Air Force Space and Missile Systems Organization (SAMSO). Winning of these two competitions could further stabilize employment.

An announcement is expected in July on the award of the Ground Systems Definition contract for the Vandenberg Space Shuttle launch and checkout facility. The division is competing with McDonnell Douglas and Rockwell International for the contract.

The division has three competitors for the Interim Upper Stage (IUS) contract. The Boeing Company, Lockheed Missile and Space Company, General Dynamics, and the division have submitted proposals to design and fabricate a new upper stage to be used for Space Shuttle as well as on Titan III to place payloads in other than Earth orbit. Award of the contract is expected in September.

Assuming wins of these two contracts, employment will continue to rise at a

slow, but steady rate between now and the end of the year.

At the beginning of 1976, 3333 employees were on the division's payroll. A low of 3194 was reached March 28. From that low, employment has gradually gone up, with 3223 on the roll June 6.

Employment also has been rising at the division's Michoud operations. From 1166 at the beginning of the year, the number of employees at Michoud has grown to more than 1300 in June and is expected to reach about 1500 by year end.

Michoud modifications

Changes in NASA's Michoud Assembly Facility (MFA) in support of external tank production are nearly complete. Modifications have been made to the 1.9 million square foot main manufacturing building and a new building—the first since 1966—has been added to house the pneumatic test facility.

When the first construction phase is complete early in 1977, about \$13 million will have been spent on facility modification and additions since mid-1974 to support the external tank project.

Acquisition of new equipment and rehabilitation of existing facilities and equipment will have cost an additional \$5.3 million. At mid-1976, about \$20 million of major structural tooling for external tank fabrication has been completed and erected.

Production is proceeding on major components of the tank dome, with more than 4,000 inches of weld laid down with no weld repair required.

During the second half of 1976, production will continue on the intertank structural test article and on the main propulsion test article.

Capital investment

Facility modifications have been made at Denver to support new business and new business acquisition with two major tasks in mind: provide capital equipment planning and estimates during the proposal phase and provide efficient space to programs when they are won.

For example:

A total of \$1.5 million in capital expenditures has been approved in support of new business programs;

During the first five months of 1976, 1280 people were moved in support of proposal activity and new programs;

Major improvements for these people and to meet contract requirements were made

in the Administration building and the Space Support building;

New installations were complete for solar energy projects.

The remainder of 1976 will call for more of the same. Winning outstanding proposals will require additional capital funds expenditures and the relocation of about 1000 people in division facilities.

Space added in 1975 was put to good use in the first half of 1976 and will continue productive for the remainder of the year.

CCMS 'excellent'

The space is at 2786 South Federal where a separate facility was established for the CCMS—checkout, control, and monitoring subsystem—program.

The first eight months have been successful for CCMS, with a rating of excellent and a 90 percent award fee granted by NASA. The award, which ranks with the highest ever received for first period performance at the division, is based on the fulfilling of design requirements, meeting program schedules, and performing within budget projections.

CCMS is an integral part of the Space Shuttle Launch Processing System to be installed at the Kennedy Space Center.

First major CCMS milestone was passed in March when NASA held the 60 percent design review. The review resulted in only minimum impact on design and cost and had no impact on the schedule.

First of the CCMS sets, Serial Zero, is in production. Delivery of this set to KSC is scheduled for the last week in September. Installation, test, and checkout will take about five weeks and the hardware will be turned over to the customer November 1. Serial Zero will be used by the division as an engineering tool for hardware development and by NASA, with IBM, for development of operational software.

Existing facilities are being used by elements of technical operations—research and technology, product development, and manufacturing support services—to develop new business for the division.

With 175 current contracts, research and technology is providing the technology base to division product areas as an aid to acquiring new business.

Contracts provide experience

The technology contracts are providing the division experience and developing capabilities in software research, spacecraft electronics, electronic warfare simulation, high altitude navigation systems, spacecraft instrumentation, composite structures, advanced propulsion systems, and in Shuttle manned orbital activities.

Product development hardware contracts are giving employees experience in designing and building systems, including Space Shuttle related electronic black boxes, propulsion components for Shuttle and other spacecraft, computer systems, and in solar power.

"Build-to-print" contracts are maintaining skills and jobs in manufacturing support services. These contracts include Bell helicopter assemblies, Boeing airplane assemblies, and Shuttle orbiter assemblies, these for Grumman.

There are also 52 independent research and development (IRAD) tasks underway.

All the activities are oriented to current and potential major product areas for the division, including defense systems, command and information systems, missile X, DOD Shuttle programs, and NASA Shuttle-related and other programs.

Orders goal increased

Activity like this has allowed the orders goal in these three elements of technical operations to be increased more than 25

Hurtt discusses division future

C. B. "K" Hurtt will become vice president and general manager of the Denver division July 1. In this interview, he looks at the future of the division.

Relaxed and in shirt sleeves, the man who will become vice president and general manager of the Denver division July 1 first words were, "I'm optimistic, I'm confident, I'm excited."

C. B. "K" Hurtt went on, "We have halted the downward thrust and have turned that elusive corner. Under Larry Adams' leadership the foundation has been laid for growth. I intend to see that we use that foundation wisely."



No change in direction is necessary for division growth, Hurtt stressed. "We have the right direction. We must hold steady on the course mapped for the division.

"Opportunities exist for business in our areas of prime expertise, particularly space, space transportation systems, command and control, and some of the new emergency technologies, such as solar power," he said. "I am confident we can win the contracts."

"We have learned some important lessons in the past few years. There is no doubt in my mind that we better understand the needs of our potential customers, we are making better and more competitive proposals, and we know our competition.

"These are the elements of success and

percent since the goal was set at the first of the year. Bid and proposal effort remains at a high level, with more than two being made each working day.

Major proposal effort for the division for the remainder of the year will be in the missile X program for the Air Force. These proposals will cover various ground segments of the emerging program. Heavy procurement activity is anticipated in both airborne and ground elements of the new ICBM program in 1977-78.

With the new business activity, proposal activity, and the award of contracts, overall employment appears to have bottomed out and to be headed in an upward direction. The extent of the climb will be moderate and will be determined by success in gaining more new business.

Although there may continue to be some layoffs of people in isolated overhead areas or other areas where the division is undergoing technological change, the employment picture for 1977 remains fairly steady—but, again, is dependent on program wins in the latter part of 1976 and in 1977.

we know how to use them. We know how to win!"

Hurtt added two more elements vital to growth: good people and good facilities. "We have outstanding people and we have an outstanding facility in which they can use their skills," he said. "Our people and our facilities have withstood the pressures of the tough environment in which we have been doing business."

Those pressures are not going to diminish. "We are in a high technology business in which skill and facility requirements are constantly changing," Hurtt said. "We are alert to these changes. We are committed to providing the facilities and our employees who have a good grasp of fundamentals can readily adapt to provide the skills."

Hurtt pointed out, "The division has an enviable record, built over 20 years, of meeting the technical, cost, and schedule requirements of our customers. It is vital that we maintain this emphasis."

The division will be performing on smaller programs and working for more customers in the future.

"We are generally well organized and well staffed to handle this change in our way of doing business," Hurtt said.

"With the new business opportunities have come opportunities important to all of us," he said. "That's an opportunity for more self-satisfaction, more personal growth."

The future: "I'm optimistic, I'm confident, I'm excited," Hurtt repeated.

Adams reflects on tenure at division

L. J. Adams will become president of Martin Marietta Aerospace July 1. In this interview, he reflects on his tenure as vice president and general manager.

"Tough, responsive, competitive. That's the way I will remember the people at the Denver division," L. J. Adams said as he prepared to leave Denver to assume his new responsibilities as president of Martin Marietta Aerospace.

"I don't need to remind anyone of the difficult time we have had in the past few years," he said. "All indicators say those times are behind us. We have won new business, we have stabilized employment, we have absorbed the impact of the completion of Skylab and Viking projects.



"We have done all this because of our people—people who are outstanding in their technical and management skills."

After a short pause, Adams leaned forward, "Our people are better than any in any other company in the country!"

To back up his statement, Adams pointed out the "unquestionably superb performance" on Viking, Skylab, CCMS, External Tank; the increased ability to compete and win new business; and the increased productivity of the division.

"Our performance on past and current contracts has been essential in two ways to our success in gaining new contracts," Adams said. "That performance has provided profits to finance new business activity and enhance our image, our reputation as a cost-conscious, on-schedule producer of high quality products."

"The future looks much brighter than it has in recent years," Adams said. "But, I must add a word of caution. The division will be in an ever increasing fight to keep expenses down in all business aspects."

"With that word of caution, I must also add a note of optimism," Adams emphasized. "The competence of the people is such they can meet the challenge."

"All functions in the division have played key roles in the turnaround," Adams said, and "I am certain they will continue to do so under K. Hurtt's leadership." (C. B. "K" Hurtt has been named as Adams' successor.)

A final word?

"My most sincere thanks to all employees of the division for their support, their willingness to contribute their talents and their time—and my best wishes for continued success."

Liquid hydrogen tank structures test unique

A structurally flight-configured liquid hydrogen (LH₂) tank and intertank and the liquid oxygen (LO₂) simulator, with its attached load ring, previously used in the Intertank Structural Test Article (ISTA) program, make up the liquid hydrogen tank test article.

LH₂ tank tests will be made outdoors at the Marshall Space Flight Center in the former Saturn S1-C test stand that has been modified for structural test use.

Extending almost 130 feet in length, the LH₂ test article will be suspended from the upper girder support system. Test loads will be applied primarily to the orbiter and solid rocket booster forward and aft attach points.

"This portion of the program will be unique," George Jacobs, chief, test engineer, STA, said. "While demineralized water is being used to simulate liquid oxygen in LO₂ tank tests, liquid hydrogen will be used as the test fluid in the LH₂ test program.

Testing will be controlled from a remote bunker, using a new automatic load programming system developed for MSFC specifically for the Space Shuttle test programs.

To monitor, display, and record all the test data from strain gauges, thermocouples, pressure gauges, load cells, and deflection indicators, a 6000 channel structural test data acquisition system has been developed for MSFC.

To minimize environmental effects, a wind screen will be erected around the entire test specimen.

"The screen will improve the accuracy of the test data," William Barrett, STA manager, said. "If we are to achieve our test objectives of verifying the structural integrity of the LH₂ tank, as well as determine the growth capability of the tank, our data must be as accurate as the state-of-the-art will permit."

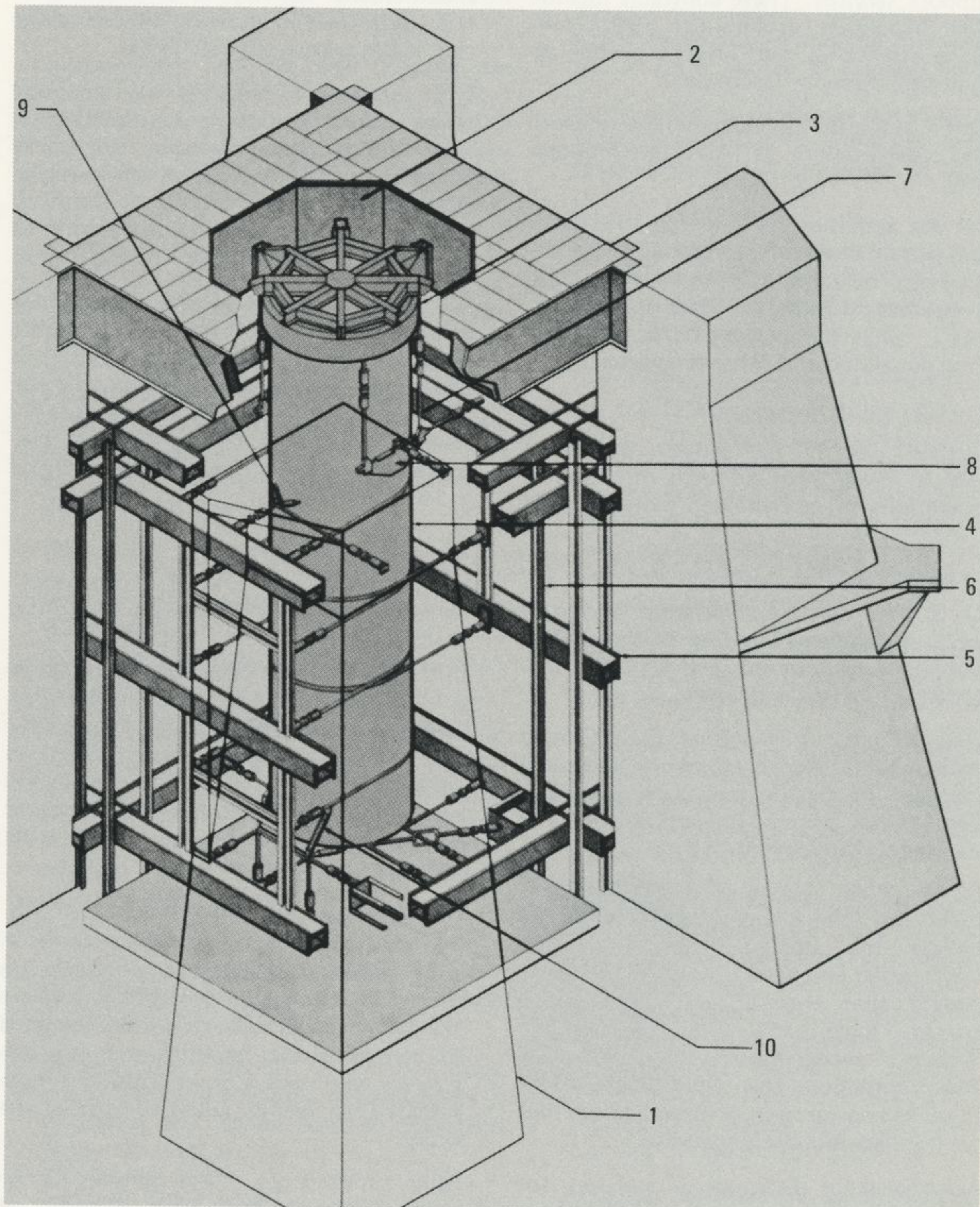
Leading the effort to develop strain gauge bonding techniques vital to the success of the program is Len Silbert of electrical engineering.

Single point loads as high as 2.28×10^6 pounds will be applied to the test article, with as many as 23 hydraulic jacks used on any one of the 11 test conditions.

Final test requirements are being determined by Jon Dutton, LH₂ tank stress group engineer and coordinated with Rolf Serferth of stress test support group.

Testing is planned for 1978.

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MICHOUD OPERATIONS



1) Test facility; 2) load platform; 3) upper girder support system; 4) static test article; 5) horizontal steel girder; 6) shear reaction girder; 7) load lines; 8) SRB/ET forward lead arm; 9) Orbiter/ET forward attach point; 10) Orbiter/ET aft attach point.

Colorado flag presented to Slidell group

The Colorado state flag is now flying in Louisiana.

It was presented to Ms C. R. Chadbourne and Ms Gladys deVillier of the Slidell Bicentennial Commission by H. J. Baum, director of professional and industrial relations for Michoud operations.

After Bicentennial ceremonies July 4, the flag will be permanently displayed in the

newly established Slidell city museum. A plaque will cite Martin Marietta-Michoud Operations as the donor.

In Michoud

Call C. H. Fleischer at 3876 with suggestions or information for articles for the Martin Marietta News

From Michoud



Dennis Folse, at the console, and Church Augustine, left, senior technicians, review procedures with Frank Rhodes, senior safety engineer, as they prepare to x-ray first complete external tank development dome.

The dome shown is the first dome to be fabricated at Michoud and contains about 315 feet of weld. It is located in a x-ray tool where all seams are dye penetrant checked and subjected to x-ray to verify weld quality.

Each weld seam is placed under the film canister mounted on a track above the dome to the right. The x-ray tube is on the inside of the dome opposite the film canister. The canister and x-ray tube automatically move along the weld seam

and expose a continuous strip of film. The developed film provides a permanent record of each weld for subsequent analysis to verify weld quality.

The operation is controlled from the console and allows production operations to continue in adjacent areas in safety.

After x-ray, the dome will have a stub barrel attached to the major tank weld fixture to continue its objective of proving tooling, procedures, and employee training.

Facilities tour, exhibits planned for Family Day

The Martin Marietta portion of the Michoud Assembly Facility manufacturing building will be opened to the families of all Martin Marietta Michoud operations employees Sunday, August 29 from 9 am to 3 pm.

Highlight of the special day for employees and their families will be a tour of the major tooling to be used to fabricate the external tank.

On exhibition will be a one-eighth scale model of the assembly facility, a full size oil painting of the external tank more than one-half the length of a football field, a three-dimensional cutaway model of external tank and other Martin Marietta and NASA displays.

Evening at Pops '76 to begin on July 4

For the fifth consecutive summer, Conductor Arthur Fiedler and the Boston Pops orchestra will appear on the 253-station PBS network through a grant from the Martin Marietta Corporation.

The completely new series, appropriately titled Evening at Pops '76, will get underway with a Fourth of July musical celebration and will be telecast on successive Sunday evenings through September 26. The programs will originate from station WGBH, Boston and telecast in Denver on KRMA, Channel 6.

The telecasts may be seen on WYES, Channel 12, in New Orleans.

Principal guests for Evening at Pops '76:

July 4: American Vignettes with Edward Villella and Polly Shelton.

July 11: Pearl Bailey

July 18: Roberta Peters and Robert Merrill

July 25: Ethel Merman

August 1: Joe Venuti

August 8: Tony Randall

August 15: Roy Clark

August 22: Ray Bolger

August 29: Sarah Vaughan

September 5: Old Timers' Night with Bill Bolcom and Joan Morris

September 12: Judy Collins

September 19: Ella Fitzgerald

September 26: Sherrill Milnes