

MARTIN MARIETTA

# news

DENVER DIVISION

NUMBER 3/1977

## First Titan Launch





# SCATHA detectives search for good guys

Super sleuths are at work in the division unraveling a mystery with a twist that even O. Henry might have trouble putting on paper.

It is not the bad guy who is eluding them, it is the good guy who is leading them in circles. The detectives know his characteristics, what he should look like, and the kind of stuff he is made of—but he keeps changing his fingerprints.

Assigned the task of finding the good guy are Paul Dalton and Dr. William A. Fraser. Dalton is manager of mission success for SCATHA and Fraser is chief scientist for payloads and sensors.

The good guy is a covering material for the SCATHA spacecraft that will meet the electrical and thermal requirements of scientists and engineers.

Sounds simple. And it would be if the covering had to meet only electrical conductivity requirements or only thermal requirements. A wide range of materials meet either requirement, but no material has yet proved it can meet the exacting requirements of both—all the time.

Gold, for example, is an ideal metal for electrical conductivity requirements, but it has little value as a control for temperature. Aluminum, with louvers if necessary, is a thermally good covering, but it oxidizes and changes its electrical conductivity characteristics.

The problem is this: SCATHA is a craft being designed to measure the effects of electrostatic charges on spacecraft and the experiment systems and instrument systems have temperature limits in which they operate properly.

Spacecraft orbiting at high altitude—25,000 miles, for example—have been hindered in their operation by electrostatic charges building up on their surfaces and discharging into the spacecraft.

Vehicles at these altitudes aren't shuffling their feet across a carpet, but the effect is the same. When you walk across a carpet, touch a door knob, and get shocked, you tolerate the momentary discomfort. Instruments aboard the spacecraft don't have your tolerance. The electrical disruption can cause an antenna to

point in the wrong direction, or start the spacecraft sending or receiving false information.

The SCATHA program's goal is to find a way to protect spacecraft from these low level, but disruptive electrical charges.

To do that, scientists need to measure the strength, time for buildup and discharge, and the composition of the charge.

That is where Dalton and Fraser are now—seeking a material that will provide a consistent measurement while protecting the spacecraft.

Several candidate materials have been tested and the results have been good. The tests have been repeated and the results have been bad. The good guy has, in effect, changed his fingerprints.

Testing has moved from laboratory vacuum chambers to larger and more capable test facilities in the Plasma Arc building where greater control of conditions can be maintained.

Has the move helped?

R.B. Demoret, who heads the SCATHA program for the division, says it has. In

fact, tests have been more consistent and the detectives believe they have found answer.

A special paint developed for spacecraft use by NASA's Goddard Center has shown it will do the job.

## Income tax forms not available here

Because the Internal Revenue Service is no longer filling requests for large orders of income tax forms, the forms will not be available at the division this year.

Generally, the most common forms will be available at a Post Office.

If you need forms in addition to those mailed to you, you may obtain federal income tax forms by calling 572-8424 or Colorado income tax forms by calling 892-2807.

Forms may also be obtained by going to the IRS forms control center in the Prudential Plaza Building, 1050 17th St. the Colorado state forms center in the State Capitol Annex, 1375 Sherman.

### On the cover

## First Titan launch was emotional moment

Early this month the 101st Titan IIIC was successfully launched at Cape Canaveral, the latest in a series of accomplishments for the Titan family that began in 1961. The photo on the cover is of that first launch when a Titan I soared from Vandenberg Air Force Base in California. The words of the late Bob Considine, famed newspaper reporter, describe the emotion of that moment:

"Two 40-ton steel doors—like doors of an old fashioned storm cellar—began to unfold as might the wings of some prehistoric blackbird. The white cylindrical nose-cone of the Titan rose surely and majestically from the bowels of its 165-foot deep silo.

"Then the thicker, black-ringed second stage, and finally we could see the still thicker first stage of the nearly 10-stories high missile. It sat there, still as a lone Grecian column left by itself on a barren plain devoid of habitation. A plume of liquid hydrogen waved from its side, with deceptive grace.

"A blinding gush of flame, bright as the hot sun overhead plunged from the bottom of the Titan. It sat there on its pad for what seemed an endless second or two, maybe three, and then lifted itself with regal liesure. A great dirty doughnut of sand and smoke spread out from the mouth of the silo.

"Observes could breathe now, and with their first breath they made sounds that were half-shouts, half-entreaties and—when the sounds reached coherency—they became 'Go...Go...Go!'

"Titan went."



## Division executive receives DOD medal

John L. Slack, vice president for command and information systems for the division, has been awarded the Department of Defense Distinguished Civilian Service Medal.

The award was presented in the office of the Secretary of Defense in Washington.

The citation accompanying the medal, signed by former Secretary of Defense David Rumsfeld, said:

"...for exceptionally distinguished achievement while serving as Deputy Director of Defense Intelligence for Programs and Resources from May 1976 to December 1976, and in previous subordinate positions within the Office of the Assistant Secretary of Defense (Intelligence)/Director of Defense Intelligence between June 1973 and May 1976. Mr. Slack provided outstanding technical and resource monitorship on behalf of the Secretary of Defense for a major sensitive intelligence program, the proper operation of which is vital to the security of the United States. Subsequently, as the Chief, Resource Management Division, Mr. Slack supervised the development of the FY 76 Defense Intelligence budget through the entire departmental Planning, Programming, and Budget Cycle. He was instrumental in implementing Presidentially-directed adjustments as part of the process of assembling the President's Budget, and served as the focus of staff support in successfully defending the Defense Intelligence Budget request before Congress.

"When he was appointed Director of Resource Management his careful, forthright direction led to a FY 77 Defense Intelligence Budget which was largely accepted by the Congress. As Deputy Director of Defense Intelligence for Programs and Resources, Mr. Slack continued to provide the superb leadership and administrative skill which characterized his earlier performance. His singularly distinctive achievements reflect the highest credit upon himself, the Department of Defense and the United States of America, and I take great pleasure in awarding John L. Slack the Department of Defense Distinguished Civilian Service Medal."

Slack was manager of the division's defense systems data management activity in 1972-73 before entering government

## Business change means facility change

The changing nature of the division's business is causing an increase in the need for desk space and the more effective use of floor space for developing new business.

"We have three alternatives to meet this

need," said C.B. Hurtt, vice president and general manager of the division. "We can build a new building, we can acquire off-site space, or we can rearrange the space we have to meet our needs."

Adding a new building is perhaps the most costly alternative and one that is difficult to justify until there are sufficient new contracts to warrant the addition.

Moving people offsite, while less expensive than building a new building, is still costly. "Even if we reopened the former administrative center at Hampden and Wadsworth, we would have the additional expense of travel, food service, and other services," Hurtt said.

"That makes the rearrangement of space we have the most logical, the least expensive, and, we hope, the least disruptive to our work and to our people," he said.

First move in the rearrangement will be to set aside the administration building for Command and Information programs. This will require finding about 50,000 square feet of desk space for relocating the Denver Data Center, the Air Force Plant Representative Office, and for the division's procurement function.

To acquire the needed space, the basic rearrangement plan calls for fewer private offices, few partitions, and more open space. There will, however, be no huge "bull pens" as was the case in the early years of the division.

Rearrangement will be in a planned, orderly way and will be done as slowly and as smoothly as possible, with employees given ample notice of changes or moves.

First changes will be in the administration and engineering buildings, followed by rearrangements in RDL and SSB.

"Moves and rearrangements are always inconvenient and sometimes upsetting," Hurtt acknowledged. "We are attempting to make the changes with as little disruption as possible.

"I ask all employees to recognize the need for more effective use of our space, that we are following a space allocation policy that is fair, and that we must make the changes to help us acquire and keep business."

### It's cold on Mars

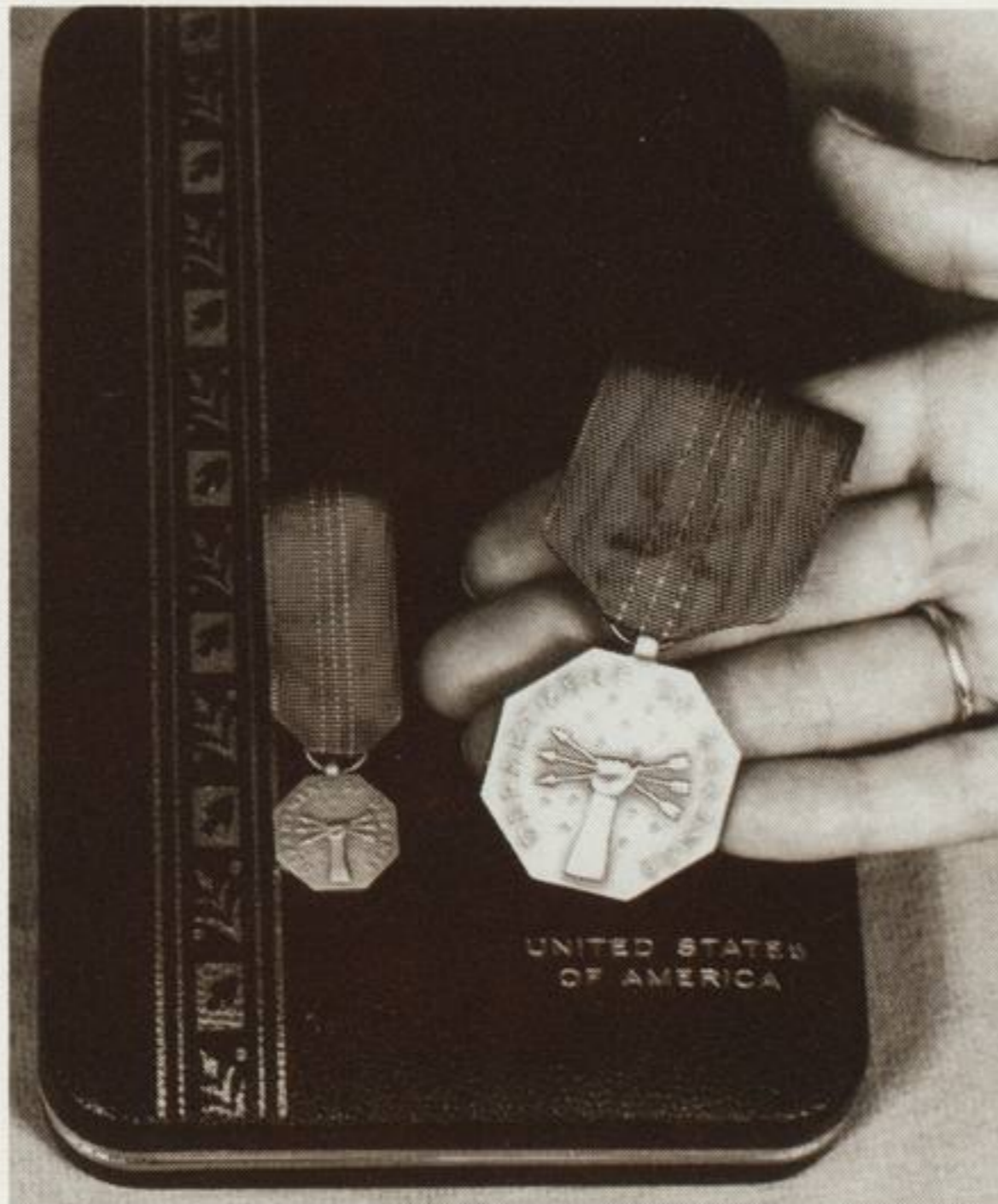
While the eastern United States is suffering through a record cold winter, Mars seems to be headed for the same fate.

Lander 2, for example, is now "very cold," according to Viking project scientists, with temperatures expected to drop to 190 degrees below zero where it is sitting on Mars.

Scientists aren't quite sure how the lander will react. Thermal switches are working properly and most systems are expected to survive the winter—which reaches its coldest period in May.

It is anticipated the spacecraft will be covered with carbon dioxide and water ice, the antennas will freeze, the sampler arm will freeze, and lubricants will stiffen.

It will be September or October before the lander will start up again.



The Department of Defense Distinguished Service Medal shown here was presented to John L. Slack.

service. He returned to the division in his present position in December 1976.

During his government service, Slack was also awarded the Joint Service Commendation Medal and the Meritorious Civilian Service Citation of the Secretary of the Air Force Special Projects.





*The Martin Marietta Foundation recently awarded a grant to Marian Hospital, Santa Maria, Calif. to enable the hospital to purchase an electronic recorder for heart monitors in use in the hospital. Shown with one of the electronic cardiac monitors are Marion S. Allen, a nurse in the pediatric section of the hospital, and Felix J. Scheffler, of the Denver division's Vandenberg operations. Previous grants by Martin Marietta assisted in the acquisition of the heart monitors like the one in the photograph.*

## Scouting's highest volunteer award is earned by employees

Scouting's highest honor for volunteer service was presented recently to two long-time Denver division employees.

Charles E. Forsyth and Henry F. Plate Jr. received the Silver Beaver award for their distinguished service from the Denver Area Council of the Boy Scouts of America. They were among 14 who received the award at the council's recognition dinner in late January.

"The award represents hundreds of hours of volunteer work by the recipients," a Scouting representative said. "To be selected from the literally thousands of volunteers is indeed a great honor for these men."

Forsyth and Plate both joined the division in 1958. Forsyth is an engineer in mechanical behavior and fractures technology and Plate is a contract administrator currently working on command and information systems contracts.

Forsyth is Cubmaster of Pack 219 sponsored by the Fulton elementary school PTA. He began as an adult leader in 1965 and has served as a scoutmaster, a troop committee chairman, adviser to an Order of the Arrow chapter, Tahosa Lodge adviser, a merit badge counselor, and as a district training chairman.

He has been awarded the Scouter's Training Award and the Scouter's Key.

Plate began his service to the Scouting movement in 1940 as an assistant scoutmaster of a troop in Philadelphia. He is currently Scoutmaster of Troop 372 sponsored by the Harvey Park Improvement Association. He has been a Webelos leader and a troop committee member.

He, too, has received the Scouter's Training Award and the Scouter's Key.

## AAAS annual meeting set for Denver Feb. 20

"Science and Change: Hopes and Dilemmas," is the theme of the annual meeting of the American Association for the Advancement of Science (AAAS) in Denver Feb. 20 to 25.

Dr. George W. Morgenthaler, vice president and general manager of Martin Marietta Aerospace's Baltimore division and former vice president for technical operations at the Denver division, is one of the principal planners for the meeting.

Floyd A. Blake, manager of solar energy programs for the division, will present a session on "Concepts and Design of Central Collector Systems" as part of the meeting's program on solar electric power generation.

The Viking project will be featured in at least two sessions. Carl Sagan and Gerald Soffen, prominent members of the Viking science team, have arranged a program on the Viking mission to Mars. Sagan will join with Richard Berendzen of American University in presenting "Two Martian Centenaries: The Real Moons and the Illusory Canals of Mars."

Colorado Governor Richard Lamm is scheduled to present one of the public lectures, discussing "The Environment and Public Policy."

Sessions at the meeting will include presentations on physical and mathematical sciences, energy, resource policy, biological science, agriculture and ecology, environment, arid lands, medicine and health, anthropology, behavioral science, education, economic and social sciences, science and public policy, and history and philosophy of science.

### MARTIN MARIETTA NEWS

Published by Public Relations  
**MARTIN MARIETTA AEROSPACE**  
 Call Ext. 5364 with suggestions  
 or information for articles.

Denver Division  
 P.O. Box 179  
 Denver, Colorado 80201  
 February 1977

## The Economic Facts

### A sales record, but...

Martin Marietta Corporation's fourth quarter sales and earnings were the best ever recorded. Net earnings and net sales for the whole year 1976 were the second highest.

Net sales were well over the billion-dollar mark (\$1,213,124,000) for the year and might lead a casual observer to call for all kinds of controls to limit the corporation's activity.

But, as smart businessmen say, "Let's look at the bottom line."

That bottom line shows a profit on that billion dollars in sales of \$78.5 million. That is a profit of about 6.5 percent. (You can get that much interest on your money from some savings programs—or even more if you let the institution keep your money longer.)

What happened to the difference between the billion dollars and the \$78 million?

It cost the corporation \$1.08 billion to make the sales and the products. As an employee, you got part of that money in your paycheck and as employee benefits. Suppliers, utility companies, and people like that got the rest.

For those who subtract the \$1.08 billion from the net sales figure, it comes out something over \$132 million. That is a lot more than \$78 million you say? Right, it is, but there are some other deductions—just like deductions from your paycheck.

Income taxes, for example. Martin Marietta pays income taxes just like you. The difference is that the bill is a little higher. The Corporation paid \$54.9 million in income taxes.

Martin Marietta people worked hard to make the Corporation a success—people in aerospace, aluminum, aggregates, cement, and chemicals.

Those same people, and that includes you, need to set the record straight when anti-business folks start talking about huge profits and claim corporations like Martin Marietta have profits of 30, 40, or even 50 percent.

Those claims just aren't fact.

Profit for Martin Marietta: about 6.5 percent. Let the anti-business people know the facts.



# Major components nearing completion

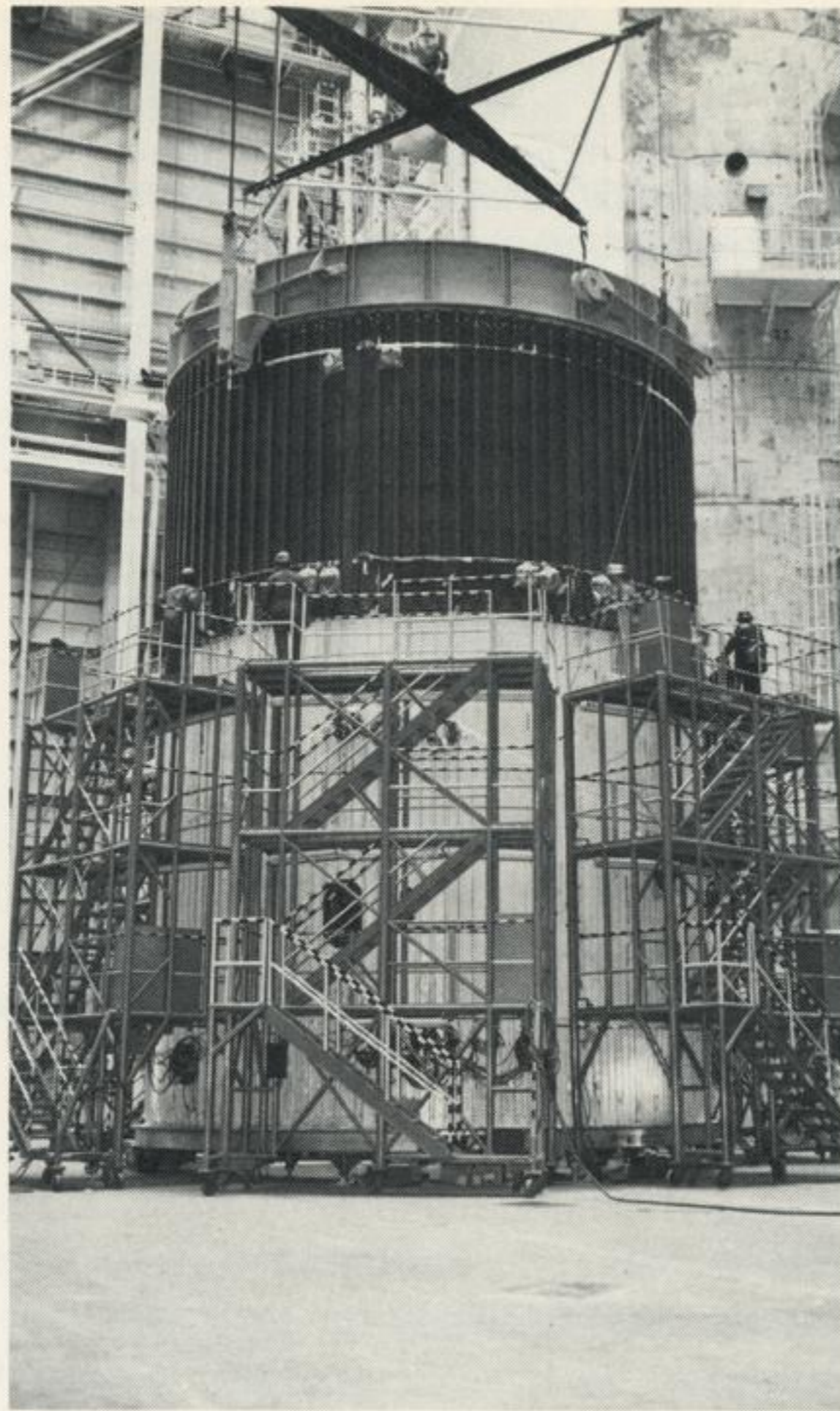
The first two major components of the main propulsion test article (MPTA) for external tank—the liquid hydrogen tank (LH<sub>2</sub>) and the liquid oxygen tank (LO<sub>2</sub>)—are nearing completion on major trim and weld fixtures at Michoud.

After instrumentation is added and the final, or forward dome, is welded in place, the 32,000-pound, 97-foot-long LH<sub>2</sub> tank, which will hold 226,000 pounds of liquid hydrogen, will be moved to the pneumatic test facility for proof and leak testing.

Fabrication of the LO<sub>2</sub> tank began early this year. Work remaining includes the addition of a T-frame, slosh baffles, and final dome. The completed 13,000-pound, 55-foot-long tank, designed to hold 1,337,000 pounds of liquid oxygen, will be moved to the vehicle assembly building for hydrostatic testing.

Vern Selby, general foreman responsible for all production tooling, cited Gene Allen, supervisor, and Bill Hayes, welding engineering, on the LH<sub>2</sub> tank and Jerry Mattio, supervisor, and Clarence Thornburg, weld engineer, on the LO<sub>2</sub> tank for outstanding work by their teams.

"What these men have accomplished thus far in assembling the LH<sub>2</sub> and LO<sub>2</sub> tanks, using unproven but highly successful tooling, is outstanding," he said. "I am proud of them and the job they are doing. Without their skills and conscientious efforts, we never could have accomplished as much as we have in such a short time."



*The liquid oxygen simulator to be used in testing at Marshall Space Flight Center is shown resting on the intertank structural test article during a fit check in the Michoud vehicle assembly building.*

## In Michoud

*Call C. H. Fleischer at 3835 with suggestions or information for articles for Martin Marietta News.*

*The liquid hydrogen tank for the Space Shuttle external tank is shown on the trim and weld fixture in the photo at left below. The liquid oxygen tank is on the trim and weld fixture in the photo at right below.*

## From Michoud

# Fit check successful

It all fits.

The intertank, the liquid oxygen, and liquid hydrogen simulators to be used in structural testing at the Marshall Space Flight Center in April fit as they should.

The check was a preview of the Intertank Structural Test Article/simulator mating that will be done at MSFC. It also proved the effectiveness of the tools that will be used to produce the liquid oxygen tank/intertank/liquid hydrogen tank splices at Michoud during production of the external tank for Space Shuttle.

In the alignment tests of the pre-drilled holes in the mating flanges, the intertank was loaded on top the liquid hydrogen simulator and bolts were installed in all 178 splice holes. The intertank was removed from the liquid hydrogen simulator, put in a support stand, and the liquid oxygen simulator was put in place. Bolts were installed in all 194 splice holes for this mating.

Among those participating in the successful fit check were B.L. Waller and C.K. Johnson, final assembly supervisors; Herman Shiloh and Herman Jolly, Rigging supervisors; Leo Veron and Oliver Pierre, Sr., rigging crew chiefs; Rex Engle, R.L. Campbell, and Gayle Howell, pre-production engineers; and Allen Smith, product assurance inspector.





# Michoud to become busy as shipping center for shuttle tanks

The Michoud assembly facility, NASA's largest manufacturing installation, will soon become a busy shipping center as well.

The first test article for the external tank will go by barge to the Marshall Space Flight Center in Huntsville this month—unless heavy river ice forces a delay.

Assembled by the Michoud operations of the Denver division, the intertank structural test article—an external tank intertank and two giant rings simulating the liquid hydrogen and liquid oxygen tanks—will make the 1,100-mile trip via the Mississippi, Ohio, and Tennessee Rivers. The trip to Huntsville normally takes eight days. Returning with the river current, the empty barge makes the trip in five days.

Other trips this year will include movement of the first completed external tank—designated the main propulsion test article—to NASA's National Space

Technology Labs in Hancock, Miss. and the liquid hydrogen and liquid oxygen tanks to Huntsville.

The main propulsion test article (MPTA) has the shortest trip, going 40 miles up the Intracoastal waterway and East Pearl River to Hancock, Miss. After the six-hour barge trip, the MPTA will undergo static testing with the Space Shuttle orbiter's three main engines.

The barging operation is managed by Marshall Space Flight Center's project logistics office.

Location of the Michoud operations on the Intracoastal waterway, with access to the Mississippi and Pearl Rivers and the Gulf of Mexico, is important to the Space Shuttle program. The external tank, measuring 155 feet in length and 28 feet in diameter, is too large for rail, highway, or air delivery.

Starting in late 1978, completed external

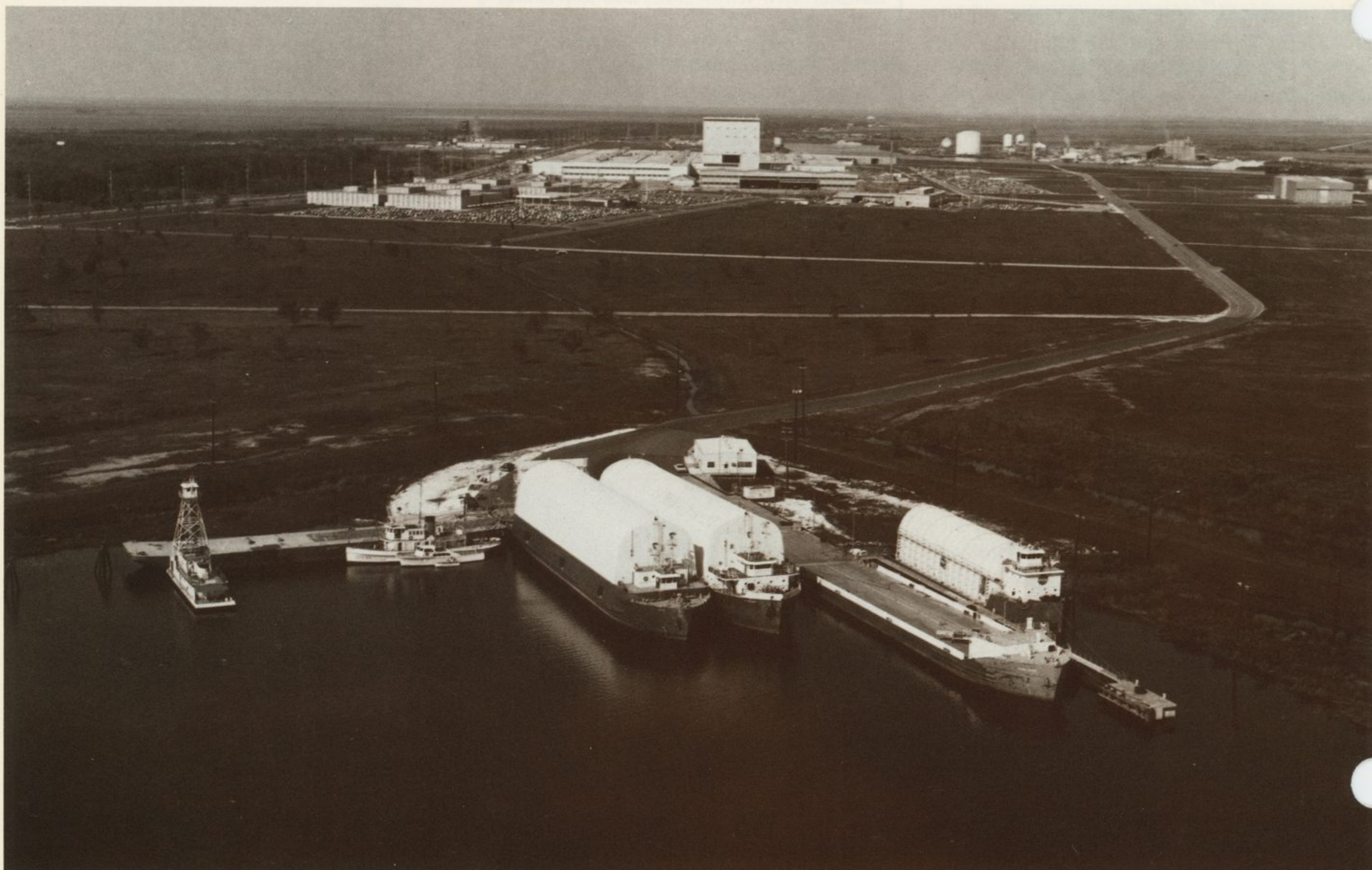
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**MICHLOUD OPERATIONS**

tanks will make a 900-mile trip from Michoud to Kennedy Space Center in five days by going down the Mississippi, across the Gulf of Mexico, around the tip of Florida, and up the east Florida coast.

Largest of the barges to be used are the Orion and Poseidon. These barges are 265 feet long and have a protective deck structure 50 feet wide, 43 feet high, and 200 feet long to house the external tanks.

For shorter trips to Hancock, two shuttle barges, Pearl River and Little Lake, will be used. They are 262 feet long and 43 feet wide with open cargo space 210 feet long.

All barges previously were used to transport the Saturn V during the Apollo program.



NASA barges tied up at the Michoud dock area await their cargo of external tanks. The Michoud manufacturing complex is in the background.