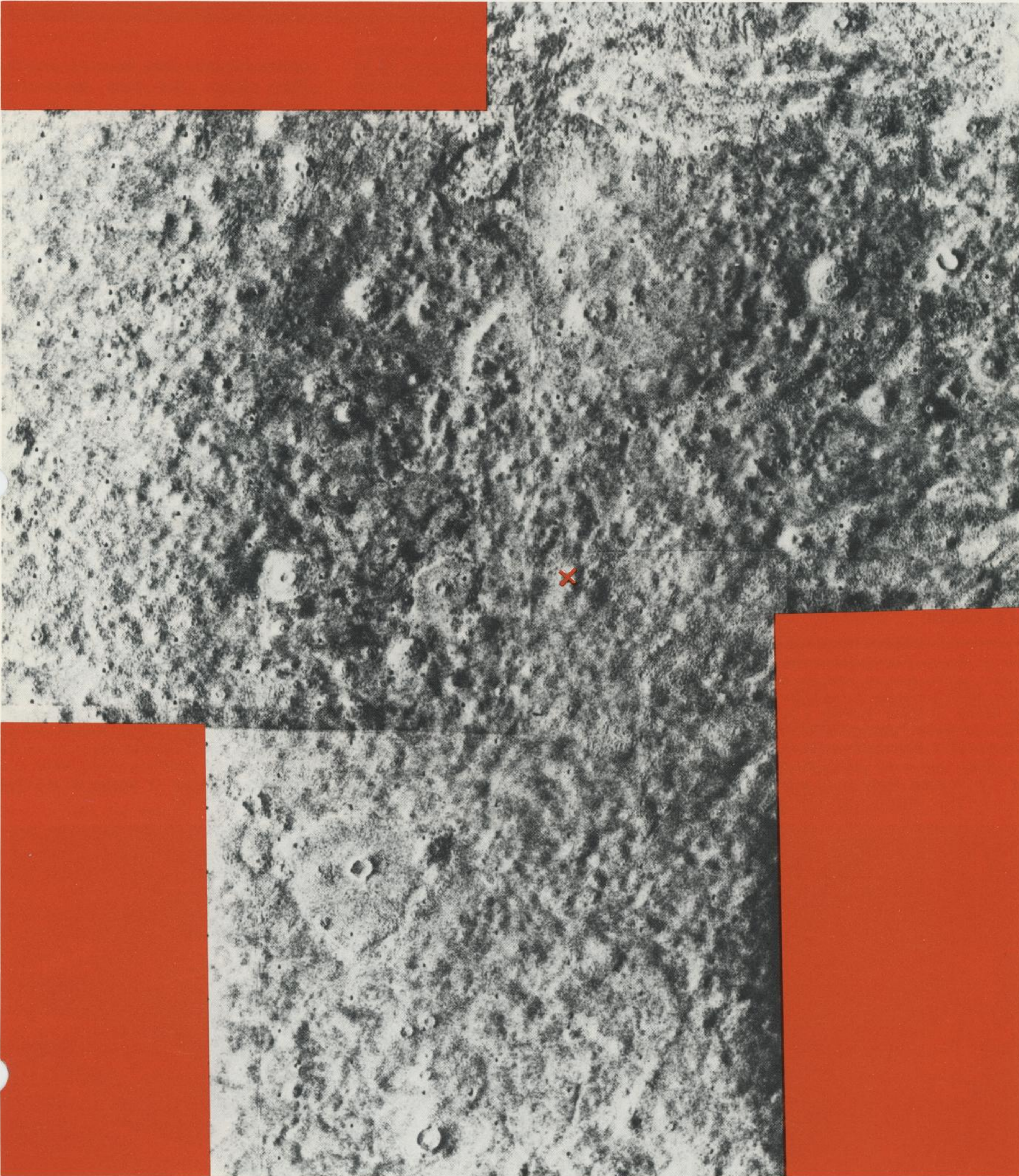


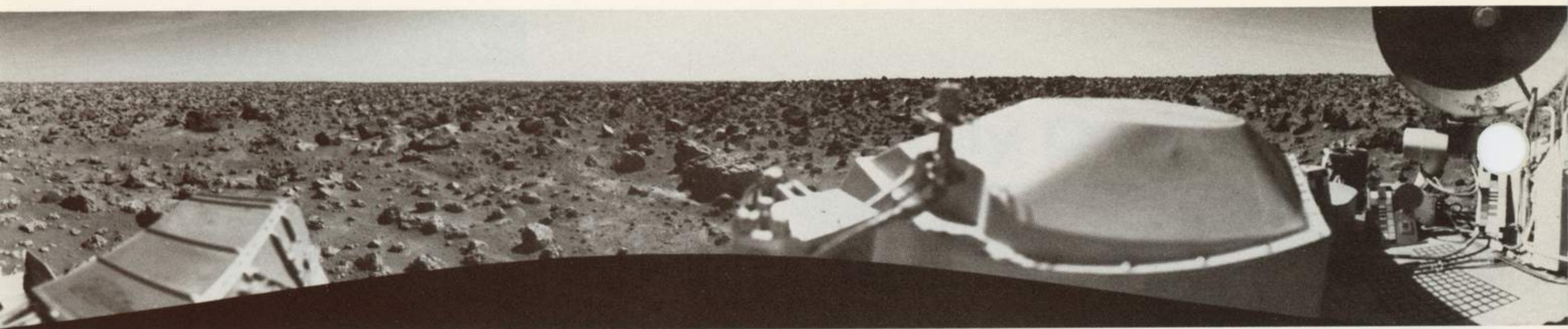
MARTIN MARIETTA

# news

DENVER DIVISION

NUMBER 12/1976





The Viking 2 Lander photographed this rocky scene shortly after touchdown on September 3 on the northern plains of Mars in a region known as Utopia. The picture sweeps around all but about one-tenth of the view from the Lander. The surface is strewn with rocks out to the horizon. These rocks range in size up to several meters. Many of the rocks have

pitted surfaces while others appear to be smooth. The pitted rocks resemble fragments of volcanic lava, which are frequently quite porous. Some of the rocks appear to have grooves that may have been cut by the impact of wind-borne sand and dust grains. There is no indication of sand dunes in the scene, although deposits of fine-grained material

occur beneath and between boulders. This picture has been geometrically rectified to account for the fact that the spacecraft landed with an 8° tilt toward the west. In the unrectified picture this tilt produces a pronounced curve in the horizon. After rectification, the horizon is properly revealed as flat and relatively featureless.

## Viking 2 lands safely, begins experiments

Viking 2, keeping mission controllers with their hearts in their throats, landed safely on the hard, rocky surface of the Utopian Plain of Mars at 4:38.32 pm (MDT) Friday, Sept 3.

The lander is estimated to be resting and working at 225.67 degrees west longitude and 47.97 degrees north latitude—within tenths of degrees of its planned aiming point.

All instruments and equipment are performing normally and no complications have developed.

That is in sharp contrast to the way the landing sequence began.

Shortly after the lander separated from the orbiter, radio relay signals began to fade. Soon, mission controllers discovered the orbiter had changed its position and could only record entry signals from the lander.

In effect, lander was performing perfectly on its own, but on Earth no one could be sure. At last, after a nervous wait of hours, and at the scheduled moment of touchdown, controllers received a signal

that the lander's data signal rate had increased—a clear sign Viking 2 was down safely. However, it was the next day before confirmation was received.

Meanwhile, controllers corrected the position of the orbiter and all returned to normal—normal that is, if landing Mars can ever be viewed as a normal event.

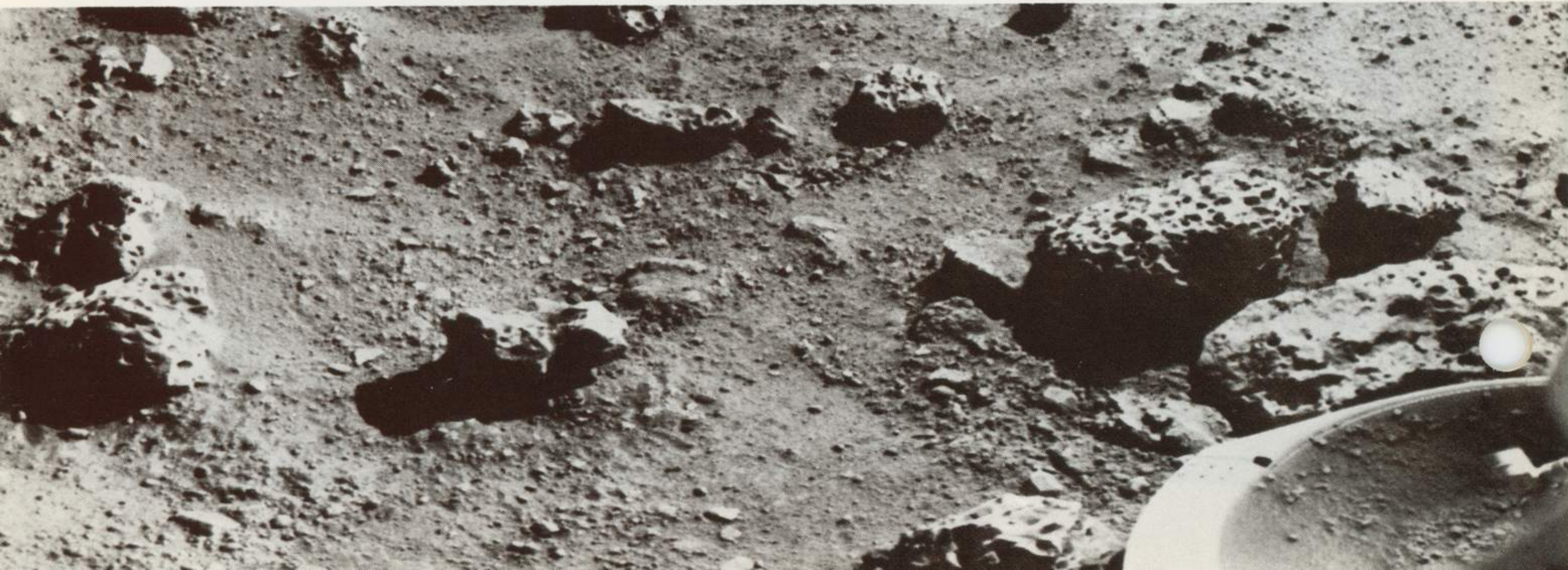
In the days that followed, status reports show events and activities of the mission:

next page, please

*Viking 2's first picture on the surface of Mars was taken within minutes after the spacecraft touched down September 3. The scene reveals a wide variety of rocks littering a surface of fine-grained deposit. Boulders in the 10 to 20-centimeter (4 to 8-inch) size range—some vesicular (holes) and some apparently fluted by wind—are common. Many of the pebbles have tabular or platy shapes, suggesting that they*

*may be derived from layered strata. The fluted boulder just above the Lander's footpad displays a dust-covered or scraped surface, suggesting it was overturned or altered by the foot at touchdown. Just as occurred with Viking 1's first picture on July 20, brightness variations at the beginning of the picture scan (left edge) probably due to dust settling after landing. A substantial amount of fine-grained material kicked*

*up by the descent engines has accumulated in the concave interior of the footpad. Center of the image is about 1.4 meters (5 feet) from the camera. Field of view extends 70° from left to right and 20° from top to bottom. Viking 2 landed at a region called Utopia in the northern latitudes about 7500 kilometers (4600 miles) northeast of Viking 1's landing on the Chryse plain 45 days earlier.*



## Viking 2

from preceding page

### Saturday, Sept. 4, 12 noon

Although Viking 2 appears from its photos to have safely landed on the Utopian Plain of Mars, flight controllers have yet very little information on the lander's condition or what happened during landing.

The orbiter is functioning normally.

Viking 2's first photos surprised scientists who expected to see undulating sand dunes instead of the flat rocky plains viewed by the camera.

### Saturday, Sept. 4, 3 pm

Project manager Jim Martin says, "It appears that the high gain antenna was somehow damaged. It has a tear in the rim of the antenna...right, now, we don't have a lot of information other than the picture showing physical damage... enough damage that we believe that something hit very hard."

(Later Saturday night, analysis proved the tear was indeed Martian soil that had settled in the lower rim of the antenna, giving the appearance of damage.)

### Sunday, Sept. 5, 8:30 am

The seismometer on Viking 2 lander was successfully uncaged and appears to be working normally.

Landing site pictures show a field of rock stretching all the way to the horizon. Most are rather small, but two different kinds can be identified. Apparently one type that gives all the appearances of having igneous origin with small vesicles—what appear to be small gas bubbles. Another type, with very flat sides, give the appearance of being sedimentary rock.

The first color photographs look quite a bit like those taken at the Viking 1 landing site.

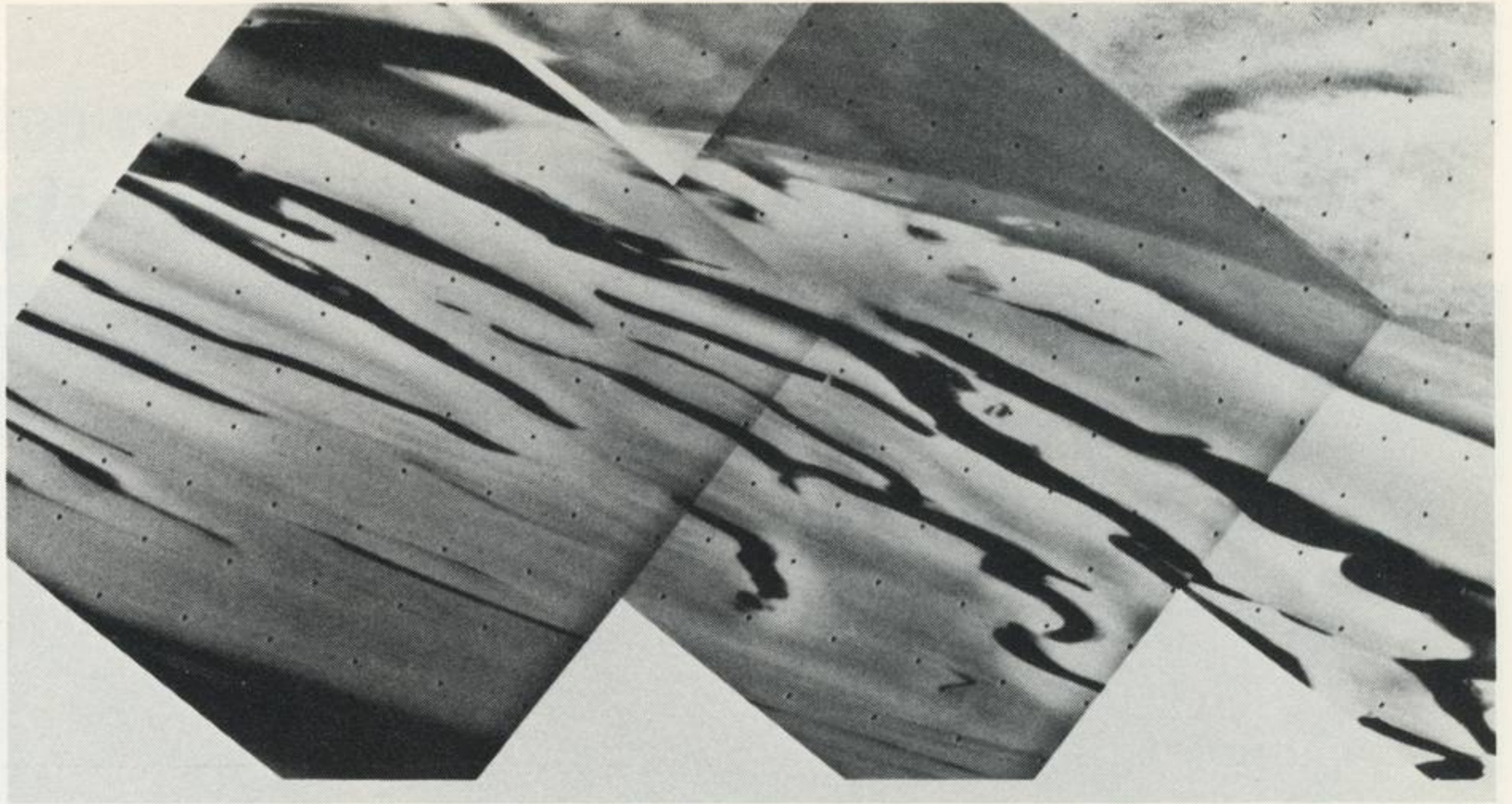
### Monday, Sept. 6, 8:30 am

A photo received last night shows that the protective covering for the lander's soil sampler head mechanism has been successfully ejected, clearing the way for the first digging in the Utopian Plain.

#### MARTIN MARIETTA NEWS

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As mid-summer approaches in the northern hemisphere on Mars, the melting north polar cap has receded to its smallest size. These overlapping pictures were taken by the Viking Orbiter 2 television cameras on Aug. 30 from a range of about 4,000 kilometers (2,480 miles). The solid white area toward the top (north) is ice—probably both frozen CO<sub>2</sub> and water ice.

The dark bands, which are regions devoid of ice, spiral in toward the cap's center. The reason so little ice occurs in these bands is uncertain, but may be related to winds blowing away from the center of the cap. The southern edge of the cap is at about 82° N. Lat. The north pole itself is approximately on the planet's limb (the horizon at top of photo on right).

There have been no Marsquakes yet, but sensor data indicates the lander is sitting on very firm ground.

Winds at the Utopian site are light—between three and 11 mph—and temperatures are cooler than at the Viking 1 location. The first noon temperature was minus 35 degrees F and the low was minus 128 degrees F. Pressure is 7.78 millibars.

### Monday, Sept. 6, 6 pm

The rocky and boulder strewn Martian surface in front of Viking 2 has dictated a change in where the first soil sample will be acquired. A rock appears to be right

where the collector head would go into the surface.

### Tuesday, Sept. 7, 3 pm

Dr. Seymour Hess, chief of the Viking meteorology team reports: "Temperature is at a minimum at 4 am (Mars time) of -114F, which is warmer than we saw at the Viking 1 site. I believe it is warmer here because at this latitude, at this season of the year, night is two and one-half hours shorter."

### Wednesday, Sept. 8, 8:30 am

Scientists have decided to screen out fine material and put only pebbles in the inorganic chemistry instrument.

next page, please



High resolution photo of the Martian surface near the Viking Lander 2 shows a few square meters (yards) at one of the possible spots for acquiring a soil sample. The sample will be collected by the Lander's trenching scoop and delivered to the spacecraft instruments. The rock in the right foreground is about 25 centimeters (10 inches) across. Most rocks appear to have vesicles, or small holes in them. Such rocks

on Earth can be produced by either volcanic processes or by hypervelocity impacts of meteorites. Some areas are lighter than others, suggesting the presence of two kinds of fine-grained materials, which also can be produced by both volcanic and impact processes. A nearby large impact crater, named Mie, may be the source of the rocks and fine-grained material at the landing site.



*Viking 2 began its search for a landing site on Mars in mid August with photos by the Orbiter TV cameras of an area called Alba Patera, or "White Saucer." Located at about 110° W. Long., 44° N. Lat., the region is a low volcanic plateau. Faults, or breaks in the crust, bound the plateau and slice through the impact crater seen in this picture. Taken during the Martian*

*morning with the sun high and atmospheric haze still present, these first pictures show a surface which appears smooth. Small details will be seen in photos to be taken in the afternoon, with the sun low on the horizon. This picture was taken from a range of 220 kilometers (1370 miles) and shows an area of about 6500 square kilometers (2500 square miles).*

## Viking 2

from preceding page

On Saturday, Sept. 11, Viking 1 orbiter will be signaled to begin a drift across Mars to a position over Viking 2 lander to act as a radio relay. Orbiter 2 is then to be repositioned to observe the north pole of Mars.

### Thursday, Sept. 9, 8:30 am

Location of the Viking 2 lander is now estimated to be a little over 6 miles (10 km) northeast of the center of its target circle in the Utopian Plain.

Viking 2's orbiter has been taking pictures of the giant volcanos on Mars.

Viking 1's orbiter, relieved of its radio duties has been focusing its instruments and cameras on a long and enormous dry

water-channel system and its sources which drain into the Chryse plain just west of Viking 1 lander.

### Friday, Sept. 10, 8:30 am

Nine photos, including a Mars sunrise and a sunset, were radioed from Viking 2, along with weather and quake data.

### Monday, Sept. 13, 2 am

The biology instrument aboard Viking 2 received a sample of Martian soil today and has begun its scientific analysis. However, photographs show a trench dug in the Mars surface but the sample arm is poised, out of position, above the hopper of the biology instrument. Mission controllers are trying to analyse the problem and draft a solution. No soil samples for the organic chemistry investigation can be dug for a minimum of six days.

## On the cover

"X" marks the spot selected as the landing site for Viking 2, located in the eastern end of Utopia Planitia on Mars: 48° North and 226° West. The lander actually set down at 47.97° North and 225.67° West. The three frames were taken by the Viking 2 Orbiter August 16 from a distance of about 3360 kilometers (2100 miles). The frame dimensions are about 90 x 100 kilometers (56 x 62 miles).

## New director elected to board

Frank M. Ewing, a Maryland business executive, has been elected to the board of directors of Martin Marietta Corporation and of its wholly-owned subsidiary, Martin Marietta Aluminum, Inc.

Ewing is a vice president and director of Ketter Brothers, Inc., a Washington-area builder and land development company, and is developer of the Beltsville Industrial Center (Md.). He is also a director of Acacia Mutual Life Insurance Co., Washington Gas Light Co., Maryland Federal Savings and Loan Association, Washington Mutual Investors Fund, and Central Scientific Co., Inc. of Chicago.

He is a native of Georgia and a 1936 graduate of Yale University.



*Mrs. Margaret Streiffert, secretary in the Air Force Plant Representative Office engineering division, has received the AFPRO semiannual TOP LADY award. TOP is an acronym for The Outstanding Performance.*

## In 1983

# A rendezvous with 10-billion-year old data

A 1983 rendezvous to intercept information that has been on its way for more than 10 billion years now seems almost certain.

That's the way Kenneth P. Timmons described the current status of the Space Telescope program.

"A Senate-House conference committee in a written report has given NASA approval to release its request for proposal (RFP) as soon as Congress receives the President's budget with a request for funds for Space Telescope," Timmons, who is program director for the division's Space Telescope effort, said. "In effect, the committee is giving the go ahead to Space Telescope before funds are authorized or appropriated for the program."

Unusual? Yes, but it shows, according to Timmons, the support for the Space Telescope in NASA, among scientists, and among lawmakers.

NASA will include Space Telescope in the nation's fiscal 1978 budget—the budget that will be submitted to Congress in late January 1977 and be in effect Oct. 1, 1977.

"The dates we are working toward," Timmons said, "are RFP in January 1977, contractor selection in August 1977, and authorization to proceed in November 1977."

The division, along with Lockheed and Boeing, was awarded a Phase B study contract for the Support Systems Module. These three will be the competitors for the award expected in August 1977.

The firm selected for the Support Systems module also will be integrating contractor and assemble the Space Telescope from that module, the Optical Telescope Assembly, and the scientific instruments.

Eastman Kodak and Perkin-Elmer are competitors for the Optical Telescope Assembly.

The Support System Module and the Optical Telescope Assembly programs will be directed by NASA's Marshall Space Flight Center.

Scientific instruments will be defined, procured, and tested by NASA's Goddard center.

The Space Telescope, designed to operate

at least until the end of the century, will be more than four meters in diameter, more than 10 meters in length, and will weigh more than 20,000 pounds.

It will be taken into space aboard Space Shuttle and launched from Shuttle's cargo bay. It can be revisited for inflight maintenance or it can be brought back to Earth for major updating of equipment.

Recording information that has been on the way for 10 billion years? In space, Space Telescope can see stars more than 10 billion light years away.

## Orlando wins contract

The Orlando division has been awarded a \$69 million contract to complete engineering development of the U. S. Army's Patriot (formerly SAM-D) missile, its launcher, and shipping-launching canister.

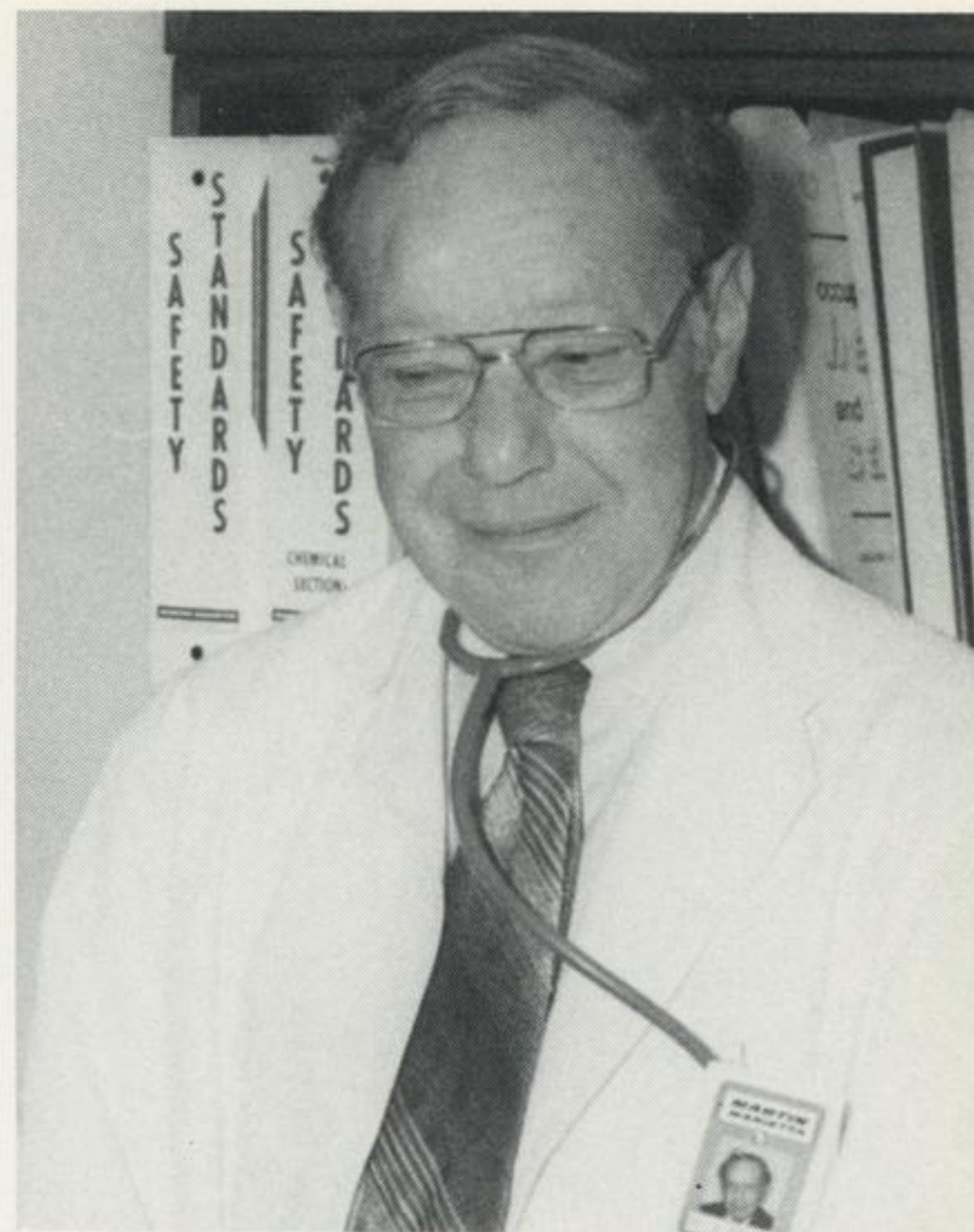
The contract was awarded by the Raytheon Company, prime contractor for the advanced air defense system. It follows a government decision to complete Patriot's third and final stage of engineering development after a highly successful flight test program to demonstrate Patriot's guidance technique. All but one of 14 test firings were successful.

## Two earn degrees in executive MBA program

Two Denver division employees have successfully completed the 17-month Executive Master of Business Administration program at the University of Denver.

Receiving degrees in ceremonies Aug. 13 were Raymond S. Wiltshire, director of research and technology programs, and Raymond J. Nalty, chief of contracts review and support.

The Executive MBA program at DU is an



*Dr. David R. Ashmun has been named as full time physician in the division's medical clinic. He received his medical degree from the University of Colorado in 1942. He has been in private practice of family medicine since then, including 17 years in Denver. He also has practiced in New Mexico and Texas.*

## Dividend declared

Martin Marietta Corporation's board of directors have declared a quarterly dividend on the Corporation's common stock of 35 cents per share, payable Sept. 30 to shareowners of record at the close of business Sept. 7.

intensive program designed for firms in the Denver metropolitan and surrounding areas. It gives middle and upper level managers and professionals an opportunity to participate in a degree-granting program that provides high-quality, paced instruction typical of longer programs without depriving the company of the candidate's services for extended periods.

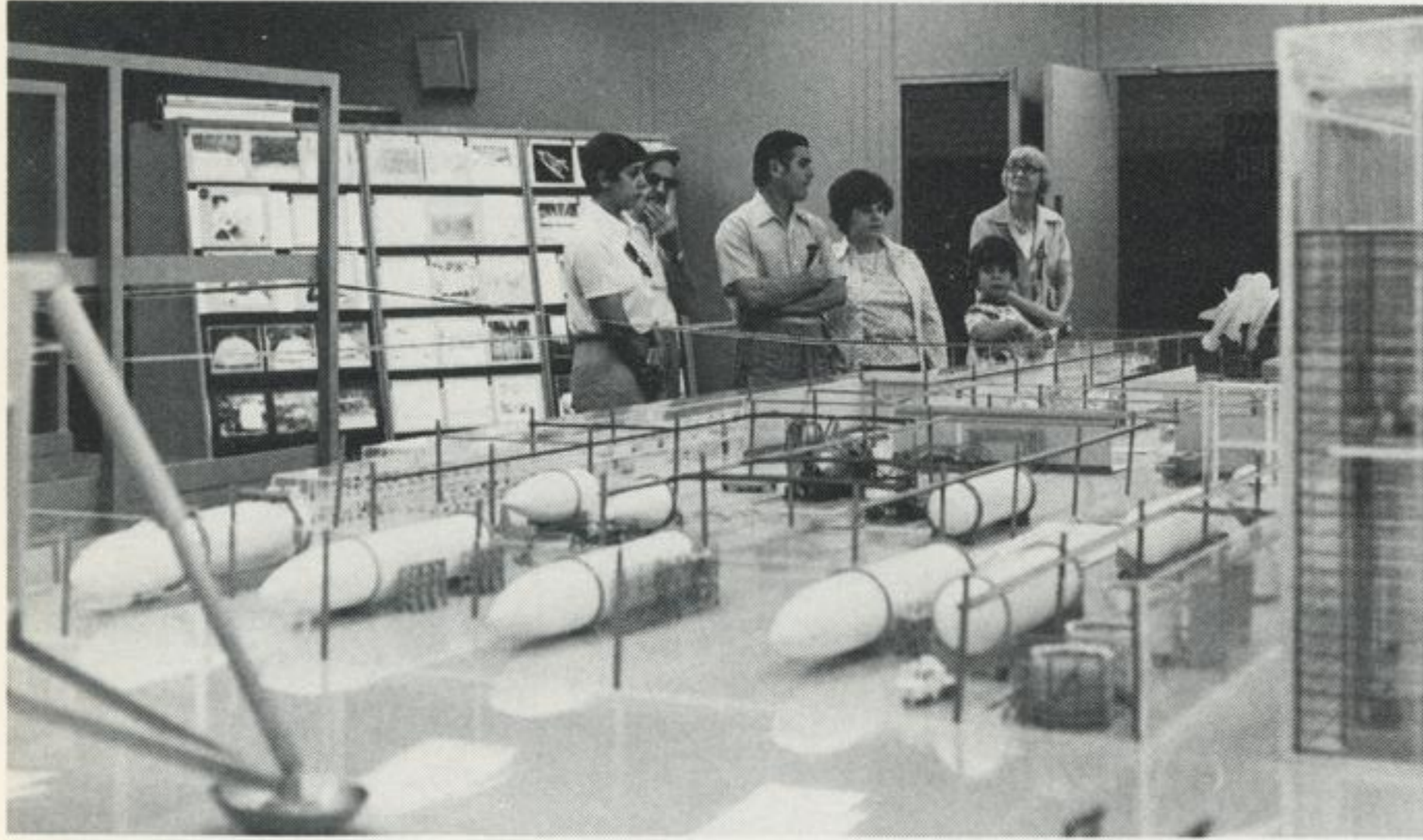
The program is limited to 40 students who have a minimum seven years' experience in progressively responsible positions in business as well as an undergraduate degree.

Nalty and Wiltshire confirmed the intensity of the program, reporting they spent 20-25 hours a week in preparing for the eight class hours.

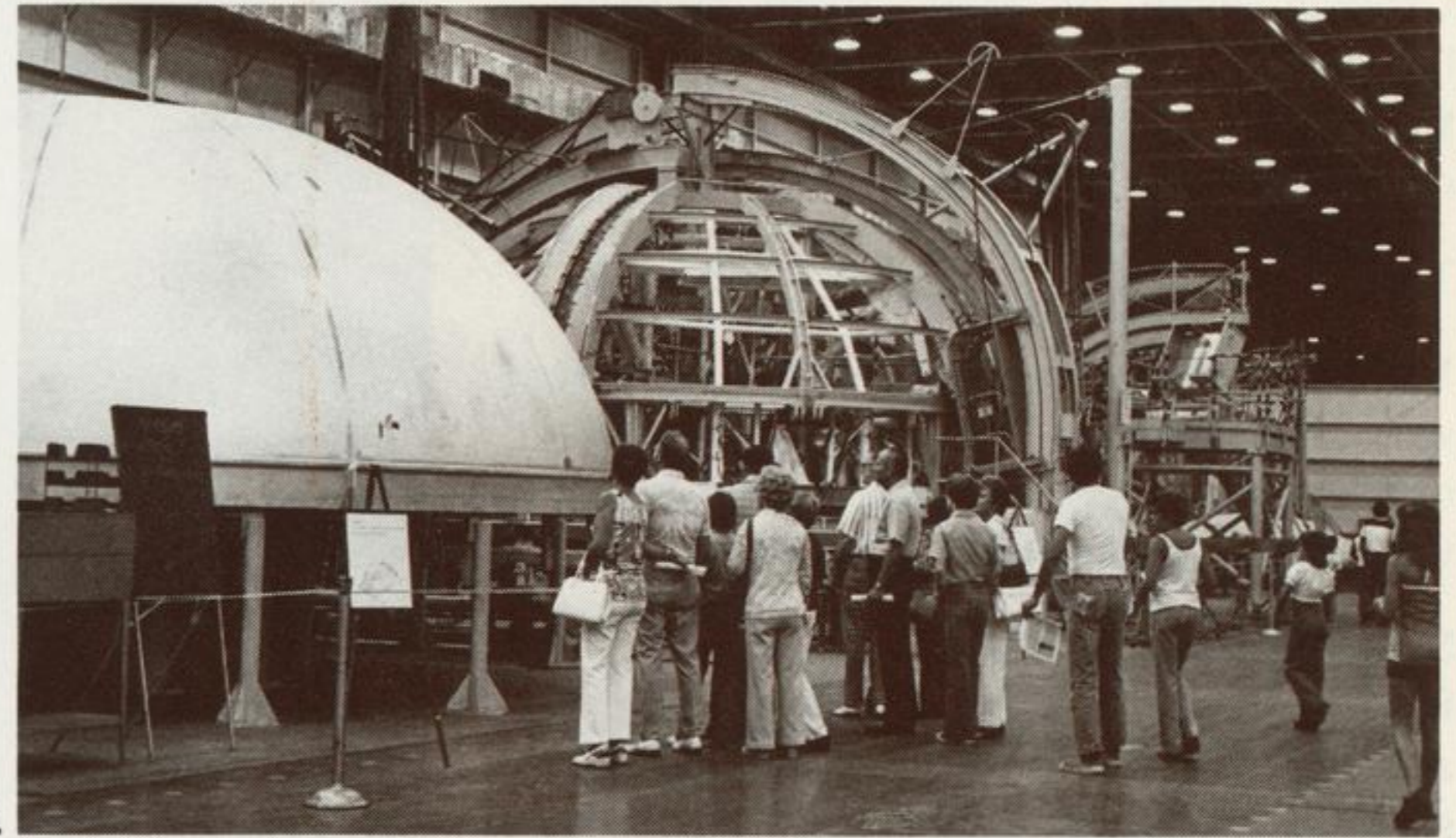
"The time was well spent," they added. "From the first day of the program we found techniques, tools, and concepts we could use on our daily jobs at the division."

# From Michoud

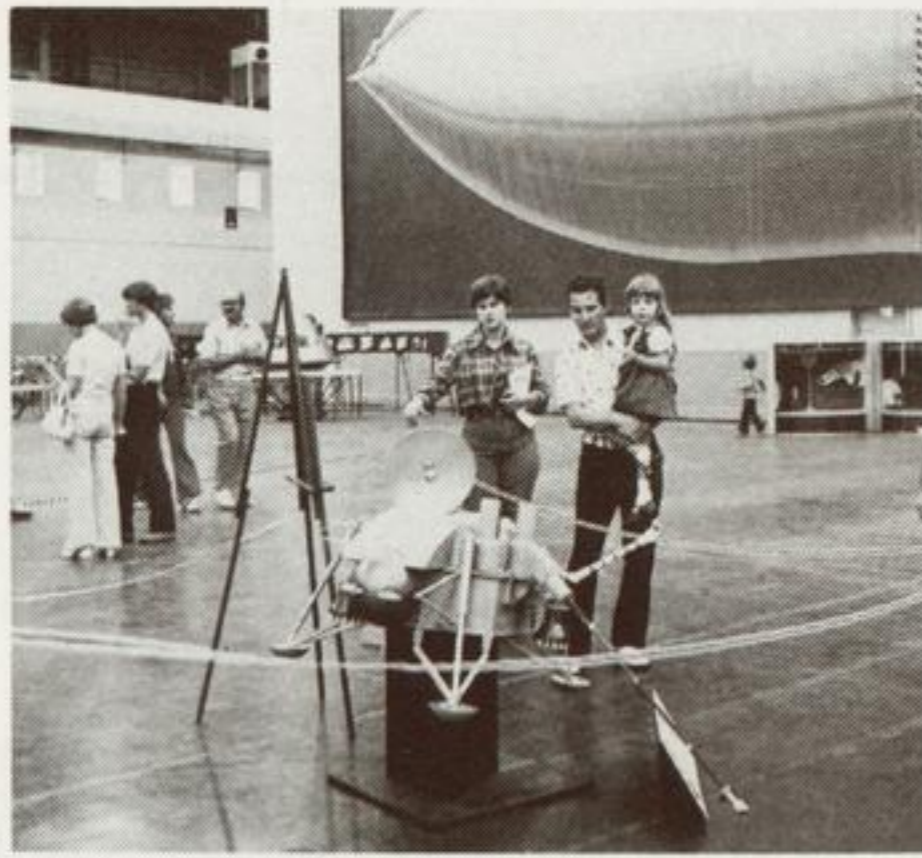
## 3300 attend Family Day



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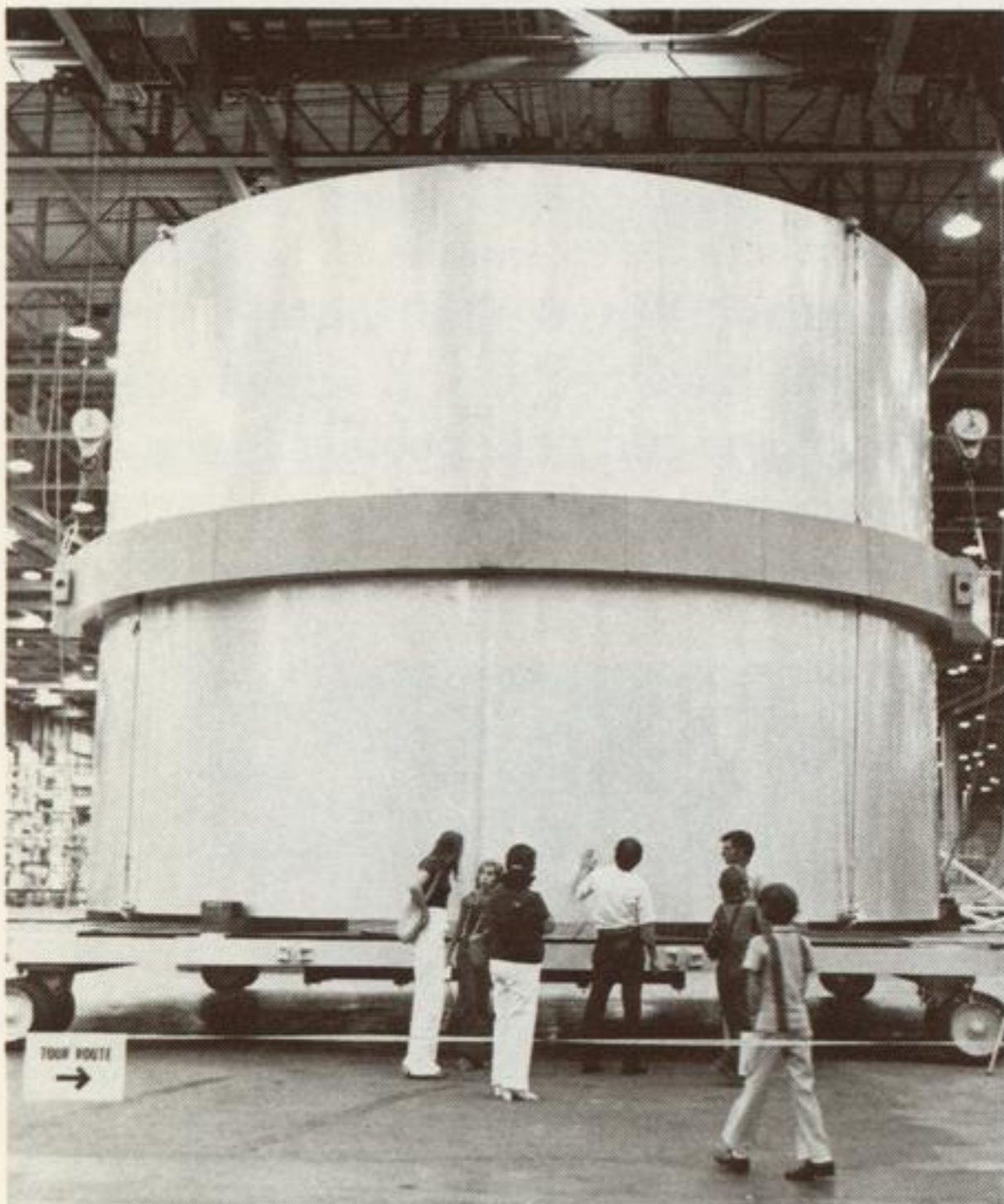
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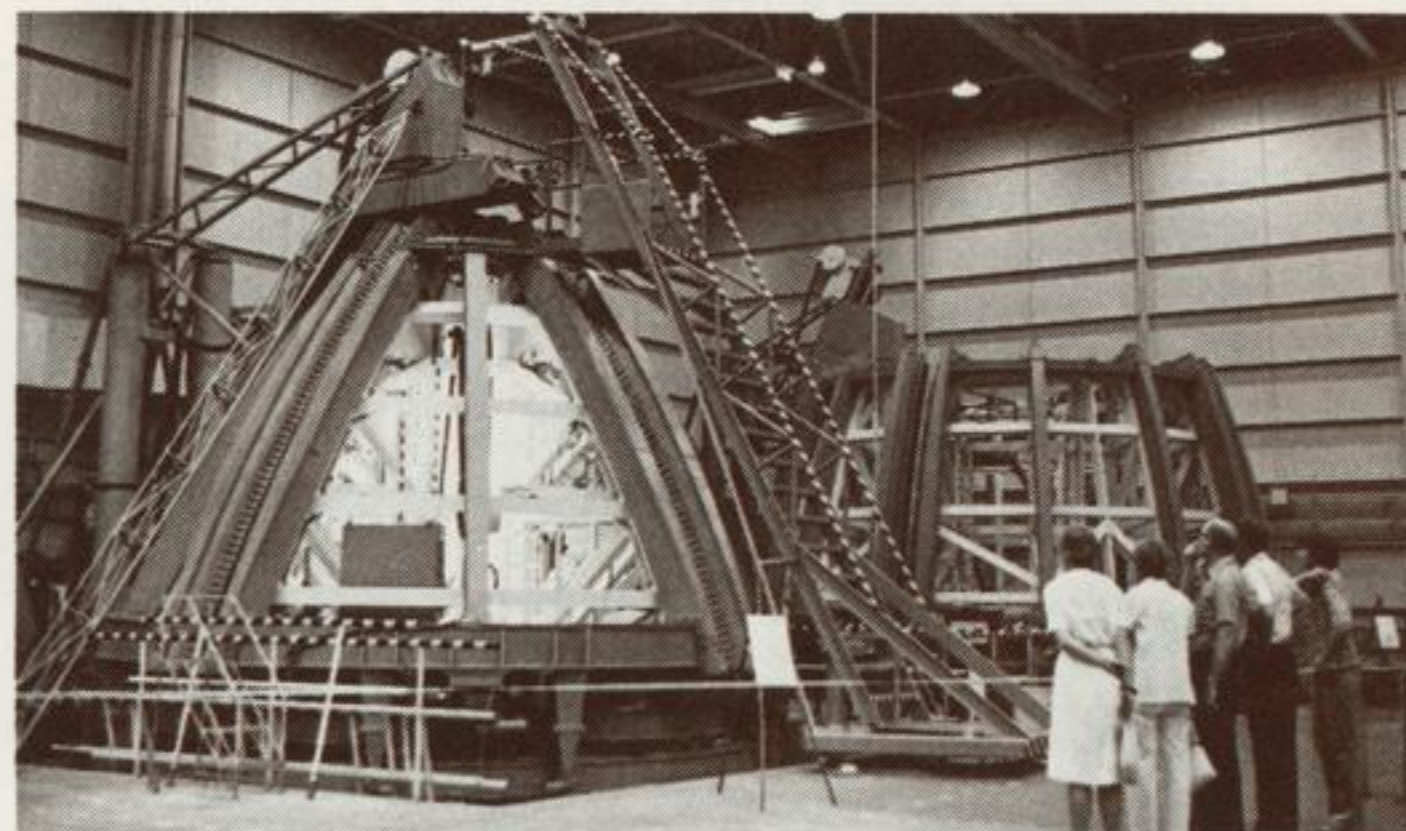
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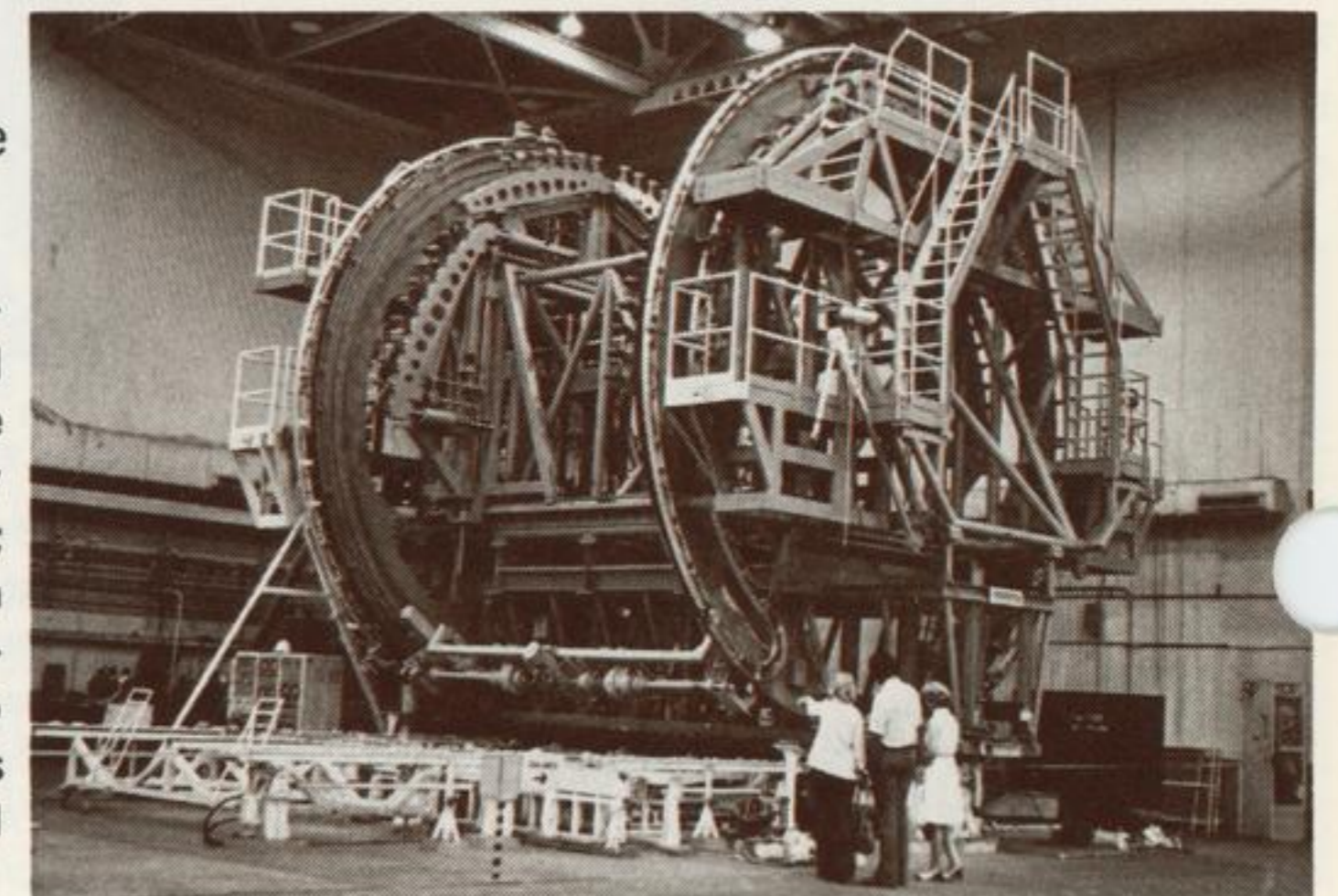


6.



7.

8.



More than 3,300 visitors passed the sign Welcome Martin Marietta Families as they entered the Michoud Assembly Facility main building for the first Michoud Operations open house.

Special displays were set up in various parts of the building with people on hand to answer questions. Glider kits which, when made up, are a scale model of the Space Shuttle Orbiter, were distributed at the door.

The day was called a success by those attending.

1—Model room shows layout of facility; 2—Subassembly area in which domes for external tanks are fabricated; 3—Viking lander scale model was on display; 4—Overview of display area with oil painting of full-size external tank; 5—Completed barrel section of liquid hydrogen tank prepared for transport to xray; 6—Forward and aft ogive fixtures; 7—Orbiter cargo bay display had European Space Agency lab as payload; 8—Horizontal hydrogen tank barrel tool.