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DENVER DIVISION

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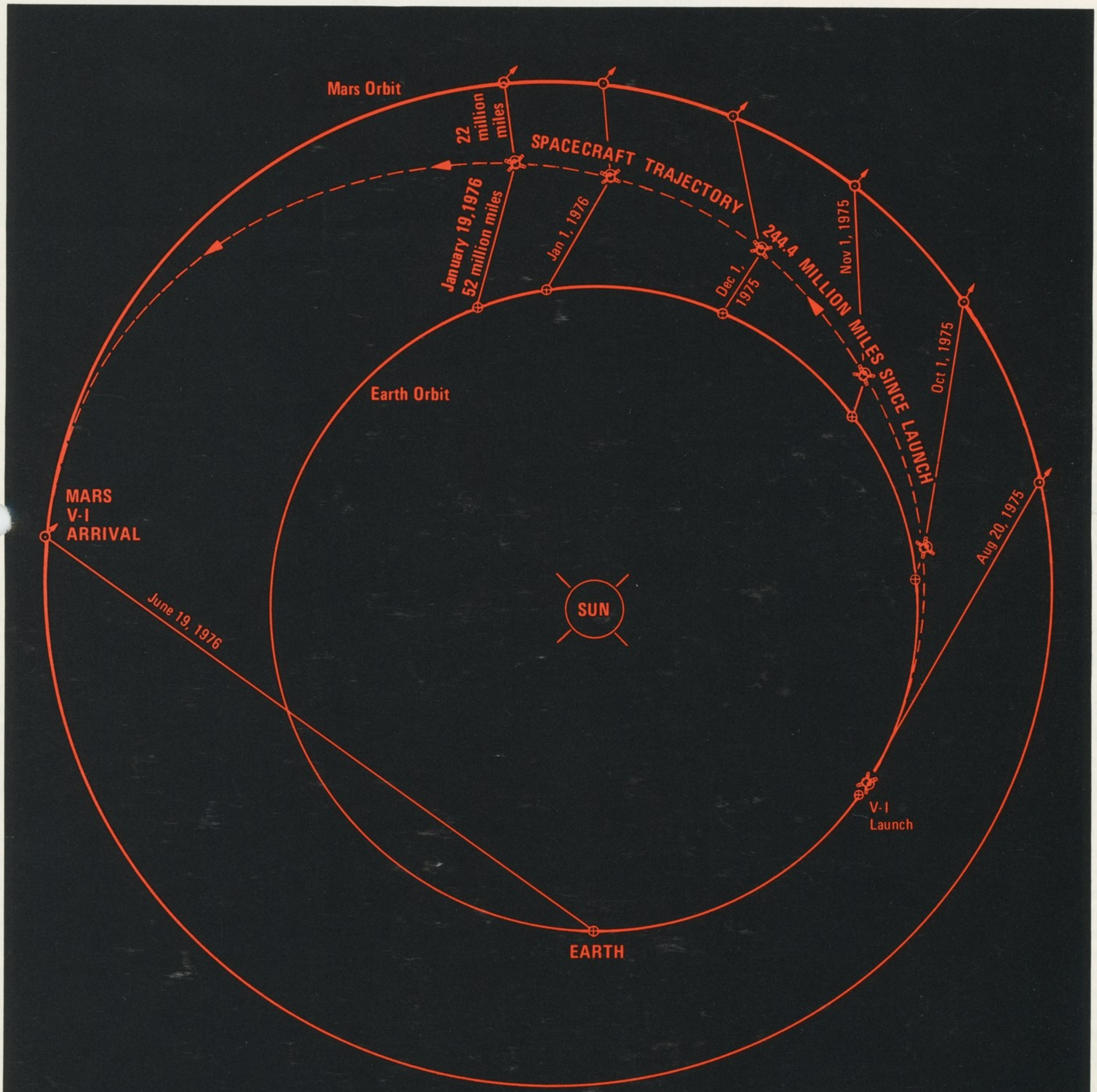


Viking - I
Journey to Mars

Viking I at mid-point in journey to Mars

Viking I, the spacecraft headed for a landing on Mars next summer, reached the half way point in its 11-month flight to the Red Planet at 1 p.m. (MST) Monday, Jan. 19.

The 2633-pound Viking was 151.9 days from launch last Aug. 20, and 151.89 days from its encounter with Mars at 9 a.m. (MST) June 19.

Viking I and its sister ship, Viking II, make up this nation's project to land two sophisticated spacecraft on Mars to search for life, and examine its atmosphere, its geology, its physical and chemical properties.

Martin Marietta Aerospace is the principal industrial contractor to the National Aeronautics and Space Administration for its Project Viking lander, scientific experiments, and mission integration.

At the mid-point of the flight, Viking I on a curving path around the Sun, has covered 244.4-million miles. The total flight will log 420.4-million miles in space. On a direct line the spacecraft is 52-million miles from Earth and 22.1-million miles from Mars.

Pursuing Mars in an arcing intercepting trajectory, Viking I is flying at 55,260-miles per hour relative to Earth. But because Mars is traveling away at a speed of 53,900-miles per hour, Viking I is gaining on the planet only at 9800-miles each hour.

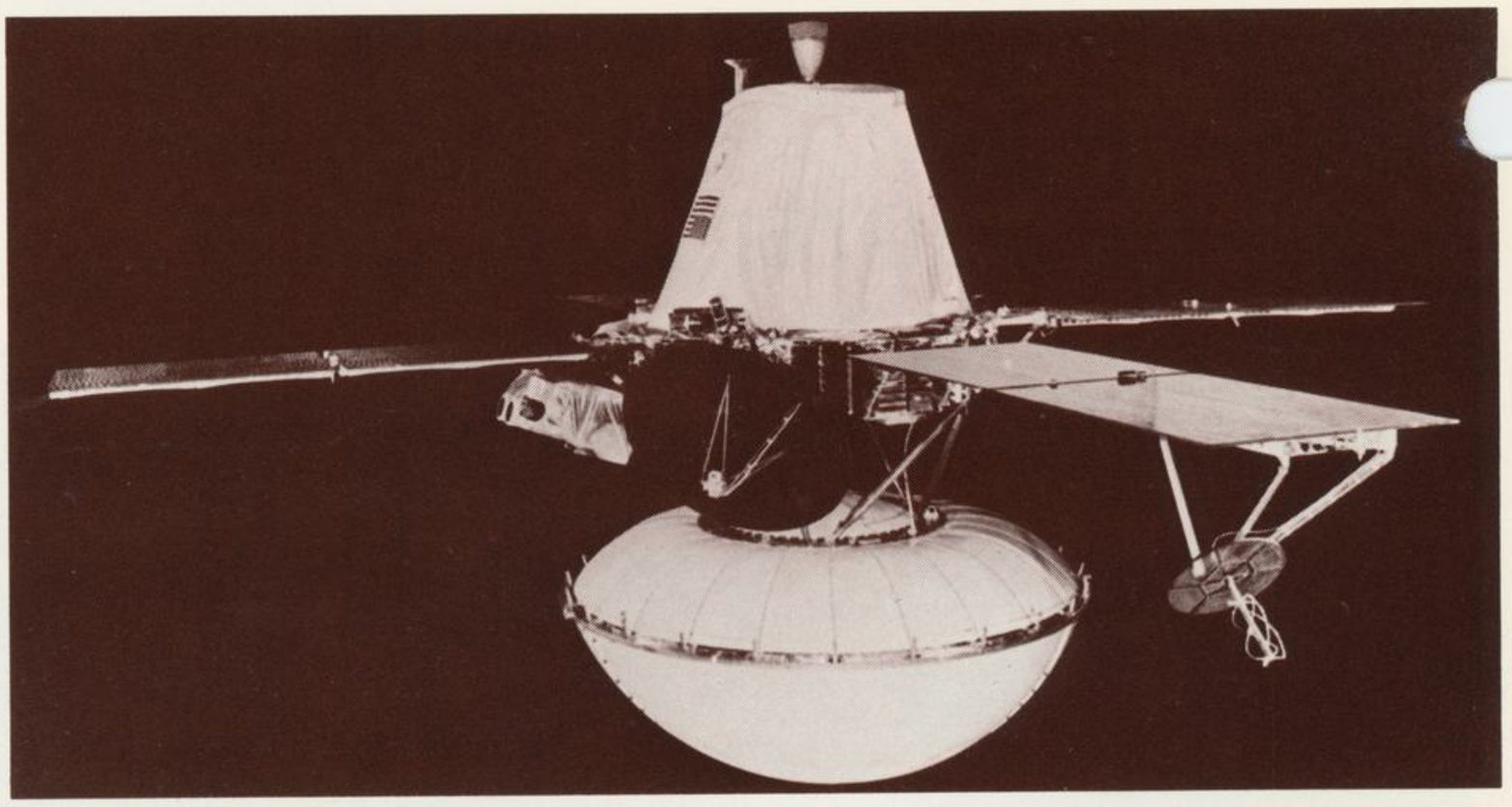
Viking II, launched on Sept. 9, is following the same flight trajectory and has traveled 206-million miles.

Tracking and flight control of both Vikings is being conducted by the Viking Flight Team from NASA's Jet Propulsion Laboratory at Pasadena, Calif. using the world-wide Deep Space Communications Network.

Since launch last August, Viking I has flown a near-perfect trouble-free mission. The Viking flight team controllers at JPL have radioed commands for the routine maintenance of main systems of both the orbiter and lander portions of the spacecraft. Additionally, all of the engineering and many of the scientific instruments have been tested, calibrated, and exercised to insure their readiness for the Mars expedition.

In the coming weeks, the flight team will continue to monitor and exercise the Viking's systems.

In May, some 30 days before entering Mars orbit, the Viking's cameras will begin taking photos of the planet. Starting five days before arrival, the spacecraft will collect weather data to aid in confirming the landing site.



VIKING I, appearing very much as in this photo of a scale model, reached the mid-point of its 11-month flight to Mars on January 19.

The Viking consists of an orbiter portion and a lander that are carried inside the saucer-shaped white protective shield during the long journey to Mars.

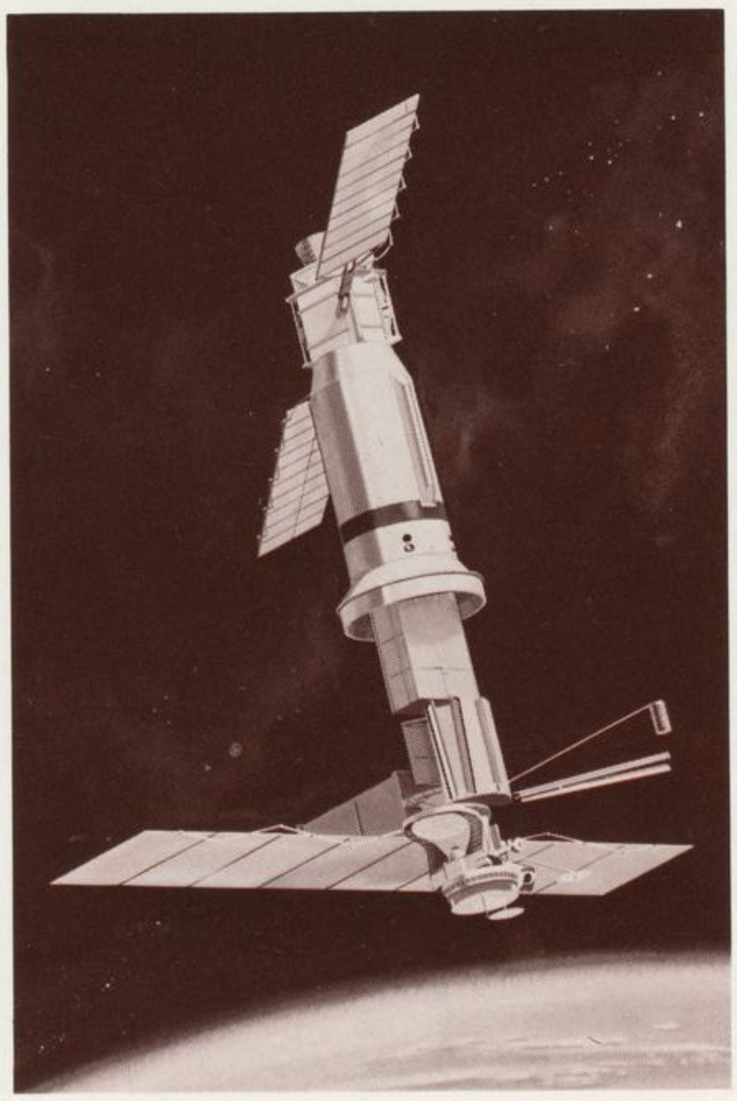
Once in Mars orbit as many as three precise orbit adjustments, during a 12-day period, are anticipated to bring the Viking over the pre-selected landing site. The site is named Chryse (rhymes with "icy") which is situated at the northeastern end of a 2500-mile long rift system. The site is believed by scientists once to have been a drainage basin for a large portion of equatorial Mars, and the collection point for large deposits of surface materials.

Data gathered by the lander's 11 experiments will be radioed to the orbiter each day as it passes over Chryse. The orbiter in turn will relay the information to Earth for study by the science teams.

Division to build SEASAT-A equipment

The division has been awarded a contract from the Jet Propulsion Laboratory to build the power converter for the synthetic aperture radar for SEASAT-A, a new ocean survey satellite.

Rolland Stewart, electronics, will lead the program for the division.



The power converter will use techniques developed in the division's Independent Research and Development (IRAD) program.

The satellite, weighing approximately 4000 pounds, will be launched in the spring of 1978 from the Western Test Range. It will be placed in a near-polar orbit having an altitude of 480 miles. It will circle the Earth 14 times a day covering 95 percent of the oceans each 36 hours.

Satellite sensors will provide radar images of waves and ice fields, determine the ocean topography, tides and currents, and measure wave heights, lengths and directions, sea surface winds and directions and sea surface temperatures.

This first global scale observation of ocean surfaces is expected to contribute to a better understanding of the oceans and the air/sea interface.

The sensor complement consists of a radar altimeter, a synthetic aperture imaging radar, a wind-field scatterometer, and a scanning multi-frequen microwave radiometer and a visible a infrared scanning radiometer.

SEASAT will be supported by aircraft, ships, and buoys to verify the accuracy of measurements from orbit.

NASA executive commends team for Titan/Centaur

John E. Naugle, associate administrator of NASA, has commended the Denver division on the successful Viking launches and the effectiveness of the Titan/Centaur launch vehicle.

In a letter to L. J. Adams, division vice president and general manager, Dr. Naugle said:

"Congratulations and my most heartfelt thanks to you and all the people at Martin Marietta who contributed to the successful launches of Viking A and B. These two launches fulfill the original objectives we set for the Titan/Centaur when we started its development in 1969.

"The entire Titan/Centaur team, Martin Marietta, Headquarters, the Lewis Research Center, Kennedy Space Center, the SAMSO organization and General Dynamics, are to be congratulated for this achievement. As I have previously stated, the high technical and managerial capability of that team, their ability to work together, and the very professional way they have handled the work has somewhat obscured the magnitude and difficulty of the job.

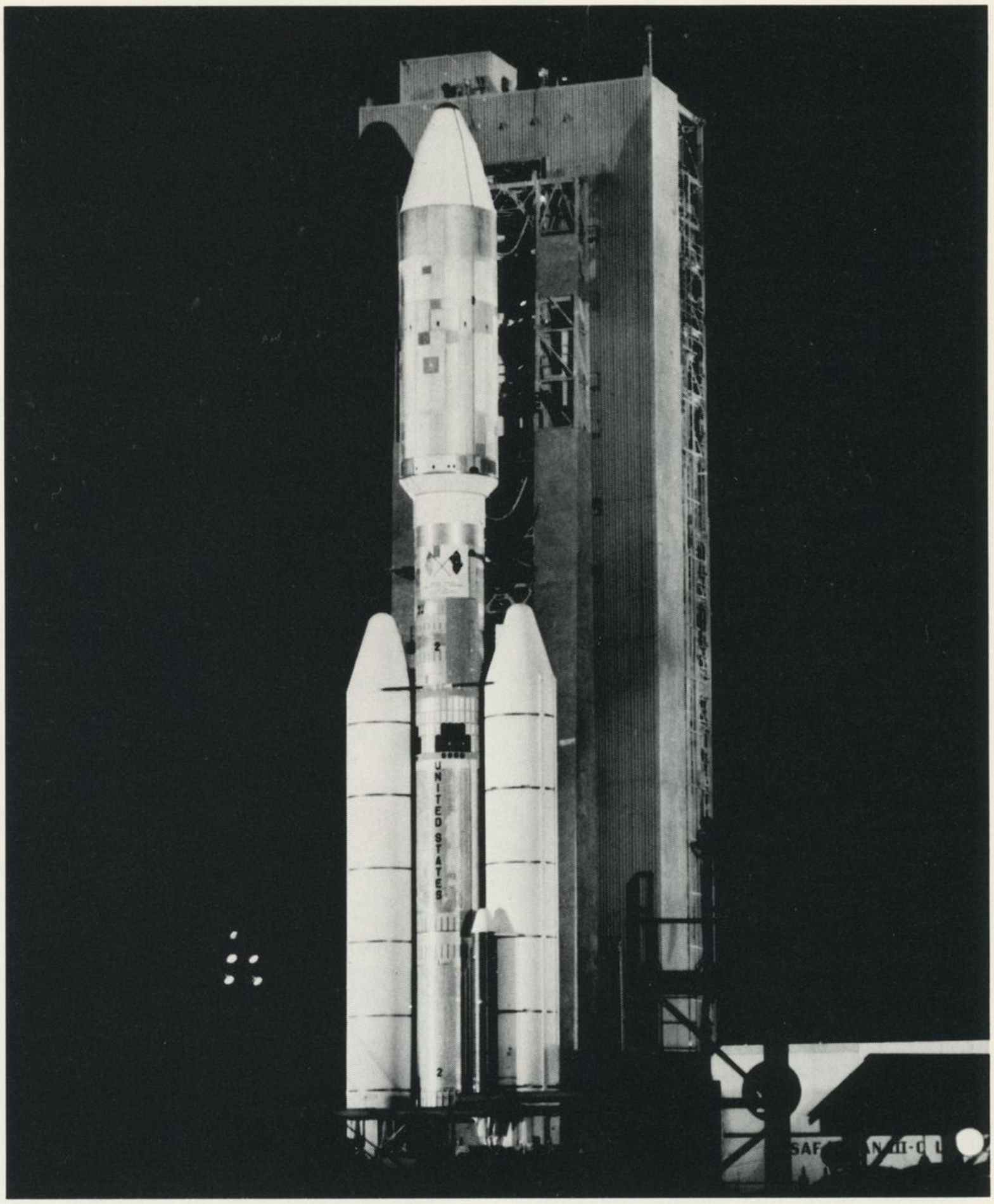
"I have to go back to my notes at the time to recall the very major concerns that we had about the difficulty of integrating the Titan and the Centaur; of getting two major, very competitive, contractors working together; of getting the NASA and Air Force organizations to cooperate constructively and of sorting out the complicated interface between the Launch Vehicle Development Center, and the Launch Center.

"The launch would not have been as successful without the vision, technical ability, leadership and drive of a number of key individuals of which you are one. You should be very proud of your personal achievement as well as that of the Martin Marietta organization.

"Again, congratulations and many thanks for myself, the Viking team and the rest of NASA."

The Titan/Centaur continued its success pattern January when it launched the second Helios, a 800-pound U.S.-West German spacecraft to make scientific observations of the Sun. The first Helios, launched in December 1974, is operating perfectly.

Also scheduled are two 1977 Mariner spacecraft launches for flyby missions past the planets Jupiter and Saturn.



Titan/Centaur stands ready to launch Helios, a joint U.S.-West German scientific solar spacecraft.

Von Braun founds Space Institute

Charter memberships in the National Space Institute, founded by Dr. Wernher von Braun, are being accepted by the organization.

The National Space Institute is a non-profit, educational and scientific organization dedicated to communicating the benefits of the space program to the American public and will serve as a catalyst to stimulate space technologists and potential users to review and research applications of space technology in their specific fields of interest.

Three classes of individual membership are available: Senior member, $15 or more; Student, 18 or younger, $9 or more; Life member, $100 or more.

Membership information may be obtained by writing the National Space Institute, P.O. Box 23527, L'Enfant Plaza, Washington, D.C. 20024.

Thirteen inventors receive awards

Thirteen employees were recently chosen to receive awards for inventions by the division's Product Development Review Board.

Receiving awards were Thomas R. Tracey, Murlin T. Howerton, John J. McDonald, Neil J. Butterfield, David W. Neiswander, and Wayne E. Simon from aerothermal and propulsion engineering.

Donald E. Kendall, William T. Perreault, Virgil F. Young, Guy D. Lynes, Gerald E. Johnson, Robert J. Richardson, and Lee Hendrick all of Electronics.

The inventions contributed to the division's new business efforts, were instrumental in winning new business, and solved problems on current contracts.

Col. C. Wayne Keith, Chief of the Colorado State Patrol, left, receives Double-Check award pin from Richard E. Ciepiela, right, for assisting with division's Titan launch vehicle shipments.

Capt. Joe Relihan, commander of State Patrol Division 1, was one of officers honored recently by the Denver division.

Lt. G. L. McClary, left, who heads District C of State Patrol in Littleton, was presented model of Titan and plaque by William T. Gansert, right, expressing division's appreciation for escort services.

Colorado State Patrol honored for Titan escort duty

For nearly 20 years the Colorado State Patrol has voluntarily escorted shipments of launch vehicles from the Denver division to Buckley air base, helping assure safe transport of the Titans along crowded area highways.

Recently the division commended the State Patrol and three officers most responsible for the assistance.

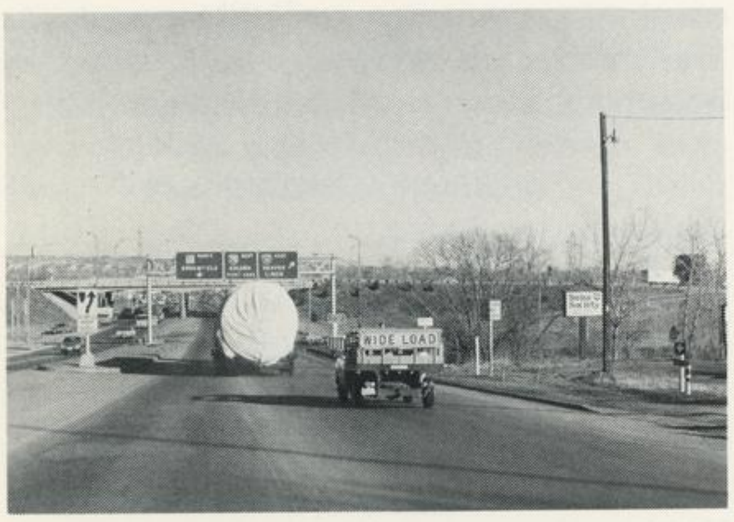
Col. C. Wayne Keith, Chief of the State Patrol; Capt. Joe Relihan, Commander of Division 1; and Lt. G. L. McClary, who heads District C of Division 1 in Littleton; each received Double-Check award pins for meritorious service.

The pins were awarded by Richard E. Ciepiela, manager of mission success for launch vehicles.

Lt. McClary was given a Titan model with a plaque noting the division's appreciation for the escort service. William T. Gansert of launch vehicle manufacturing presented the model.

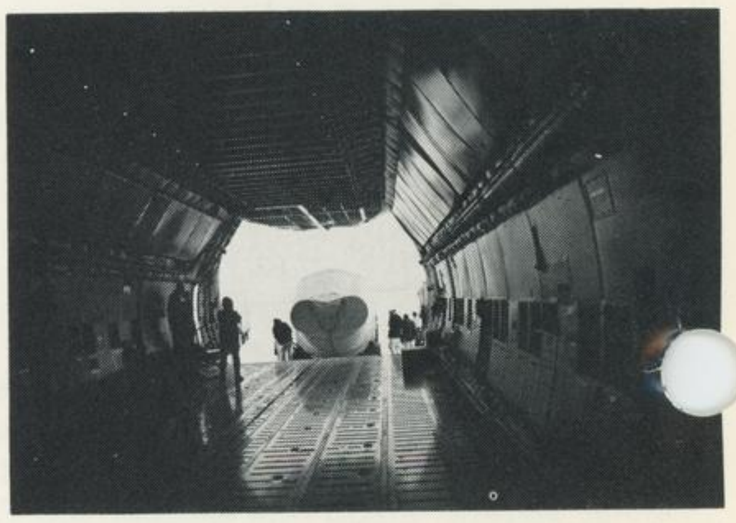
Shipping a Titan is a major undertaking and requires expert loading, transporting, and unloading. Martin Marietta loadmasters responsible for the move are LeRoy Riel and John W. Parrish. Drivers who pilot the trucks from the division to the air base are John Griego, Arthur Toney, and John Shephard.

With division security car leading and State Patrol car tucked in behind, a Titan launch vehicle begins its journey to Buckley.



Turning onto Interstate 70, Titan convoy moves smoothly through traffic. At Buckley,

one stage of launch vehicle is loaded aboard a U.S. Air Force C5A cargo jet. Inside C5A



camera shows there is ample room for launch vehicle stage.

Viking adjusts flight team

Separation of the roles of Project Manager and Mission Director and formation of a Viking flight team for the Viking mission and other organizational adjustments have been made by NASA's Viking Project Manager, James S. Martin Jr.

In announcing the changes, Martin said, "With the successful launch of two healthy Viking spacecraft, the scope of Viking activities focuses primarily upon the continuation of cruise operations and the completion of planetary development work in preparation for planetary operations.

"We must assure that the Viking resources are properly balanced to accomplish successfully both these critical functions. For this reason, some organizational adjustments are being made. I have reexamined the role of Project Manager and Mission Director, and I believe it is prudent for the roles to be separate."

As well as separating the project manager/mission director roles, Martin has established the Cruise Operation organization, Planetary Development organization, and Planetary Operations organization.

Several Martin Marietta people have key positions in the organizations, including:

W. O. Lowrie is on the senior staff for Cruise Operations and Planetary Operations.

J. D. Goodlette is chief engineer for the three organizations as well as resource manager for lander mission operations.

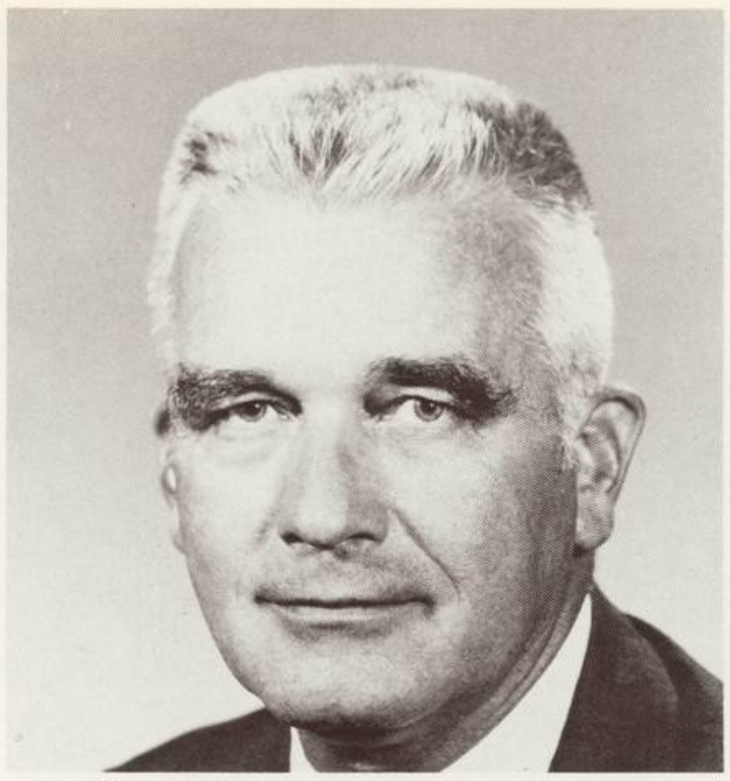
B. G. Lee is director of the science analysis and mission planning directorate for Planetary Operations and manager for the same function for Planetary Development.

R. J. Polutchko is chief of the lander support office for Planetary Operations and manages that function for the Planetary Development organization.

H. E. Craig is deputy director of Planetary Operations' spacecraft performance and flight path analysis directorate and has lead responsibility for that function in the Cruise Operations organization.

A. R. Schallenmuller is deputy director for mission control in the Planetary Operations organization and has lead responsibility for mission control in Cruise Operations.

Martin commented, "As project manager, I plan to be heavily involved in the significant aspects of cruise operations,



James S. Martin Jr.

planetary development, and subsequently planetary operations. The project manager must also assure the proper independent assessment for major decisions, assure the proper accomplishment of scientific objectives, interface with Langley Research Center, NASA headquarters, Viking contractors, and other elements, as well as public affairs. The mission director must direct the Viking Flight Team and assure that all operational activities are successfully accomplished. Detailed involvement and understanding is paramount to assuring timely decision making."

James B. Odom, Manager of the Space Shuttle external tank project at NASA's Marshall Space Flight Center, is shown at a press conference following the Critical Design Review (CDR) for external tank. The CDR, held in late 1975 at the division's Michoud operations, demonstrated that the design of the external tank "is mature enough to allow fabrication of the first deliverable item." It resulted in the release of engineering drawings for the official start of tank production.

Employees aid state in quest for Solar Institute

Colorado efforts to convince the Energy Research and Development Administration (ERDA) to locate its Solar Energy Research Institute (SERI) in the state are being aided by three Denver division staff members.

Dr. George W. Morgenthaler, vice president of technical operations, and Raymond S. Wiltshire, director of research and technology, are serving on the state's proposal development committee and Garland Roe, of new business management and planning, is assisting in the preparation of the written proposal.

The Institute is to be established by ERDA to carry out the mandate of Congress when it created the Energy Research and Development Administration.

Governor Richard Lamm and Senator Gary Hart are leading the state's efforts and were instrumental in forming the proposal development committee in the spring of 1975. The committee is made up of representatives from Colorado's major industries, businesses, universities, and governmental agencies.

In its report on the establishment of a Solar Energy Research Institute, the National Academy of Sciences, said, " . . . SERI will indeed fill an urgent need for a central intellectual and technical resource on all phases of solar energy . . . in collaboration with industry, government, university, and other participants in the national scene, SERI can make a major contribution to the early, efficient, and economic exploitation of solar energy."

Among the site selection criteria for SERI are transportation and communication, desirability of area for personnel and families, availability of resources for continuing education for SERI personnel, availability of technical and support personnel, value of location to serve also as a field station (offering high average winds, reliable insolation), land availability and cost.

It is possible the Institute would employee 1400 people, with half of them professional personnel.

Major competition for location is expected to come from California, New Mexico, Arizona, and the New England states.

Space Telescope featured at AIAA exhibit

"Our only hope of understanding the universe is to look at it from as many different points of view as possible . . . the universe is not only stranger than we suppose, but stranger than we can suppose. These words from the late John Burden Sanderson Haldane of Cambridge University nearly 50 years ago are as true now as they were then. They are echoed by the astronomers and physicists of today."

Using these words, the narrator opens the tape/slide presentation featured in the Martin Marietta exhibit at this year's American Institute for Aeronautics and Astronautics (AIAA) exhibit in Washington, D.C.

The AIAA exhibit at the Sheraton Park hotel January 27-29 will attract scientists, engineers, military and congressional leaders, and the public. Admission is by invitation only.

Martin Marietta's display is a marketing and public relations effort to inform those attending of the importance of astronomy and the scientific contribution the space telescope (formerly LST—large space telescope) can make when it is put in orbit by Space Shuttle.

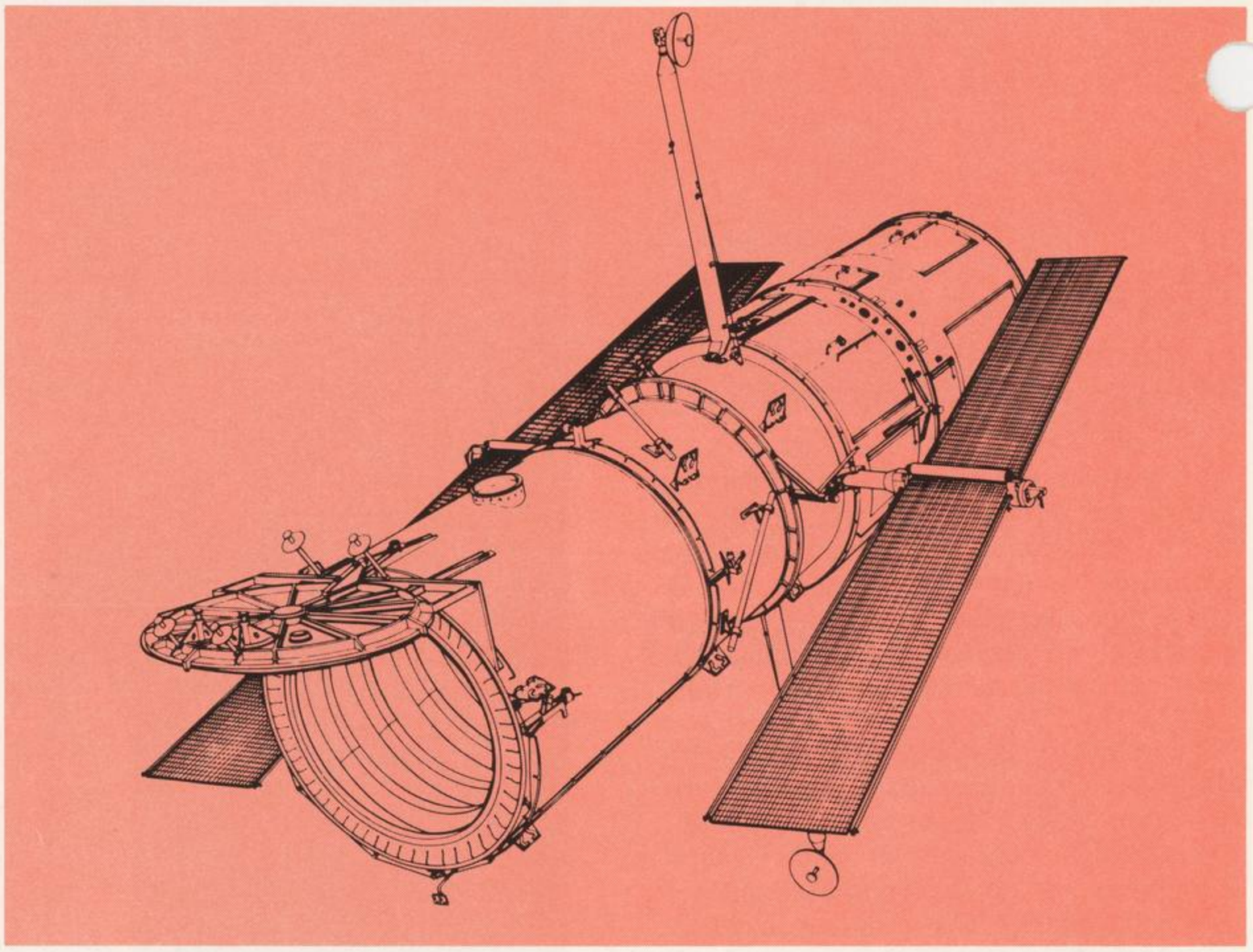
The Denver division's public relations department conducted tape-recorded interviews with five leading astronomers and excerpts from these interviews make up part of the sound accompanying the slides.

Those interviewed are Dr. John Bahcall, Institute for Advanced Studies at Princeton; Dr. Arthur Code, professor of astronomy at the University of Wisconsin; Dr. George B. Field, director of the Center for Astrophysics at Harvard University; Dr. Arthur Hoag, director of the Kitt Peak National Observatory; and Dr. Harlan J. Smith, director of the Department of Observational Astrophysics, University of Texas.

Commenting on the advantages of the space telescope, Dr. Bahcall said, "The large space telescope, because it's an orbiting telescope outside the atmosphere, can make observations which are impossible from the ground and which will be qualitatively different from terrestrial observations no matter how much money we were to spend for ground-based observations.

"There will be large parts of the universe which would otherwise be completely unknown and inaccessible to mankind if we couldn't get above the earth's atmosphere and look outside," Dr. Bahcall said.

Dr. Code added, "If you look at this star, which ought to look like a pinpoint, it turns out from a telescope to be a big fuzz ball bouncing around. One sees things similar to this on hot days. You can see mirages, you see heat waves rising off concrete, and when you have to look through the Earth's whole atmosphere, things can really bounce around so you can't get a sharp view of anything.



Space Telescope in operating position.

"If you get above the earth's atmosphere," Dr. Code continued, "and this is a very important thing to exploit, it means one can get, can observe much fainter objects, you get much finer detail of objects you observe with a telescope above the earth's atmosphere."

The Denver division is one of three firms working on phase B contracts for the space telescope. A request for proposal for phase C/D—the design and development phases—is expected this year. Kenneth P. Timmons is director of the program.

The significant business aspect of space telescope is that it is the earliest large free-flying payload associated with Space Shuttle. It will be put in orbit from the Shuttle and left there, with Shuttle revisiting it.

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IRAD program covers all areas

The division's Independent Research and Development (IRAD) program is like a checkerboard with all the squares filled.

Everything must be covered!

In 1975 there were more than 30 IRAD technology tasks singled out for emphasis. So far about 50 similar tasks are on the list for 1976.

Objective of these tasks is to maintain and advance the division's capability to win new business—new business as specified in the division's long-range plan.

IRAD is, therefore, a broad and balanced program for 1976 covering, among other things, electronics, guidance and control, sensors, software, propulsion, aerothermal, structures, materials, and systems.

Keeping abreast of technological development becomes more difficult each year with the rapid advance of science.

This is especially difficult since each task must be planned in advance; the division is not permitted to set aside funds for future, unplanned efforts.

Areas in which technological advancement is most likely to occur in 1976 in the aerospace industry include Space Shuttle and Space Shuttle science, defense systems, energy (e.g., solar energy power generation), and microprocessors.