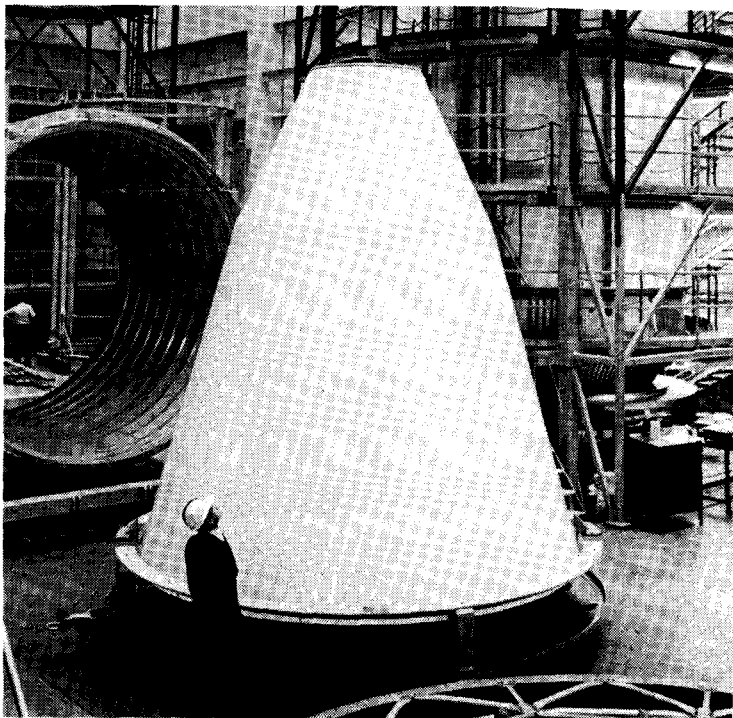


February 11, 1972



Centaur Shroud

This three-ton shroud was produced for Lewis' Centaur booster and the Viking spacecraft at Lockheed Missiles and Space Company, Sunnyvale, California. The Viking spacecraft is scheduled for a soft Mars landing in 1976. The shroud will protect the booster and spacecraft from stresses and friction as they soar through the Earth's atmosphere.

Centaur shroud passes cryo test

In a split second during the quiet evening hours last Wednesday, two latches unfastened, hinges rotated and a 6500-pound aluminum cover on a rocket broke loose at Plum Brook Station.

No alarms were sounded, no emergency crews were summoned. The events were part of a test to prove that the Centaur Standard Shroud would work properly. The shroud is a new development for NASA's largest unmanned launch vehicle of the coming decade, the Titan-Centaur.

In much the same way as clothing protects the body, a shroud protects the launch vehicle and spacecraft. The Centaur shroud keeps the spacecraft and Centaur launch stage from freezing for two hours when liquid hydrogen fuel at $-423^{\circ}\text{Fahrenheit}$ is being pumped into the Centaur just prior to launch. It also shields them from heat and pressure of the atmosphere after launch during ascent through the atmosphere. Once these goals are reached, the shroud must be safely "blown off", out and away from the payload it so carefully protected.

The test on Feb. 14 was the third of a series to check out the shroud in the worst possible weather conditions the vehicle would face when launched from the Cape. In a Plum Brook test stand 200 feet tall, the shroud, 14 feet wide and 58 feet high, was kept warm during the two-hour Centaur tanking. Then, the shroud was split into two halves to prove that the pyrotechnic joints and rotating hinges would perform as expected. The test was successful, confirming an important part of the total qualification of the shroud. The first two tests of the cryogenic unlatch series failed because a tube broke, spraying the vehicle with unwanted debris, and a seal did not function properly. Neither of these failures resulted in any changes to the shroud shell itself, made under a Lewis contract to Lockheed Missiles and Space Company of Sunnyvale, California.

The Centaur Shroud Development Program is NASA's largest vehicle test program currently underway.

In the Lewis program will be tests of the strength of the shroud conducted at Plum Brook through the summer, and then a series of tests in the fall to prove that the shroud

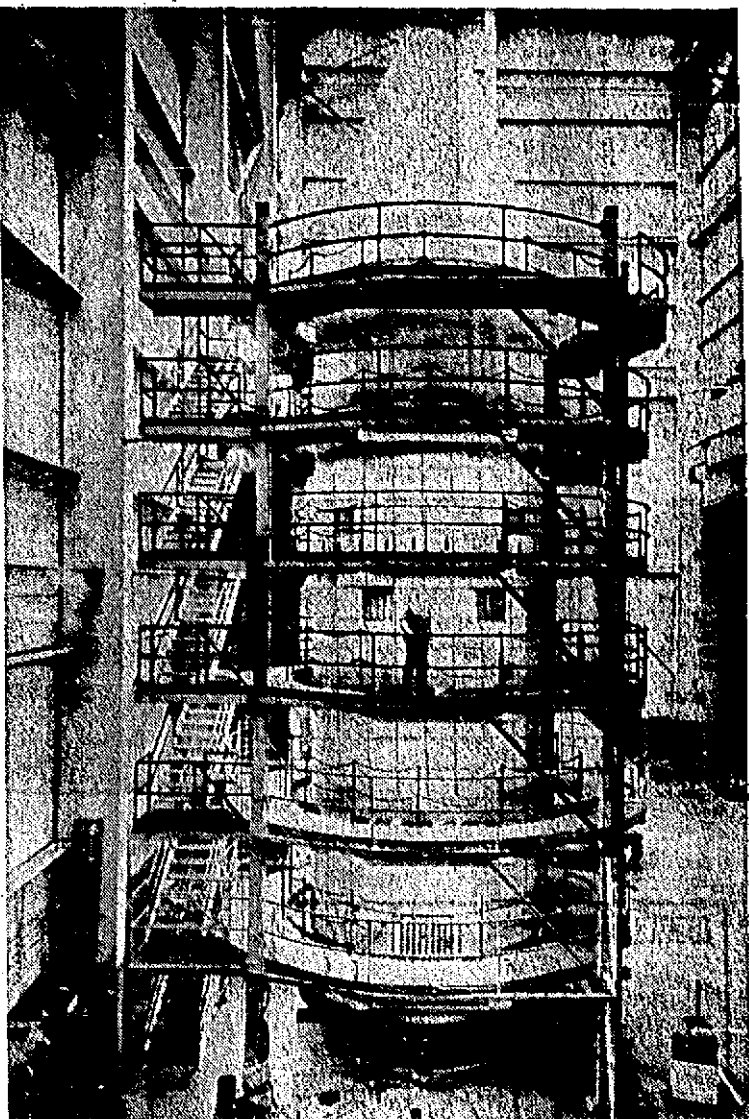
(Continued on page 2)

Cryo test... *(Continued from page 1)*

will pull away properly after being exposed to heat in flight and the vacuum of space. These tests will be in Plum Brook's Space Power Facility, a 100x120 foot chamber in which the air can be thinned to simulate space and heat can be applied to the shroud. There, the shroud again will be split into two halves, being caught by large nets on each side of the vehicle assembly.

The Centaur Standard Shroud testing at Plum Brook may be one of the last major programs run there for some time. Under the current Federal budget cutbacks, Plum Brook nuclear reactor work is being terminated, and by June of 1974 the Station will be placed in a standby condition, reducing the present work force of nearly 600 persons to a maintenance and security crew. About 180 of the Station's personnel are involved in the shroud tests.

The Centaur launch vehicle is being modified to be boosted by a Titan III booster for high-performance planetary missions as well as for placing large spacecraft into orbit around the Earth. The total thrust of the Titan III/Centaur shortly after liftoff is about 2.3 million pounds. The proof test of this vehicle combination is scheduled for early 1974. Some missions to be flown on the Titan/Centaur are the Viking Spacecraft, a dual landing mission to Mars in 1975, and a cooperative Sun-study mission with the West German government called Helios.

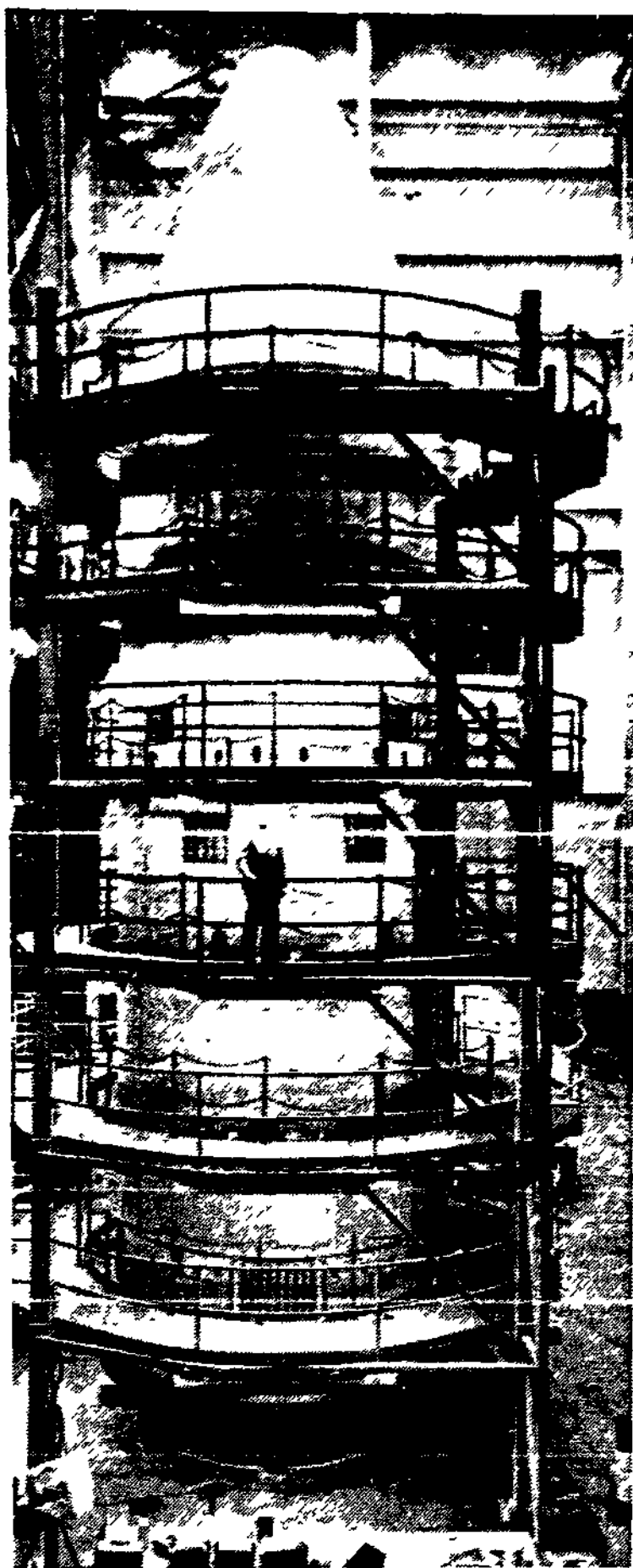


UPI Telephoto

Aiming for Mars

This six-story Centaur standard shroud dwarfs Program Manager Malcolm Avery, standing on the third "deck" of a test stand at Lockheed Missiles and Space Co. in Sunnyvale. A total of 14 feet in diameter and weighing more than three tons, the aluminum-magnesium-steel structure is undergoing final alignment before being ship-

ped to NASA's Lewis Research Center, Cleveland, for extensive testing. Shrouds protect the spacecraft and Centaur boosters from stresses and aerodynamic heating as they soar through the Earth's atmosphere. Centaur boosted spacecraft are destined for a soft landing on Mars in 1976.



SPACECRAFT SHIELD — This massive Centaur Standard shroud will protect a Viking spacecraft during launch and ascent through the earth's atmosphere enroute to Mars for a bicentennial landing on July 4, 1976. Once free of the atmosphere, the spacecraft will shed the shroud and continue its voyage. Weighing more than three tons, the six-story shroud contains nearly 5,000 pounds of aluminum, including main structural ring forgings, which are 14 feet in diameter, and are made at Aluminum Company of America's Cleveland Works. The aluminum shroud, as big as the fuselage of a jet transport, is seen here on a test stand during final alignment checks with a laser beam.