P66-10022

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
WASHINGTON, D.C. 20546

TELS. WO 2-4155
WO 3-6925

FOR RELEASE: FRIDAY A.M.
JANUARY 28, 1966

RELEASE NO: 66-18

PRESS KIT

PROJECT: Scout Reentry-E

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TO BE LAUNCHED NO EARLIER THAN FEBRUARY 7, 1966.

NEWS NASA
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NASA TO LAUNCH

5TH SCOUT REENTRY

HEAT EXPERIMENT

A flight experiment to determine how well phenolic nylon spacecraft heat shield material performs under actual reentry conditions will be launched on a Scout vehicle no earlier than Feb. 7 by the National Aeronautics and Space Administration from NASA's Wallops Station, Wallops Island, Va.

Total Scout payload weight to be flown will be just under 400 pounds. Payload weight at the start of reentry will be about 210 pounds. Including the adapter linking it to the Scout's fourth stage, the payload is about four feet long. It tapers from 11½ inches at the nose cap to 20½ inches at its widest point.

The phenolic nylon material to be tested is a type of plastic, the density of which is made quite low by mixing in it millions of microscopic plastic spheres known as microballoons. It is classified as a charring-ablation material.

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The reentry experiment was designed and is managed by scientists of NASA's Langley Research Center, Hampton, Va., to verify under actual flight conditions an extensive series of tests of low density phenolic nylon made in the best available laboratory simulation facilities.

From the flight results, NASA scientists will be able to determine the accuracy of current theories for predicting heat shield performance under conditions that can be only partially simulated on the ground.

The low-density charring ablator material test will be the fifth flight in the Langley Center's Scout Reentry Heating Project sponsored by NASA's Office of Advanced Research and Technology (OART).

The Scout flight is expected to reach a reentry speed of more than 18,000 miles per hour.

Four stages of the Scout launch vehicle, plus a 17-inch spherical rocket attached to the payload as a velocity package, will subject the phenolic nylon heat shield material to a combination of very high heating rates and conditions of air flow beyond those presently attainable in laboratory simulation. Heating time will be about two minutes.

Temperature readings and ablation measurements will be gathered by thermocouples and by two types of ablation sensors in the charring nose cap.

The payload nose cap is instrumented with 26 thermocouples, and temperatures in the supporting structure of the payload afterbody will be measured by four additional thermocouples.

Sixteen ablation sensors are imbedded in the nose cap to measure the rate at which the surface recedes during the process of ablation.

Twelve of the 16 ablation sensors are of the spring wire type. Four sensors are of the "light pipe" type which obtain information on the progress of ablation by optical means.

Temperatures of the tungsten substructure beneath the phenolic nylon will be measured by two thermistors.

The term "ablation" has come into engineering use during the past 10 years. It describes a complex process which takes place on the forward face of a heat shield during the very high energy conditions of atmosphere entry.

Phenolic nylon is an example of the charring ablator type of heat shield, which is usually composed of plastic resin materials reinforced with various added organic or inorganic substances.

Heat shields of charring ablation material protect a spacecraft in several ways. At the beginning of reentry heating they begin to decompose chemically, absorbing some heat in the process. During decomposition, gases are evolved and dilute the hot air over the heat shield surface.

Finally, at the surface, a charred layer of coke-like material develops, capable of operating at very high temperatures to radiate heat away from the spacecraft. The uncharred inner layers provide an insulating effect throughout the reentry.

After launch from Wallops Island, the first two Scout stages fire in rapid succession to a second stage burnout altitude of 54 miles. The remainder of the launch vehicle then coasts upward to an altitude of about 110 statute miles.

Near the peak of the trajectory, during third stage burning, the Scout guidance system begins positioning the vehicle to the desired reentry angle of minus 7.3 degrees. The fourth stage fires on the downward leg of the trajectory, followed immediately by spacecraft separation and ignition of the 17-inch spherical velocity package motor.

When the velocity package motor has completed its task, the payload will be some 715 statute miles down range at an altitude of 67 miles and moving at more than 18,000 miles per hour toward the Earth's atmosphere where the reentry experiment takes place.

Following reentry, the payload will drop into the Atlantic Ocean about 1,150 statute miles from Wallops Island, at a point 450 statute miles southeast of the Bermuda Islands. There will be no attempt to recover the payload. Total flight time will be just over 10 minutes.

(End of General Release; Background Information Follows)

Tracking and Telemetry

Radar, telemetry and optical coverage will all play a part in gathering detailed information on the flight performance of the charring ablator payload.

Telemetered data broadcast from the experimental reentry body will be received and recorded at Wallops Island, Langley Research Center, Bermuda, and in the reentry area aboard ships and aircraft operated by NASA and the Air Force's Eastern Test Range.

Two telemetry links are provided in the payload. One will transmit information on the experiment and on vehicle performance as the various flight events occur. The second system includes a continuous loop tape recorder in the payload to store flight information and transmit it after a delay of 85 seconds.

The delayed telemetry system, which has been used successfully on previous NASA flight reentry experiments, is designed to circumvent the predicted signal loss which occurs during the blackout phenomenon caused by ionization of the air surrounding the reentry vehicle.

On the forthcoming flight, blackout is predicted to begin about seven minutes after Scout liftoff and to continue for slightly more than one minute.

Two aircraft stationed in the reentry area will carry optical equipment to photograph the visible portion of the reentry flight. Since reentry will take place far from the nearest land, there will be no ground-based optical coverage. The flight will be made in complete darkness after sunset during the dark of the Moon.

Precise data on atmospheric conditions is required for proper evaluation of the results of the experiment. To obtain the needed information, a series of Arcas meteorological sounding rockets will be launched from Bermuda, Cape Kennedy, Antigua, and the radar tracking ship before and after the flight.

Scout Launch Vehicle

Scout is a multi-stage launch vehicle using four solid propellant rocket motors capable of carrying payloads of varying sizes on orbital, space probe, or reentry missions. Scout is 72 feet tall and weighs 20 tons at liftoff.

The four rocket motors are interlocked, with transition sections which contain guidance, control, ignition, and instrumentation systems, separation mechanisms, and the spin motors required to stabilize the fourth stage. Guidance is provided by a strapped-down gyro system, and control is achieved by a combination of aerodynamic surfaces, jet vanes, and hydrogen peroxide jets.

Prime contractor for the Scout is Ling-Temco-Vought, Dallas, Texas.

Scout is capable of placing a 320-pound payload into a 300 nautical mile orbit or of carrying a 100-pound scientific probe 18,000 miles from the Earth.

Scout stages include the following motors:

First stage:	Algol 11B - 100,944 pounds thrust, burning time 80 seconds.
Second stage:	Castor 1 - 63,109 pounds thrust, burning time 46 seconds.
Third stage:	Antares 11 (ABL X-259) - 22,606 pounds thrust, burning time 34.9 seconds.
Fourth stage:	Altair 11 (ABL X-258) - 6,414 pounds thrust, burning time 22.2 seconds.

Scout Reentry Heating Project Officials

The following are key officials for Scout Reentry Heating Project:

Reentry Heating Experiment - Langley Research Center

Joseph M. Hallissy, Jr., Project Manager

William A. Brooks, Jr., Experimenter

Marvin B. Dow, Experimenter

Milton L. Williams, Technical Project Engineer

Charles E. Feller, Instrumentation Project Engineer

John N. Daniel, Tracking and Data Acquisition Engineer

Scout Launch Vehicle - Langley Research Center

R. D. English, Head, Scout Project Office

James D. Church, Operations Manager

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Robert D. Duffy, Test Director

Melvin Saltzberg, Project Engineer

NASA Headquarters

Milton B. Ames, Jr., Director, Space Research and Technology Division, Office of Advanced Research and Technology

Ballard E. Quass, Scout Reentry Heating Project Director

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