CHAPTER 3

Experiments

Explorer I

Food

Freedom 7 (MR-3)

NASA
C-61146

Office of Public Information
NASA Lewis Research Center
Cleveland 35, Ohio
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C-61146

H. Warren Plohr (right), scientist at the Lewis Research Center, discusses Lewis research in electric propulsion for deep space missions with William Baker (left), radio WGAR, and David Gulbenkian, Harvard National Merit Scholarship winner who is working at Lewis this summer as a student trainee. Gulbenkian is a graduate of Euclid High School, resides at 21031 S. Lake Shore Blvd. They are shown with a model of a proposed space vehicle with clusters of ion engines supplying the thrust. This is one of many exhibits and displays planned for "Youth Days" Aug. 4 and 5 at the Lewis Research Center.

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APR 5 1963
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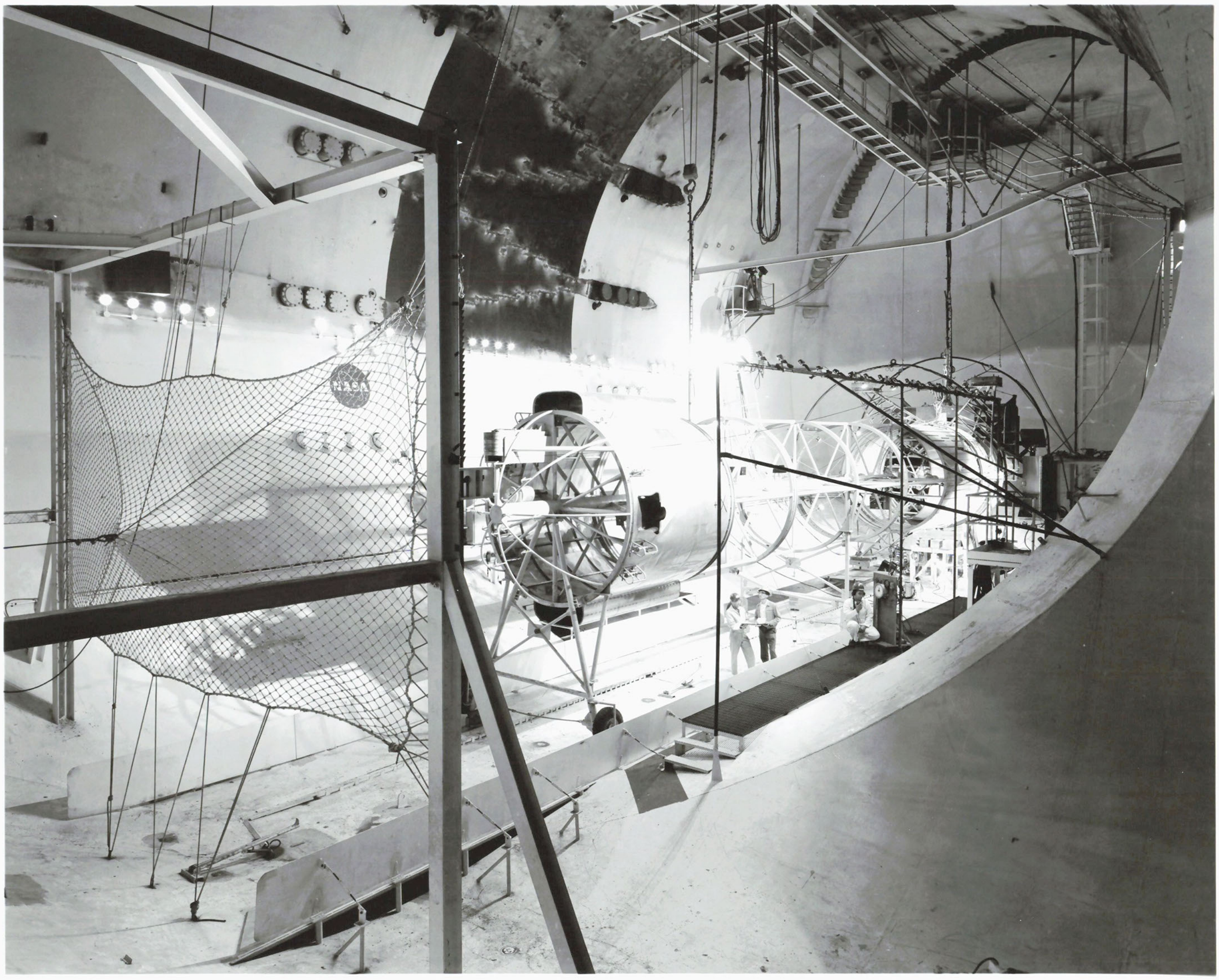
D/6038 NASA-



NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
400 MARYLAND AVENUE, SW, WASHINGTON 25, D.C.

FOR RELEASE: November 24, 1963 - AM
PHOTO NO.: 63-Centaur-11

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Simulated Atlas-Centaur vehicle configuration in Lewis Research Center's ~~space~~ power chamber, a former wind tunnel converted for use in Atlas-Centaur separation tests and Centaur environmental studies. The chamber can be exhausted to an altitude of 100,000 feet. Tests were conducted to verify a new Atlas-Centaur separation system consisting of linear-shaped charges, which cut through the interstage adapter, and retrorockets mounted on the aft end of Atlas. Atlas portion is retrieved by nylon net.

A 19000

CLEVELAND PRESS
MAY 20 1964
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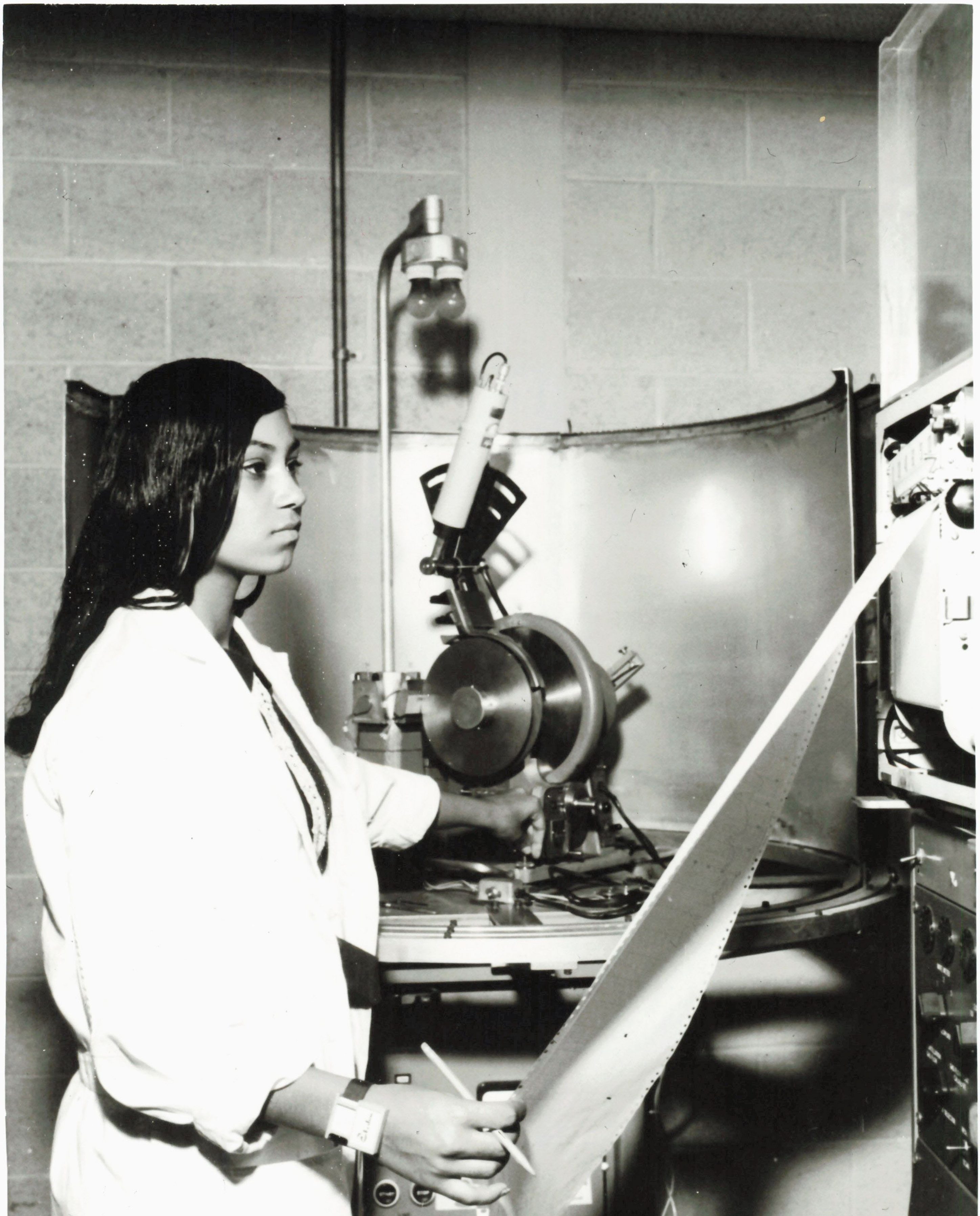

A16038 NASA-research

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
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SUMMER WORKER -- Rosetta Taylor examines a specimen by x-ray diffraction in the Materials and Structures Division as part of a youth program at the National Aeronautics and Space Administ's Lewis Research Center, Cleveland.

PHOTO CREDIT--NASA or National Aeronautics and Space Administration

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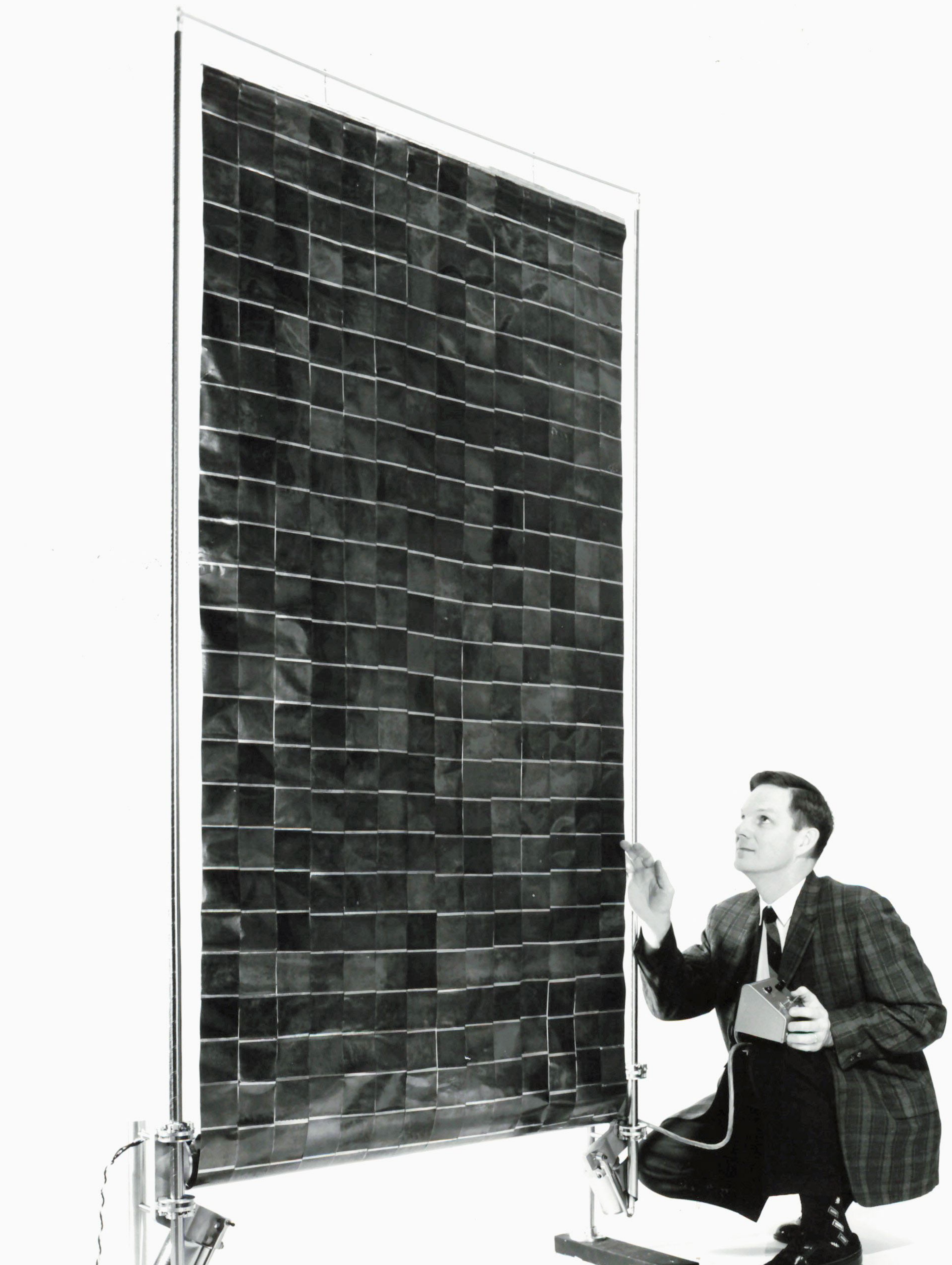
C-61147

H. Warren Plohr (right), scientist at the Lewis Research Center, explains how laboratory's 8- by 6-foot wind tunnel was used to conduct research on base heating problems of the Saturn launch vehicle. Looking on is William Baker of radio WGAR. This Saturn model will be seen by Cleveland youth Aug. 4 and 5 when they visit the Lewis Research Center for "Youth Days."

CLEVELAND PRESS
APR 5 1963
REFERENCE DEPT.

D16038 NASA

NASA
C-66-4546



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NASA Lewis Research Center
Cleveland, Ohio 44135
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FOR IMMEDIATE RELEASE

C-66-4546

This self-extending, retractable, flexible solar array is undergoing study at NASA's Lewis Research Center. Although not designed for flight, the unit does demonstrate the feasibility of obtaining solar power through flexible sheets of thin-film cells which can be rolled up during launch much like a window shade. This prototype array is 7 foot long, 3.3 feet wide and consists of 378 self-contained thin-film solar cells.

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APR 7 1967
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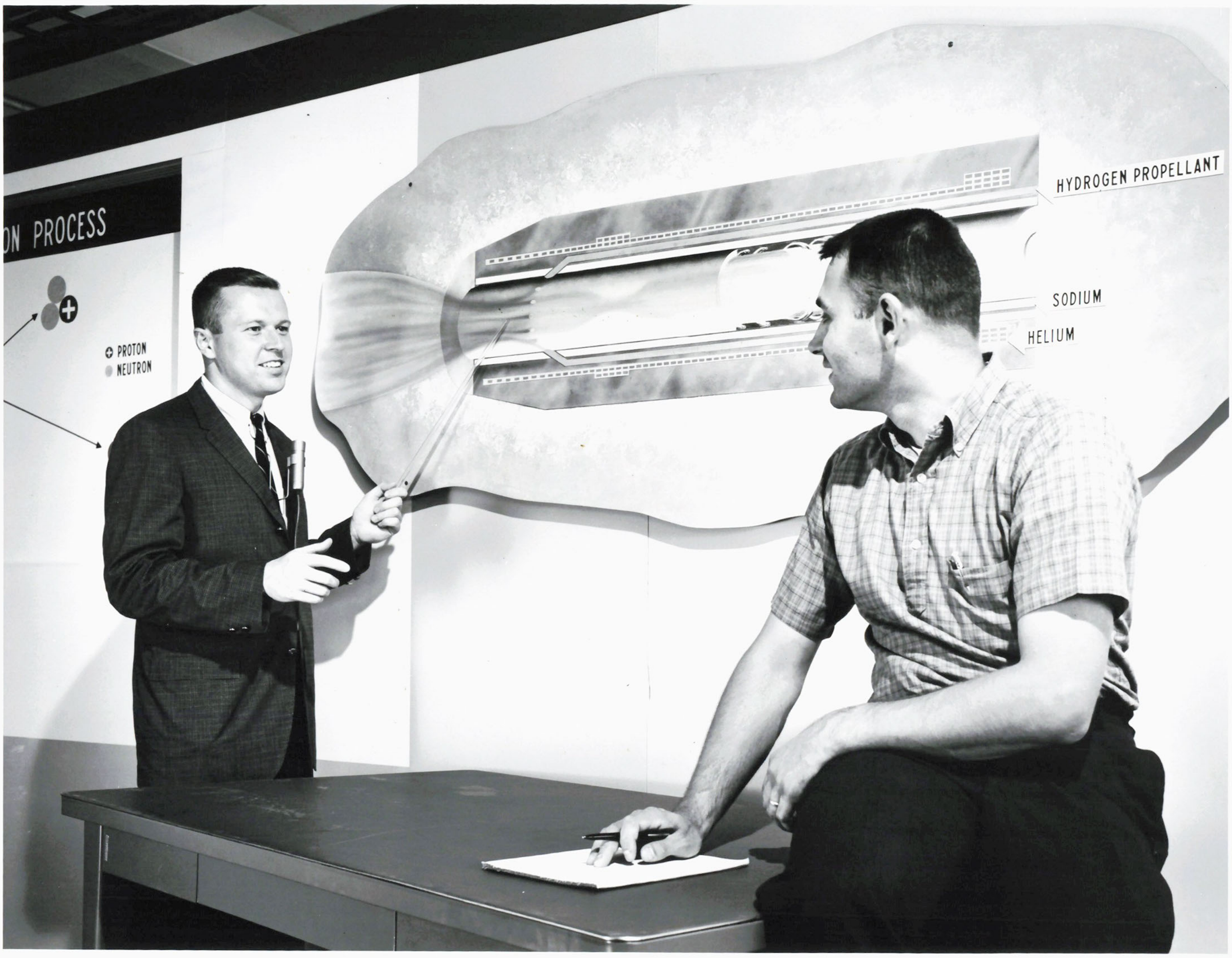
NASA
C-61131


ON PROCESS
PROTON
NEUTRON
HYDROGEN PROPELLANT
SODIUM
HELIUM

D/6038 NOSA

CLEVELAND PRESS
AUG 14 1962
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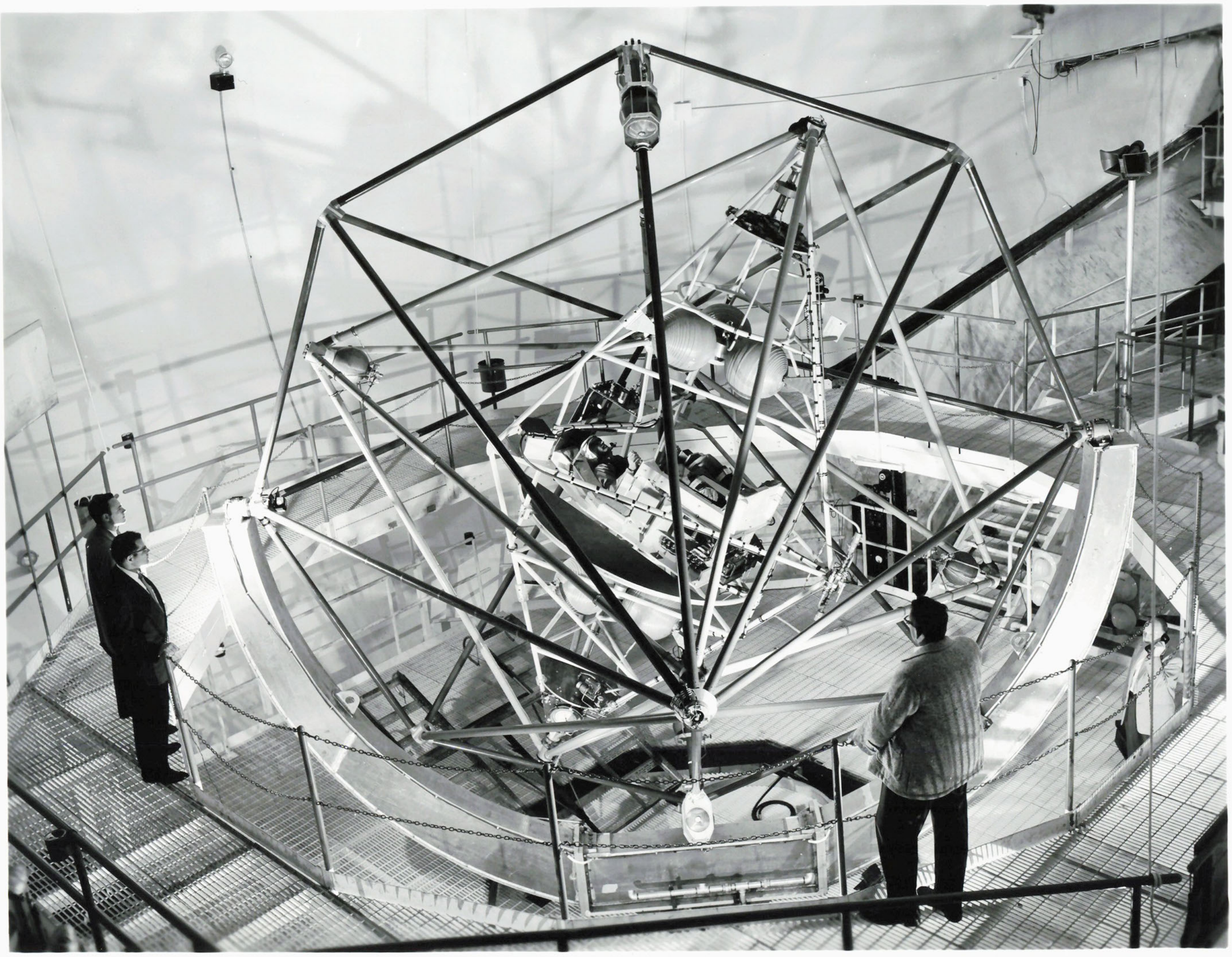
C-61131

Don Chubb (left) and Jack Reinmann of the Lewis Research Center discuss illustration of a thermonuclear rocket which will be displayed during "Youth Days" Aug. 4 and 5 at the NASA Cleveland laboratory.

NASA
C-51948



Wind Tunnel

010038 NASA -

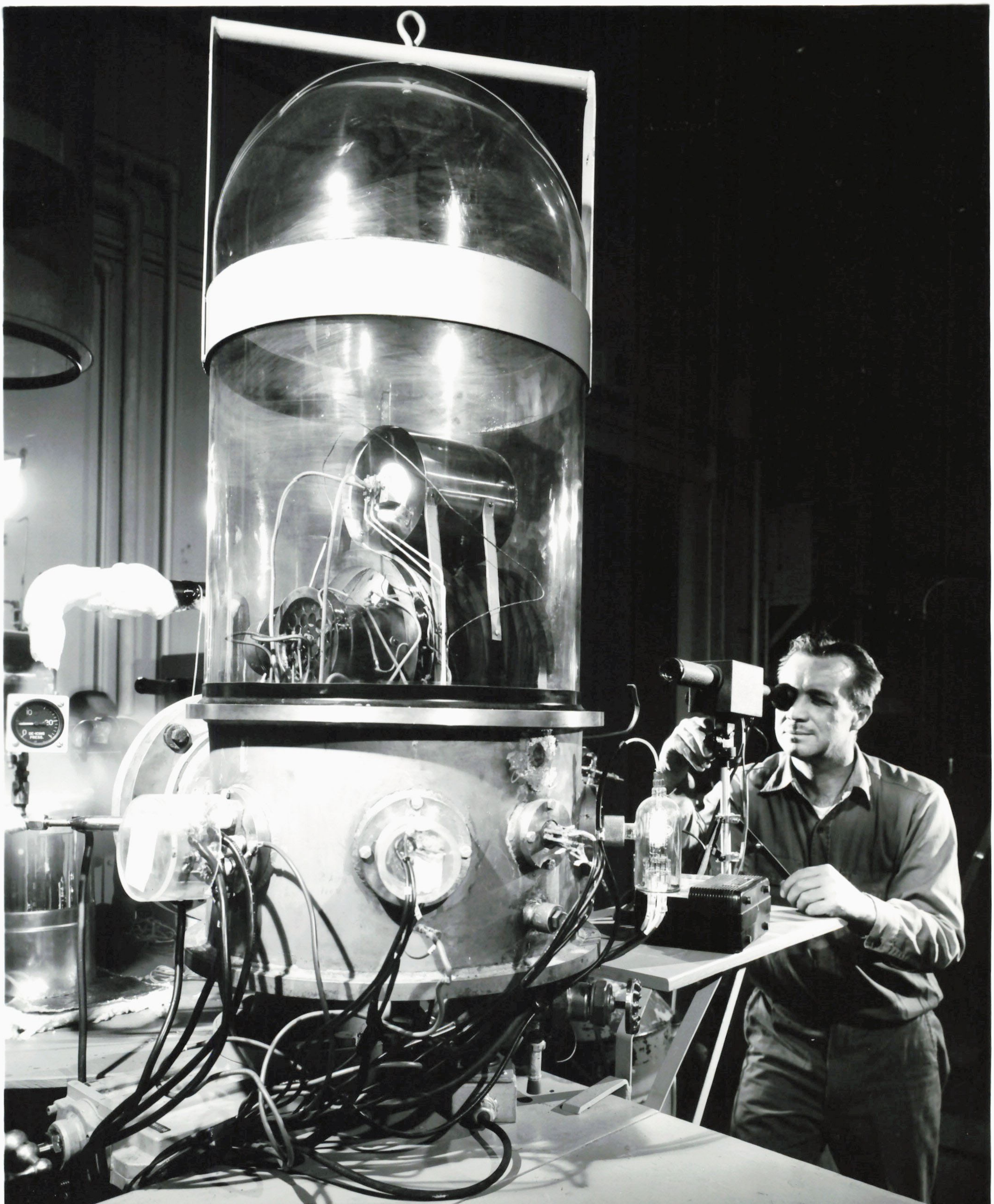
From Public Information Office
Lewis Research Center, NASA
Cleveland, Ohio

For Immediate Release - 2 p.m., Friday, April 29, 1960

C-51948

Today the Altitude Wind Tunnel at Lewis Research Center is the scene of several Project Mercury research programs, one of which is the Multiple Axis Test Inertia Facility. MASTIF is a device for simulating space flight problems and man's reaction to them. The three gimbal cages simulate all space flight attitudes -- yaw, roll, and pitch -- for the space capsule mockup in which the pilot rides in a life support couch. The rig is designed to test pilot reactions to disorienting motions in space and for use in design of space orientation systems.

NASA
C-62500



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FOR IMMEDIATE RELEASE

C-62500-1

The test in progress here is designed to study the endurance of different filaments that will be used in flight models of ion rocket engines. Lewis electric propulsion engineers hope to obtain lifetimes from 1,000 to 10,000 hours for their tiny ion engines. Filament lifetime is one of the critical factors in endurance. The ion source must be tested in the high vacuum (equivalent to about a 350-mile altitude) of the bell jar because the presence of air would not only stop the ionization process, but also would burn the hot filament. In this experiment, as in a flight engine, the ion source uses mercury vapor. Liquid nitrogen is pumped through coils inside the bell jar to condense the mercury vapors coming from the ion source. Two filaments are heated at the same time for comparison, the bottom one in the ion source and the top one outside the ion source.

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CLEVELAND PRESS
SEP 28 1964
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NASA
C-61196

Office of Public Information
NASA Lewis Research Center
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FOR IMMEDIATE RELEASE

C-61196

John H. Collins, Jr., Executive Chairman of the NASA-Cleveland Press Youth Days program, is here examining an exhibit on nuclear propulsion. The "Nerva" (nuclear engine for rocket vehicle application) will be used in spacecraft to supply the thrust for extended periods of time needed on manned deep-space missions. Nuclear propulsion is currently under study throughout NASA. There are many problems associated with the constructing of a working nuclear propulsion system for manned flight. One of the most pressing is that of shielding the space crew from the ionizing radiation that is a necessary byproduct of the fission process in the reactor. Exhibits relating to nuclear propulsion were designed to explain both the inherent problems and the tremendous potential of nuclear rocket propulsion.

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CLEVELAND PRESS
AUG 4 1962
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A 16038 NASA

NASA
C-61136

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C-61136

Dave Crawford of the Lewis Research Center completes illustration of the moon for use in lunar displays at "Youth Days" open house Aug. 4 and 5 at the NASA laboratory.

CLEVELAND PRESS
AUG 14 1962
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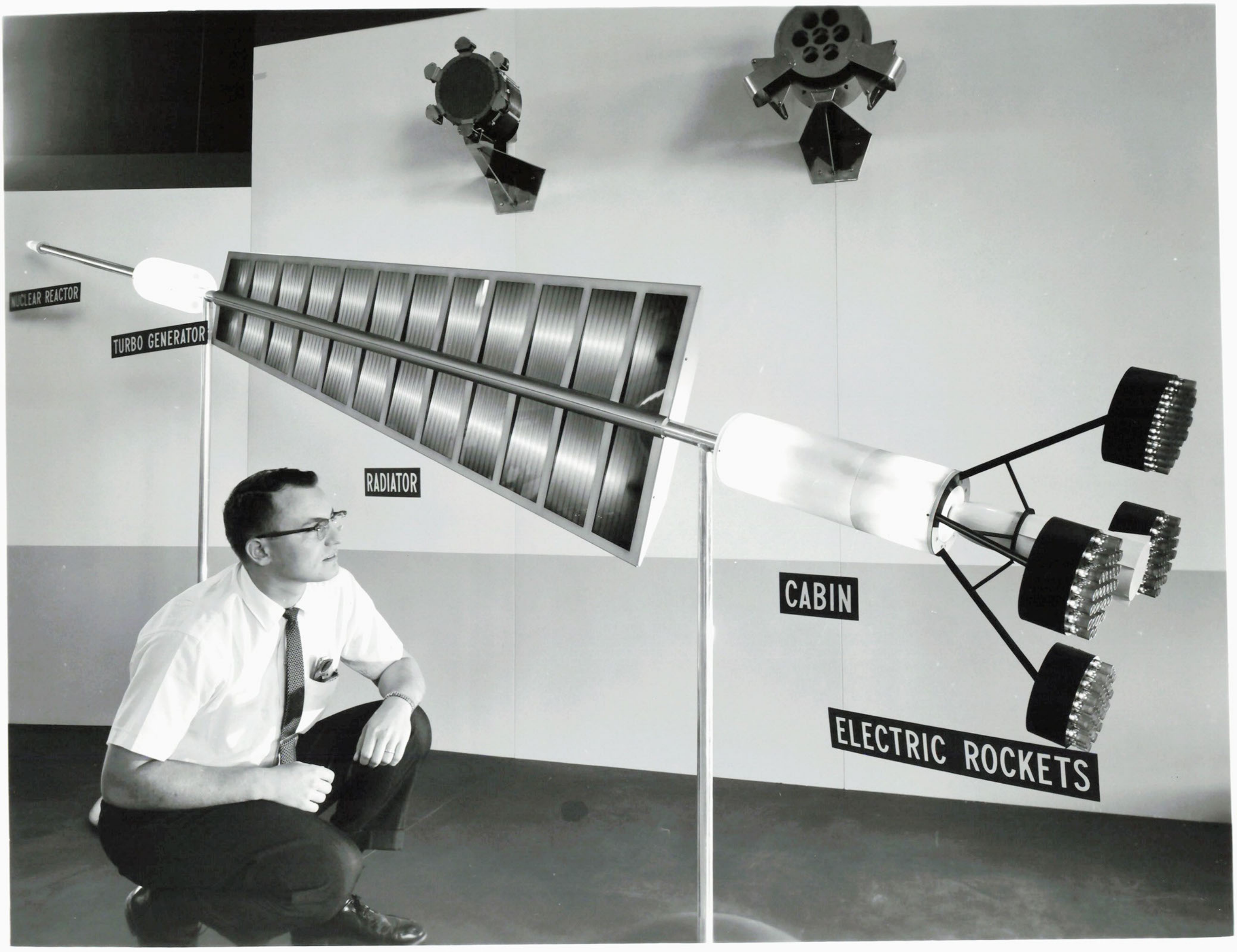
D/66 38 NASA

NASA
C-61190


NUCLEAR REACTOR
TURBO GENERATOR
RADIATOR
CABIN
ELECTRIC ROCKETS

Office of Public Information
NASA Lewis Research Center
Cleveland 35, Ohio
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C-61190

Propulsion, the principal research interest of the Lewis Research Center, can be achieved in a number of ways. All of them require that one form of energy be converted into another. In the chemical rockets now in use, the heat energy of burning fuel produces hot gaseous exhausts that perform mechanical work in driving the rocket upward. Electric rockets further require an electric power generating system. The electric rocket model shown here was prepared for "Youth Days." Such rocket vehicles will be used in deep space missions to Mars and Venus or beyond. The variable thrust power and reliable shutoff and re-ignition of electric rockets make them ideal for extended manned flights. Electric rockets use many power sources--ions, plasmas, arc jets, the sun. Lewis propulsion experts are interested in all these phases of electric rockets.

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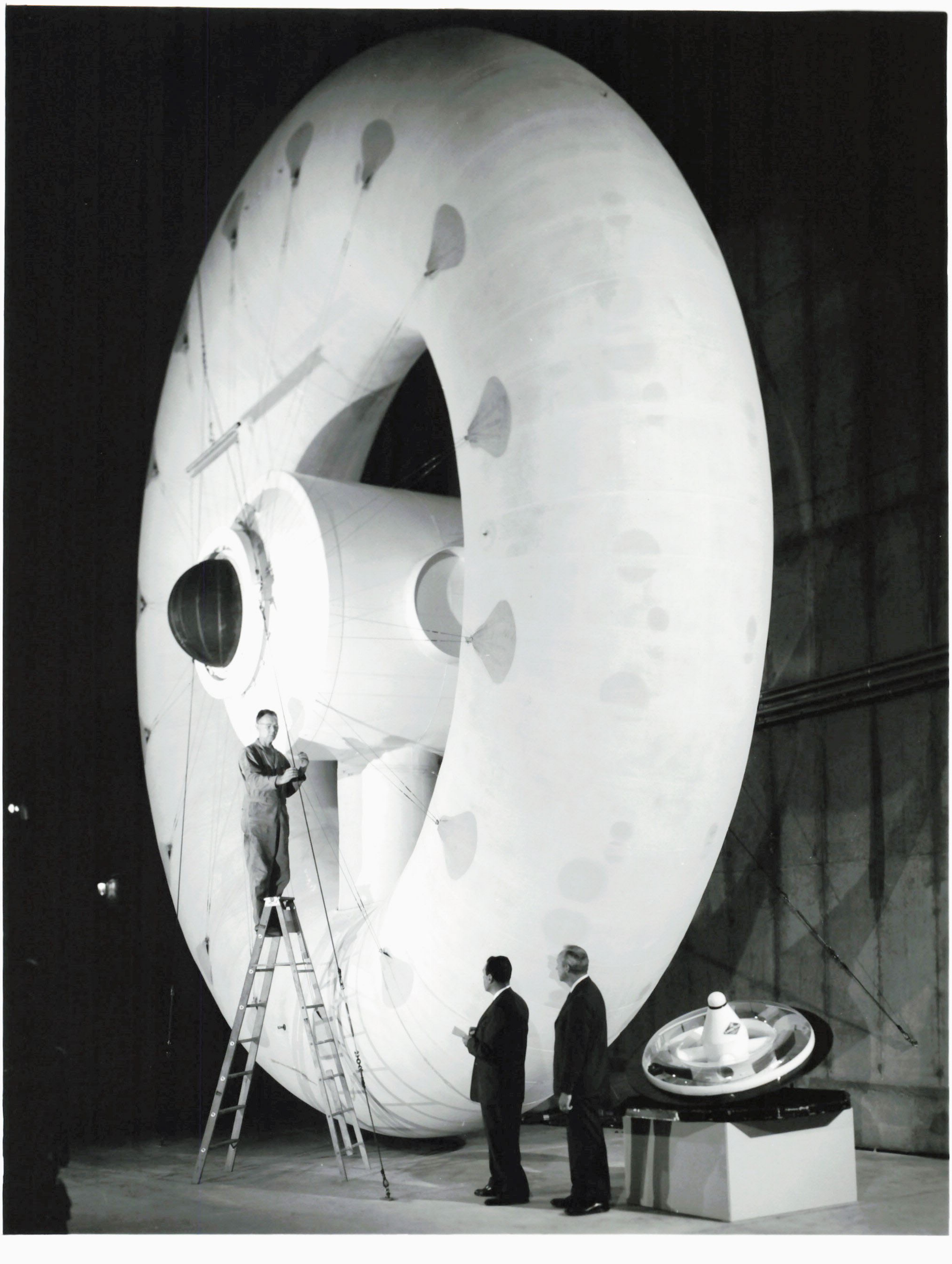

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C-61193

A 30-foot research model of an inflatable space station is being displayed as part of the "Youth Days" exhibit at the Lewis Research Center. The three-story structure, shaped like a doughnut with a canister as its core, is constructed of rubberized fabric. Once in space, the station can be inflated and will be able to induce an artificial gravity. This necessary rotation can be accomplished with compressed gas or solid propellant jets mounted on the outside of the doughnut. This is one of several structural concepts for orbiting space stations under study by NASA's Langley Research Center in Virginia. The station would provide living quarters for at least three men, and would contain kitchen, bunks, controls to orient the station, communications system, in addition to any equipment required for specific missions. The inflatable, built-in furnishings are also constructed of rubberized fabric.

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CLEVELAND PRESS
AUG 14 1962
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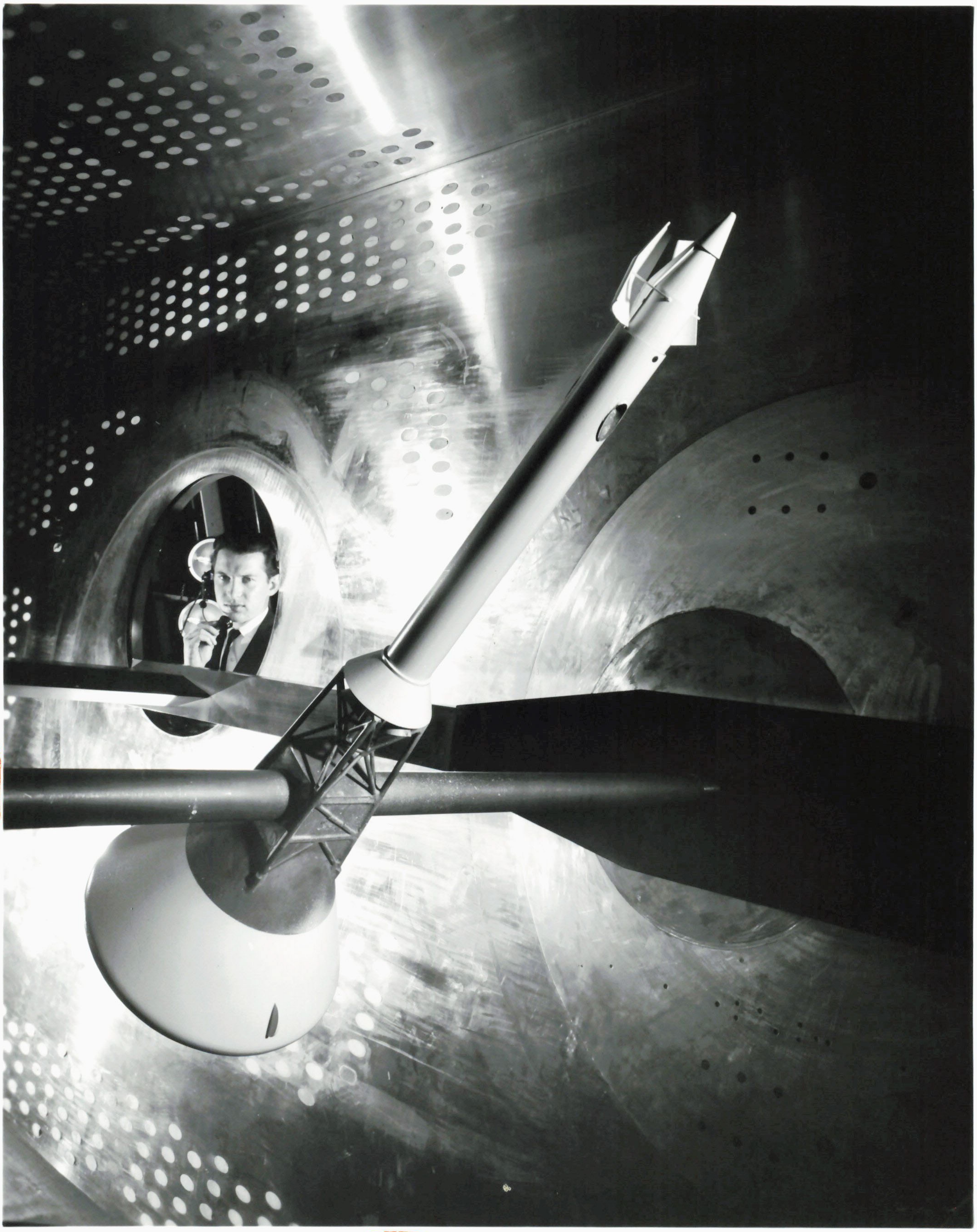
NASA
C-72479



B/6038 NASA
CLEVELAND PRESS
OCT 29 1964
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News

NASA LEWIS RESEARCH center
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PUBLIC INFORMATION OFFICE
PHONE - (AREA CODE 216) 433-4000 EXT. 415

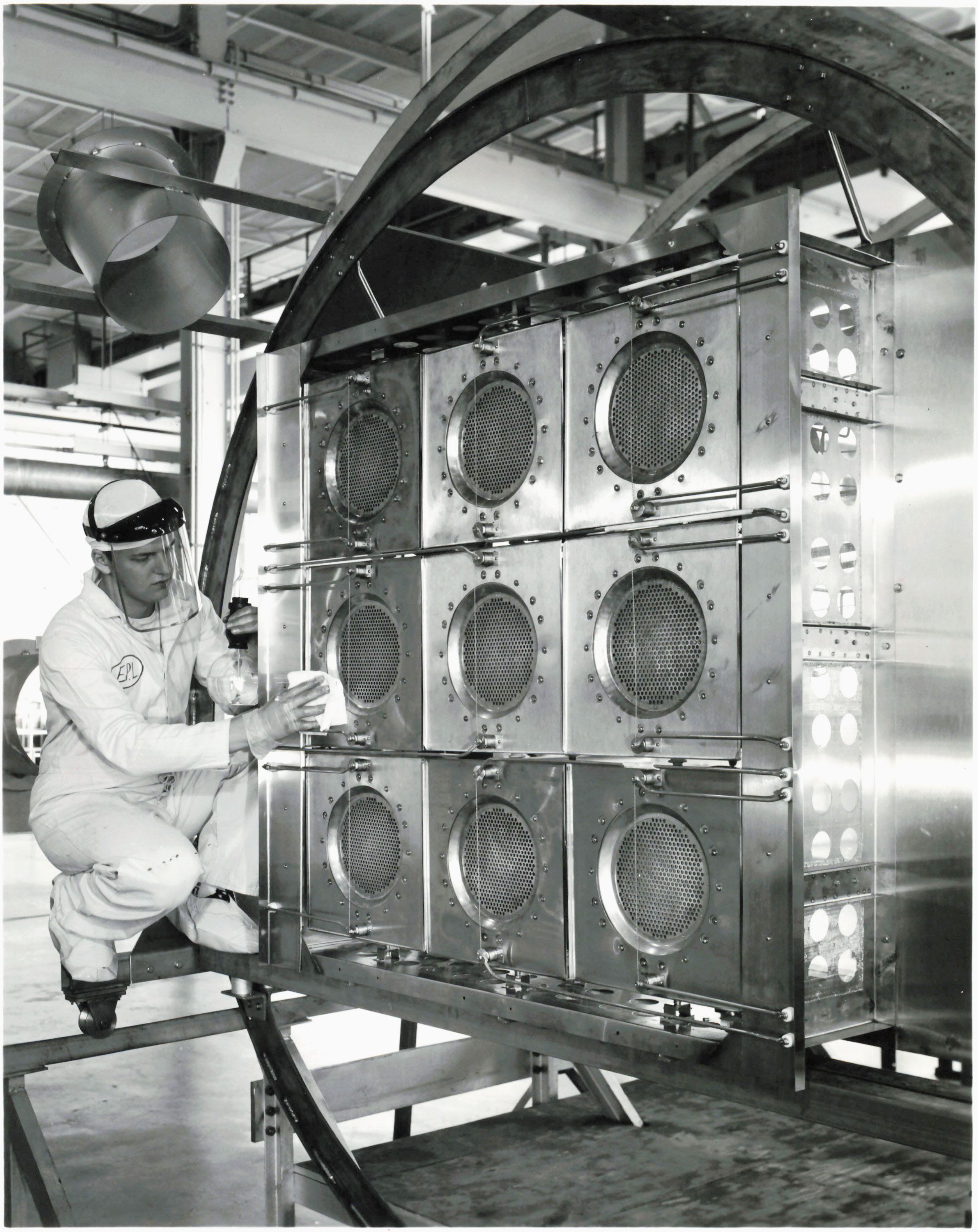
FOR RELEASE: THURSDAY A. M. 'S
October 22, 1964

Release 64-91

Hugh Harris
(res: 681-9354)

CLEVELAND, Ohio, Oct. 22 -- Preparations for dynamic stability tests of the Apollo command module and its launch escape system are observed by NASA engineer Bobby W. Sanders at the Lewis Research Center, Cleveland, Ohio. A scale model of the command module, in which three astronauts will ride during their journey to the moon, and the launch escape system are undergoing tests in Lewis' 8 x 6-foot transonic wind tunnel. The tunnel simulates conditions the spacecraft will encounter during a portion of its flight through the earth's atmosphere. The Apollo project is under the direction of NASA's Manned Spacecraft Center, Houston, Texas.

NASA
C-66678



Space flight beyond the moon requires unique propulsion. NASA's Lewis Research Center is doing extensive research on electric engines--currently one of the leading competitors of a future manned mission to Mars. The Kaufman ion engines shown here were invented, designed and perfected at Lewis. Since hundreds of such low-thrust electric engines would be needed for deep space flights, Lewis' current research centers on the problems of clustering many engines to operate together. The technician here is shown checking a nine-engine array after its initial test in Lewis' space tank.

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Electric ... next big development project for space ... Research Center.

Up to now the biggest ion engines have been half that size, said Edmund E. Callaghan, assistant chief of the electromagnetic propulsion division of the NASA laboratories.

CALLAGHAN

Callaghan conducted a progress briefing yesterday at Cleveland School Administration Bldg. A veteran of 20 years with the space agency, he headed the U. S. Lunar Probe Program.

"A spaceship designed to carry 8 or 10 men to Mars probably would use 10 or 20 of the new three-foot size ion engines. We're studying ways to group them," he said.

THE MARS voyage would take one year each way. This creates the greatest problems with ion engines: reliability.

"If you go down to the Illuminating Co. and tell them you want a generator to run perfectly and without stopping for two years they'll throw up their hands," said Callaghan.

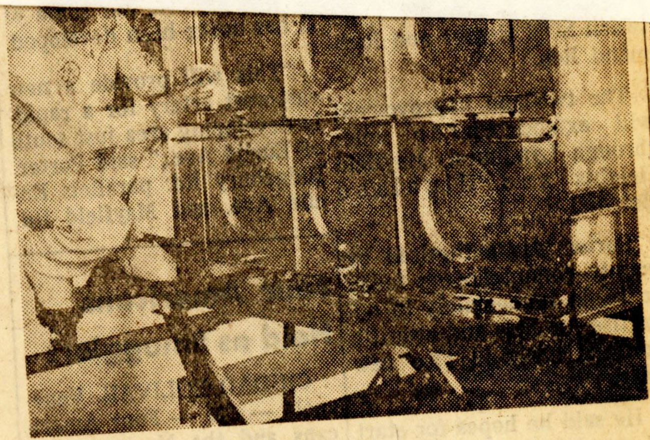
"I'd hate to think of starting our astronauts for Mars with any less reliability."

THE THREE-FOOT engine would develop about five pounds of thrust throughout the two-year period. It will use mercury for fuel and need only a few hundred pounds for the trip.

The Mars spaceship will be designed to function even though four of its ion engines are not operating. There may even be a system for interchanging engine units.

Research and development for the Mars ship and its booster system will take 10 years. However its ion engines are in good shape today except that more study has to be made of materials to improve reliability.

One of the more serious problems is that it takes an electric power plant to provide the current for engine operation. Much of the research time will be spent solving this.



SPACE FLIGHT BEYOND THE MOON requires unique electric propulsion. The Kaufman ion engines shown here were invented, designed and perfected at Lewis Research Center. Since hundreds of them will be needed for deep space flights, Lewis' current research is on problems of clustering many to operate together. The technician here is checking a nine-engine array after test in a space tank.

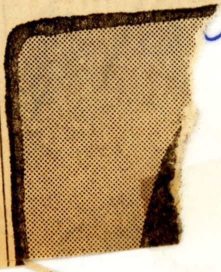
D 16038 NASA
DEC 17 1964

18-Inch Flower Oldest

DENVER — Eighteen-inch fossils found on red rock in Colorado's San Juan Mountains show a palmlike flowering plant that flourished about 165 million years ago —the oldest flower known.

Canadians Strike, Seek Parity With Workers in U. S.

TORONTO — (UPI) — A second major Canadian industry today faced the threat of a strike action if its workers don't achieve ...



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FOR RELEASE: Immediate
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The Martians haven't landed. It was just housecleaning day at the Electric Propulsion Laboratory, National Aeronaut and Space Administration, Lewis' Research Center, Cleveland, Ohio. Three NASA technicians, shown here in protective clo had just emerged from Lewis 70-foot-long vacuum tank where had been cleaning in the toxic mercury atmosphere left after engine testing in the tank. They stopped briefly to pose by their "Mars ship" -- the end of another tank -- also removed for cleaning.

MARTIANS ARRIVING BY FLYING SAUCER is what this scene looks like. But actually it's housecleaning day at the Electric Propulsion Laboratory of NASA's Research Center, Cleveland Hopkins Airport. Three technicians in protective clothing are cleaning the end of a huge space tank in which ion space engines were tested. The engines produce toxic mercury exhaust requiring use of such clothing when tanks are opened for cleaning. SEP 17 1964

A16038 NASA

CLEVELAND PRESS
SEP 17 1964
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NASA
C-64187

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C-64187-8

This giant magnetic coil is one of twelve that Lewis researchers plan to use in creating a magnetic field 400,000 times stronger than that of the earth. Edmund E. Callaghan, assistant chief of the Electromagnetic Propulsion Division at NASA's Lewis Research Center, is shown here examining the coil.

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JUN 5 1964
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D/6038 NASA

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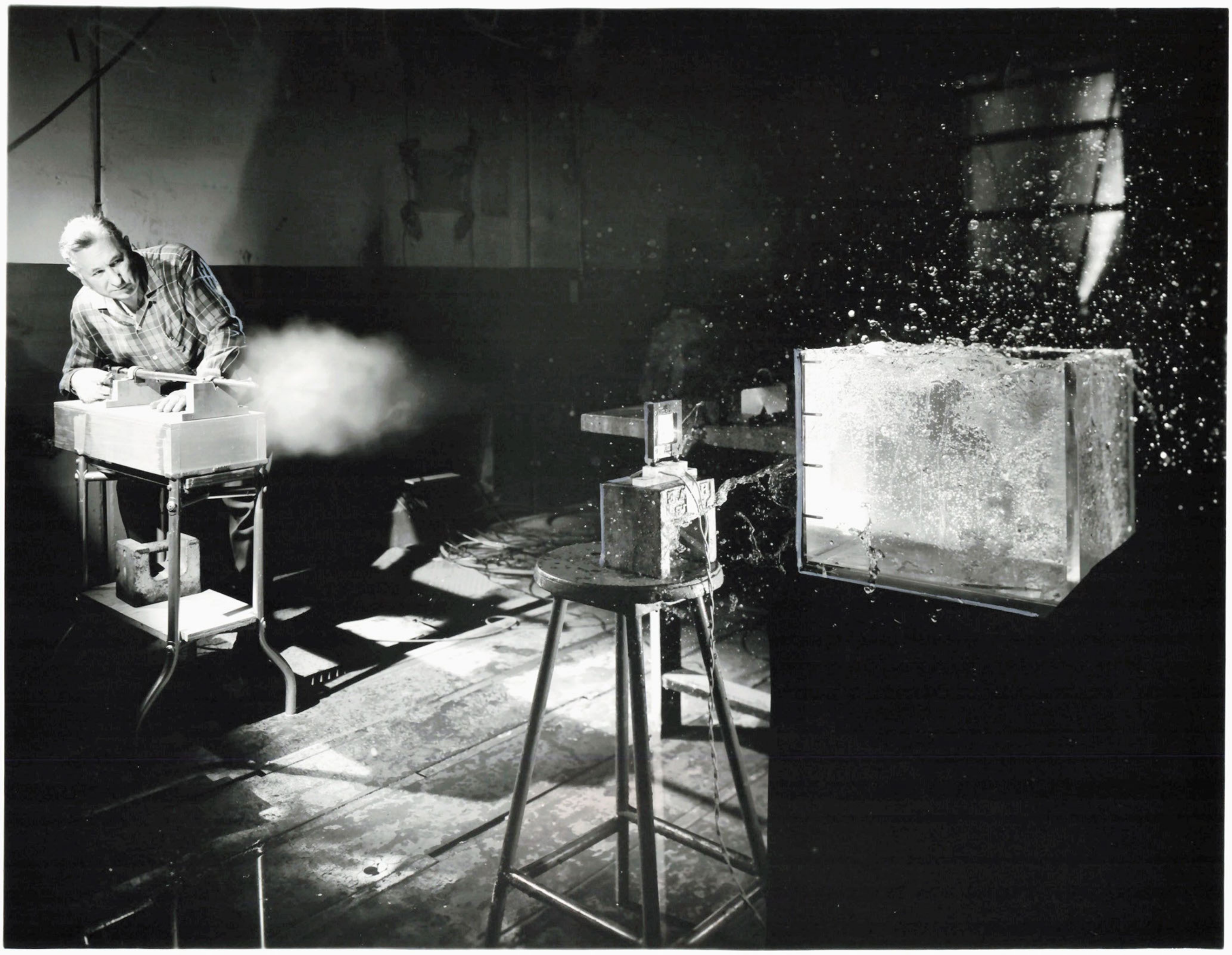
C-59004



RIFLE BULLET HITTING FUEL TANK full of liquid nitrogen simulates a meteorite strike on a spaceship's fuel tank. This experiment will be performed for Youth Day visitors to NASA's Lewis Center. Nitrogen is used for safety. Spaceships actually will carry liquid oxygen ~~or~~ and hydrogen.

-30-

~~METEORITE IMPACT TEST~~ on Cryogenic fuel Tank

8/16038 NASA

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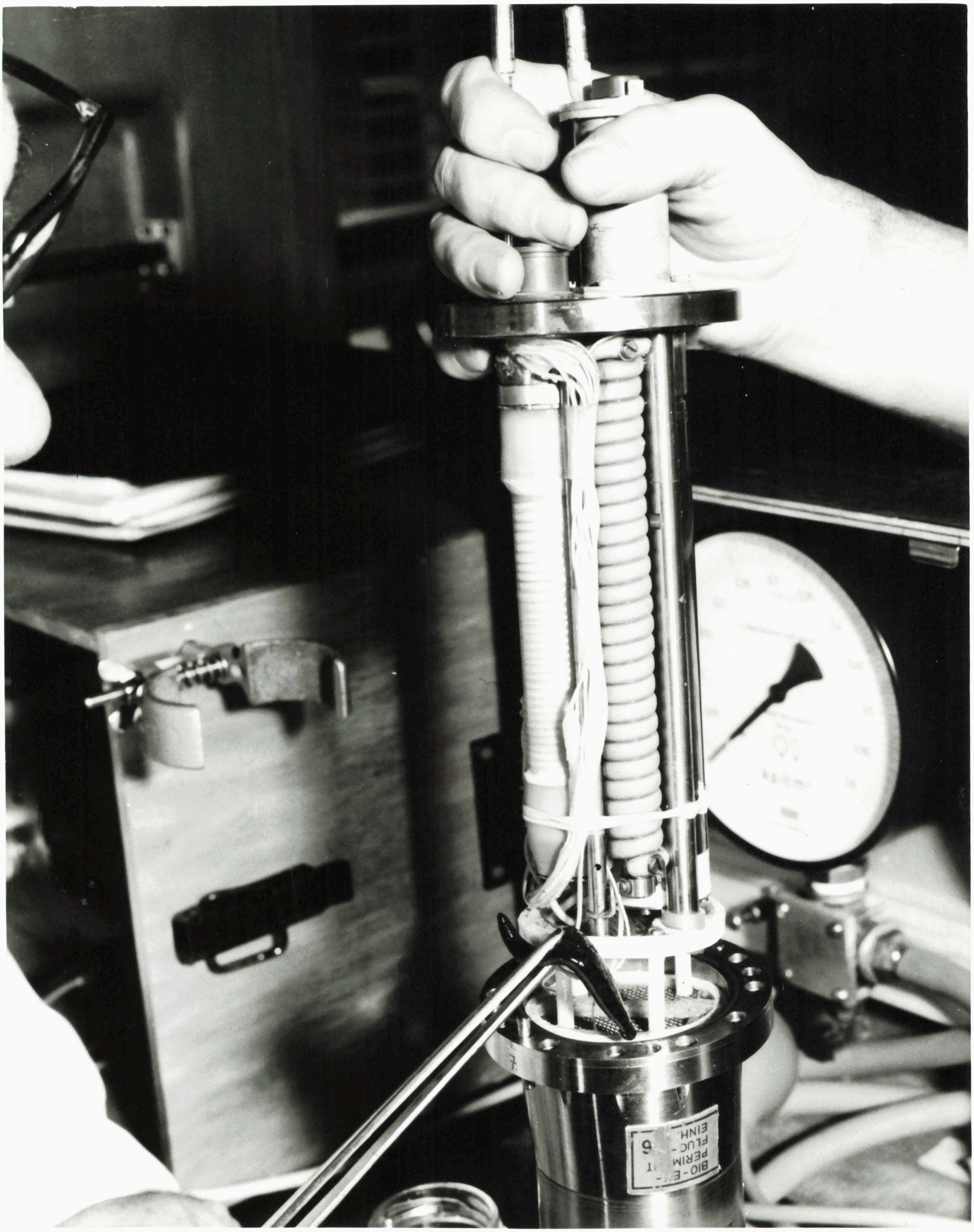

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NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
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WALLOPS ISLAND, VIRGINIA--Two German Nike-Tomahawk Biosonde Experiments are being prepared for launching from NASA's Wallop Island Test Station carrying live animals (leeches). The prime objective of the flights are to test under weightless conditions a newly developed life support system designed for use in a satellite. The second objective is to obtain information on the behavior of the leeches when subjected to the high stress conditions of a rocket launch. NASA will launch the two Biosonde rockets for the West German Ministry for Education and Science. The Principal Investigator, Dr. Robert Lotz and the Experiment Manager, Gary H. Bowman are from the University of Frankfurt, Frankfurt/Main, Germany. The Project Manager, Reiner Klett is from the German Research Establishment for Aerospace, Oberpfaffenhofen, Germany. Project Engineer for Wallops Station is Robert T. Long.

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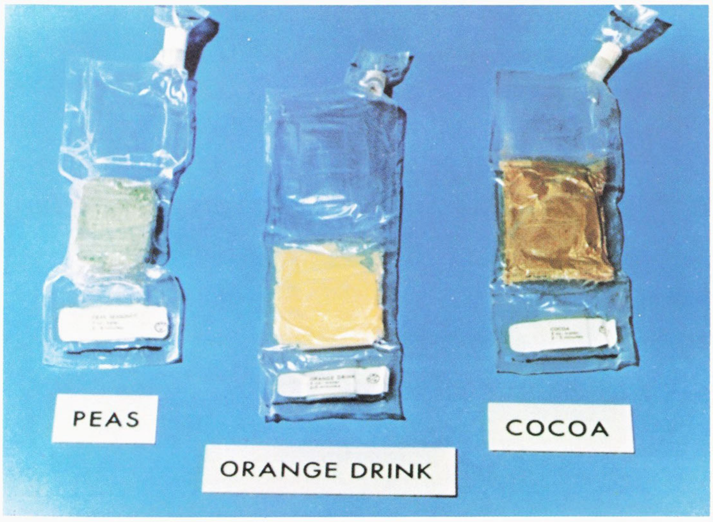
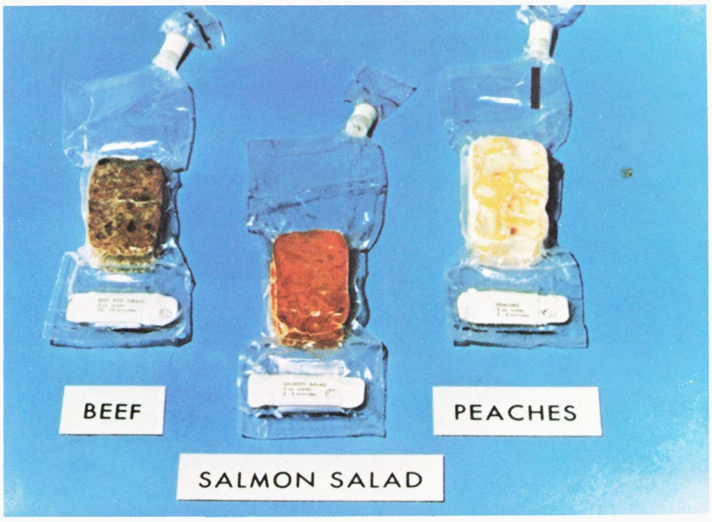
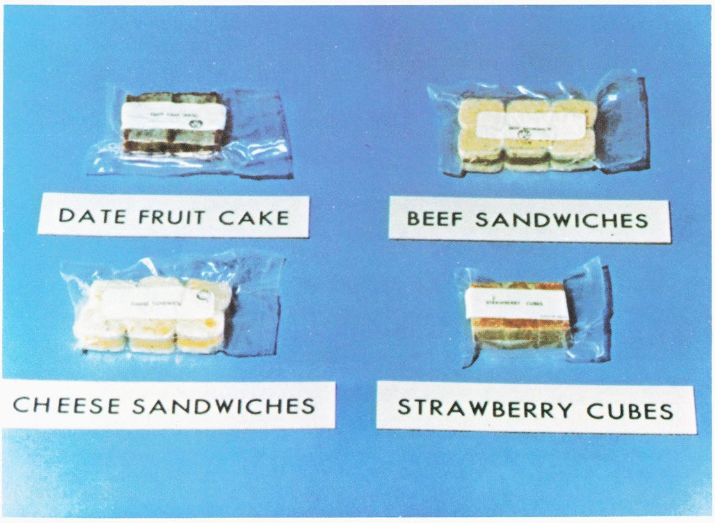
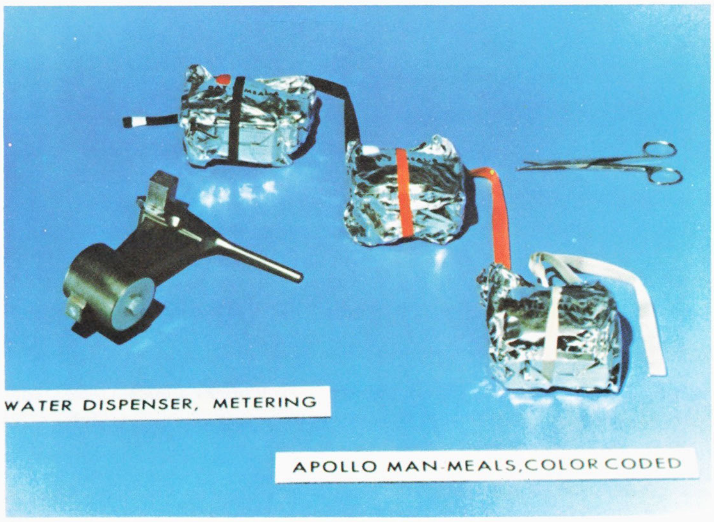
FOOD FOR SPACE FLIGHT









MSCL-6

MANNED SPACECRAFT CENTER

HOUSTON, TEXAS

OFFICIAL PHOTOGRAPH

Food for space flights must withstand many conditions not common on earth. Weight and space limitations in the spacecraft make it necessary that the food which the astronauts take with them be lightweight, require little storage space and no refrigeration. Convenience in handling is also important. Meal components must be given directly from a sealed container, because weightlessness during space flight makes it impossible to keep solid food on a plate or liquids in an open cup.

The preparation, handling and consumption of space foods during the Mercury and Gemini missions provided a valuable background of experience for the development of foods for the Apollo Program. Apollo foods are similar to the foods used during the Gemini missions, with additional food items provided to give the astronauts a greater choice in the selection of flight menus.

Food for Apollo missions consist of two types: dehydrated, cubed foods and freeze-dehydrated foods. The cubed foods are solid foods processed in the form of compressed and/or dehydrated ¾-inch cubes which are rehydrated by the saliva in the mouth as the food is chewed. These foods are vacuum-packed in containers made of four-ply laminated plastic.

Freeze-dried foods are prepared by removing moisture from a quick-frozen product without appreciably changing its shape, color, or taste. The freeze-dry process provides foods which can be rehydrated quickly within their own containers and which closely resemble the freshly-prepared product in taste and texture. The freeze-dried food has a porous texture and is extremely lightweight. It is vacuum-packed in a four-ply laminated plastic container similar to that used for the bite-sized food. However, in this case, the container is fitted with a one-way, spring-activated injection valve at one end and a folded, sealed eating tube at the other end.

To prepare the freeze-dried food for consumption, the astronaut inserts a pistol-like water probe (shown in picture) through the valve and injects a prescribed amount of water for rehydrating the food. When the food is rehydrated, the astronaut cuts a plastic strip which holds down the folded eating tube and unfolds the tube. This tube serves as a passage through which the food is squeezed from the container directly into the mouth. After the food has been eaten, the astronaut removes a germicidal tablet from a pouch attached to the outside of the food package, and places the tablet inside the package. This germicide inhibits spoilage of the leftover food.

The water used for reconstituting hot foods and beverages is heated to about 150° F in a 1.9-pound capacity reservoir. One ounce of hot water is released from the reservoir through a fixed water dispenser each time the release button is pressed. Cold water is drawn from a water chiller, which cools six ounces of water to 50° F every 24 minutes. A portable hand-held water probe which meters ½-ounce increments of cold water for drinking or for injection into food packages is used for the preparation of cold foods and beverages.

Production guides for NASA space food items establish strict requirements regarding size and weight as well as the microbiological standards to be maintained to insure low bacterial count. Specific amounts of the rehydratable foods must also rehydrate completely with a given amount of water, at a given temperature, and within a specified time.

All food and beverage packets for one man for one meal are placed in aluminum overwrap packages. Each overwrap has a color code to designate specific meals for each astronaut. Food packages are stored in a fire-proof container until ready for use.

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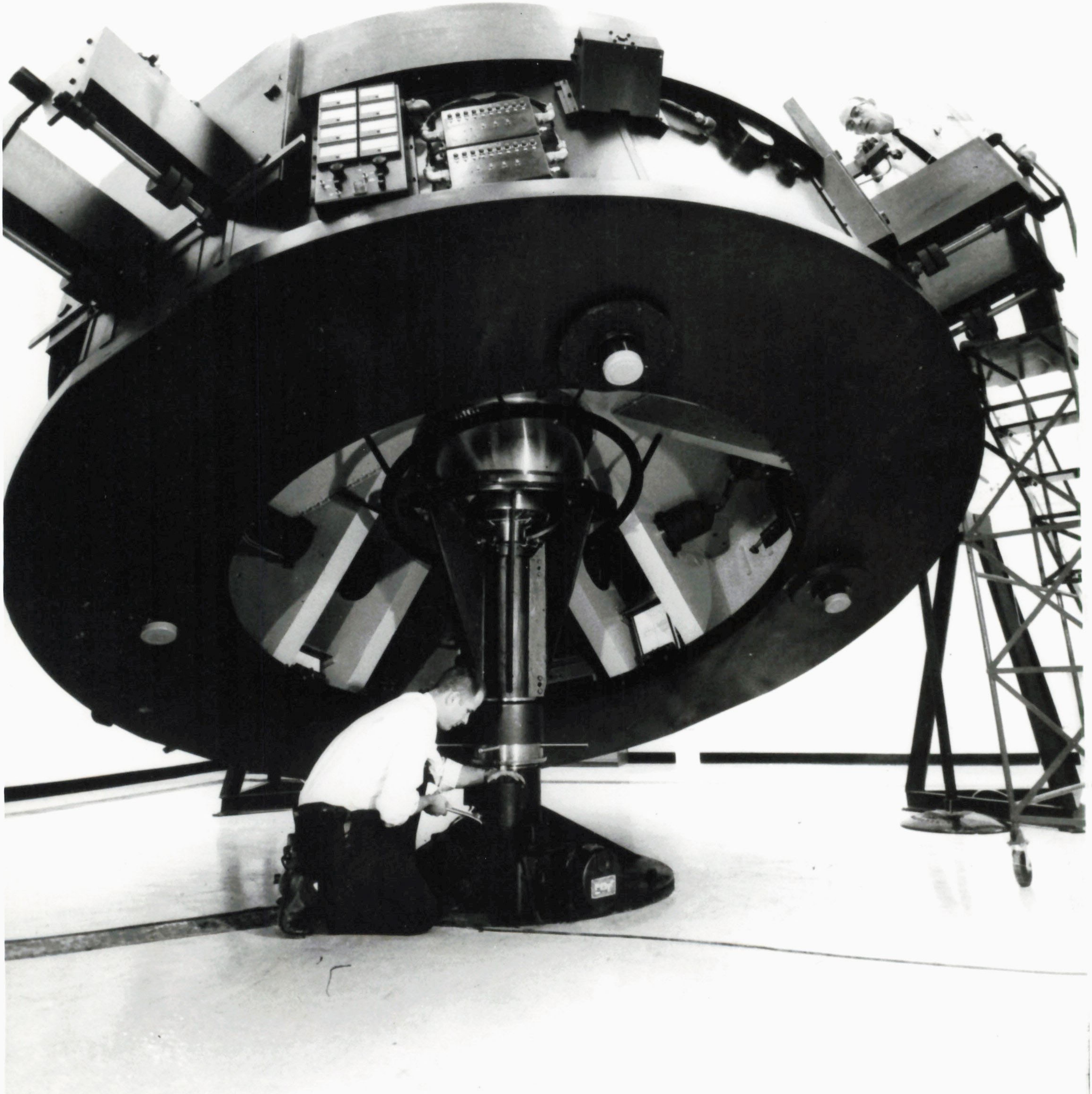

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
400 MARYLAND AVENUE, SW, WASHINGTON 25, D.C.

FOR RELEASE: June 12, 1964

PHOTO NO.: 64-Space Simulator-16

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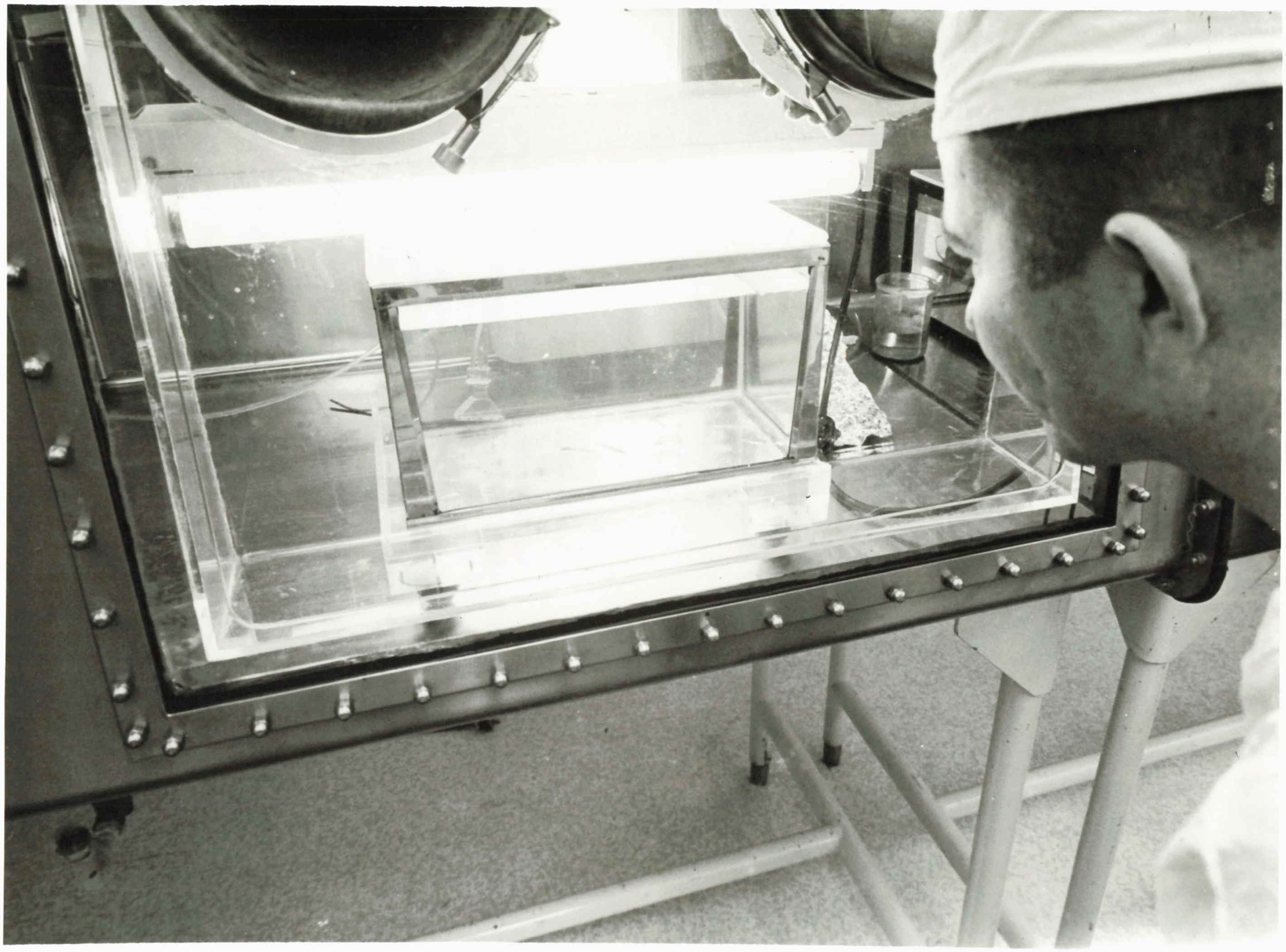
PERCHED atop its slender pedestal, this space simulator is 13 feet in diameter and weighs around nine tons. Yet it is so delicately balanced it can be moved by a puff of air. Built by the Minneapolis-Honeywell Company, the platform will simulate flight characteristics of NASA's Apollo moonship in space.



NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

FOR RELEASE:

PHOTO NO: 69-H-485

MANNED SPACECRAFT CENTER, HOUSTON, TEXAS.,

LUNAR LAB ACTIVITY--Dr. Terry Allison examines an aquarium of fathead minnows within a Class III cabinet in the Invertebrate, Aves, and Fish Laboratory of the Lunar Receiving Laboratory, Building 37, Manned Spacecraft Center. This laboratory is part of the overall physical, chemical, and biological test program as part of NASA's preliminary examination of returned lunar samples.

A93365

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APR 3 '69
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GROWN IN MOON DUST -- These plants were grown in the Plant Laboratory of the Manned Spacecraft Center Lunar Receiving Laboratory, Houston. In this experiment by the National Aeronautics and Space Administration, plants were exposed to lunar material several weeks and apparently suffered no harm. Amont the plants pictured are citrus plants, peppers, blooming cantaloupe and beans. The gloved hand holds a radish.

MOON SOIL

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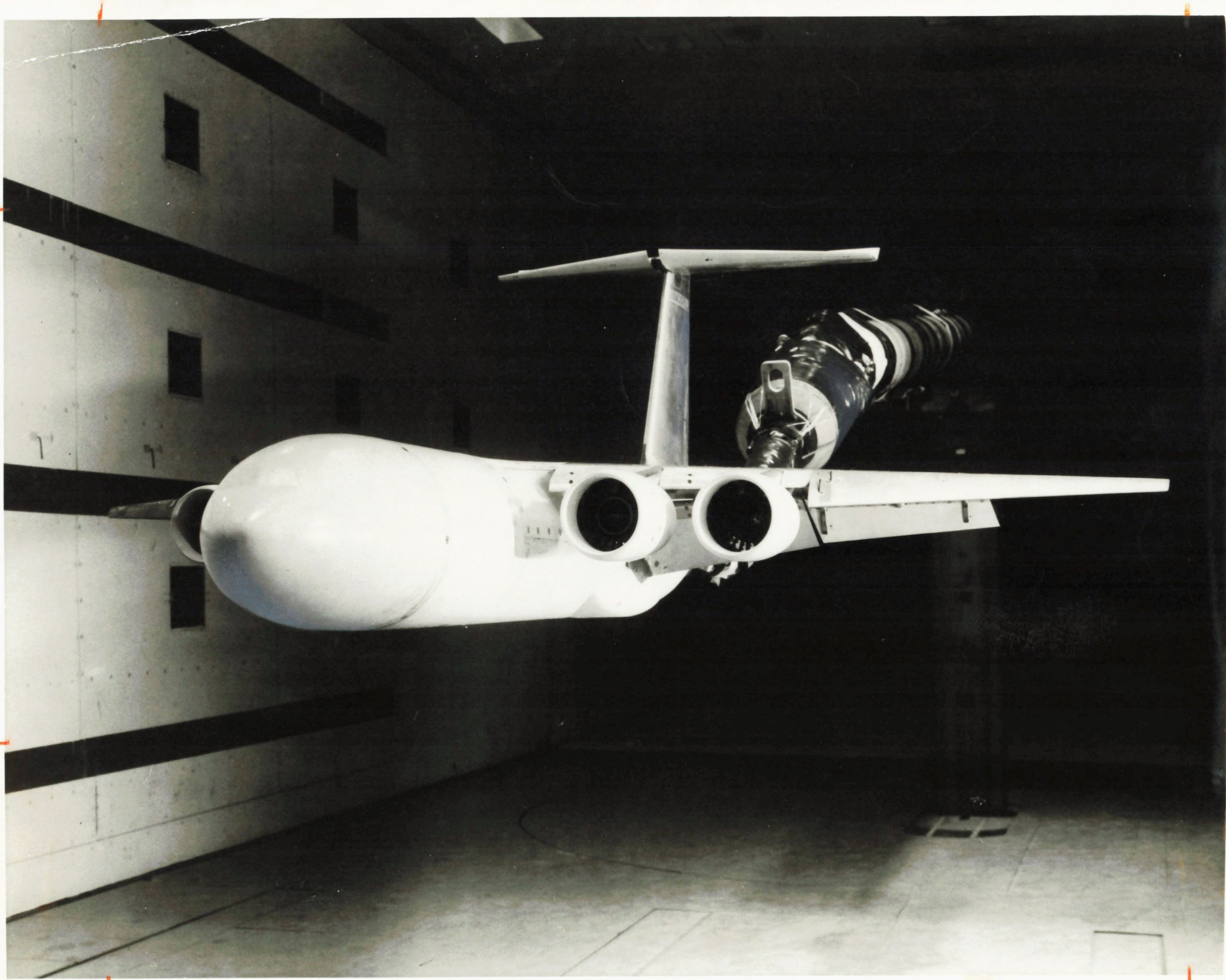

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
WASHINGTON, D.C. 20546

FOR RELEASE: January 5, 1972
PHOTO NO. 72-H-1
72-HC-1

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Hampton, Virginia - Extensive wind tunnel testing, analysis, and simulation work has been conducted on the development of an externally blown flap concept by the National Aeronautics and Space Administration's Langley Research Center, Hampton, Virginia. Shown in Langley's Vertical/Short Takeoff and Landing (V/STOL) Wind Tunnel is a model used in developing the concept. NASA's quiet, experimental short takeoff and landing (QUESTOL) program is to provide the propulsive-lift technology required for development of a quiet STOL transport aircraft. The use of turbofan engine systems to augment aerodynamic lift is a key to community noise reduction, airport congestion relief and improvements in short-haul transportation.

REFERENCE
JAN 24 '72
N. E. A.

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NASA TEST
BOEING

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
400 MARYLAND AVENUE, S.W., WASHINGTON, D. C. 20546

FOR RELEASE: IMMEDIATE
PHOTO NO.: 64-Research Aircraft-19

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A Boeing 707 jet transport prototype shown in a landing test at the Wallops Island air strip.

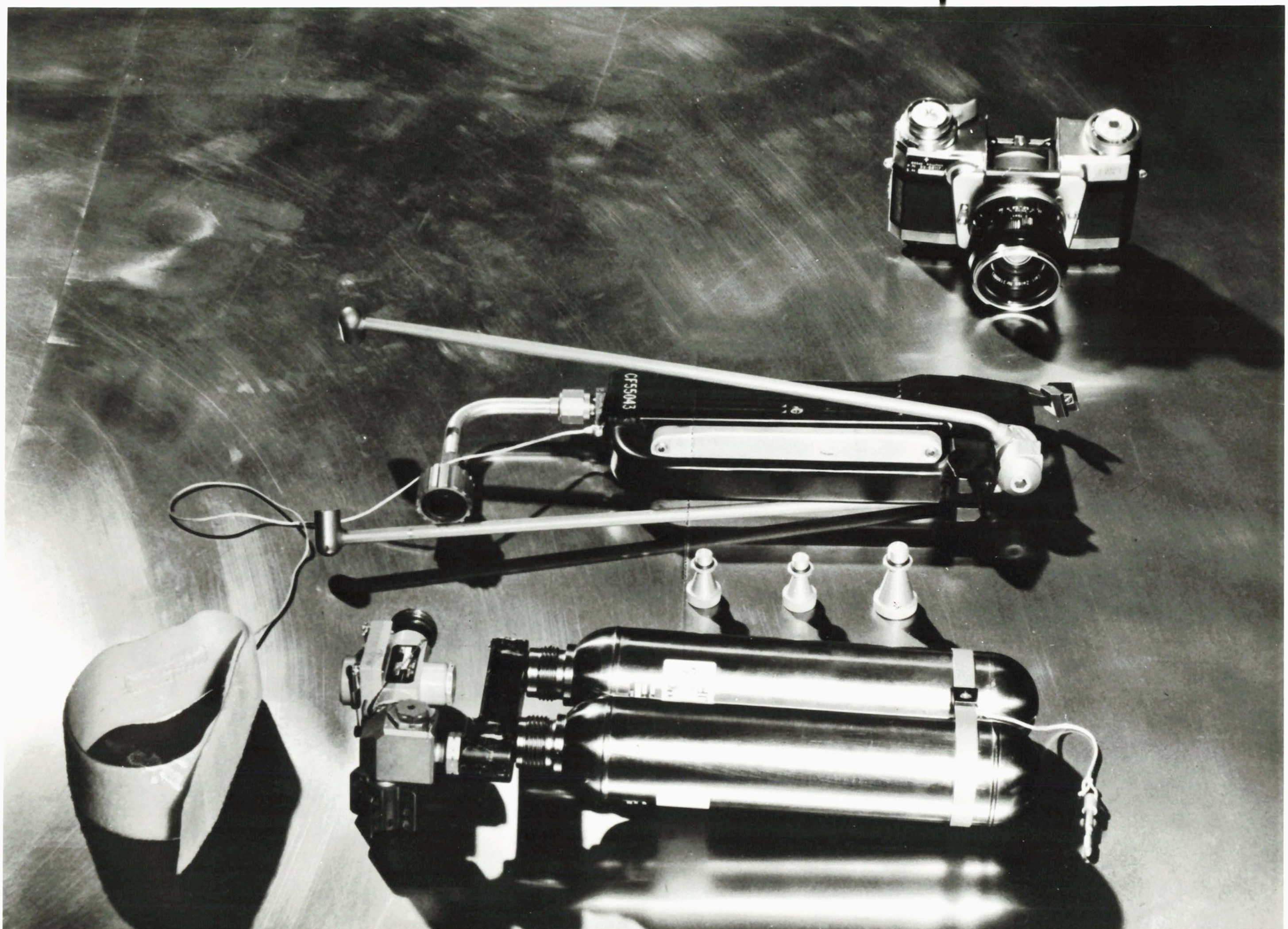
NASA and Boeing are conducting tests with the 707 to find ways to lower landing and take-off distances required for large jet transports.

Boeing has outfitted the 707 prototype with large wing flaps, a boundary layer control (BLC) system, a thrust modulating system, and instruments to measure its flight capabilities.

In preliminary tests the airplane has flown at speeds well below 100 miles an hour during landing approach. Normal speeds for the 707 are 150 miles an hour on approach, and 135 miles an hour at touchdown.

REFERENCE
MAY 26 '64
N. E. A.

A 37- Boeing 707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NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
400 MARYLAND AVENUE, SW, WASHINGTON, D. C. 20546

FOR RELEASE: June 2, 1965
PHOTO NO.: 65-H-~~1033~~ 1034

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MANNED SPACECRAFT CENTER, HOUSTON, TEXAS

MANEUVERING UNIT -- Closeup view of disassembled Hand-Held Self-Maneuvering Unit, a device used by an astronaut in a zero gravity environment. Upper right is commercially available 35mm camera loaded with space-qualified color film. The camera is attached to a bracket on the front upper end of the HHSMU when in use. Astronaut Edward H. White II, pilot of the Gemini-Titan 4 flight, will use this equipment during his planned extravehicular activity. The HHSMU is an integral unit that contains its own high pressure cold gas supply together with the necessary metering valves and nozzles required to produce controlled thrust. To move forward, the astronaut squeezes the front half of the trigger. To stop or move backwards, the astronaut squeezes the rear half of the trigger.

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

FOR RELEASE: Filed: February 22, 1972
PHOTO NO. 72-H-205

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MANNED SPACECRAFT CENTER, HOUSTON, TEXAS

SPACE SHUTTLE FOOD----Dr. Malcolm C. Smith, D.V.M., Chief, Food and Nutrition, Preventive Medicine Division, displays a mock-up of a proposed food tray being considered for use aboard the Space Shuttle.

REFERENCE
APR 28 '72 -CEP
N.E.A.

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FOR RELEASE:
PHOTO NO.: 64-H-2625

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NUCLEAR ROCKETS - - In August and September of 1964, here at Jackass Flats, Nev., the National Aeronautics and Space Administration and Atomic Energy Commission conducted intensive reactor experiments in pursuit of a nuclear rocket for heavy launch vehicles. The tests resulted in significant advances in rocketry.

Space

43

DEC 25 1964

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DEANE

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
400 MARYLAND AVENUE, SW, WASHINGTON, D. C. 20546

FOR RELEASE: March 1, 1965
PHOTO NO.: 65-H-522

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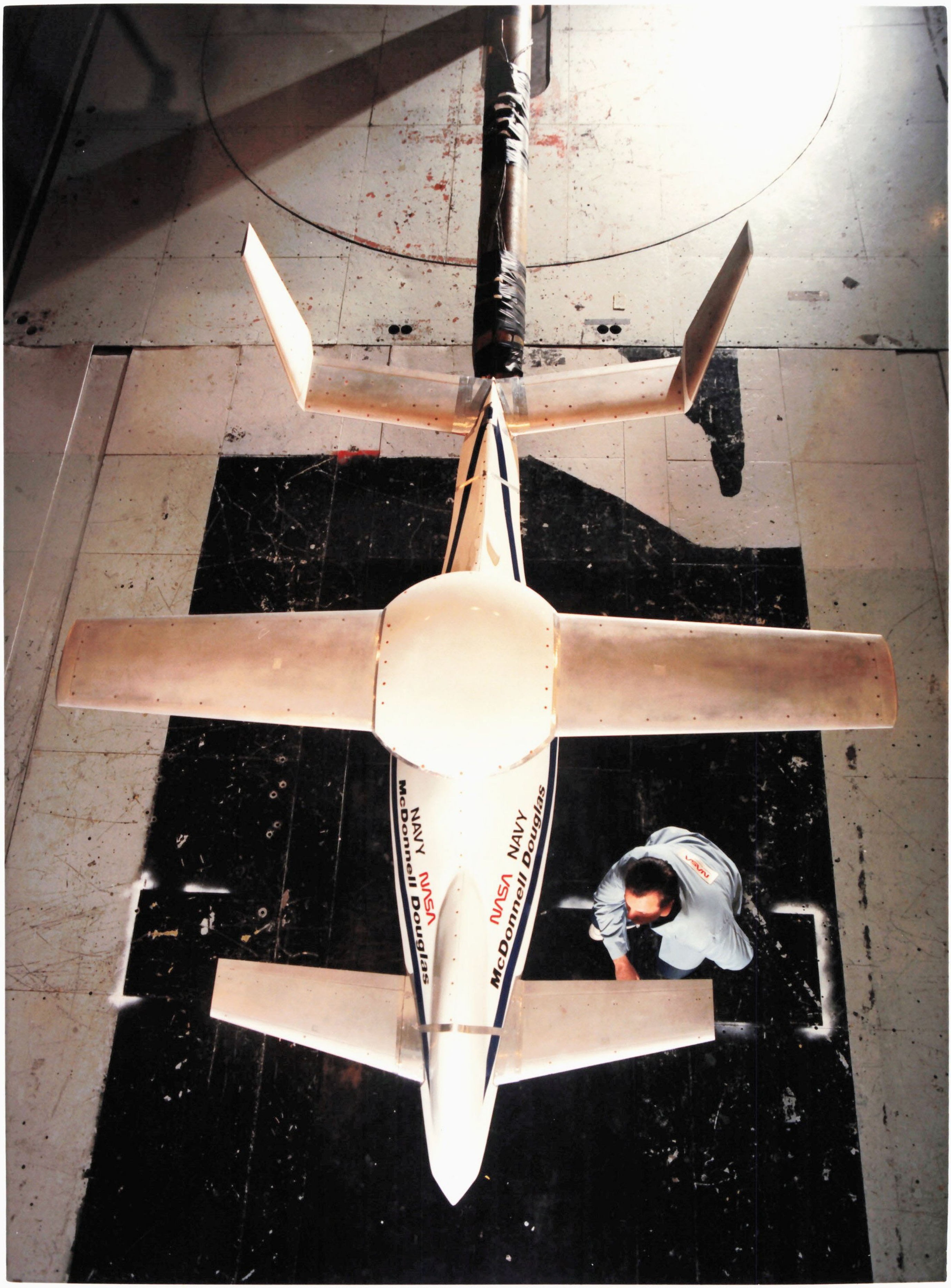
"It's chow time aboard NAS Pensacola's spinning room for the four Navy enlisted men inside." Dr. Frederick R. Deane, research assistant at Pensacola Navy's School of Aviation Medicine hands a tray of food to Airman Apprentice Terrence L. Duverney of North Adams, Mass. He's assisted by Mr. Edward Ricks, the electronic technician who's job it is to keep the room rotating during the 28-day experiment. Young Duverney, along with three other enlisted men are participating in one of the National Aeronautics and Space Administration School's tests to determine mans' requirement for artificial gravity and his ability to withstand the various rotational stresses he may encounter in the space environment. The room in which the experiments are taking place is called the Coriolis Acceleration Platform. It is a circular device capable of producing sensory conflicts in a way similar to that which would be experienced by a space traveller.



NASA

93-02458

Langley Research Center
Hampton, Virginia 23665-5225

File: U.S. National Aeronautics and Space administration

NASA

National Aeronautics and Space Administration

Hampton, Virginia 23665

For Release: May 1993

Photo No. L-93-2458 (Rel. No. 93-17)

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CRW CONCEPT IS HALF HELICOPTER, HALF AIRPLANE

A NASA technician inspects a McDonnell Douglas aircraft concept between wind tunnel runs at NASA Langley Research Center, Hampton, Va. The unusual aircraft -- half helicopter and half airplane -- features a small forward-mounted fixed wing called a canard, a convertible center wing and a conventional aft mounted horizontal and vertical tail. The center wing rotates for takeoff, hover, low-speed flight and landing; for high-speed flight, it is stopped and becomes a conventional wing. According to its designers, the "canard/rotor/wing (CRW)" combines the operational advantages of a helicopter with cruise efficiency approaching that of an airplane. The Langley 14- by 22-Foot Subsonic Tunnel tests are a joint McDonnell Douglas-U.S. Navy-NASA study of the aerodynamic characteristics of the concept in the fixed-wing, cruise mode, as pictured.

FOR FURTHER INFO: NASA: Keith Henry - 804/864-6123
McDonnell Douglas: Hal Klopper - 602/891-5519

NASA LaRC photo by Fred Jones

PHOTO CREDIT: NASA or National Aeronautics and Space Administration

NASA
S-68-25208

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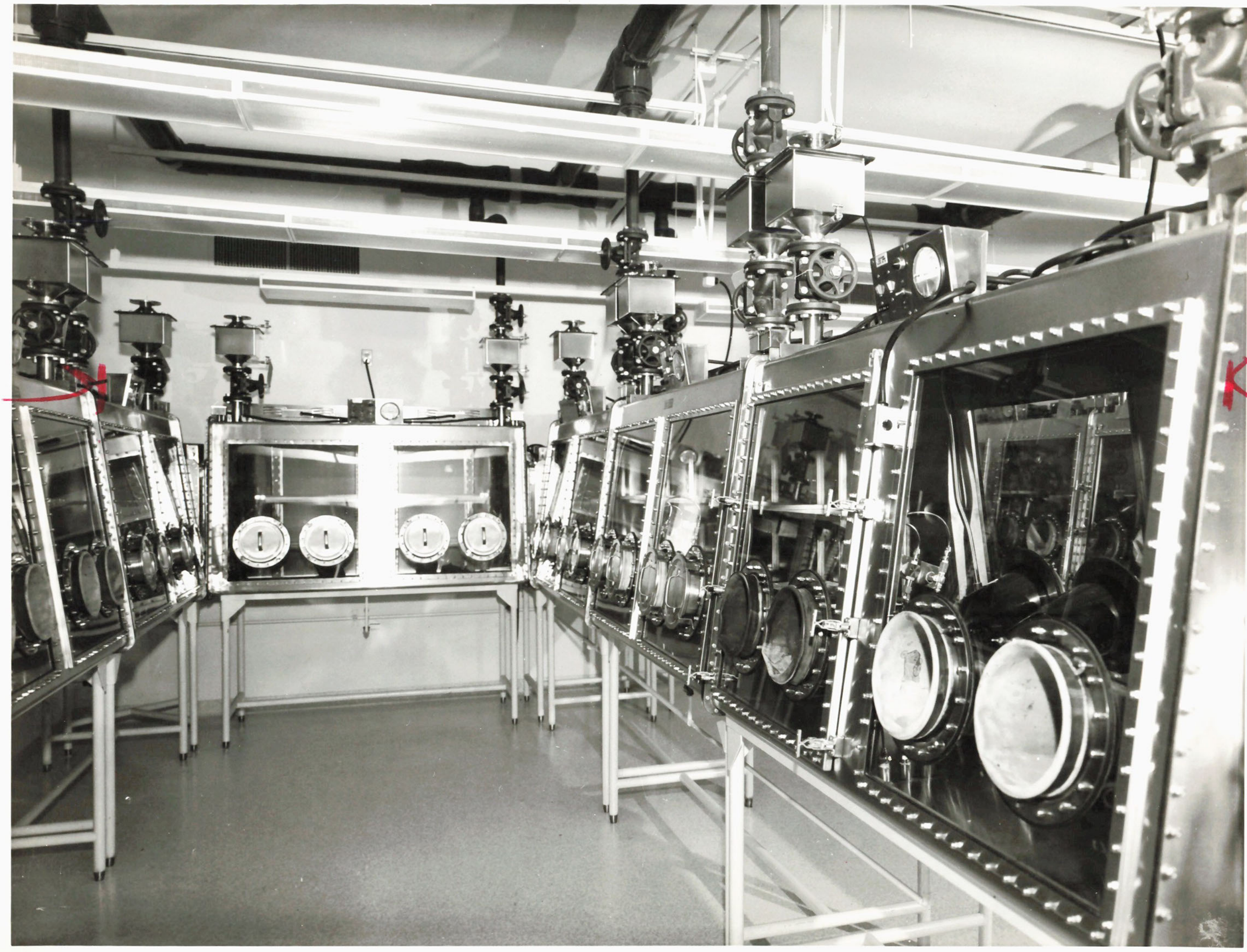

MANNED SPACECRAFT CENTER

HOUSTON, TEXAS

OFFICIAL PHOTOGRAPH

B & W

1968 S-68-25208

MANNED SPACECRAFT CENTER, HOUSTON, TEXAS

LUNAR LAB INTERIOR-----The incubation laboratory of the Sample Operations Area of the Lunar Receiving Laboratory, Building 37.

Part Of The Complicated LRL System To Handle Moon Dust
... $8.5 Million Lab To Shield Materia

JUL 24 1969

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National Aeronautic & Space Adm

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FOR RELEASE: Filed: April 5, 1971
PHOTO NO. 71-H-656

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MANNED SPACECRAFT CENTER, HOUSTON, TEXAS

FIRE SUIT TESTING--Volunteers from the Houston Fire Department show off suits at the Manned Spacecraft Center prior to a test/demonstration of firefighter garments made of non-flammable space age fabrics. The conventional fireman's suit at left was not able to allow the man wearing it to get nearly as close to burning JP-4 jet fuel as the NASA-developed garments pictured. The non-flammable materials used in the garments were developed to ensure maximum safety of Apollo crews in an oxygen-rich atmosphere. The Crew Systems Division at the Manned Spacecraft Center is also fabricating similar suits for evaluation in various climates and firefighting conditions in 21 other cities across the country.

37

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90M02733

HUNTSVILLE ALABAMA

MARSHALL SPACE FLIGHT CENTER

NASA-MARSHALL SPACE FLIGHT CENTER
HUNTSVILLE, ALABAMA

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FOR RELEASE: December 9, 1965 PHOTO NO: 5-32828

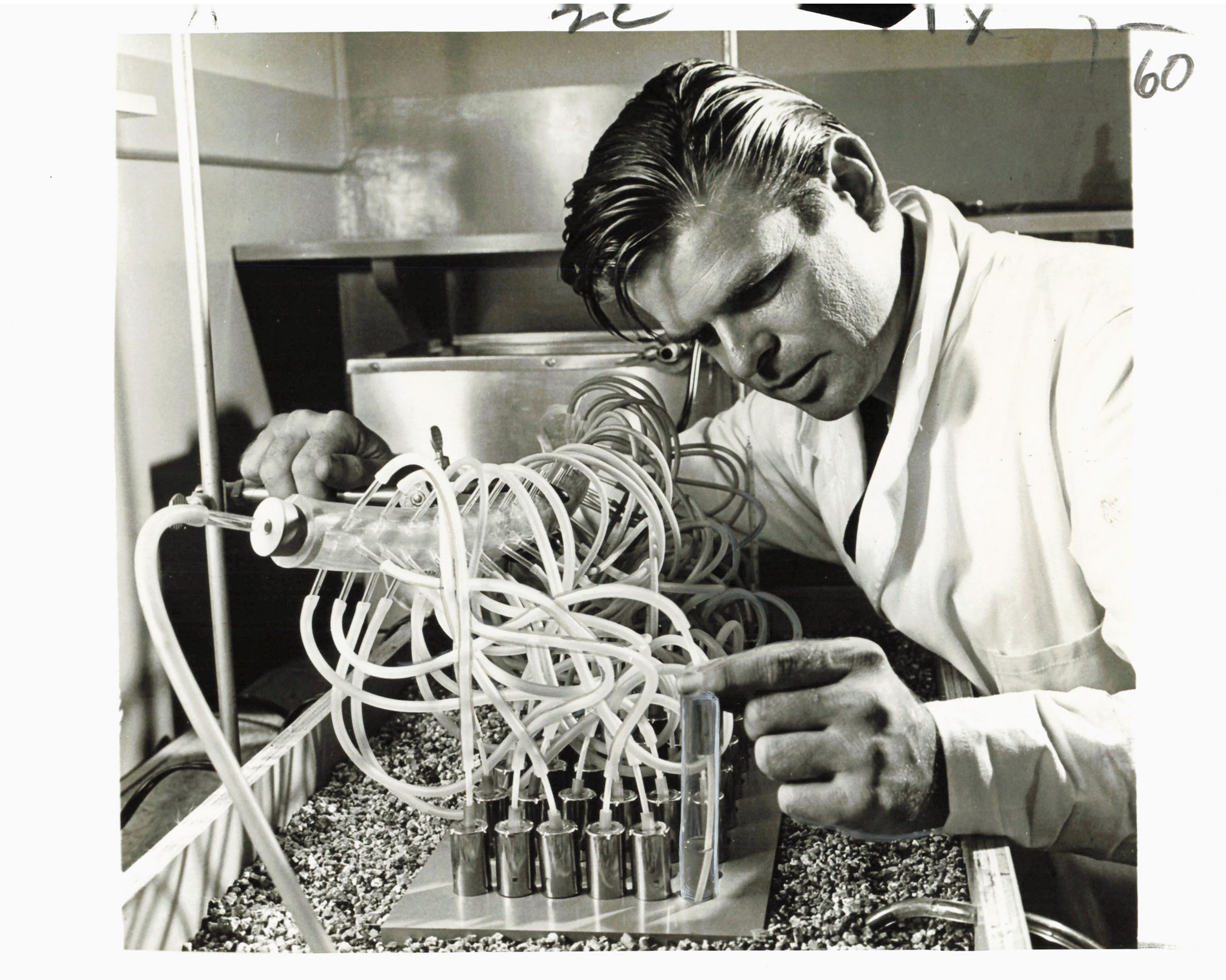
PHOTO CREDIT: NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

HUNTSVILLE, Ala.--Suspended over its catch tube at the NASA-Marshall Space Flight Center's dynamic test stand, this bullet-like drag shield is used by MSFC engineers to simulate gravity-free (zero G) environments and their effects on rocket equipment systems and operations. The 14-foot long "bullet" reaches speeds of 100 miles-an-hour, carrying a 250-500 pound test package which is observed by internal and external cameras during the 336-foot drop. At the nose of the projectile are Dick Stone (left), chief, Fluid Mechanics Test Section, Test Laboratory, and Scott Covington, project engineer for the drop facility.

23-E 30 x 42 ###

DRAG SHIELD SUSPENDED OVER CATCH TUBE AT NASA
. . . Dick Stone, left, test section chief, and Scott Covington, project engineer.

DEC 12 1965



INTERACTION OF HEAT AND LIGHT on algae is studied as part of continued research on tiny water plants that help remove impurities in water.

LANCASTER, Calif.—The sun, the warm desert air, and the capricious appetite of chickens all play a part in a water reclamation plant now being operated here by North American Aviation, Inc., in cooperation with the National Aeronautics and Space Administration.

Lancaster is a small desert city with a population of 27,500. Its water comes from artesian wells. Every day 4.5 million gallons of water are lost in the discharge of its sewage system. This same loss, expanded scores of times over, applies to metropolitan areas throughout the world.

CONSERVATION OF water is a matter of international concern. The big users are industry and agriculture. If reclaimed water could be piped back to those two users, the big drain on supplies would be cut.

The water threat is being attacked in many ways. One of them is being demonstrated in the pilot plant operated by North American's Space and Information Systems Division's Life Sciences Department.

Cols

#2-M WATER

P-1-5-2-FRI.

STATES-ITEM

JUL 30 1965

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
400 MARYLAND AVENUE, SW, WASHINGTON, D. C. 20546

FOR RELEASE: Immediate
PHOTO NO. 65 H-1163

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INTERACTION OF HEAT AND LIGHT -- On algae is studied as part of continued research on tiny water plants that help [illegible] impurities in water. The National Aeronautics and Space Administration, which is interested in [illegible] water systems for spacecraft, is cooperating in [illegible] research with North American Aviation, Inc., builders of NASA's Apollo Spacecraft.


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NASA
U.S. AIR FORCE

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

Airplane
YF-12

FOR RELEASE: June 24, 1971
PHOTO NO. 71-H-947

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WASHINGTON--A third high-performance Air Force YF-12 aircraft, like the one shown here being refueled by a tanker plane, is being added to a joint aeronautical research program of the U.S. Air Force and the National Aeronautics and Space Administration. It will be the second YF-12 under operational control of NASA and will be specially instrumented for in-flight studies of propulsion. The NASA Flight Research Center, Edwards, Calif., will manage the flights for NASA's Office of Advanced Research and Technology. Engineers will seek data on engine internal flow dynamics; propulsion and airframe interactions; air inlet dynamics; such external disturbances as atmospheric turbulence and temperature variations; internal disturbances such as rapid airflow changes and factors affecting in-flight stopping and restarting of engines. Two YF-12s in the NASA program will allow one to be on flight status most of the time, improving proficiencies of both the ground maintenance crews and the research pilots. The other NASA-managed YF-12 is instrumented to study aerodynamics and thermal loads, bending deflections and other structural factors. The NASA phase of the joint program is aimed at advancing the technology of supersonic military and civil aircraft.

PHOTO CREDIT--NASA or National Aeronautics and Space Administration


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GEMINI

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
400 MARYLAND AVENUE, SW, WASHINGTON, D. C. 20546

FOR RELEASE: May 18, 1965
PHOTO NO.: 65-H-758

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Dr. Guglielmo Righini, of the Observatory Astrofisico di Arcetri, Firenze, Italy, is one of the world-renowned astronomers who will participate in a unique chase of the shadow of a solar eclipse across the south Pacific on May 30, 1965. Dr. Righini, one of a group of scientists from the United States and four Foreign countries, will ride in a NASA's jet transport which is loaded with more than a million dollars worth of specialized scientific equipment. By flying at 600mph within the shadow of the moon as it races across the ocean, it will be possible to double the time of apparent totality of the eclipse, allowing scientists more time for their observations.

A94414
~~A33813~~- Gemini

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MAY 26 '65
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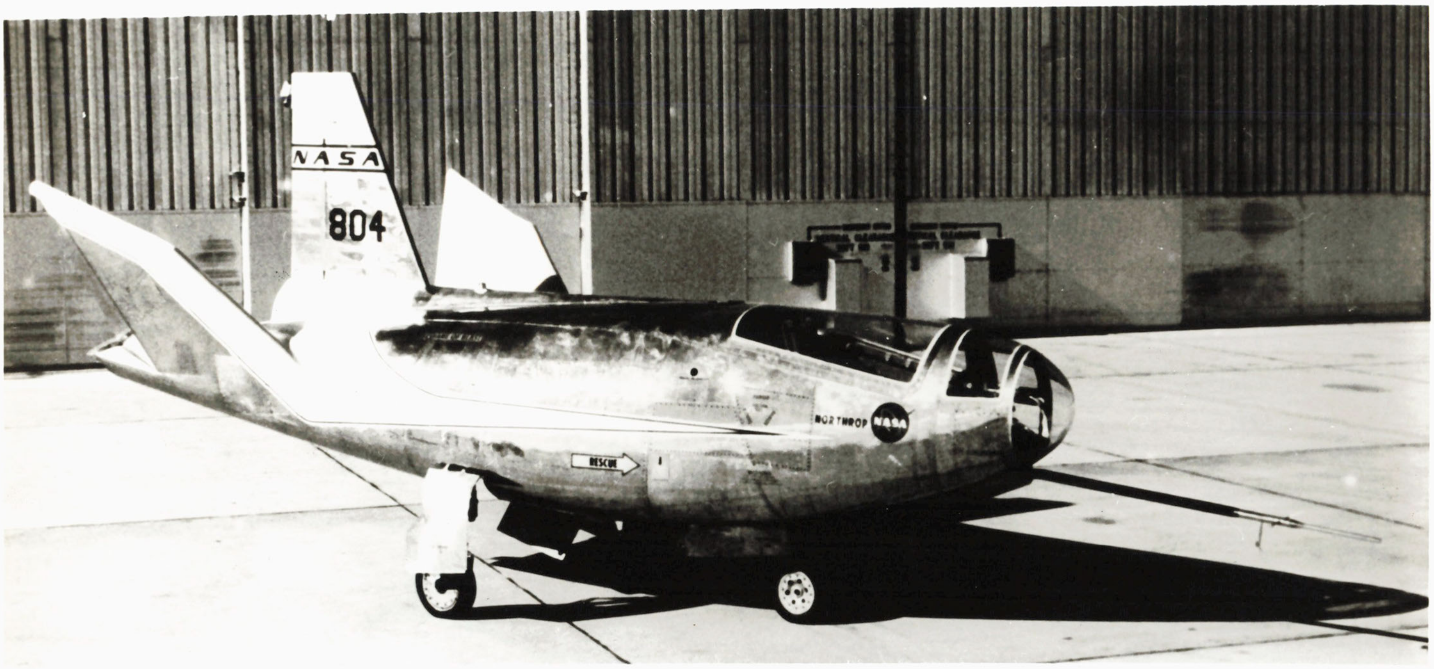
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NORTHROP
NASA
RESCUE

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FOR RELEASE: June 30, 1968
PHOTO NO. 68-H-574

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HL-10: This experimental lifting-body research vehicle is air-dropped from under the wing of a specially equipped B-52 at maximum altitudes of around 45,000 feet.

Airplanes - U.S. Air Force

24

PHOTO CREDIT--NASA or National Aeronautics and Space Administration

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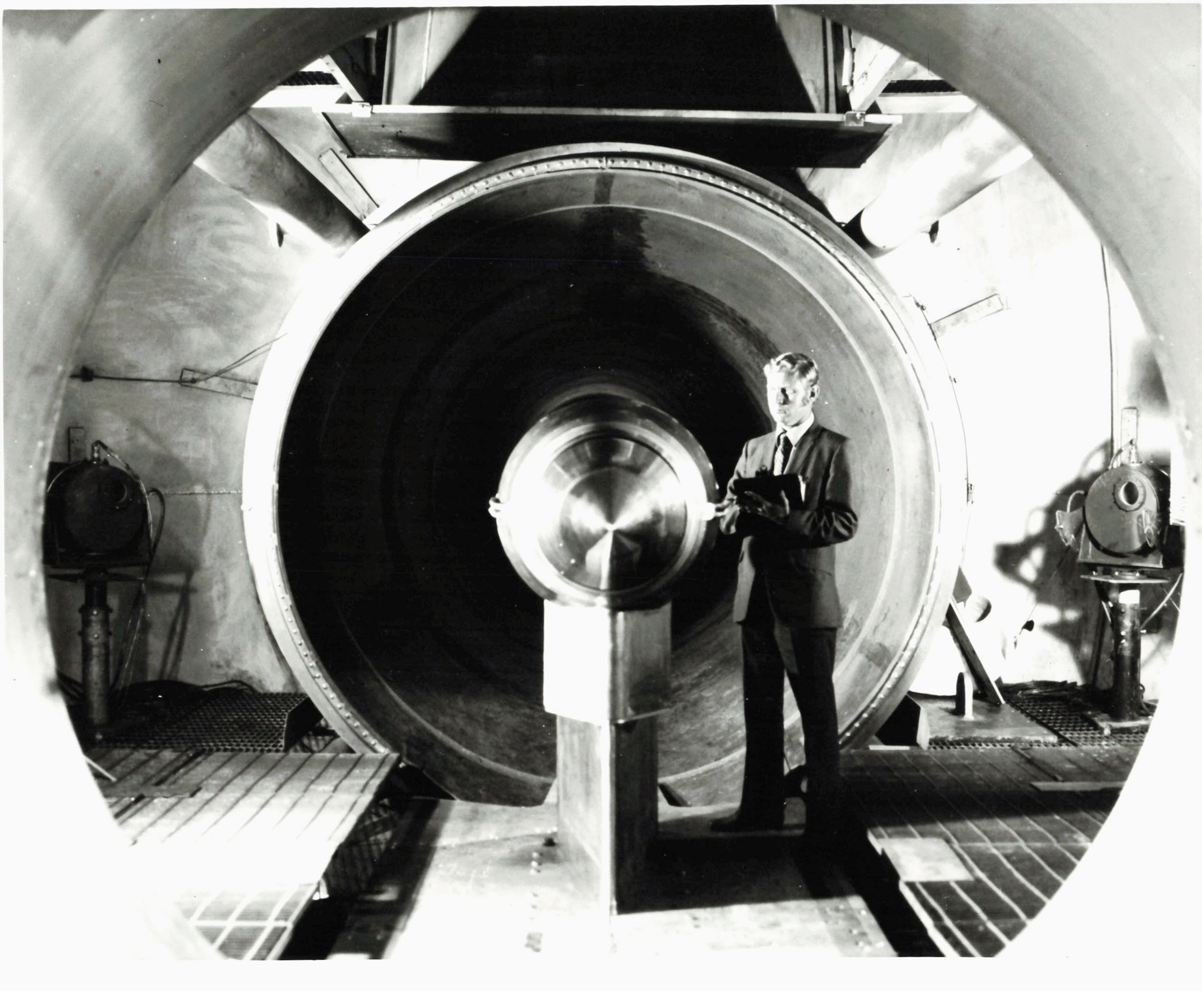

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FOR RELEASE: Filed: October 27, 1970
PHOTO NO. 70-H-1361

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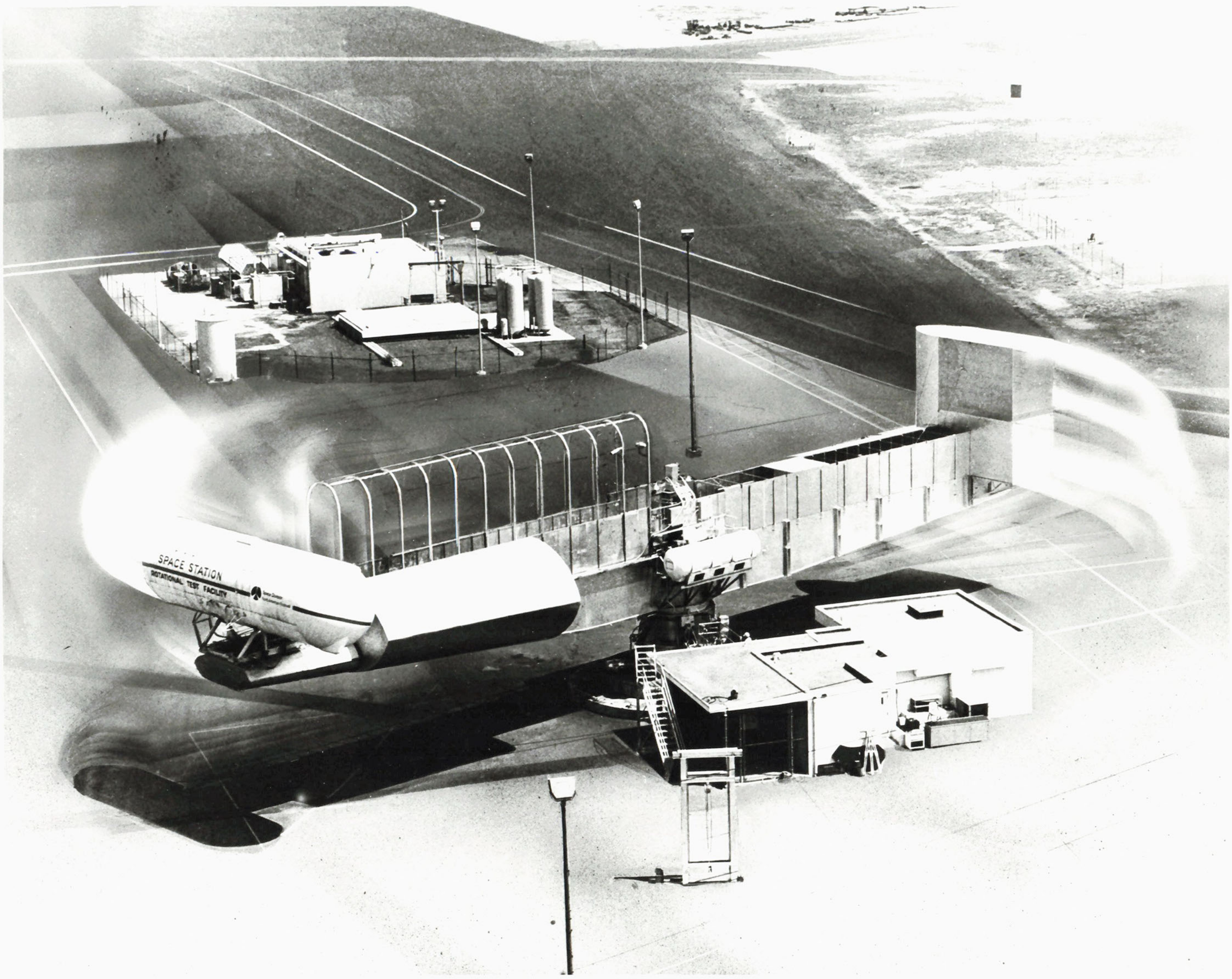
SPACE
ENGINE

18

HAMPTON, VA. -- First wind tunnel tests of a Hypersonic Research Engine (HRE) under development by the National Aeronautics and Space Administration were conducted at the NASA Langley Research Center in Hampton, Va., this month. The engine is shown in the Langley 8-foot High Temperature Structures Tunnel which produces a stream of hot gases moving faster than seven times the speed of sound--more than 4,600 mph. The wind tunnel tests are intended to demonstrate that the flight-weight engine, cooled by liquid hydrogen, can repeatedly withstand the intense thermal strains of flight in the excess of Mach 7. In the first test run, Mach 7.4 was achieved at 2000°F and 900 lbs. per square inch pressure. The HRE Project is a NASA effort to demonstrate the technology needed to develop engines capable of propelling aircraft of the future at hypersonic speeds--more than five times the speed of sound. The test engine incorporates advanced technology in structure and materials and a cooling system which circulates liquid hydrogen through the engine parts to protect them from the intense heat of hypersonic flight. The hydrogen coolant is then burned as fuel, yielding more than twice the energy of conventional jet fuels. Engine performance and fuel consumption will be measured in future tests to be made upon completion of a special facility being built at NASA's Lewis Research Center. The research engine being tested was built for NASA under contract by the AiResearch Manufacturing Co., Los Angeles, California.

PHOTO CREDIT -- NASA or National Aeronautics and Space Administration


SPACE STATION
ROTATIONAL TEST FACILITY

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

FOR RELEASE: Filed: August 31, 1970
PHOTO NO. 70-H-1128

SPACE MEDICINE

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WHIRLING TESTS BEGIN--Four test subjects begin studying the effects of artificial gravity on men in this giant spinner at North American Rockwell's Space Division, Downey, Calif. Study is part of NASA's program to provide information for earth-orbiting space station planned for 1970's. Twelve 8-hour tests are planned plus 7-day continuous run. Crewmen study tasks of walking, climbing ladders, handling and moving cargo while suspended in slings and perform tests requiring mental and hand-eye coordination. Giant gondola on end of 160-foot diameter beam has living quarters and experimental equipment. Tests are for NASA's Langley Research Center. Rotational test facility is largest known device of its type.

PHOTO CREDIT--NASA or National Aeronautics and Space Administration

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FOR RELEASE: Filed: April 5, 1971

PHOTO NO. 71-H-665

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SPACE PLANE UNVEILED--Research pilot Al Moyles checks panels in mockup of Space Shuttle Orbiter crew station at North American Rockwell's (NR) Space Division, Downey, Calif. Crew station actually is nose section of 210-foot-long Orbiter that can accommodate 12 passengers, resupply orbiting space stations, carry lab experiments into orbit, launch military or communications satellites or retrieve satellites. Space Division is performing Space Shuttle design studies for the National Aeronautics and Space Administration.

30

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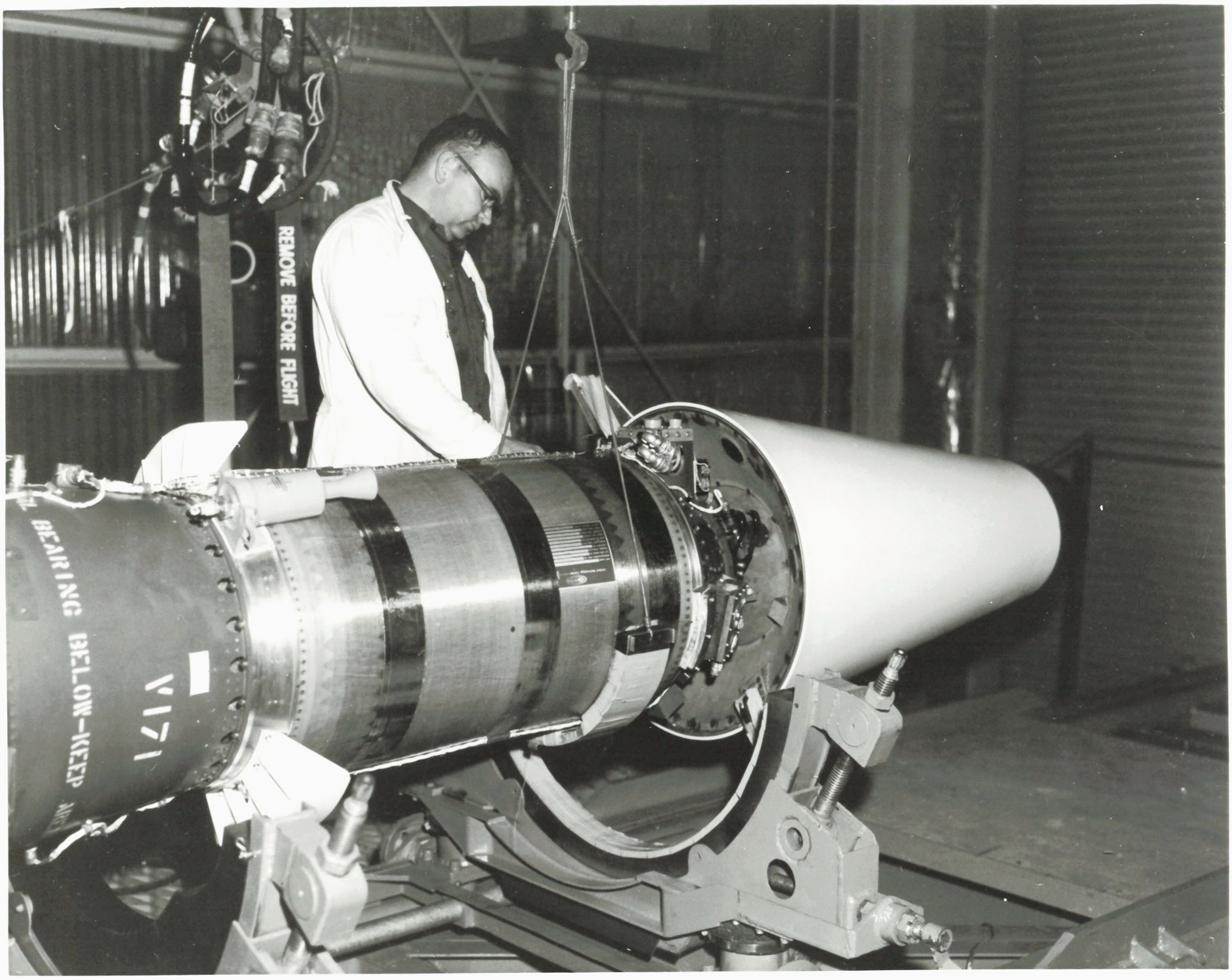
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WASHINGTON, D.C. 20546

FOR RELEASE: Filed September 30, 1970
PHOTO NO. 70-H-1240
70-HC-891

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WALLOPS ISLAND, VA. -- HEAT SHIELD IS PLACED ON THE SCOUT BOOSTER VEHICLE. The National Aeronautics and Space Administration will launch an atmosphere entry flight experiment September 30 to study ways of preventing loss of radio signals from spacecraft returning to Earth. The experiment, managed by Langley Research Center, Hampton, Va., will be launched from NASA's Wallops Station, Wallops Island, Va., aboard a Scout booster vehicle. The flight test, designated RAM C-C, is the third and last in the RAM series and is a continuation of the NASA's Project RAM (Radio Attenuation Measurements) to study the problem of communicating through the ionized gas (plasma sheath) created around a spacecraft reentering the Earth's atmosphere at high speeds.

PHOTO CREDIT -- NASA or National Aeronautics and Space Administration

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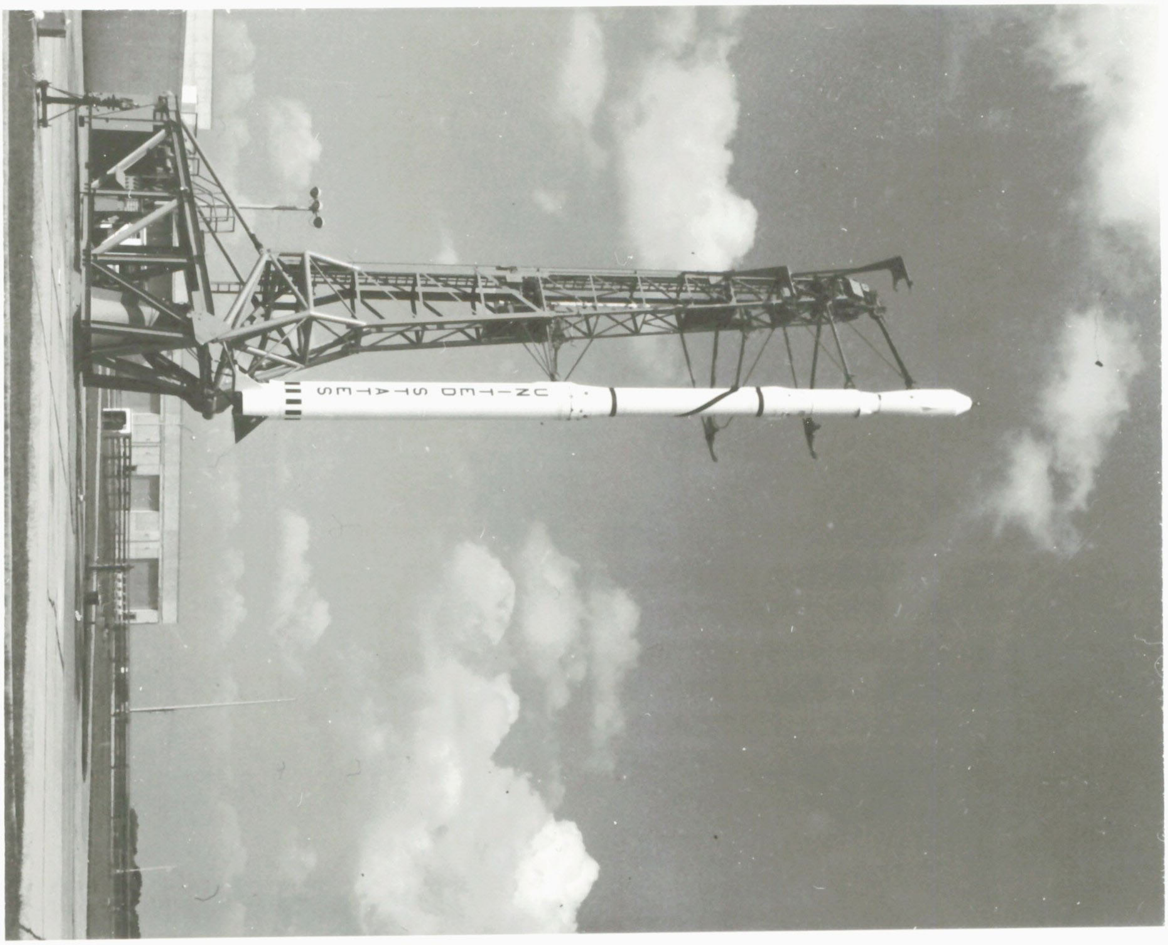
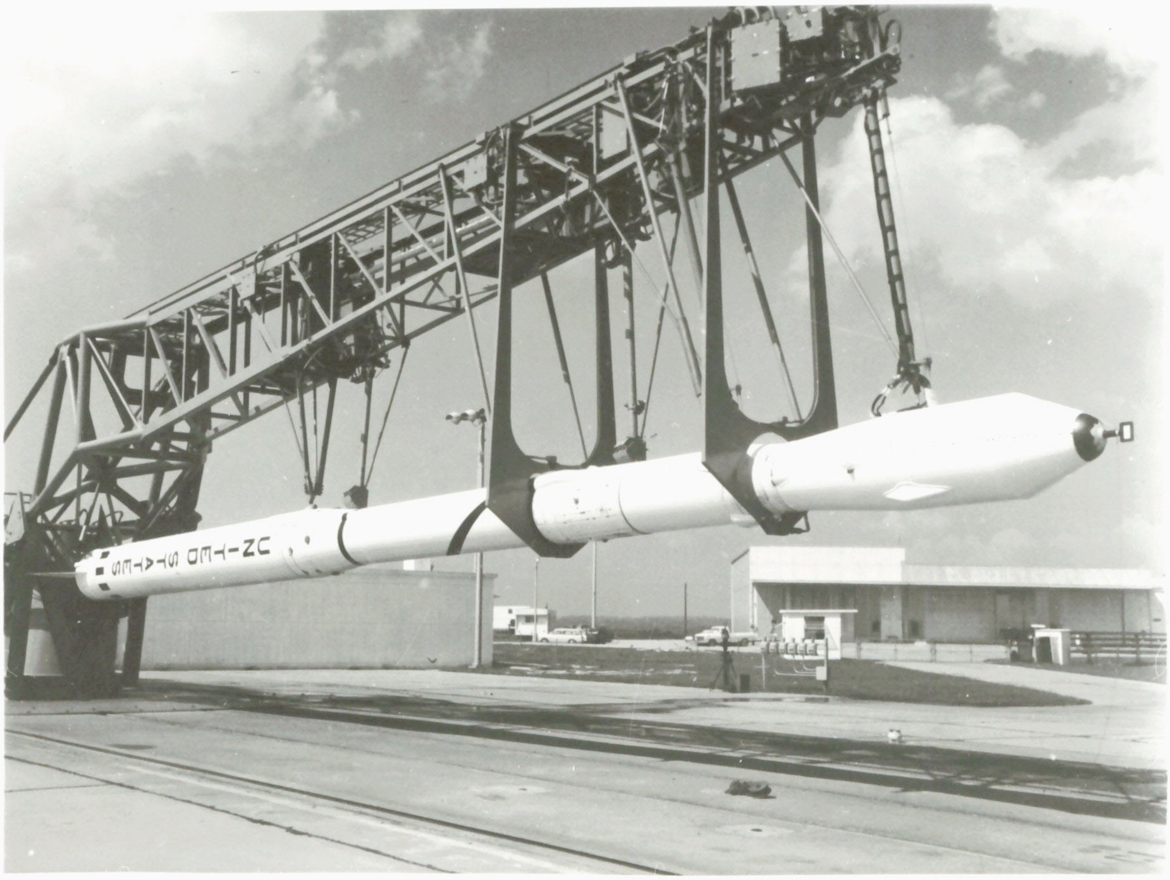

UNITED STATES


UNITED STATES

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FOR RELEASE: September 30, 1970
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70-HC-892

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21

WALLOPS ISLAND, VA. -- Scout Launch Vehicle in pre-launch and launch position in preparation for an atmosphere entry flight experiment. The National Aeronautics and Space Administration will launch an atmosphere entry flight experiment September 30 to study ways of preventing loss of radio signals from spacecraft returning to Earth. The experiment, managed by Langley Research Center, Hampton, Va., will be launched from NASA's Wallops Station, Wallops Island, Va., aboard a Scout booster vehicle. The flight test, designated RAM C-C, is the third and last in the RAM serise and is a continuation of NASA's Project RAM (Radio Attenuation Measurements) to study the problem of communicating through the ionized gas (plasma sheath) created around a spacecraft reentering the Earth's atmosphere at high speeds.

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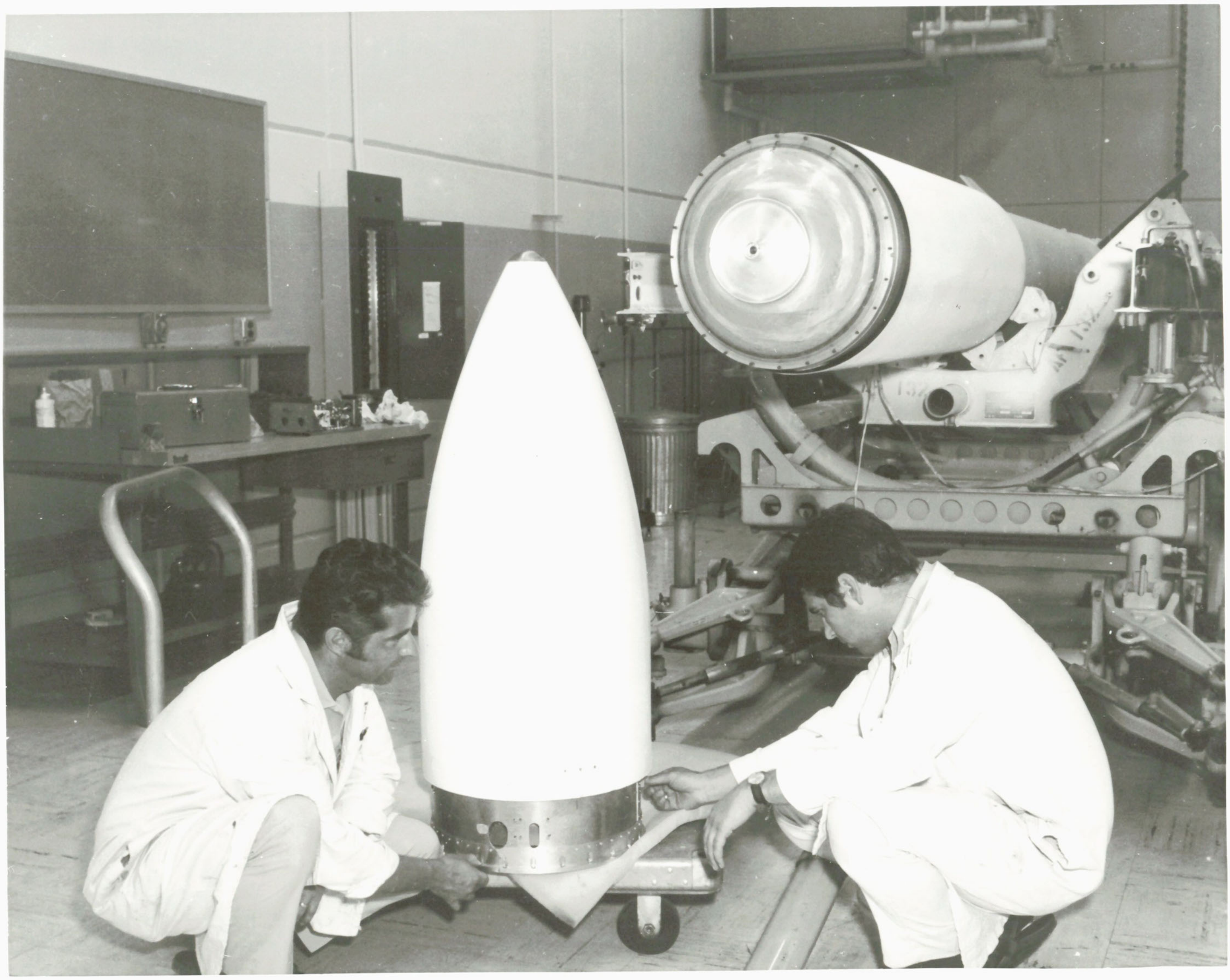

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WASHINGTON, D. C. 20546

FOR RELEASE: September 30, 1970
PHOTO NO. 70-H-1239
70-HC-733

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WALLOPS ISLAND, VA. -- Engineers mate the payload to the fourth stage of the Javelin launch vehicle in preparation for the cloud experiment. (L-R) Werner Goebel and Dieter Maurer of Max Plank, Institute of Germany. The National Aeronautics and Space Administration will launch sounding rockets from its Wallops Station, Va., facility to conduct scientific experiments with vaporized barium which will form the clouds. One cloud, scheduled approximately for September 29, will be at an altitude of 560 miles and may expand to 300 miles or more in length. The second, at an altitude of 150 miles, is expected to be cucumber-shaped and expand to about 90 miles long by 20 miles thick. Data from experiments like these help scientists understand better the electric and magnetic fields in the upper atmosphere. Such knowledge may speed the development of improved techniques for weather forecasting and better radio and television communications.

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580

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71-H-1747

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OV-IOA BRONCO--The OV-IOA Bronco aircraft which is being used in the National Aeronautics and Space Administration's Short Take-off and Landing (STOL) research program. This aircraft has been equipped with experimental rotating cylinder flaps, one of a number of STOL concepts being investigated for possible application to civil and military aircraft. The aircraft is now being flown at NASA's Ames Research Center, Mountain View, Calif. Modifications include new engines with the propellers interconnected so that either engine can drive both propellers and the rotating cylinders which are installed in the leading edges of the wing flaps.

DEC 11 1971

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STATES-ITEM

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

FOR RELEASE:
PHOTO NO. 68-H-471

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GROOVED RUNWAYS: Engineers examine the effects of aircraft landings on a grooved runway at NASA's Wallops Station, Va. The test grooves, one-quarter inch wide and deep, spaced about one inch apart, are made across the runway as part of a research program that may lead to improved airport and highway safety.

2 Col
#2 - W/LANDING
P-1-S-2-TUES.

AUG 20 1968

ENGINEERS EXAMINE the effects of aircraft landings on a grooved runway. The test grooves, one-quarter inch wide and deep, spaced about one inch apart, are made across the runway.

STATES-ITEM

PHOTO CREDIT--NASA or National Aeronautics and Space Administration

2X4½
3X5½


USAF
06935

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

airplane

YF-12

FOR RELEASE: June 24, 1971
PHOTO NO. 71-H-943

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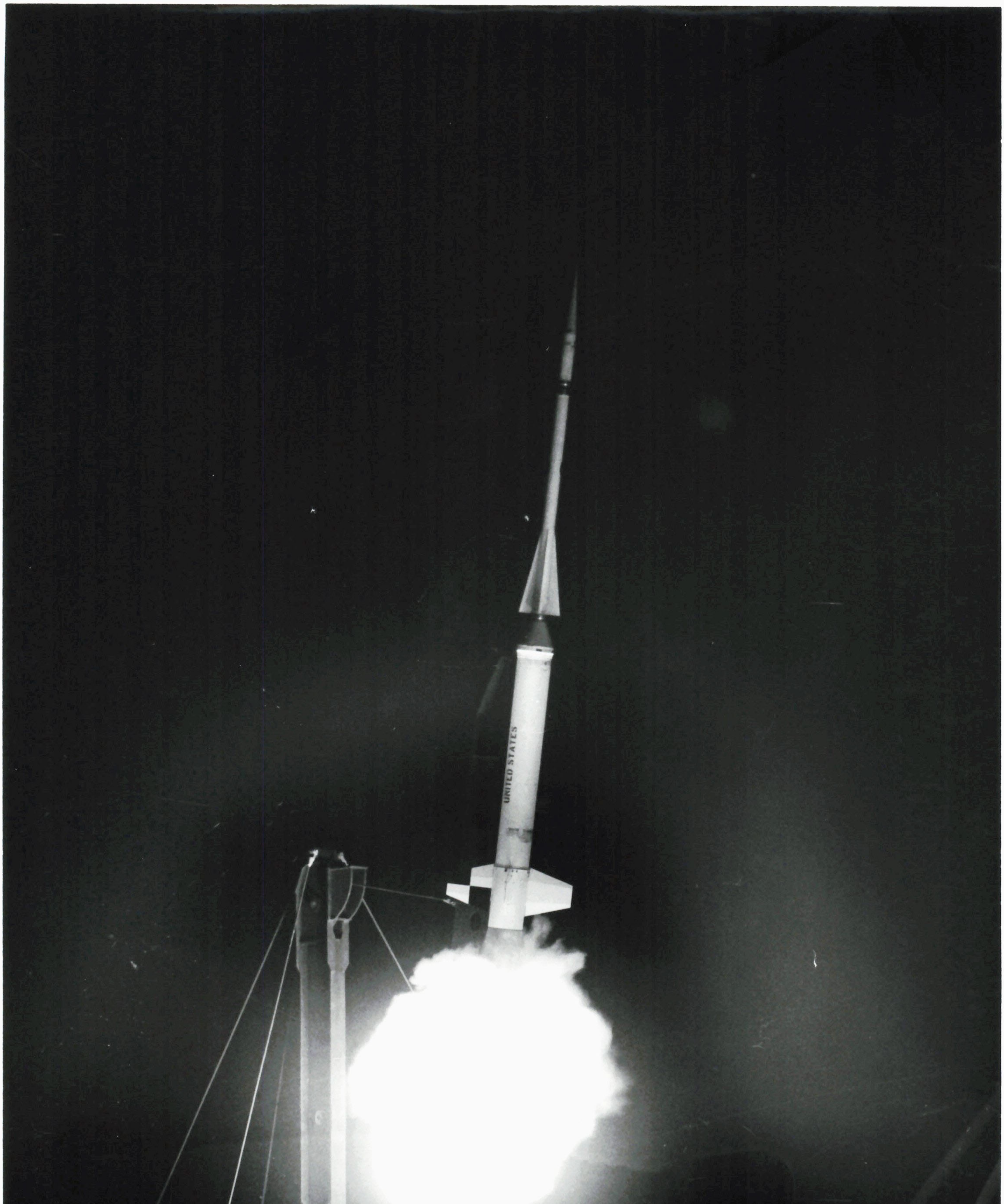
WASHINGTON--A third high-performance Air Force YF-12 aircraft, like the one shown here, is being added to a joint aeronautical research program of the U.S. Air Force and the National Aeronautics and Space Administration. It will be the second YF-12 under operational control of NASA and will be specially instrumented for in-flight studies of propulsion. The NASA Flight Research Center, Edwards, Calif., will manage the flights for NASA's Office of Advanced Research and Technology. Engineers will seek data on engine internal flow dynamics; propulsion and airframe interactions; air inlet dynamics; such external disturbances as atmospheric turbulence and temperature variations; internal disturbances such as rapid airflow changes and factors affecting in-flight stopping and restarting of engines. Two YF-12s in the NASA program will allow one to be on flight status most of the time, improving efficiencies of both the ground maintenance crews and the research pilots. The other NASA-managed YF-12 is instrumented to study aerodynamic and thermal loads, including deflections and other structural factors. The NASA phase of the joint program is aimed at advancing the technology of supersonic military and civil aircraft.

CREDIT--NASA or National Aeronautics and Space Administration

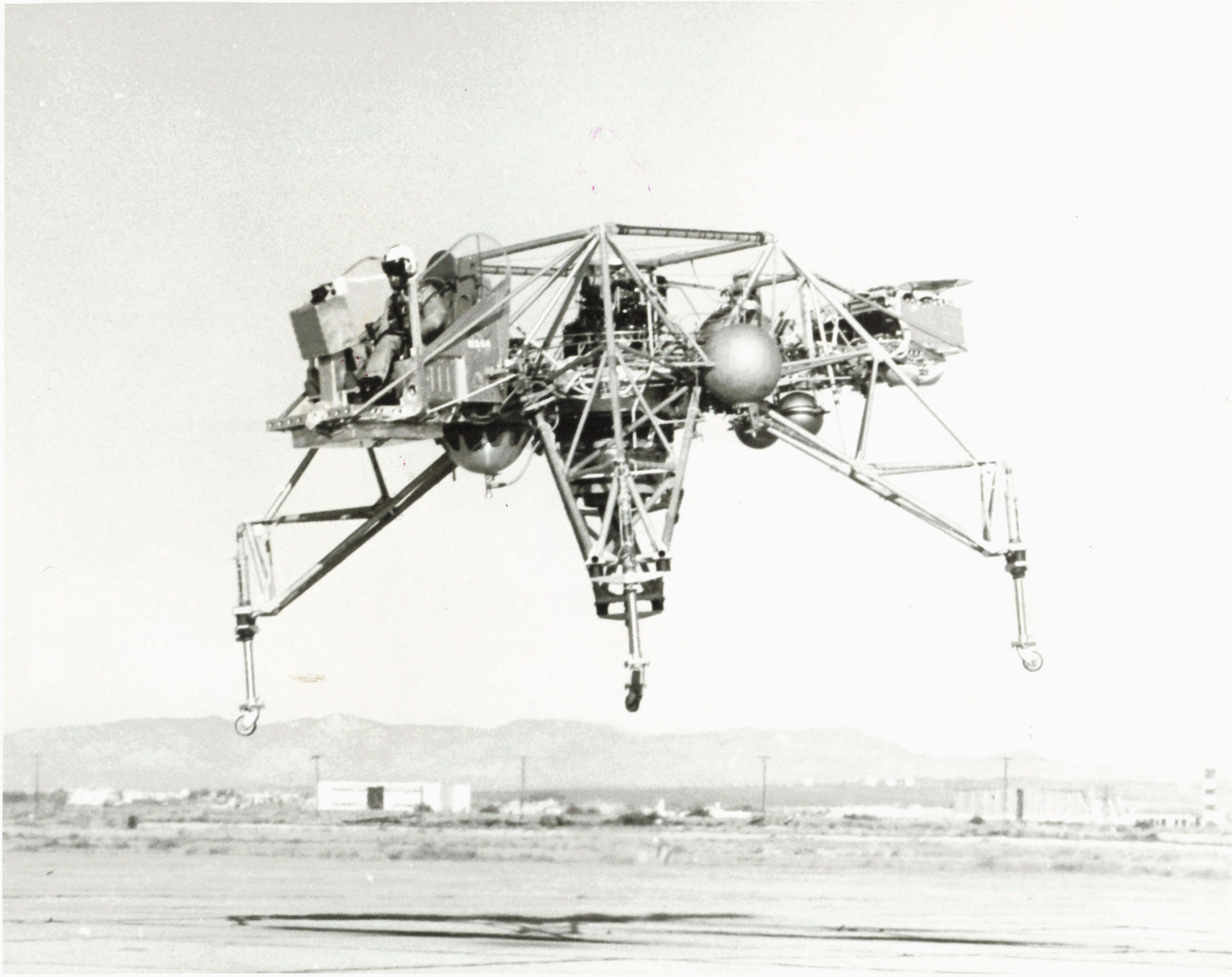

UNITED STATES

NATIONAL AERONAUTICS AND SPACE
ADMINISTRATION PHOTOGRAPH

PHOTO NO. 60 Nike Asp-1

SUBJECT:
NIKE-ASP lifts off Pad - Sodium Vapor Experiment
Wallops Island, Virginia.

41



NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
400 MARYLAND AVENUE, SW, WASHINGTON, D. C. 20546

FOR RELEASE: November 5, 1964
PHOTO NO.: 64-H-2602

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WINGLESS FLIGHT -- Highlighting the National Aeronautics and Space Administration's year of testing machines and equipment for ultimate exploration of the moon was this device. Called the Lunar Landing Research Vehicle, it achieved its first flight on October 30 at NASA's Flight Research Center, Edwards, California. Piloting and operational procedures in a lunar landing are studied with the aid of 1 the LLRV.

WINGLESS FLIGHT—Highlighting the National Aeronautics and Space Administration's year of testing machines and equipment for ultimate exploration of the moon was this device. Called the Lunar Landing Research Vehicle, it achieved its first flight on Oct. 30 at NASA's Flight Research Center, Edwards, Calif. Piloting and operational procedures in a lunar landing are studied with aid of LLRV.

NASA
C-64188

NASA
D/6038

CLEVELAND PRESS
APR 18 1963
REFERENCE DEPT.

Public Information Office
NASA Lewis Research Center
Cleveland 35, Ohio
252-7700, ext. 415

FOR RELEASE: IMMEDIATE

C-64188

This giant magnetic coil is one of twelve that Lewis researchers plan to use in creating a magnetic field 400,000 times stronger than that of the earth. Edmund E. Callaghan, assistant chief of the electromagnetic propulsion division at NASA's Lewis Research Center, is shown here examining the coil.

#

NASA
C-72595

038 NASA

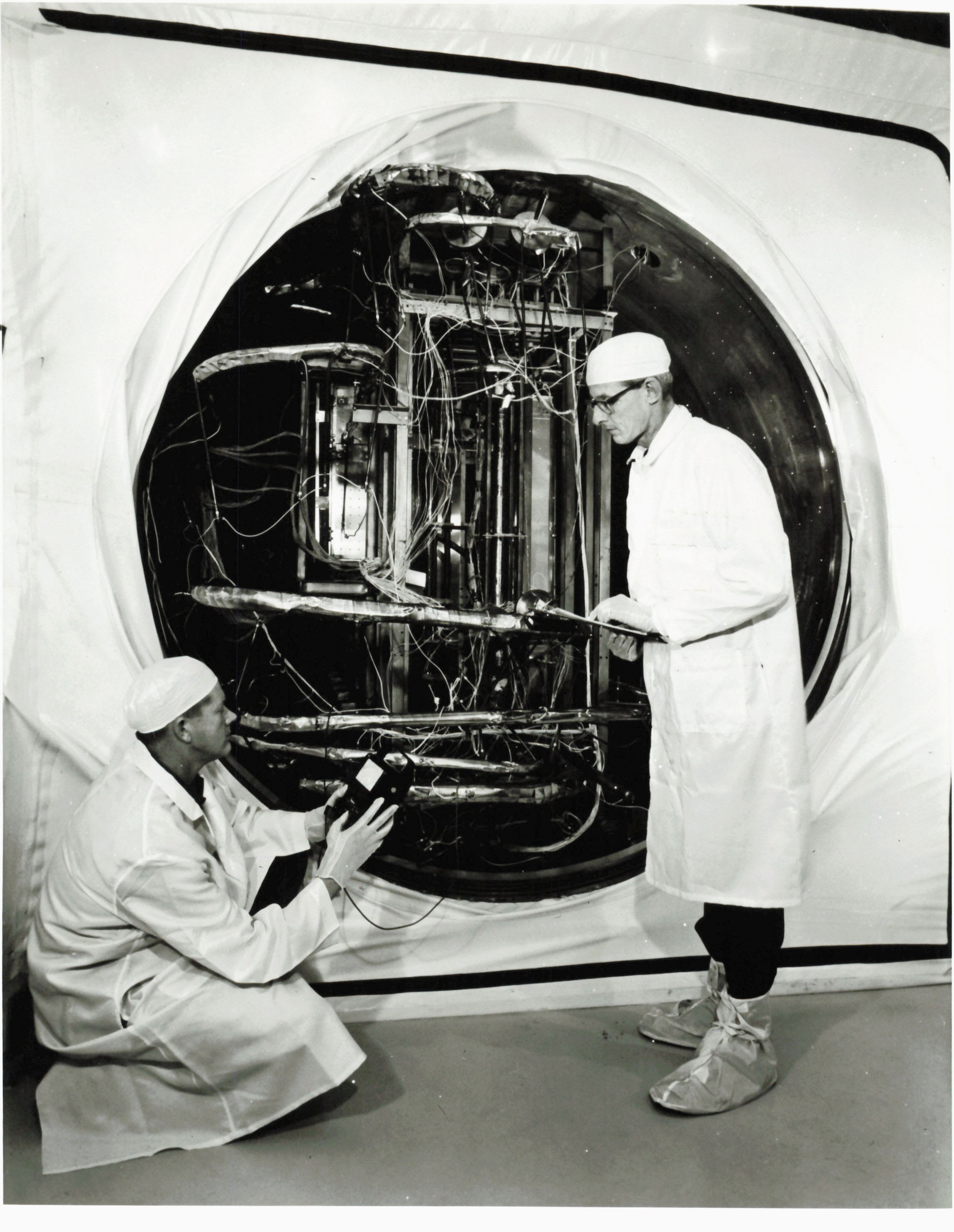
CLEVELAND PRESS
APR 9 1965
REFERENCE DEPT.

Public Information Office
NASA Lewis Research Center
Cleveland, Ohio 44135
433-4000, ext. 415

FOR RELEASE: IMMEDIATE

C-72595

A gas bearing designed to operate in a vacuum chamber is shown here at the NASA Lewis Research Center's Electric Propulsion Laboratory. This bearing is a research tool for ground-testing of satellite attitude control or station-keeping systems. Robert R. Lovell, shown here examining the loaded bearing, says that such proposed systems can now be fully evaluated before they are ever put into space.



NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
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FOR RELEASE: Immediate
PHOTO NO.: 65-H-1097

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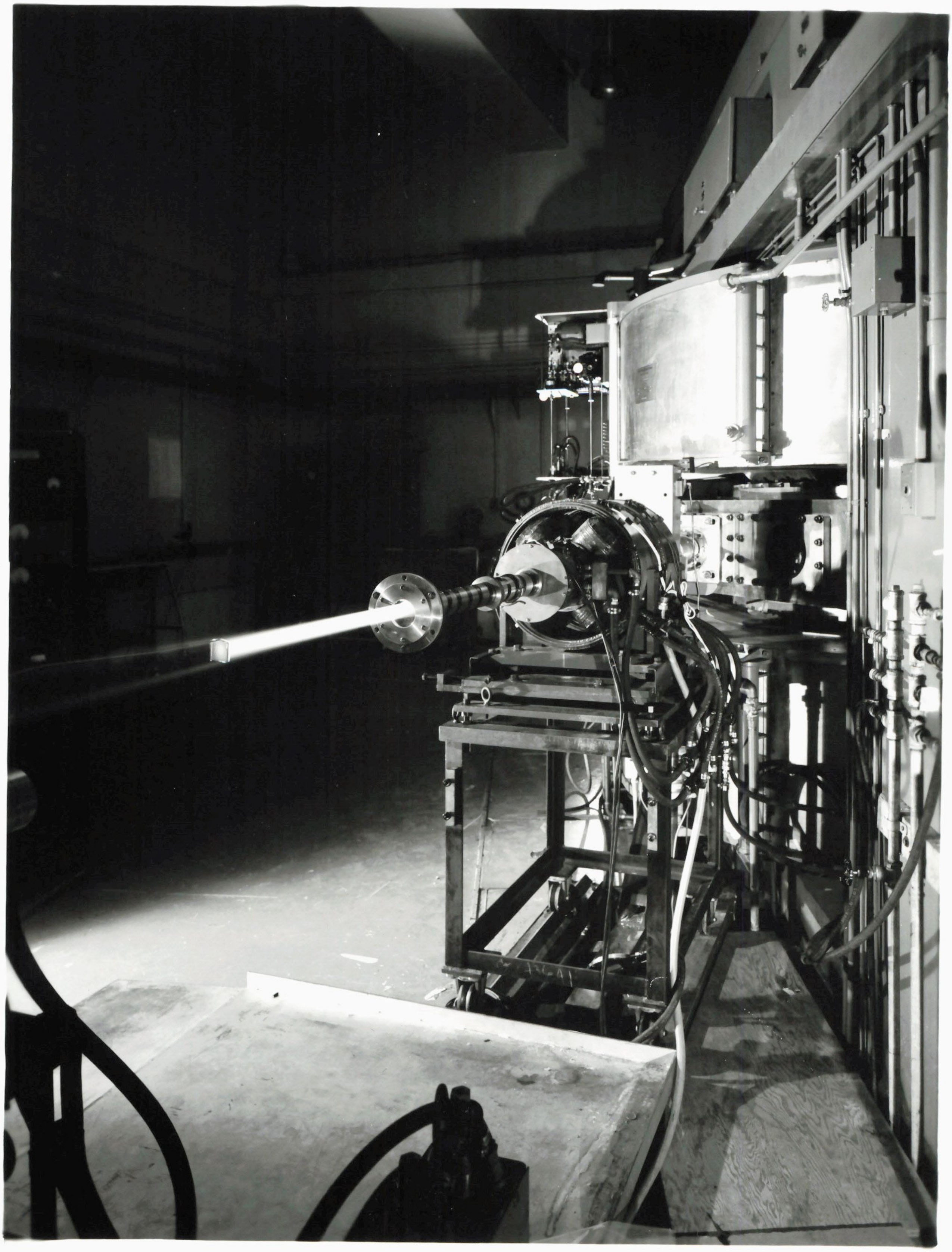
LIQUID METALS -- Have been used throughout the course of history. Now the National Aeronautics and Space Administration is investigating their possible use in space. James P. Lewis, Project Engineer, (right) and Wilber D. McConaghay are shown at the NASA Lewis Research Center in Cleveland with a unique facility for studying the behavior of liquid sodium boiling at some 2000°F.

The sodium boiler itself, background made of refractory columbium, a metals such as sodium. Columbium at high temperatures oxidizes rapidly and the boiler ssembly must be kept immaculately clean. Thus, a portable clean room surrounds the opening to the tank and ll personnel observe clean room conditions.

D16038 NASA

CLEVELAND PRESS
AUG 20 1965
REFERENCE DEPT.

NASA
C-65333



Public Information Office
NASA Lewis Research Center
Cleveland, Ohio 44135
252-7700, ext. 415

FOR IMMEDIATE RELEASE

C-65333

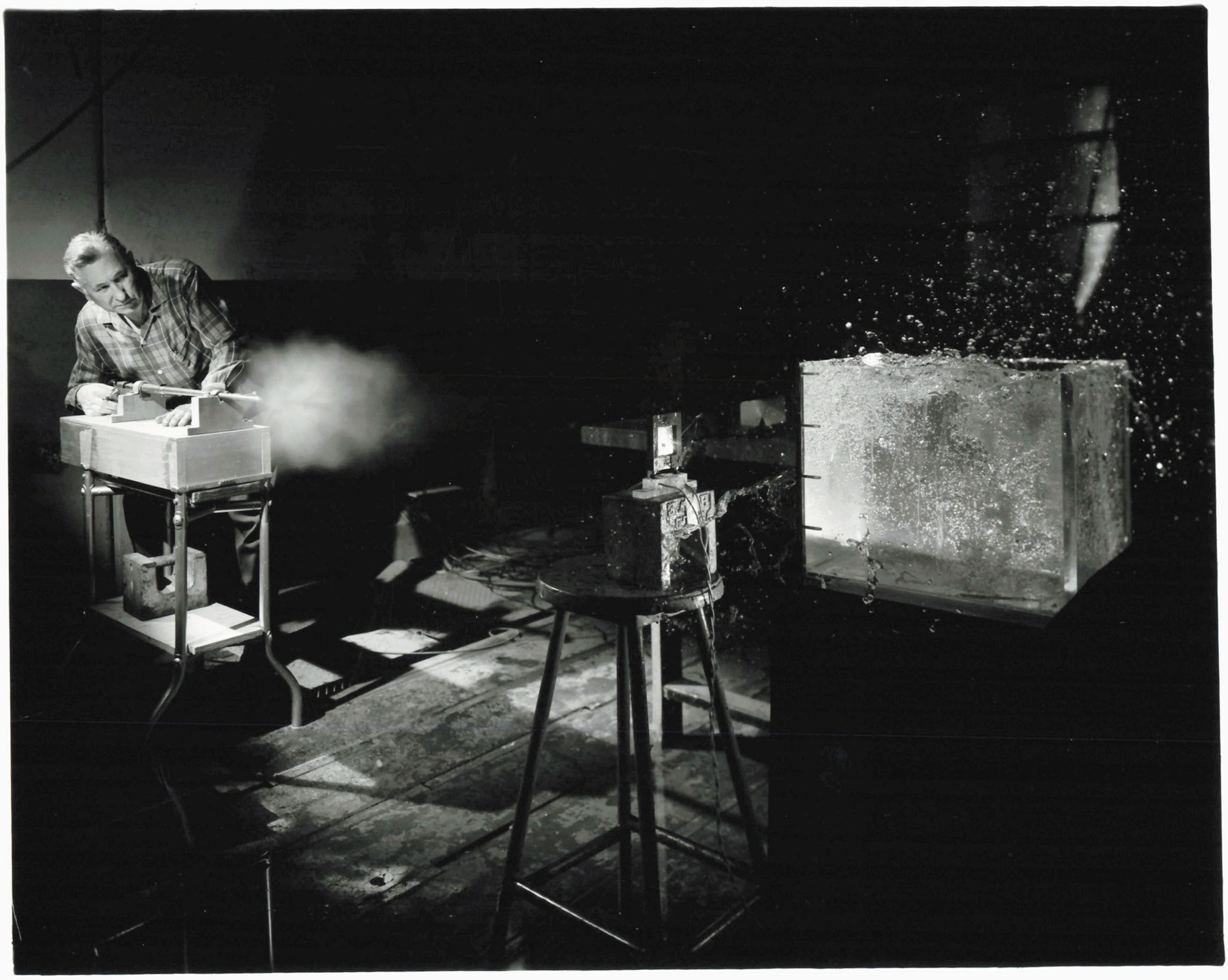
The Lewis cyclotron is shown in operation. NASA scientists are interested in how the radiation in the visible beam damages materials. The test crystal in this picture is ordinary salt. Although radiation damage involves internal structural changes in the metal, the damage in salt is visible in a color change. The clear salt crystal begins to yellow under initial radiation. This light yellow deepens into brown if the radiation "dose" is intensified.

#

A16038 NASA

CLEVELAND PRESS
MAY 13 1964
REFERENCE DEPT.

NASA
C-59004



NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
400 MARYLAND AVENUE, SW, WASHINGTON 25, D.C.

FOR RELEASE: September 1, 1963
PHOTO NO.: 63-Lewis-22

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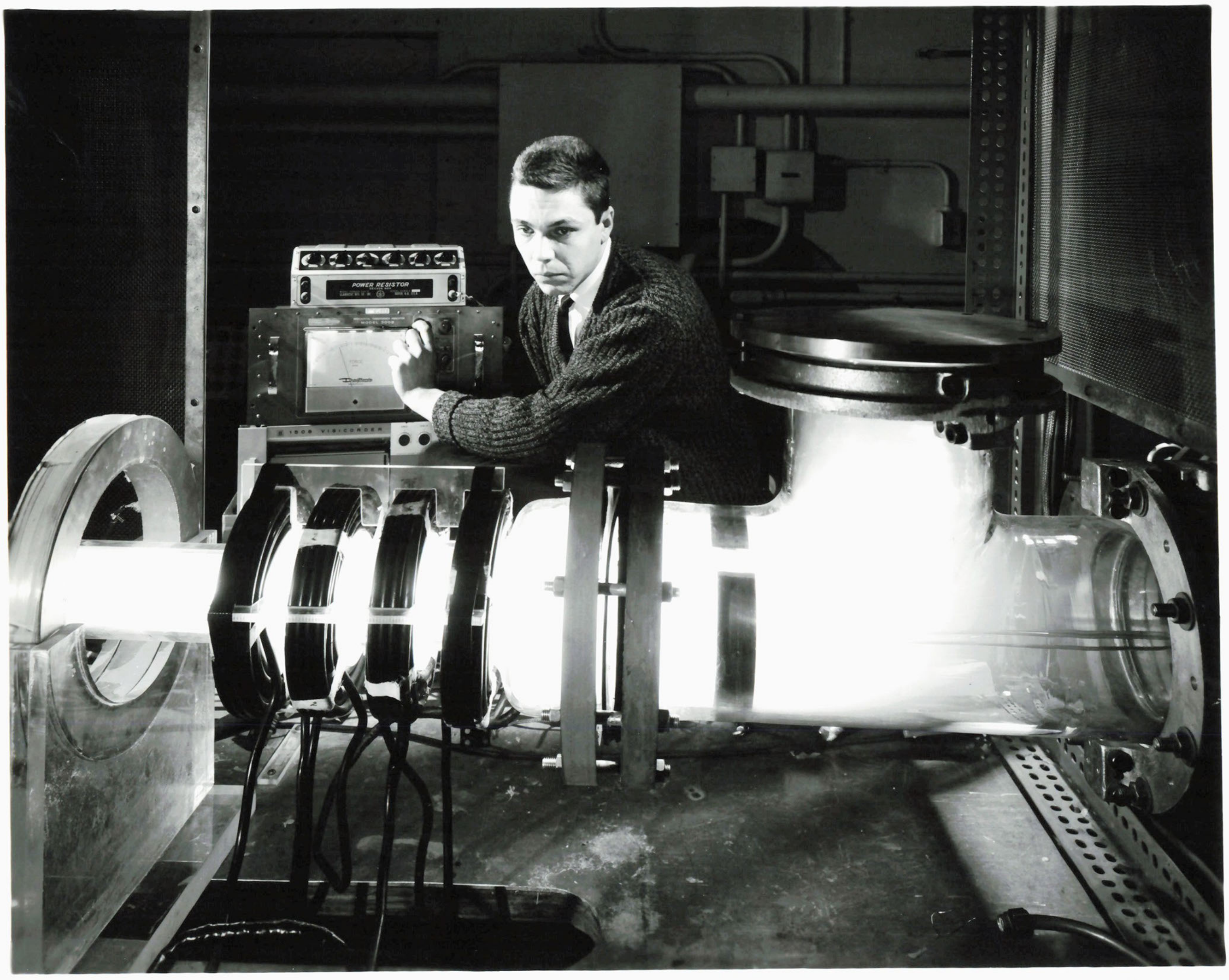
CLEVELAND, Ohio--High-velocity gun fires tiny particles into this liquid-filled tank, simulating spacecraft's fuel tank, at Lewis Research Center. Purpose is to study what effect a micrometeoroid might have if it were to puncture a vehicle traveling in space.

A16038 NASA

CLEVELAND PRESS
JAN 14 1964
REFERENCE DEPT.

NASA
C-68265



News

NASA

LEWIS RESEARCH center

21000 BROOKPARK ROAD CLEVELAND, OHIO 44135
PUBLIC INFORMATION OFFICE
PHONE - (AREA CODE 216) 252-7700 EXT. 415

FOR RELEASE: IMMEDIATE
March 12, 1964

Release 64-19

(Joann Temple: 433-4000, ext. 415)
res: 941-4769

C-68265

Manned spaceflight to the planets will require unique propulsion. One contender for this future job is the pilot plasma engine shown here at the National Aeronautics and Space Administration's Lewis Research Center. Although this is a research tool and not intended for propulsion purposes, the thrust efficiency of this traveling wave accelerator has been increased from only 1 per cent up to 25 per cent in the last year. The accelerator, being operated by Raymond W. Palmer of the Lewis Electromagnetic Propulsion Division, uses an alternating current power supply. The A-C feature avoids the life limitations of direct current accelerators where electrode parts rapidly deteriorate from touching the plasma. The traveling wave accelerator works like its name. A neutral plasma of electrons and ions is produced in the source at the left. This plasma moves to the right and is accelerated by a moving magnetic field in the four black coils. Such acceleration produces thrust--perhaps enough to propel a future spacecraft beyond the moon.

CLEVELAND PRESS
MAR 12 1964
REFERENCE DEPT.

National Aeronautics and
Space Administration

S95-15266

Lyndon B. Johnson Space Center
Houston, Texas 77058

National Aeronautics and Space Administration

Houston, Texas 77058

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COLOR

8 AUGUST 1996 S95-15266

JOHNSON SPACE CENTER, HOUSTON, TEXAS

LIFE SUPPORT TEST --- Dr. Nigel Packham, a Lockheed-Martin life support systems scientist, displays a handful of the 30,000 wheat plants that produced oxygen for him during a 15-day regenerative life support systems test at the Johnson Space Center (JSC). The regenerative life support systems test was the first in a series of tests of advanced, recycling life support technologies planned over the next several years. The test was the first of its kind at JSC in more than 25 years.

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PHOTO CREDIT: NASA or National Aeronautics and Space Administration.


NASA 810

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

FOR RELEASE: March 9, 1971
PHOTO NO. 71-H-471

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EDWARDS, CALIF.--This modified Navy F-8 jet serves as flying testbed for a new airfoil shape that could substantially lower the operating cost of future jet transports. The National Aeronautics and Space Administration originated the new airfoil shape, called the NASA super-critical wing. It will be flight tested by NASA's Flight Research Center, Edwards, Calif. At cruise [illegible] of modern day jet transports, approximately Mach 0.8 or about 530 m.p.[illegible] air flowing over the curved upper surface of the wing reaches supersoni[illegible] before the aircraft does. This results in local shock waves on the wi[illegible] cause a sharp rise in aerodynamic drag buffeting, and a significant decrease in efficiency. The super-critical wing has a flattened top surface that moves the shock wave near the back of the wing and substantially increases the total wing efficiency at subsonic speed. The super-critical wing was developed at NASA's Langley Research Center, Hampton, Va. Tests indicate the new airfoil shape could allow highly efficient flight near the speed of sound, approximately 660 m.p.h. at cruising altitudes.

PHOTO CREDIT--NASA or National Aeronautics and Space Administration

A-29974

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
AMES RESEARCH CENTER, MOFFETT FIELD, CALIFORNIA

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NASA
PHOTOGRAPH
NATIONAL AERONAUTICS
AND SPACE ADMINISTRATION
AMES RESEARCH CENTER
Moffett Field, California

DEC 6 1962

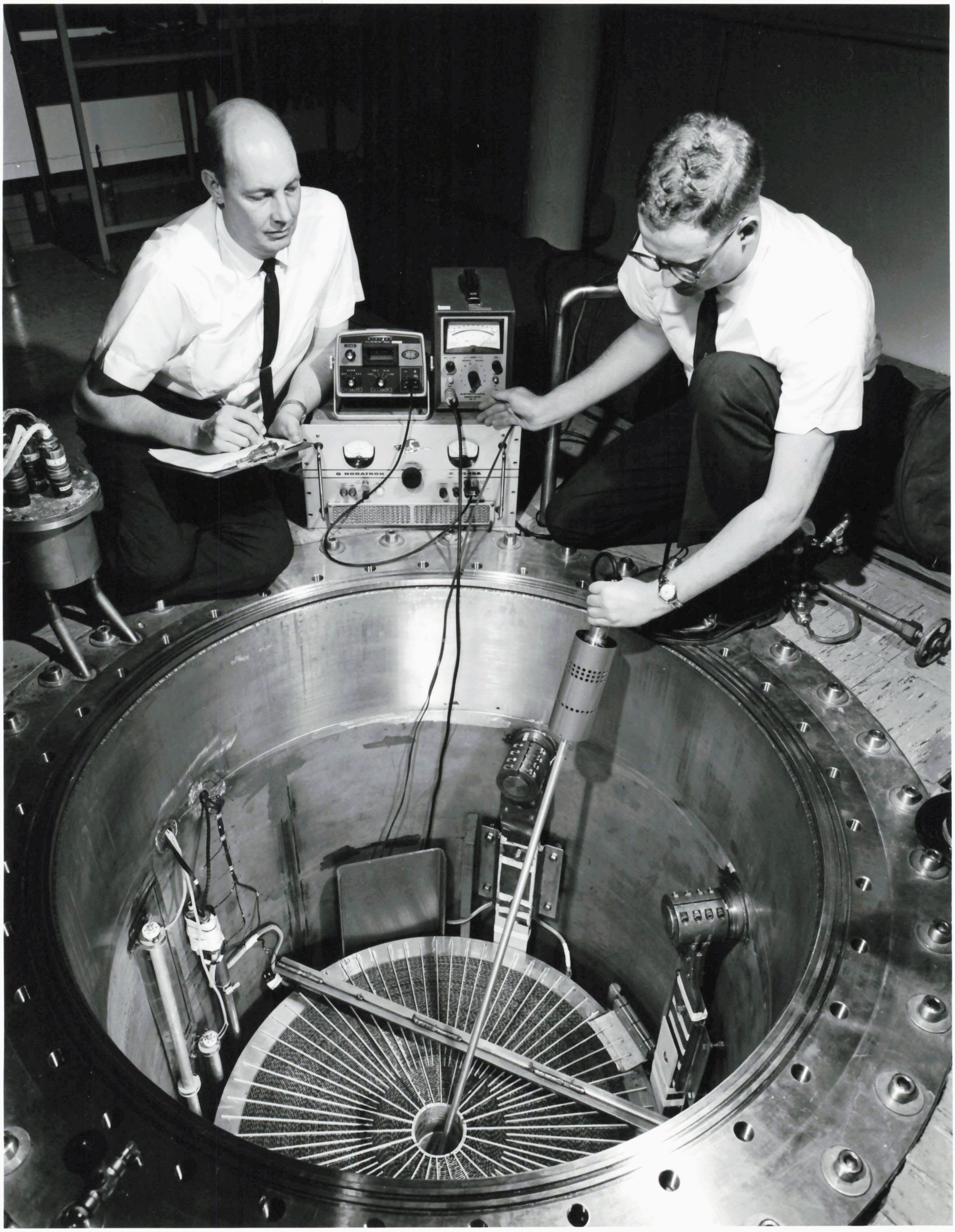
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
AMES RESEARCH CENTER
MOFFETT FIELD, CALIFORNIA

Photo Number A-29974

Vertical descent by the jet-powered Bell X-14A enables research pilots of NASA's Ames Research Center, Moffett Field, California, to simulate landings on lunar and other planetary surfaces. Jet reaction nozzles on the wing tips and tail control the X-14A during hovering and slow speed flight.

(Official NASA Photo)

NASA
C-65-810



News NASA LEWIS RESEARCH center

21000 BROOKPARK ROAD CLEVELAND, OHIO 44135

PUBLIC INFORMATION OFFICE

PHONE - (AREA CODE 216) 433-4000 EXT. 415

FOR RELEASE: FRIDAY A. M. 'S
MAY 28, 1965

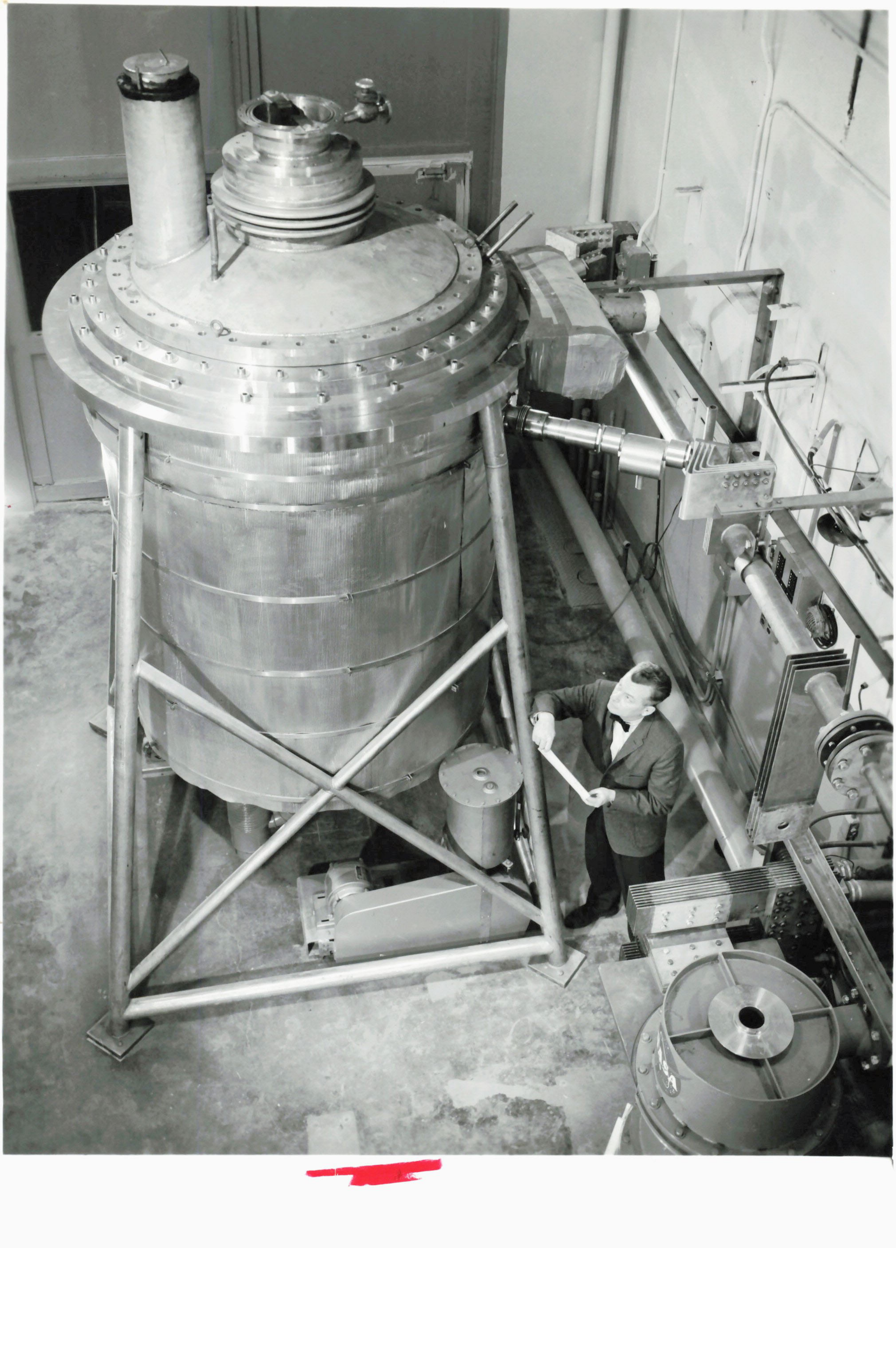
C-65-810

CLEVELAND, Ohio, May 28 -- A high-field strength cryomagnet having a volume many times larger than any previously known will be used in magnetic research at the National Aeronautics and Space Administration's Lewis Research Center. The 200 kilogauss cryomagnet is shown here being examined by Willard D. Coles (left), Head, Magnetics Section, Lewis Research Center, and John C. Fakan. The north and south poles of the magnet are visible on the wall of the emersion chamber.

#

65-38

NASA
C-64186



NASA Lewis researchers are building a supermagnet to aid research on harnessing thermonuclear fusion for possible space use. Shown here is the huge tank used to hold the magnet coils and their supercooling fluid--liquid neon at 410 degrees below zero. Edmund E. Callaghan, assistant chief of the electromagnetic propulsion division, is supervising installation of the new magnet.

APR 19 1963

HUGE MAGNETIC BOTTLE, built by scientists at NASA's Lewis Research Center, is the first form of a power plant to propel spaceships between planets. The bottle contains a magnet coil made of stainless steel and aluminum, cooled by liquid neon at 410 degrees below zero. Edmund E. Callaghan, assistant chief of electromagnetic propulsion, is supervising installation of the new test device. (NASA Photo)

D16038 NASA

CLEVELAND PRESS
APR 18 1963
REFERENCE DEPT.

NASA
C-66-3683

Public Information Office
NASA Lewis Research Center
Cleveland, Ohio 44135
433-4000, ext. 415

FOR IMMEDIATE RELEASE
October 4, 1966

C-66-3683

Technicians inspect a 1500-lb. experiment being prepared for testing in Lewis' 500-foot deep Zero Gravity Research Facility, just recently completed to augment research on fluids in a weightless environment. The chamber shaft extends 510 feet below grade and is lined with an 18-inch thick concrete casing 28 feet in diameter. Inside the shaft is a steel vacuum chamber 20 feet in diameter. The chamber can create a pressure similar to that found at 50 miles altitude. By dropping experiments from the top of the shaft, five seconds of weightlessness can be produced. This zero-G time is doubled when experiments are propelled upwards from the bottom by a high-pressure accelerator, permitted to fall free, then retrieved by a large decelerator cart. The Zero Gravity Research Facility can handle experiments weighing up to 6000 lbs.

#16058
CLEVELAND PRESS
OCT 20 1966
REFERENCE DEPT.

NASA
C-29145

From Public Information Office
Lewis Research Center, NASA
Cleveland, Ohio

For Immediate Release - 2 p.m., Friday, April 29, 1960

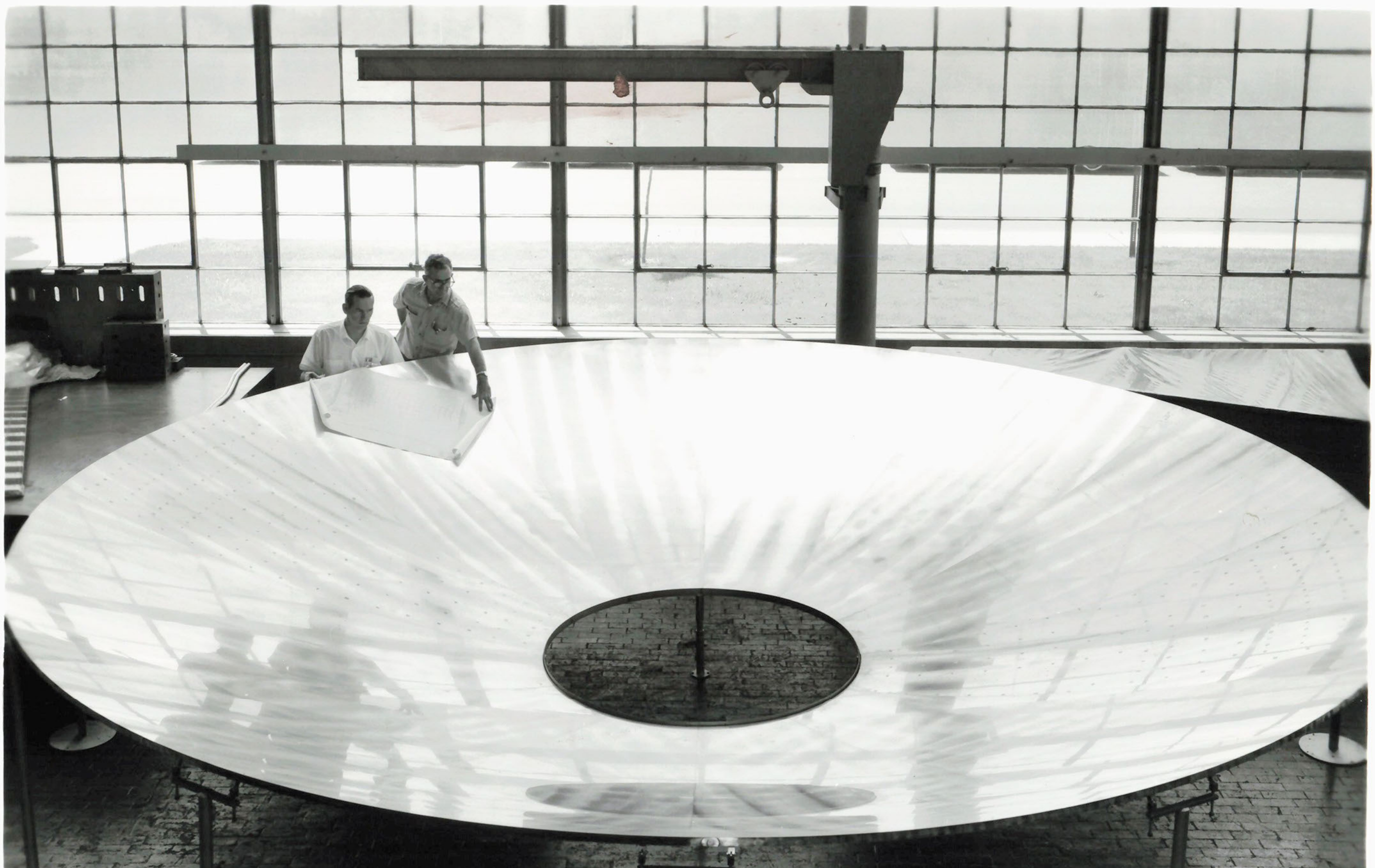
C-29145

Past aeronautical research provided basic concepts from such tests as this ram-jet powered missile model in Lewis' 8x6 Supersonic Wind Tunnel.

D 16038 NASA - Wind Tunnel

CLEVELAND PRESS
JUL 30 1960
REFERENCE DEPT.

NASA
C-66-2471



Public Information Office
NASA Lewis Research Center
Cleveland, Ohio 44135
433-4000, ext. 415

FOR IMMEDIATE RELEASE
October 4, 1966

C-66-2471

Technicians check a 20-foot solar mirror built at the Lewis Research Center for work on space power generating devices. Formed of magnesium plates, the mirror was given an epoxy coating and then an evaporated aluminum finish. It will be used with a Brayton cycle electric generating system,.similar in operation to a jet engine except that the energy produces electrical power rather than thrust. This Lewis concept is the first to use a rigid mirror. Other concepts using solar mirrors have involved folding or inflatable structures.

OFFICIAL PHOTO
NASA - LEWIS RESEARCH CENTER

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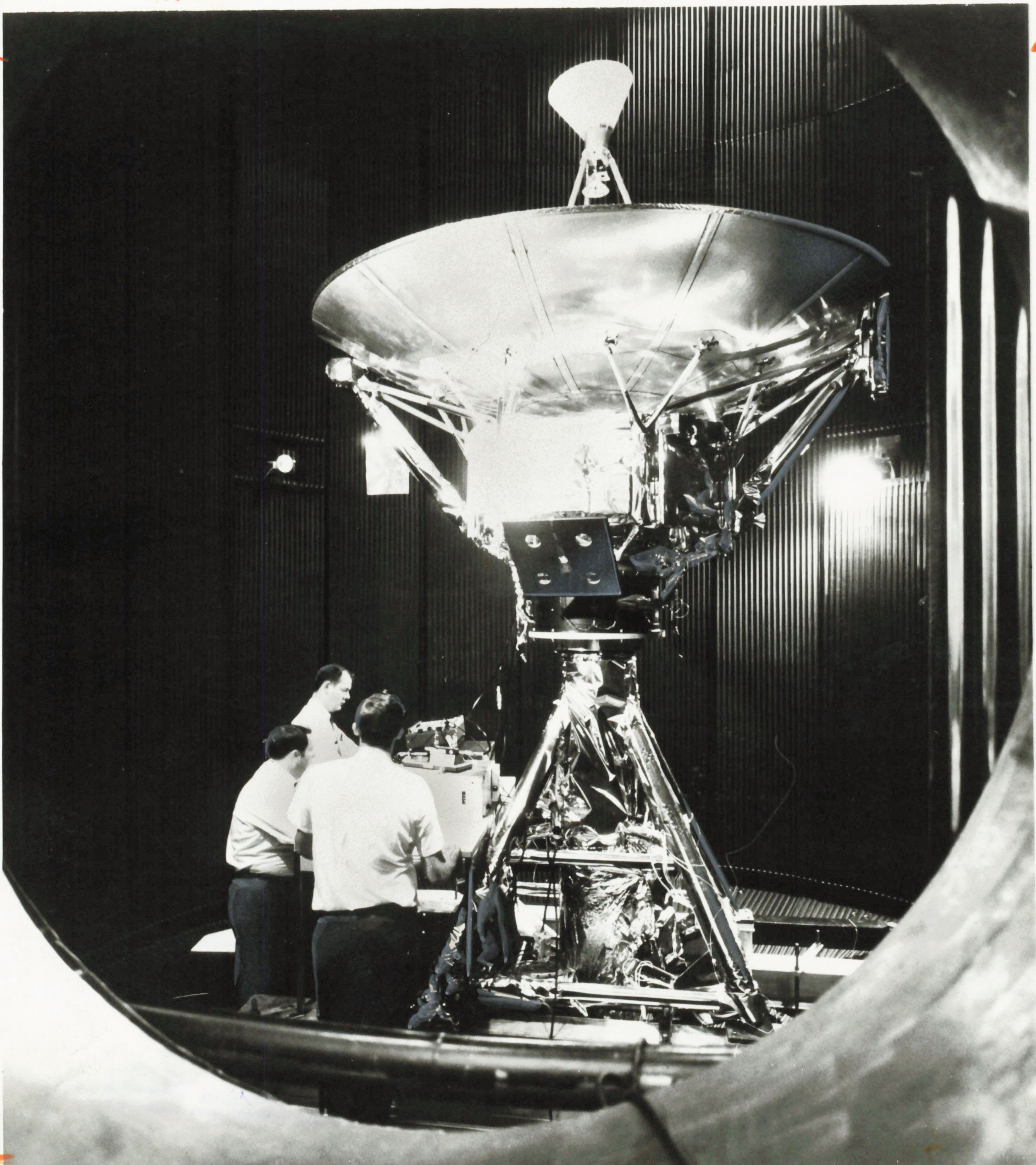
CLEVELAND PRESS
OCT 20 1966
REFERENCE DEPT.

D 16038 NASA



A819

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

FOR RELEASE: Filed: January 25, 1972

PHOTO NO. 72-H-67
72-HC-40

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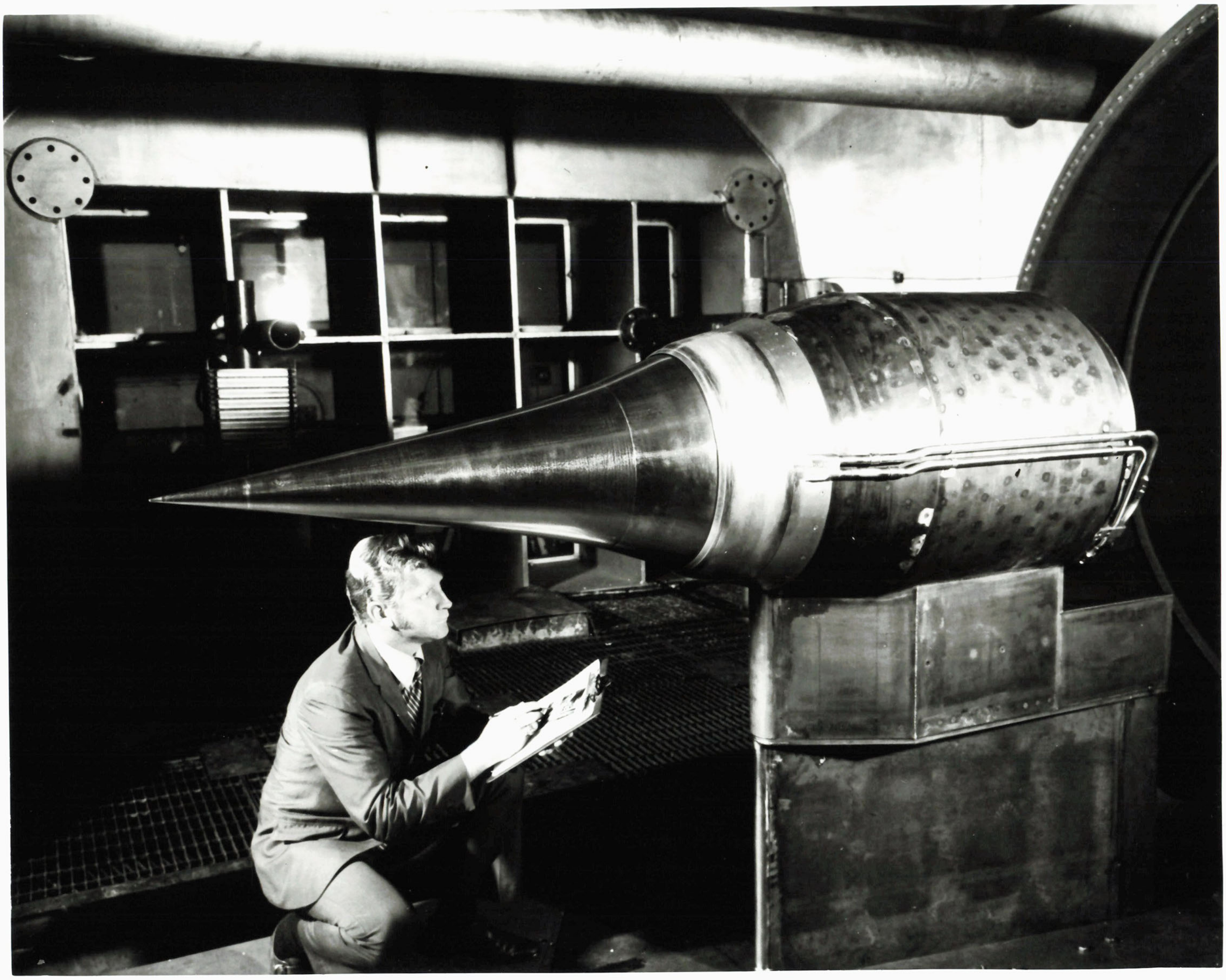
REDONDO BEACH, CALIF. -- Technicians prepare Pioneer F spacecraft for testing in space simulation chamber. The chamber subjects the spacecraft to the heat, cold, vacuum and simulated radiation that it encounters in space. Pioneer Jupiter is the first spacecraft designed to travel into the outer solar system and operate effectively there, possibly for as long as seven years and as far from the Sun as 2.4 billion kilometers (1.5 billion miles). Pioneer F's primary objective will be to take the first close-up look at Jupiter. It will return data on about 20 aspects of the big planet, its moons and environment, from the Mission's 13 experiments carried out by 11 onboard scientific instruments and is also expected to explore a curving strip of space one billion kilometers (620 million miles) long extending from the Earth's orbit to Jupiter.

REFERENCE
FEB 15 '72
N. E. A.

PHOTO CREDIT -- NASA or National Aeronautics and Space Administration



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

FOR RELEASE: Filed: October 27, 1970
PHOTO NO. 70-H-1362

SPACE
ENGINE

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19

HAMPTON, VA.--First wind tunnel tests of a Hypersonic Research Engine (HRE) under development by the National Aeronautics and Space Administration were conducted at the NASA Langley Research Center in Hampton, Va., this month. The engine is shown in the Langley 8-foot High Temperature Structures Tunnel which produces a stream of hot gases moving faster than seven times the speed of sound--more than 4,600 mph. The wind tunnel tests are intended to demonstrate that the flight-weight engine, cooled by liquid hydrogen, can repeatedly withstand the intense thermal strains of flight in the excess of Mach 7. In the first test run, Mach 7.4 was achieved at 2000°F and 900 lbs. per square inch pressure. The HRE Project is a NASA effort to demonstrate the technology needed to develop engines capable of propelling aircraft of the future at hypersonic speeds--more than five times the speed of sound. The test engine incorporates advanced technology in structure and materials and a cooling system which circulates liquid hydrogen through the engine parts to protect them from the intense heat of hypersonic flight. The hydrogen coolant is then burned as fuel, yielding more than twice the energy of conventional jet fuels. Engine performance and fuel consumption will be measured in future tests to be made upon completion of a special facility being built at NASA's Lewis Research Center. The research engine being tested was built for NASA under contract by the AiResearch Manufacturing Co., Los Angeles, California.

PHOTO CREDIT--NASA or National Aeronautics and Space Administration


NASA
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N811NA
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NASA

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

FOR RELEASE: Filed: February 23, 1973

PHOTO NO. 73-H-129
73-HC-115

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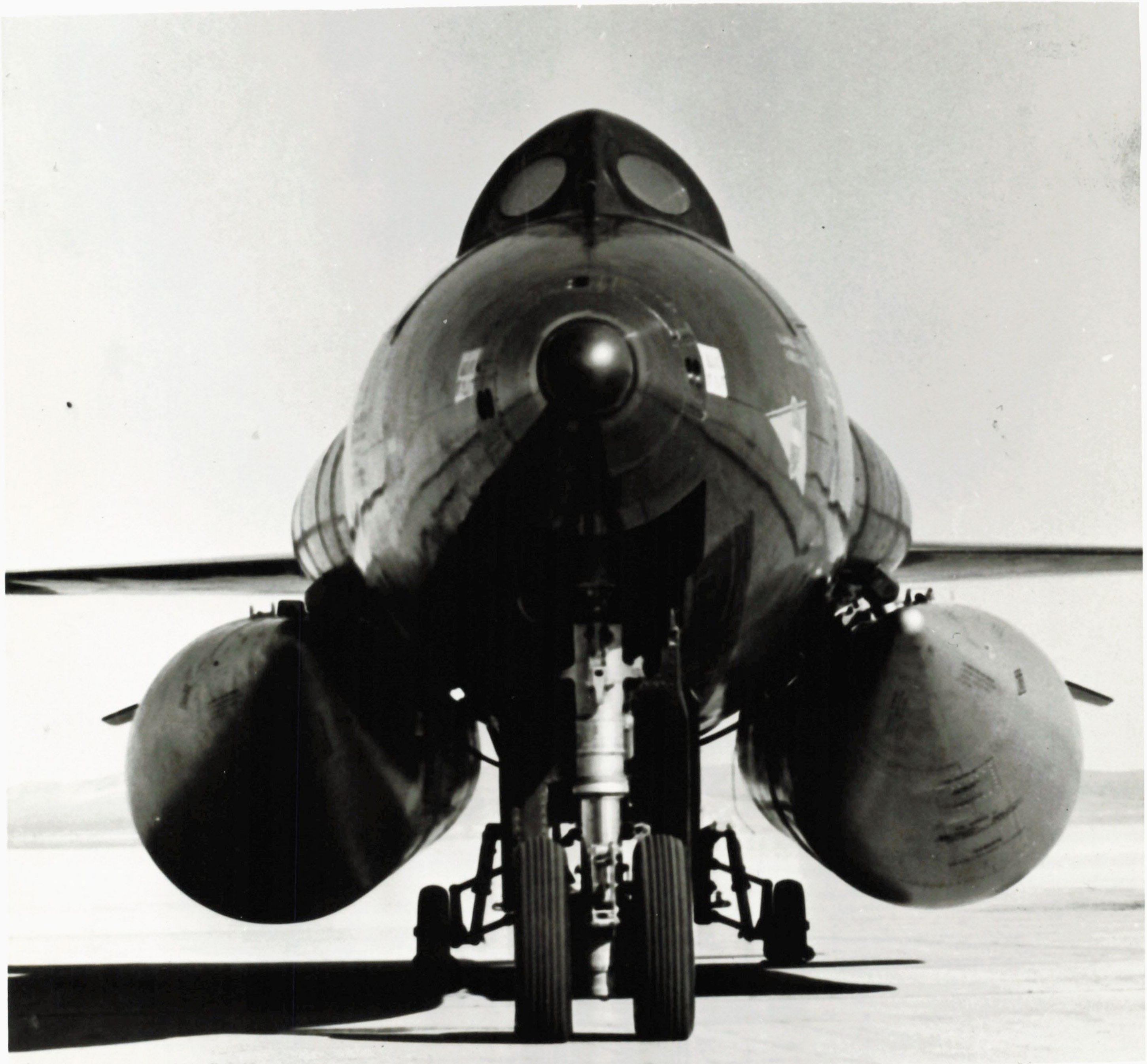
NASA FLIGHT RESEARCH CENTER, Edwards, CA. . . .In addition to pilot proficiency, the F-104 aircraft is used by NASA's Flight Research Center to carry small aerodynamic experiments at supersonic speeds. The jet powered aircraft is capable of flight at speeds in excess of Mach 2 and altitudes above 50,000 feet. With its engine at idle power and landing gear and flaps extended, it can simulate the landing approach maneuvers of the X-15, the wingless lifting bodies and the orbiter portion of the space shuttle.

PHOTO CREDIT--NASA or National Aeronautics and Space Administration



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NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
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FOR RELEASE:
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NEW LOOK -- NASA's X-15 research airplane took on a new appearance in 1965 -- a pair of 25-foot long fuel tanks attached to its fuselage. They'll mean more speed for the plane which flew its 150th successful mission last Sept. 28. It has flown to a record altitude of 354,200 feet and at a record speed of 4,104 miles per hour. With the extra tanks, the X-15 will seek to top 5,000 mph.

PHOTO CREDIT -- NASA or National Aeronautics and Space Administration

Johnston, Mary Helen
Scientist

The Huntsville Times
LIBRARY

FOR RELEASE: November 5, 1975
PHOTO NO. 6-69099

MARSHALL SPACE FLIGHT CENTER, Ala. --Dr. Mary Helen Johnston, of the Materials and Processes Laboratory, NASA-Marshall Space Flight Center, checks the sample container for a "Dendrite Remelting and Macrosegregation in Zero-Gravity Casting" experiment. The clear vial in the center of the fixture will contain ammonium chloride kept in a liquid state of above 70 degrees Fahrenheit. It will be launched aboard a sounding rocket in December. When the payload becomes weightless, the liquid will be solidified by lowering the temperature. A camera will record the solidification process. The material solidifies much like molten metal. More knowledge of the process will lead to better methods of processing alloys. Co-principal investigator for the experiment is Carolyn Griner of the same laboratory.

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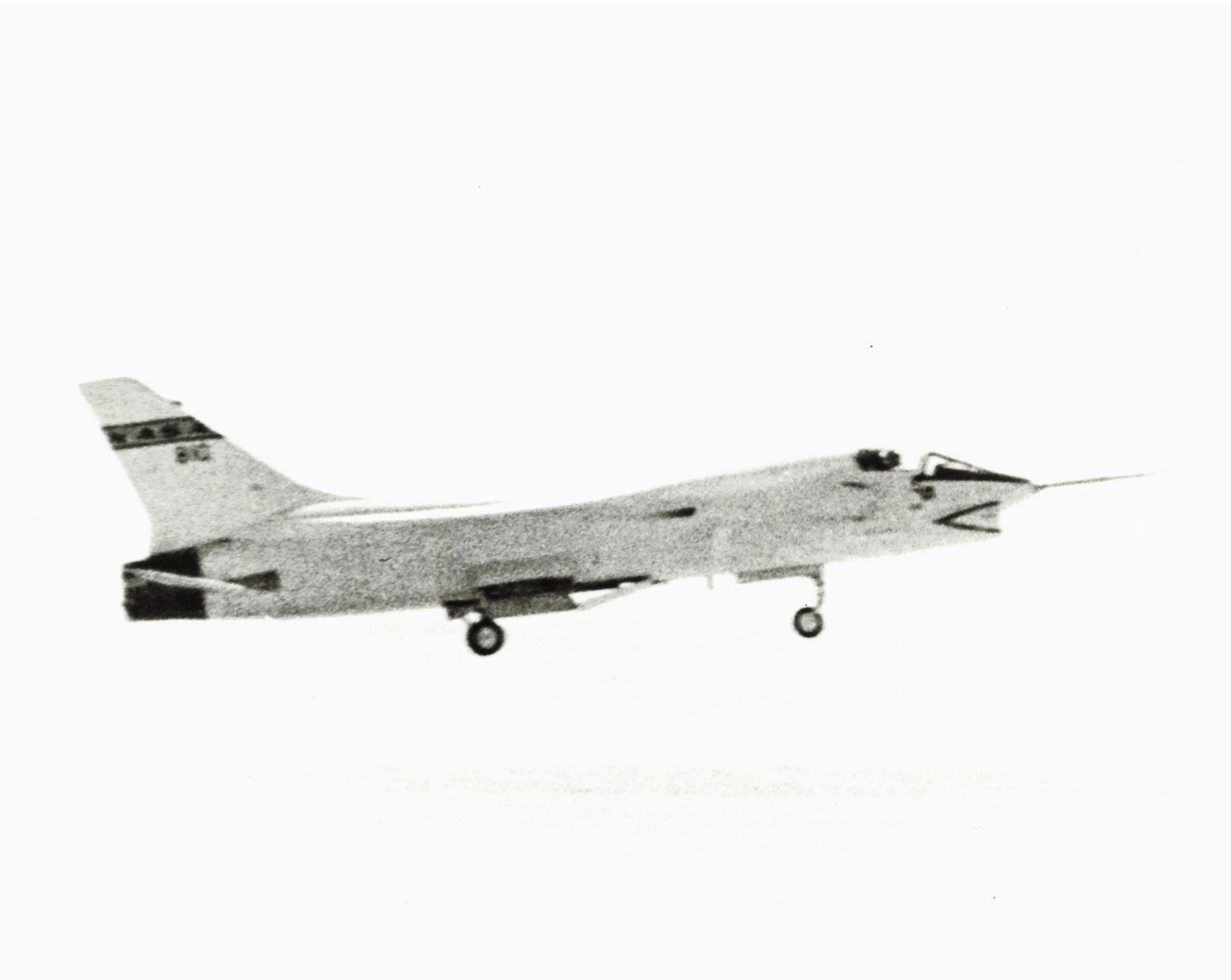

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
WASHINGTON, D. C. 20546

FOR RELEASE: March 10, 1971
PHOTO NO. 71-H-521

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NASA FLIGHT RESEARCH CENTER, EDWARDS, CALIF...The first flight of a new airfoil shape that might significantly reduce the cost of future air travel was successfully flown today at the NASA Flight Research Center, Edwards, California. Called the NASA supercritical wing, it was flown on an extensively modified F-8 jet fighter by Thomas C. McMurtry, a civilian research-pilot engineer for NASA's Flight Research Center. The NASA supercritical wing was developed in the wind tunnels at NASA's Langley Research Center, Hampton, Virginia, under the direction of Dr. Richard T. Whitcomb. These tests indicate that the new airfoil could allow highly efficient flight near the speed of sound, approximately 660 m.p.h. at a cruising altitude of 35,000 feet.

Airplanes F-8

45

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PHOTO CREDIT--NASA or National Aeronautics and Space Administration


U.S. AIR FORCE
810

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

FOR RELEASE: March 10, 1971
PHOTO NO. 71-H-523

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NASA FLIGHT RESEARCH CENTER, EDWARDS, CALIF...The first flight of a new airfoil shape that might significantly reduce the cost of future air travel was successfully flown today at the NASA Flight Research Center, Edwards, California. Called the NASA supercritical wing, it was flown on an extensively modified F-8 jet fighter by Thomas C. McMurtry, a civilian research-pilot engineer for NASA's Flight Research Center. The NASA supercritical wing was developed in the wind tunnels at NASA's Langley Research Center, Hampton, Va., under the direction of Dr. Richard T. Whitcomb. These tests indicate that the new airfoil could allow highly efficient flight near the speed of sound, approximately 660 m.p.h. at a cruising altitude of 35,000 feet.

Airplanes 44 F-8

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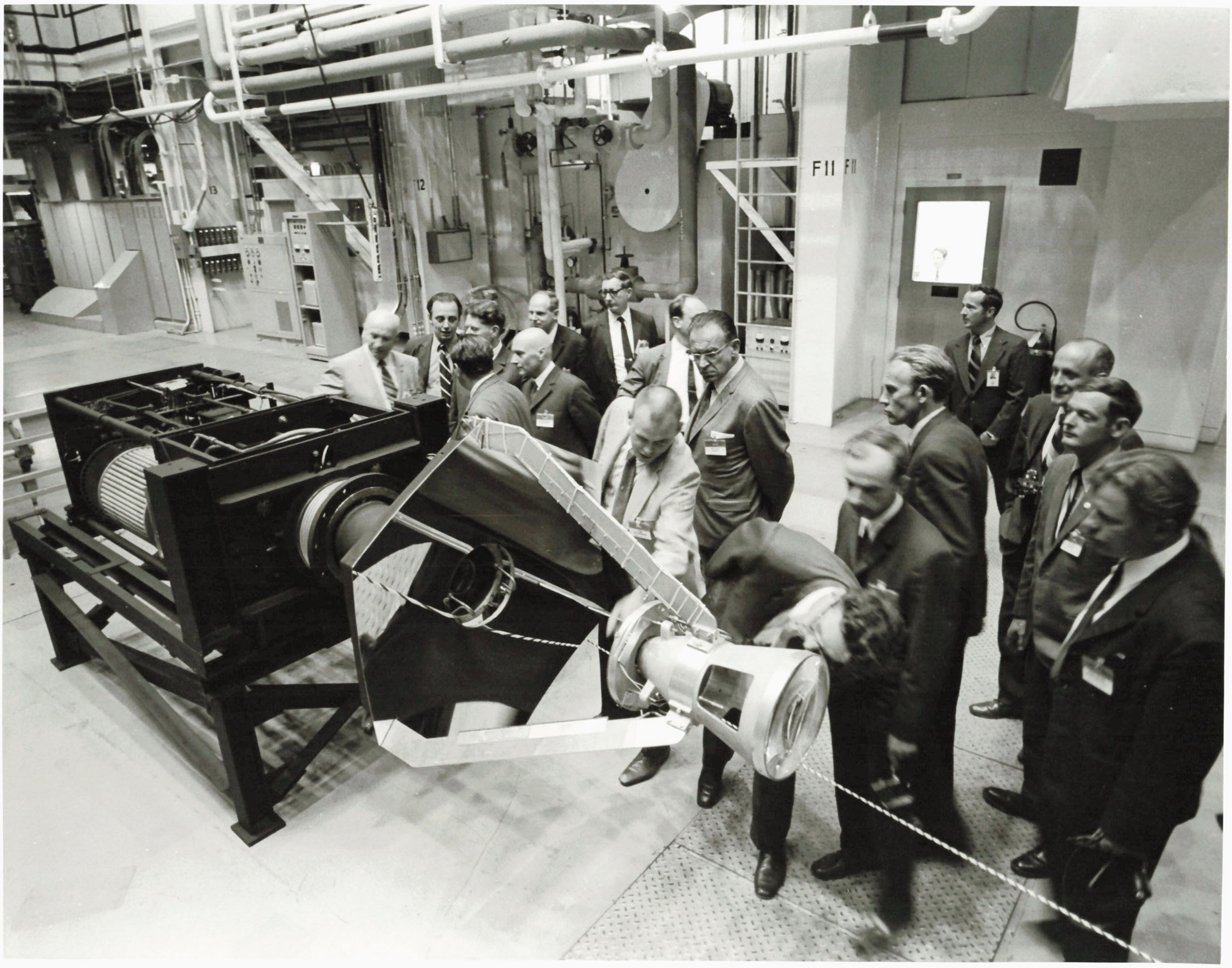
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NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
WASHINGTON, D.C. 20546

FOR RELEASE: Filed: July 6, 1971

PHOTO NO. 71-H-1050

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HOUSTON, TEXAS -- United States and Soviet scientists look over an early design study of an international probe assembly. A meeting of working groups under the October 28, 1970 agreement between NASA and the Soviet Academy of Sciences was held at the Manned Spacecraft Center, Houston, Texas, from June 21-25 to consider the technical requirements for compatible rendezvous and docking between Soviet and American spacecraft. Heading the Soviet delegation of some 20 space scientists and engineers was Igor P. Rumyantsev, Council on International Cooperation in space research and the uses of space (INTERCOSMOS) of the USSR Academy of Sciences.

93

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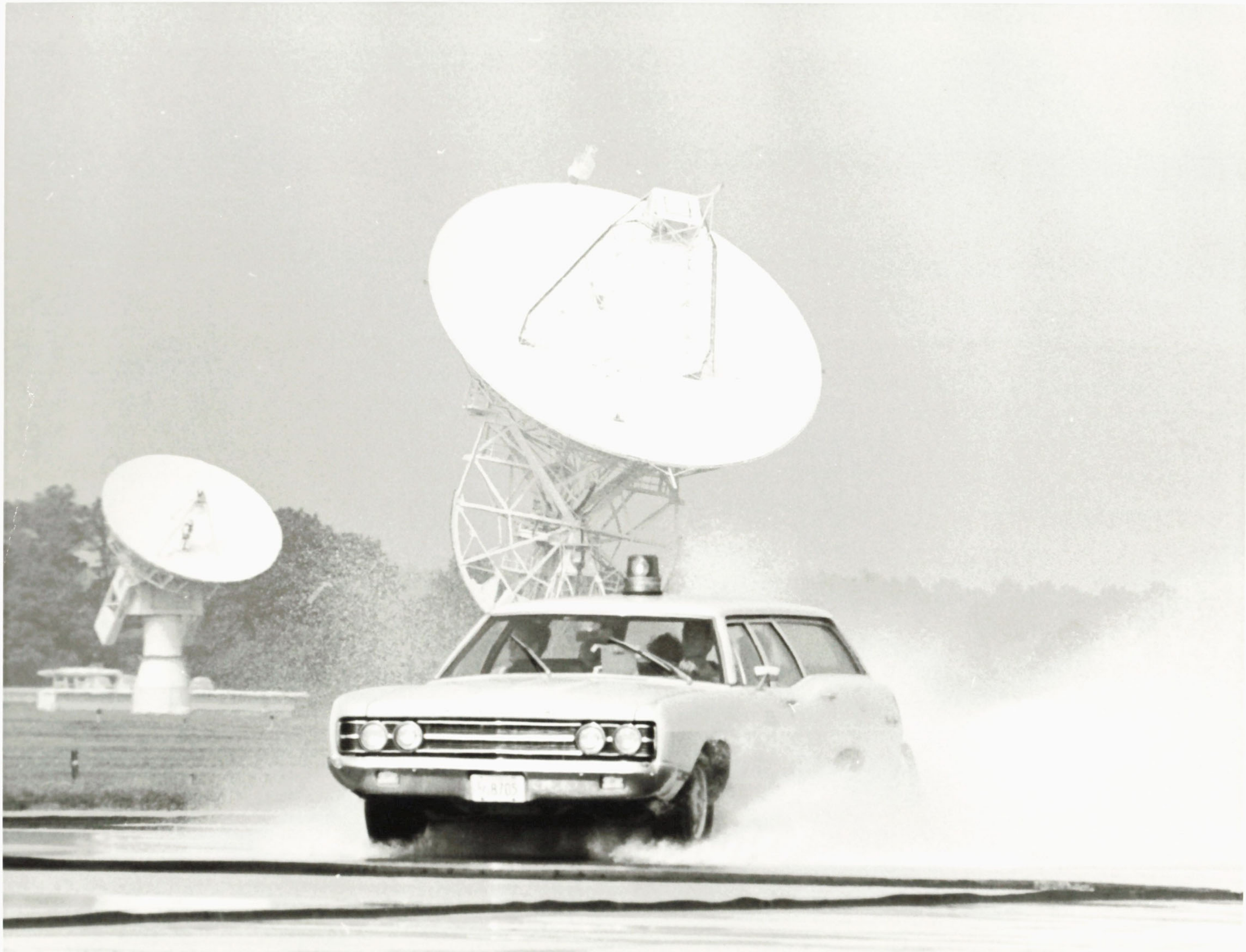

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
WASHINGTON, D.C. 20546

FOR RELEASE: Filed: October 8, 1971
PHOTO NO. 71-H-1611
71-HC-1256

81

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WALLOPS ISLAND, VA.--A test vehicle with a friction measuring device called a Mu-Meter makes a run through the flooded test section of the runway.

RUNWAY RBSEARCH PROGRAM

The National Aeronautics and Space Administration, the Federal Aviation Administration, and the U.S. Air Force began a joint runway research program Oct. 4 with a series of aircraft and ground vehicle tests. At Wallops Station to be followed by similar measurements at five airports -- Houston Intercontinental; Lubbock (Texas) Regional Airport; Edwards Air Force Base, California; Seattle-Tacoma International, and John F. Kennedy International. Purpose of the research is to evaluate methods for measuring runway slipperiness at military and civil airports and improve techniques for estimating aircraft performance on runways that become slippery when wet. The increased knowledge of runway friction characteristics should result in improvements in the safety of aircraft and airport ground operations in adverse weather conditions.

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FOR RELEASE: October 7, 1971
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WALLOPS ISLAND, Va.--This week, the National Aeronautics and Space Administration, in cooperation with the Federal Aviation Administration and the U.S. Air Force, began a series of tests to measure runway slipperiness at various military and civil airports. Surface measurements of each runway are to be made under wet and dry conditions by using a friction measuring device called a Mu-Meter and a NASA developed diagonally-braked automobile. These measurements will be compared to actual landings of a Boeing 727. On the first day of flights at NASA's Wallops Station, Wallops Island, Va., the research aircraft unexpectedly encountered a hazard other than runway slipperiness. Coming in for a touch-down, the 727 ran headlong into a flock of sea gulls. Fortunately, the plane and its occupants were not damaged and the tests were resumed shortly thereafter.

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WALLOPS ISLAND, VIRGINIA--Photo-sequence of Boeing 727 coming in for a landing and running into a flock of sea gulld. The plane and its occupants were not damaged and the tests were resumed shortly thereafter.

RUNWAY RESEARCH PROGRAM

The National Aeronautics and Space Administration, the Federal Aviation Administration, and the U.S. Air Force began a joint runway research program Oct. 4 with a series of aircraft and ground vehicle tests. At Wallops Station to be followed by similar measurements at five airports -- Houston Intercontinental; Lubbock (Texas) Regional Airport; Edwards Air Force Base, California; Seattle-Tacoma International, and John F. Kennedy International. Purpose of the research is to evaluate methods for measuring runway slipperiness at military and civil airports and improve techniques for estimating aircraft performance on runways that become slippery when wet. The increased knowledge of runway friction characteristics should result in improvements in the safety of aircraft and airport ground operations in adverse weather conditions.

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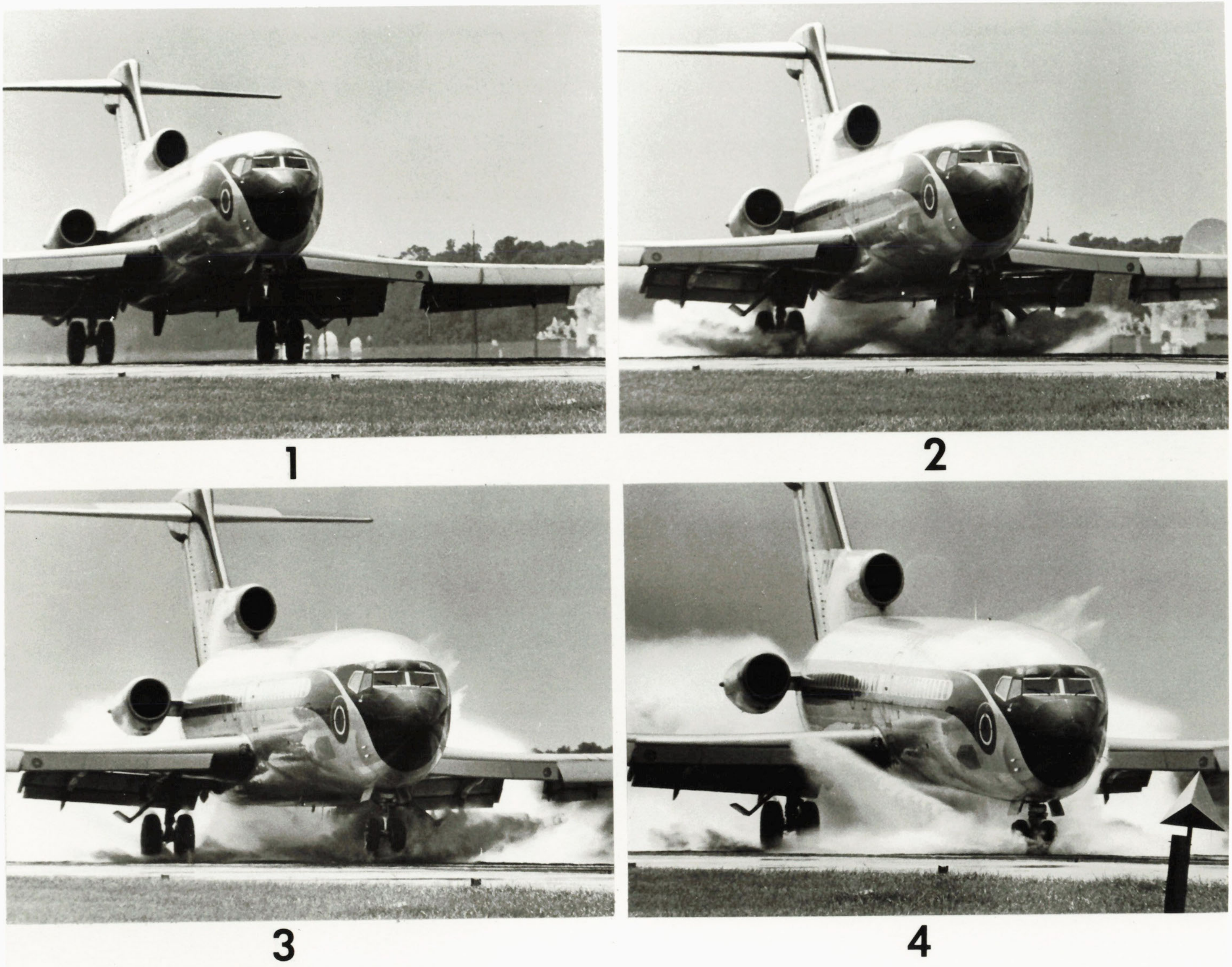
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NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
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FOR RELEASE: Filed: October 8, 1971
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WALLOPS ISLAND, Va.-- Landing sequence of the Boeing 727, as it enters the test section of the runway. The National Aeronautics and Space Administration, the Federal Aviation Administration, and the U.S. Air Force began a joint runway research program Oct. 4 with a series of aircraft and ground vehicle tests at Wallops Station to be followed by similar measurements at five airports -- Houston Intercontinental; Lubbock (Texas) Regional Airport; Edwards Air Force Base, California; Seattle-Tacoma International, and John F. Kennedy International. Purpose of the research is to evaluate methods for measuring runway slipperiness at military and civil airports and improve techniques for estimating aircraft performance on runways that become slippery when wet. The increased knowledge of runway friction characteristics should result in improvements in the safety of aircraft and airport ground operations in adverse weather conditions.

84

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FOR RELEASE: October 8, 1971

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71-HC-1254

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85

WALLOPS ISLAND, Va.--The Boeing 727 (FAA) airplane rolls through the test section of the runway. The National Aeronautics and Space Administration, the Federal Aviation Administration, and the U.S. Air Force began a joint runway research program Oct. 4 with a series of aircraft and ground vehicle tests at Wallops Station to be followed by similar measurements at five airports -- Houston Intercontinental; Lubbock (Texas) Regional Airport; Edwards Air Force Base, California; Seattle-Tacoma International, and John F. Kennedy International. Purpose of the research is to evaluate methods for measuring runway slipperiness at military and civil airports and improve techniques for estimating aircraft performance on runways that become slippery when wet. The increased knowledge of runway friction characteristics should result in improvements in the safety of aircraft and airport ground operations in adverse weather conditions.

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FOR RELEASE: October 13, 1971

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21

ADVANCED TECHNOLOGY TRANSPORT PROGRAM

AMES RESEARCH CENTER, Mountain View, Calif.--The Convair Advanced Technology Transport model is shown in the 11- x 11- foot wind tunnel at NASA-Ames Research Center. Jack Whaley of the Mechanical Operations Branch is shown with the model. The Program was run in the 11- x 11- foot wind tunnel at .3 mach to 1. mach. The Advanced Technology Transport Program is managed by the NASA-Langley Research Center, Hampton, Virginia.

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FOR RELEASE: Filed: September 23, 1971

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71-HC-1193

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MANNED SPACECRAFT CENTER, HOUSTON, TEXAS

POLYIMIDE FIREMAN'S HELMET---A prototype of a firemen's helmet fabricated from high temperature polyimide resin. The helmet is said to withstand well over 1000 degrees. It was designed by Dale G. Saurers in the Crew Equipment Branch of the Crew Systems Division at the Manned Spacecraft Center (MSC). Visor is made of polysulfone.

57

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61

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AMES RESEARCH CENTER, Mountain View, Calif.--Researchers at the National Aeronautics and Space Administration's Ames Research Center have discovered additional life-related molecules--amino acids and pyrimidines--believed to be of extraterrestrial origin, in meteorites. The finds appear to strengthen recent Ames-discovered evidence suggesting that there may be a basic pattern for the chemical evolution process, possibly leading to the origin of life. The team of scientists at the Ames Research Center, Mountain View, California, now has found six amino acids of apparent extraterrestrial origin in a third meteorite, the Orgueil. These are similar to, but not identical to, amino acids found in living cells. Amino acids are among the principal constituents of living cells. Shown is the sample of the Orgueil meteorite sent to the scientists by France for experimentation purposes. The Orgueil meteorite fell in France in 1964.

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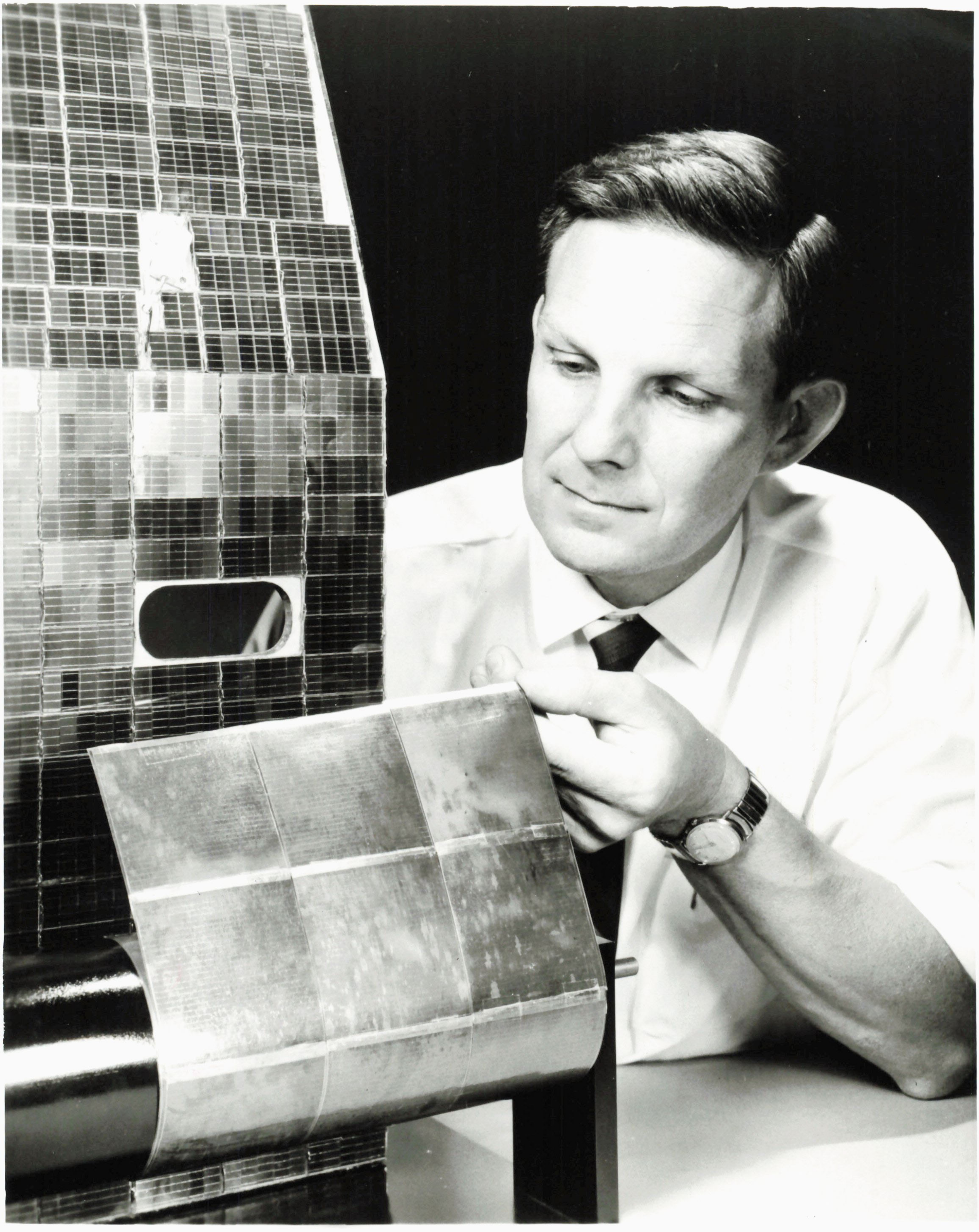

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
400 MARYLAND AVENUE, S. W. WASHINGTON, D. C. 20546

FOR RELEASE: Sept 29, 1966
PHOTO NO.: 66-H-1173

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CELVELAND -- Adolph E. Spakowski, Head of the National Aeronautics and Space Administration's Lewis Research Center's Photovoltaic Fundamentals Section, here demonstrates the striking differance between conventional silicon solar cells (rear panel) and the newer thin-film cells. The larger, flexible thin-films in the foreground are being evaluated by energy conversion specialists for possible future space use.

D 16038 NASA

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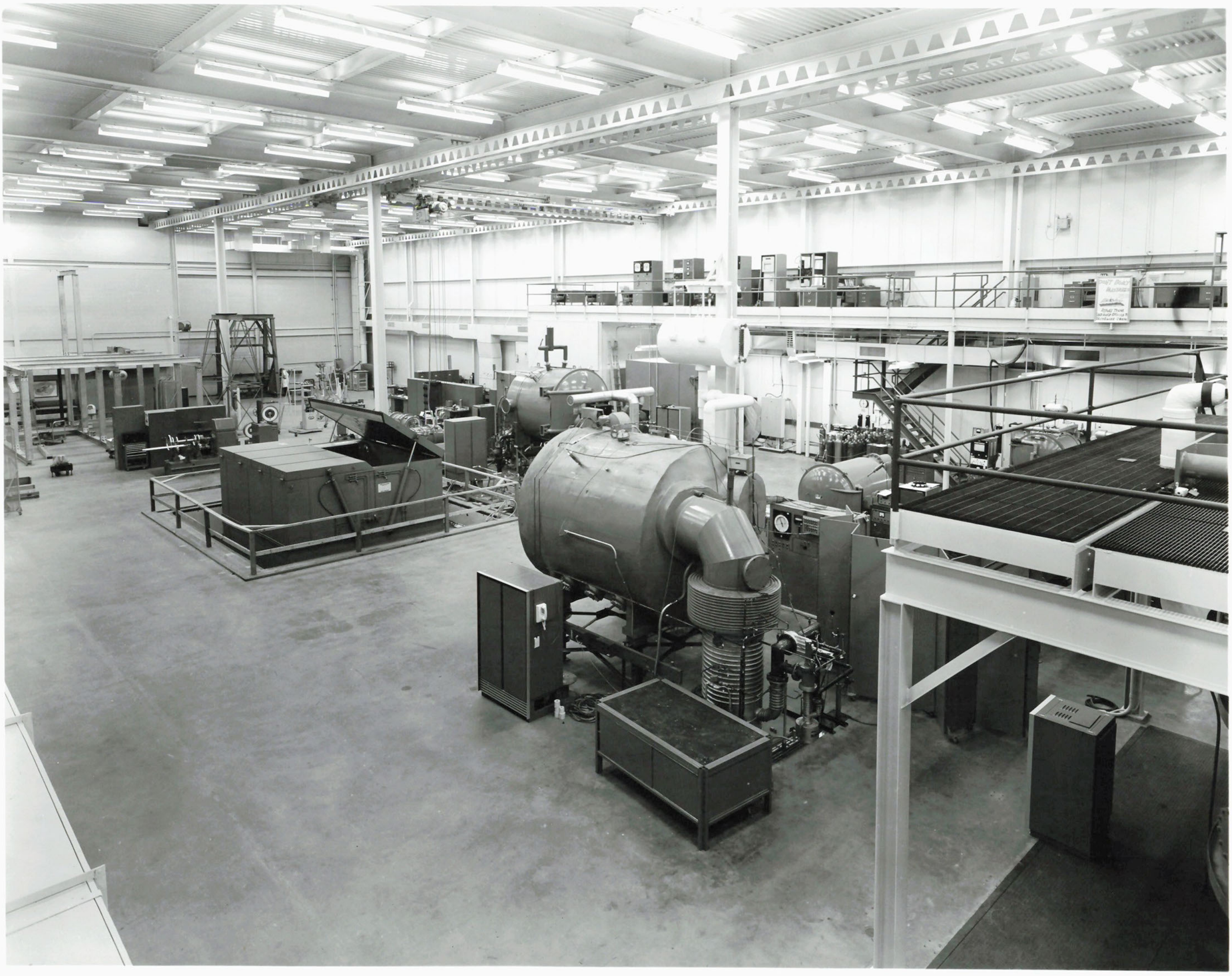

NASA G-63-1903

SPACECRAFT ENVIRONMENTAL TESTING

General view of equipment used in the pre-flight testing of spacecraft. This facility is located at the Goddard Space Flight Center, Greenbelt, Maryland.

GODDARD SPACE FLIGHT CENTER PHOTOGRAPH G-63-1901 NASA

G-63-1902

G-63-1903 (Series)

G-63-1784

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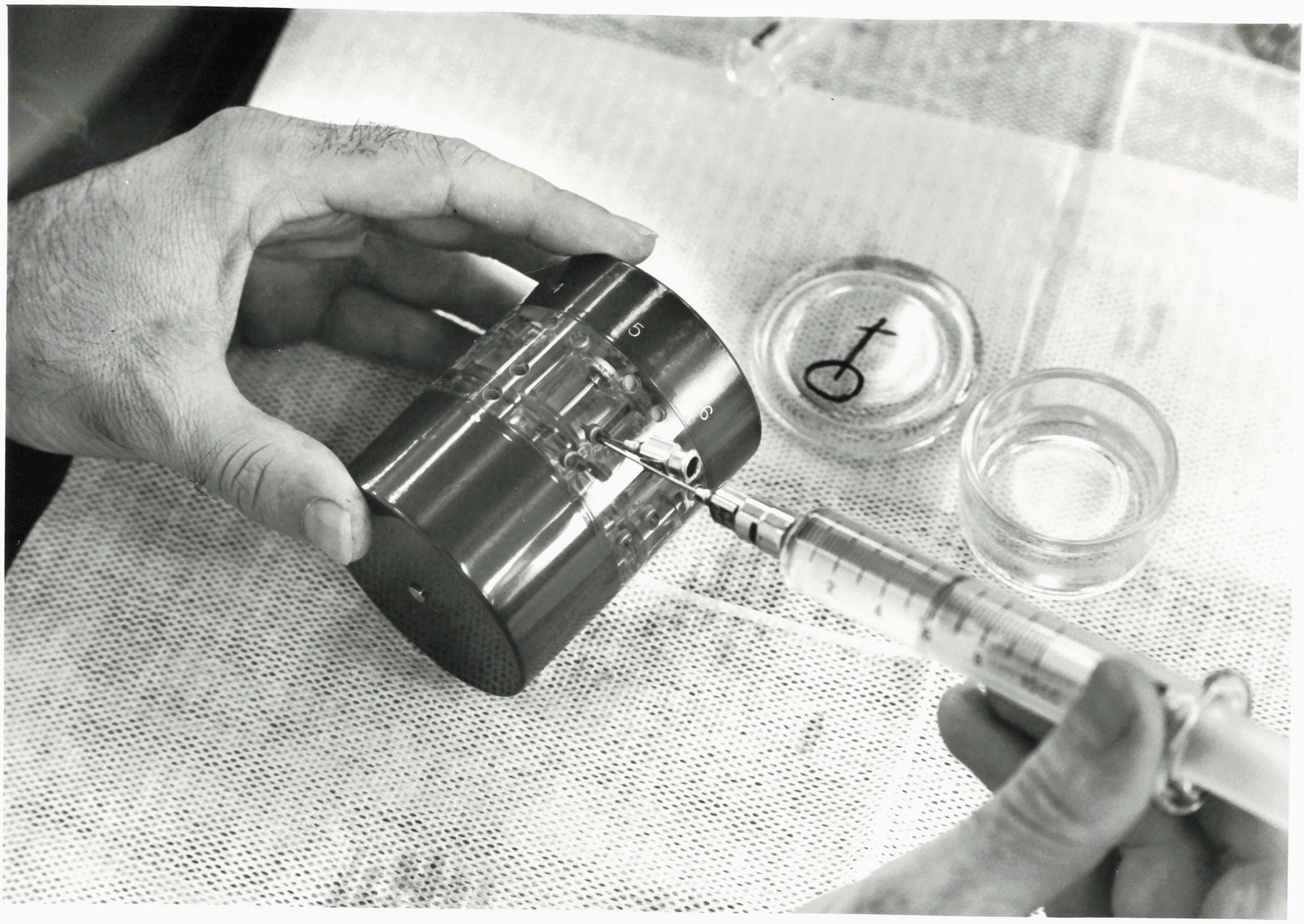

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
AMES RESEARCH CENTER, MOFFETT FIELD, CALIFORNIA

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AMES RESEARCH CENTER
Moffett Field, California

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Photograph A-28349-32

Technique for loading egg chamber of sea urchin or sand dollor fertilization device intended to be flown in a recoverable spacecraft.

P- 8719 A

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P-8719A.

NOT MEN FROM MARS: Just men from Antarctica, Howard Conrow and Dr. Roy E. Cameron, of Caltech's Jet Propulsion Laboratory, test Antarctic soil for clues as to what might grow on Mars. Dr. Cameron, right, chief biologist of the JPL Soil Sciences Laboratory, and Conrow, a technician, have to don parkas to withstand the 22-below-zero temperatures in their walkin freezer lab. Surgical masks are worn to guard against contamination of the samples of Antarctic soil which two JPL expeditions have returned to Pasadena. Another half-ton arrived this week.

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George C. Marshall Space Flight Center
Huntsville, Alabama

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Askins, Barbara S.
Chemist / MSFC

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79P-11

MARSHALL SPACE FLIGHT CENTER, Ala. -- Barbara S. Askins, a chemist at NASA's Marshall Space Flight Center, Huntsville, Ala., has been named the 1978 National Inventor of the Year for her invention of a process that restores detail to underexposed negatives that would otherwise be useless. Ms. Askins was selected from national competition, both private and government, by the Association for Advancement of Inventions and Innovations in Washington, D. C.

-30-

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AMERICAN REVOLUTION BICENTENNIAL 1776-1976

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The Huntsville Times
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WHITAKER, ANN F.
SCIENTIST/MSFC

FOR RELEASE: Dec. 4, 1975

PHOTO NO. 602739

MARSHALL SPACE FLIGHT CENTER, Ala. -- Three women scientists at the NASA-Marshall Space Flight Center pause and congratulate each other upon completion of pressure suit checkout. The three are involved in designing experiments on materials processing in space. Checking out in the suits will allow them to work in the bulky garments in the Neutral Buoyancy Simulator at MSFC, a facility in which they will experience simulated weightlessness under water. From this they will learn more about what can and cannot be done under zero-gravity conditions. This knowledge will help them design experiment equipment accordingly. The three have also checked out in scuba gear and have conducted experiments while flying zero-g arcs in a KC-135 aircraft. The scientists, left to right, are Mrs. Carolyn Griner, Mrs. Ann F. Whitaker and Dr. Mary Helen Johnston.

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center

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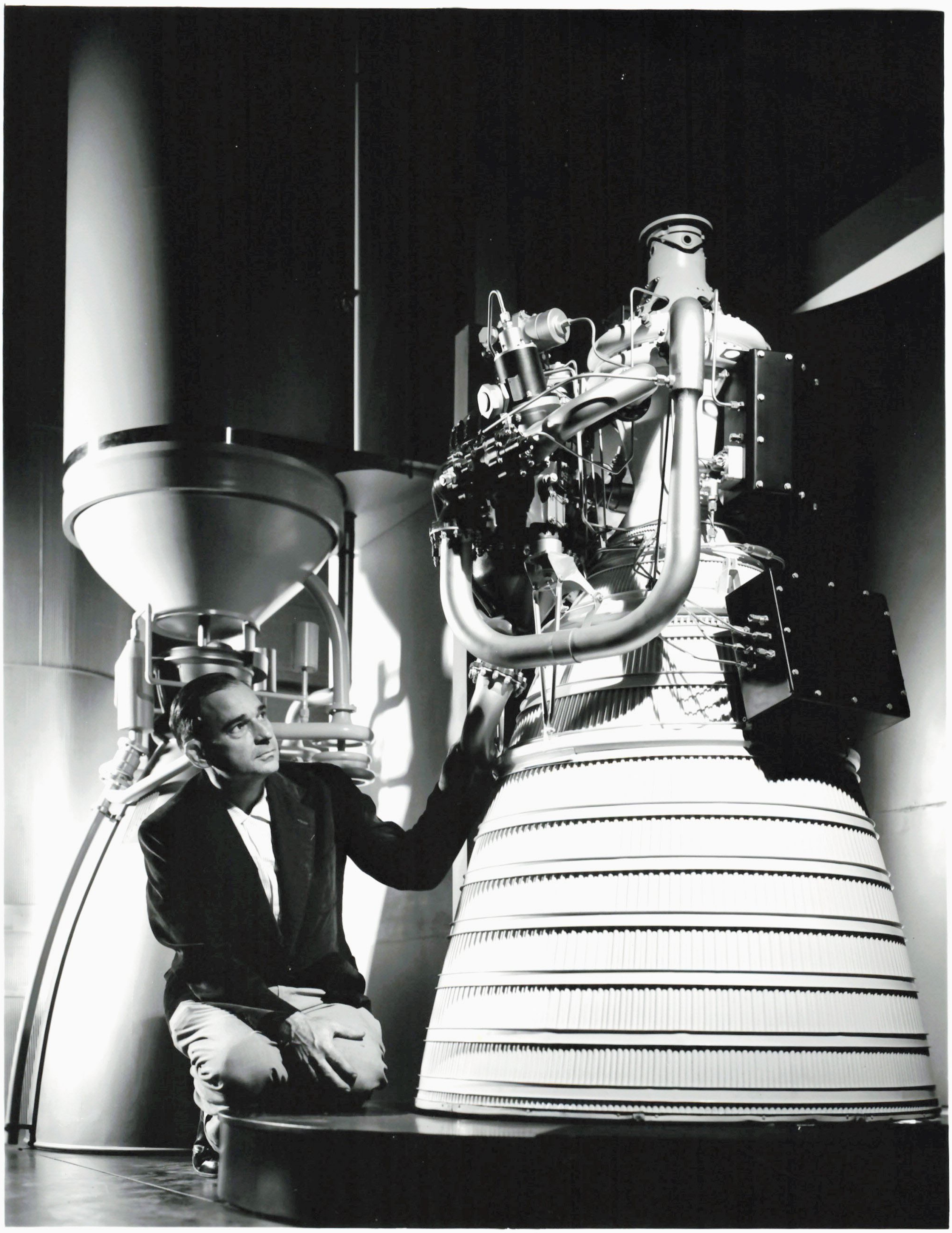
C-61188



0/1603F NASA

Office of Public Information
NASA Lewis Research Center
Cleveland 35, Ohio
252-7700, ext. 438

FOR IMMEDIATE RELEASE

C-61188

An RL-10 engine for the Centaur rocket system is part of the "Propulsion Systems Components" exhibits at the Lewis Research Center's "Youth Days." Lewis, being NASA's propulsion specialist, is interested in all components of rocket systems--engines, storage tanks for propellants, nozzles, pumping systems and all the other varied parts of workable rocket systems are underdoing research and study at Lewis. Present Centaur plans are designed to perform space missions relating to scientific exploration of the solar system and support of manned orbital and lunar expediations. However, heavier payload requirements can be met with refined or clustered launch vehicles and advanced designs of high-energy upper stages.

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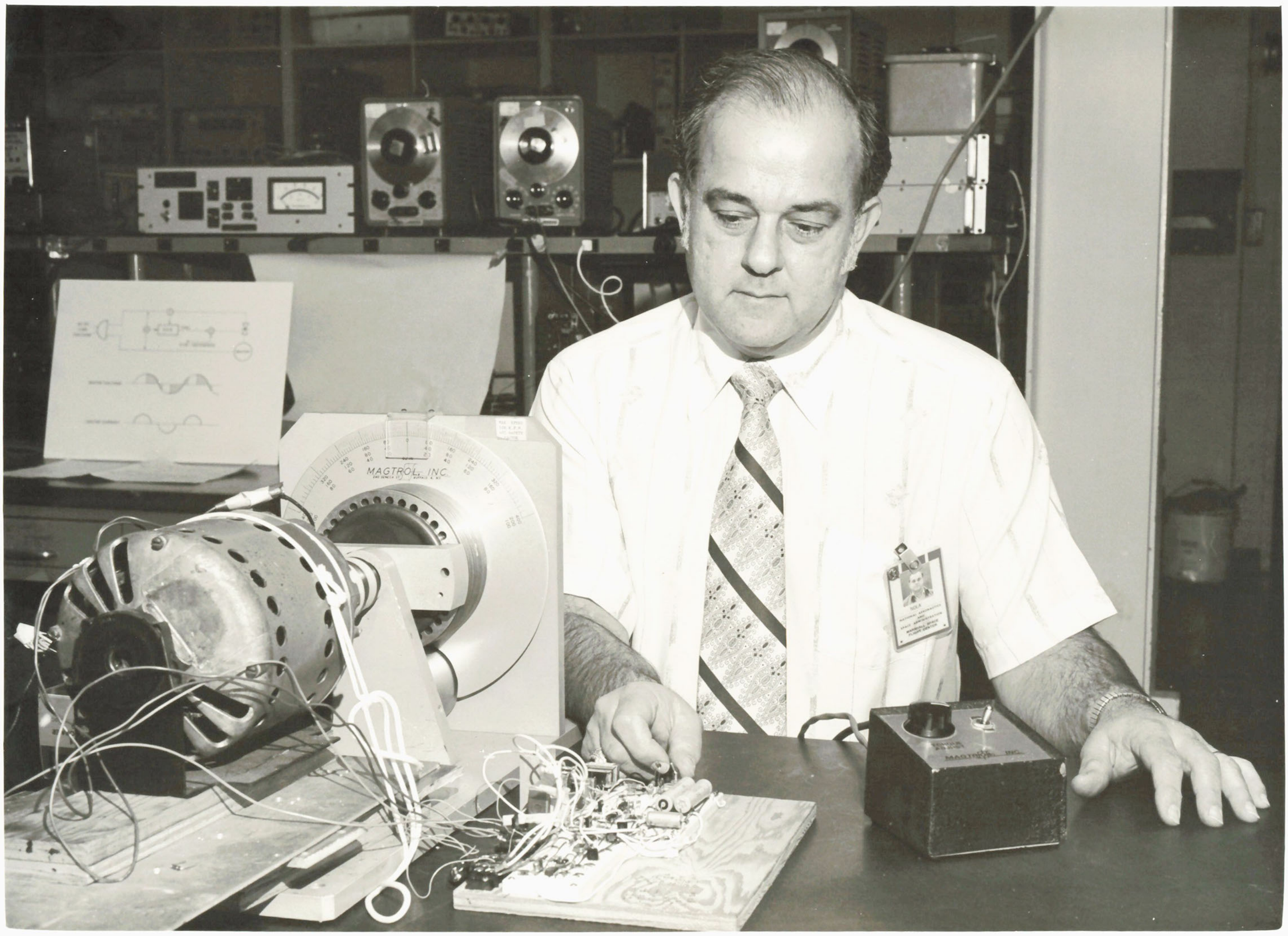
NASA National Aeronautics and Space Administration

George C. Marshall Space Flight Center
Huntsville, Alabama



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FOR RELEASE: Upon Receipt
PHOTO NO. 8-85265
78P-13

MARSHALL SPACE FLIGHT CENTER, Ala. -- NASA engineer Frank J. Nola tinkers with a revolutionary gadget he invented to reduce power consumption of electrical motors used in homes and industry. His inexpensive Power Factor Controller, seen here mounted on a scrap of plywood, can cut the energy consumed by common motors like the one at the left by as much as 65 percent. Nola developed the Controller while working on a Solar Heating and Cooling project at NASA's Marshall Space Flight Center in Huntsville, Ala.

-30-

April 18, 1978

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MSFC - Form 2914-22 (October 1976)

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NASA
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George C. Marshall Space Flight Center
Marshall Space Flight Center, Alabama 35812
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WHITAKER, ANN F.
SCIENTIST / MSFC

The Huntsville Times
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FOR RELEASE: 2-2-76

PHOTO NO. 6-69989

MARSHALL SPACE FLIGHT CENTER, Ala. -- Space specialists (left to right) Dr. Mary Helen Johnston, Carolyn Griner and Ann Whitaker surface after a session in the Neutral Buoyancy Simulator at the NASA-Marshall Space Flight Center. At far right is safety diver Don Hammer. The three women experience simulated weightlessness while under water. This helps them in their current work of designing experiments on materials processing, experiments to be conducted in space. Dr. Johnston and Mrs. Griner are on the staff of the Physical Sciences Branch and Mrs. Whitaker of the Lubrication and Surface Physics Branch of the Materials and Processes Laboratory. Dr. Johnston is a metallurgical science specialist, Mrs. Griner an astronautical engineer and Mrs. Whitaker a physicist.

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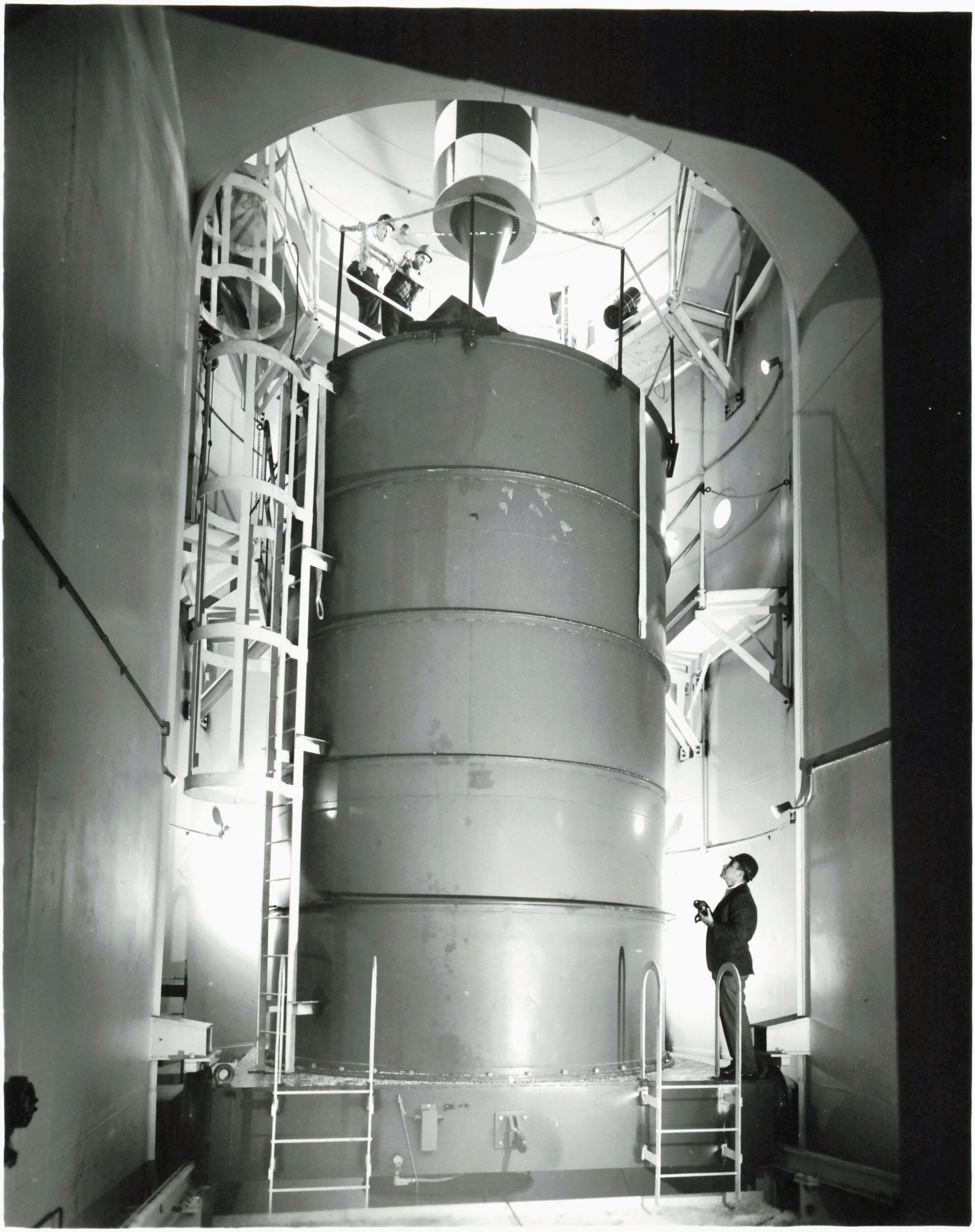
NASA
C-66-3684



Public Information Office
NASA Lewis Research Center
Cleveland, Ohio 44135
433-4000, ext. 415

FOR IMMEDIATE RELEASE
October 4, 1966

C-66-3684

Shown is the decelerator cart used to retrieve experiments in Lewis' Zero Gravity Research Facility. The cart is over 19 feet high, 12 feet in diameter and weighs 22 tons. It is filled with millions of small spheres of expanded polystyrene which permit deceleration of zero-G experiments at a controlled rate. Experimental vehicles are decelerated at about 30 G's to prevent damage. The Zero Gravity Facility can produce ten seconds of zero-G to study the reaction of fluids in a weightless condition.

16038 NASA

CLEVELAND PRESS
OCT 20 1966
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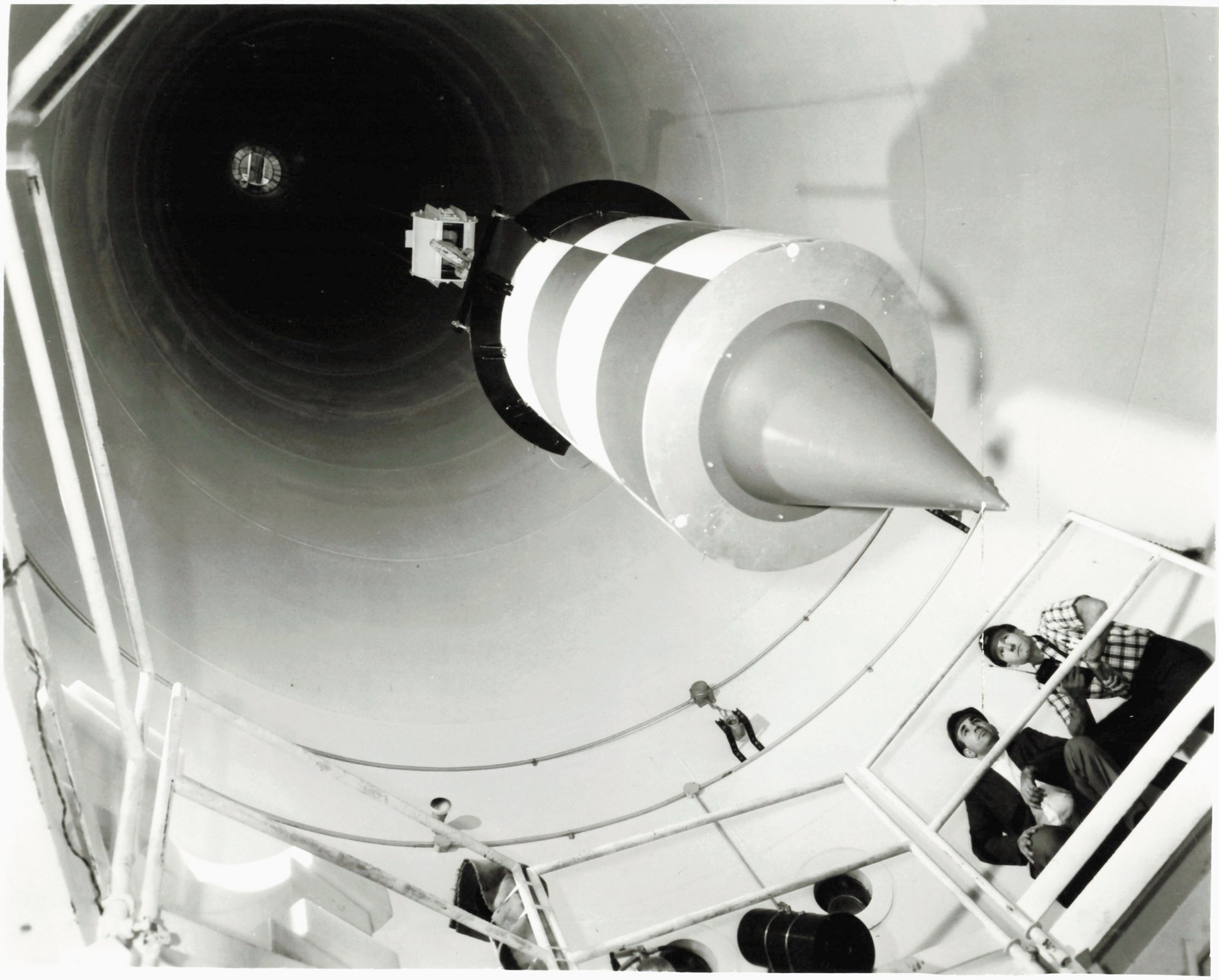

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
400 MARYLAND AVENUE, S. W., WASHINGTON, D. C. 20546

FOR RELEASE: October 18, 1966
PHOTO NO.: 66-H-1364

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GIANT PLUMB BOB. It looks like a king-sized plumb bob but actually it's a 1,500-pound experiment being prepared for testing the Zero Gravity Research Facility at the National Aeronautics and Space Administration's Lewis Research Center in Cleveland. By dropping experiments from the top of the shaft (visible about 500 feet up at top right of photo) five seconds of weightlessness can be produced in the shaft vacuum chamber. The facility can handle weights up to 6,000 lbs.

A 16038 NASA

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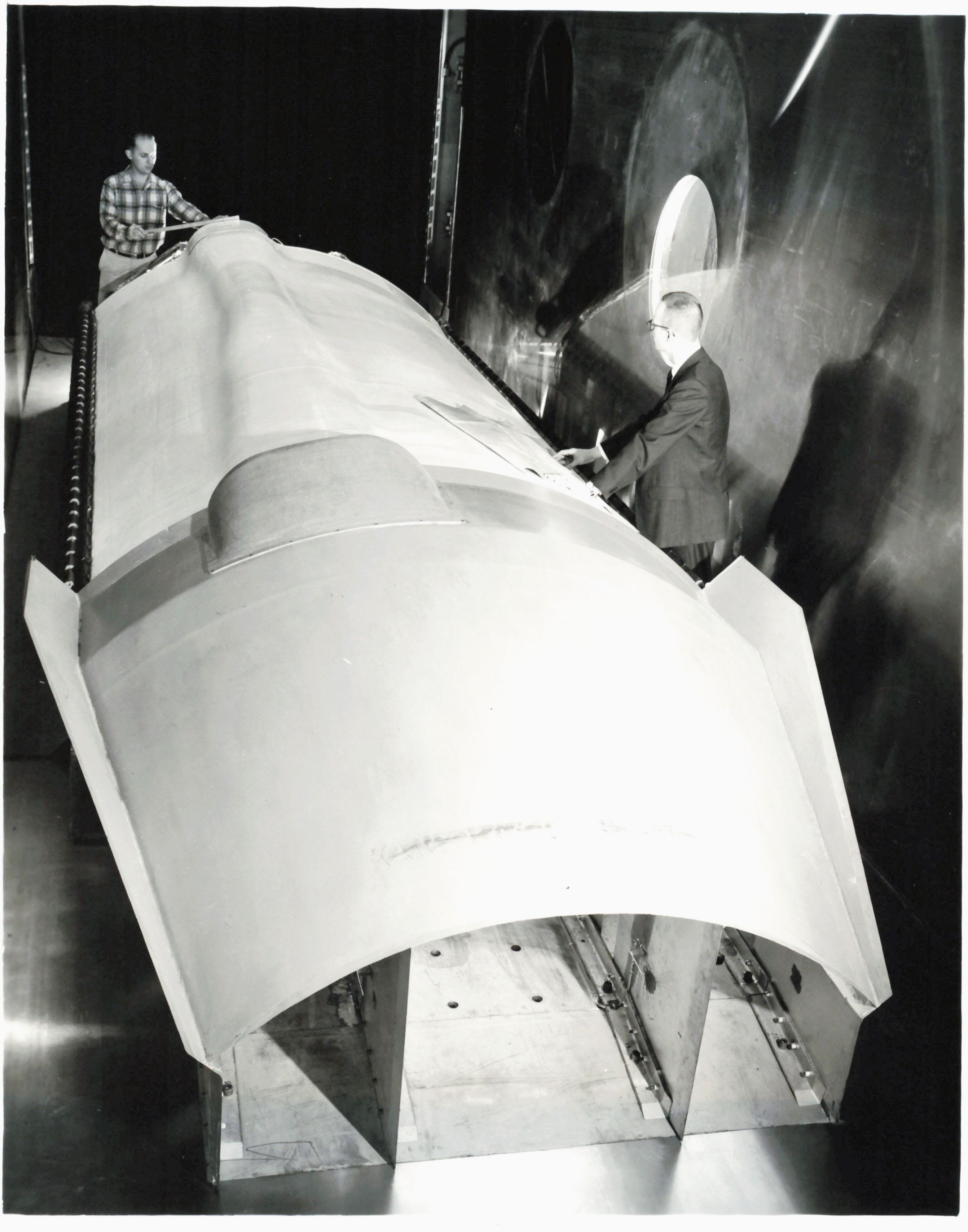
NASA
C-66-278



D16038 NASA

Public Information Office
NASA Lewis Research Center
Cleveland, Ohio 44135
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FOR RELEASE: IMMEDIATE

C-66-278

CLEVELAND, Ohio -- As part of the continuing Centaur development program, a series of tests were conducted in Lewis Research Center's 10X10-foot supersonic wind tunnel to study flutter characteristics of Centaur's insulation panels. The panels surround the Centaur hydrogen stage to prevent the heat of air friction from causing excessive boiloff of liquid hydrogen during flight through the atmosphere. They are jettisoned prior to second-stage ignition.

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APR 20 1966
REFERENCE DEPT.

NASA
C-67-3238

CLEVELAND PRESS
SEP 18 1967
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Public Information Office
NASA Lewis Research Center
Cleveland, Ohio 44135
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FOR IMMEDIATE RELEASE

HIGHEST STRENGTH METAL - Peter L. Raffo, Walter R. Witzke, and William D. Klopp (left to right) show a rod made from Tungsten RHC, a new alloy developed at NASA's Lewis Research Center. Klopp, head of the Refractory Metals Section, says the new alloy has a tensile strength of 75, 400 pounds per square inch at 3500 degrees F. compared with 9000 pounds per square inch for pure tungsten.

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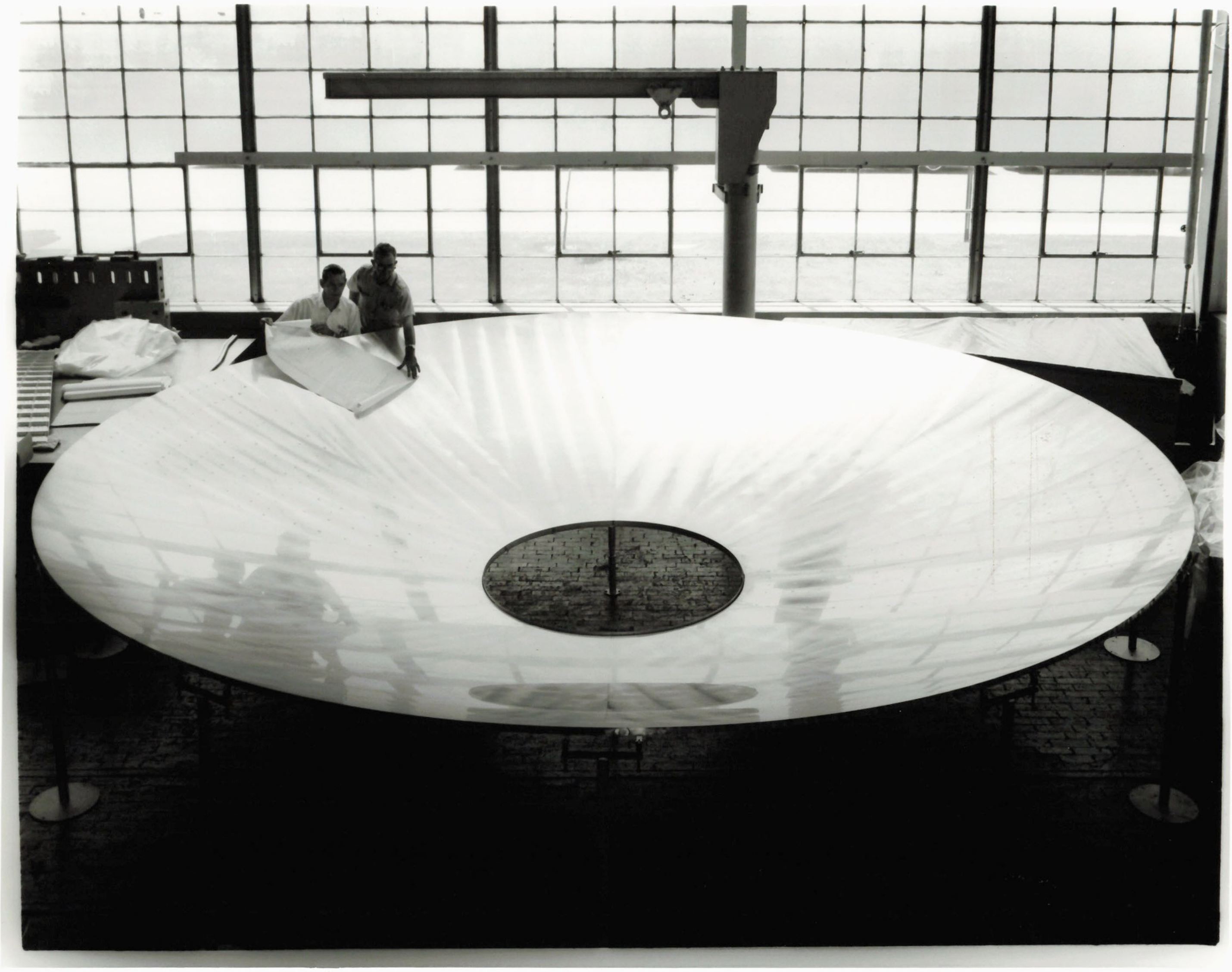
Walter R. Witzke
Wm D. Klopp



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FOR RELEASE: September 29, 1966
PHOTO NO.: 66-H-1306

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CLEVELAND -- A prototype rigid solar mirror was completed recently at The National Aeronautics and Space Administration's Lewis Research Center here. It could be used on future spacecraft to focus the sun's rays in space on a boiler which could run turbo-machinery to produce on-board electrical power. The 20-foot-wide mirror was built to study fabrication problems for larger mirrors in a series of tests for developing advanced technology on advanced power generation and propulsion. The mirror is made in 12 sections of magnesium plate.

A16038 NASA

CLEVELAND PRESS
OCT 12 1966
REFERENCE DEPT.

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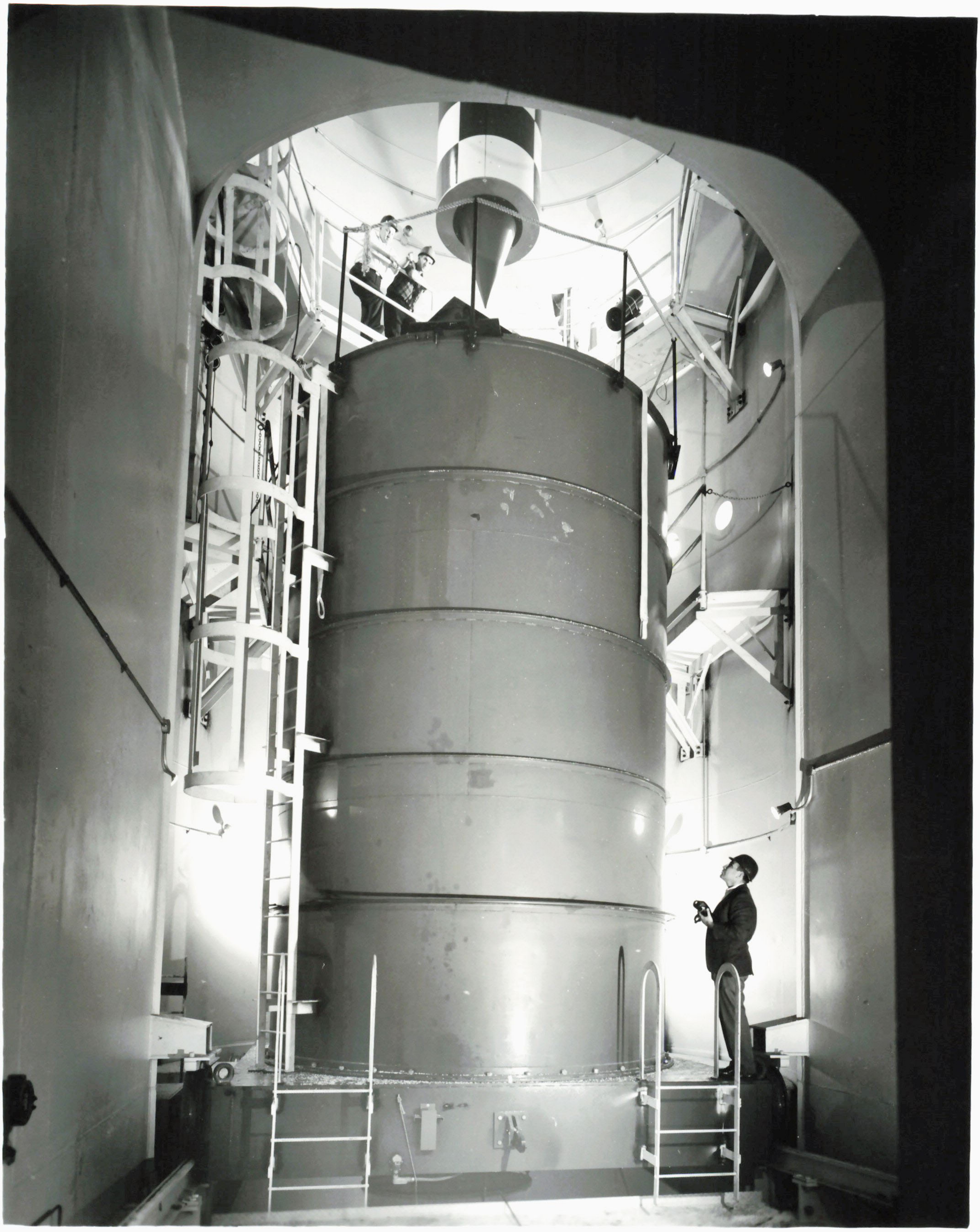
NASA
C-66-3684



Public Information Office
NASA Lewis Research Center
Cleveland, Ohio 44135
433-4000, ext. 415

FOR IMMEDIATE RELEASE

C-66-3684

Shown is the decelerator cart used to retrieve experiments in Lewis' Zero Gravity Research Facility. The cart is over 19 feet high, 12 feet in diameter and weighs 22 tons. It is filled with millions of small spheres of expanded polystyrene which permit deceleration of zero-G experiments at a controlled rate. Experimental vehicles are decelerated at about 30 G's to prevent damage. The Zero Gravity Facility can produce ten seconds of zero-G to study the reaction of fluids in a weightless condition.

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Q 16038 NASA

CLEVELAND PRESS
OCT 5 19[illegible]
REFERENCE DEPT

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
400 MARYLAND AVENUE, S. W., WASHINGTON, D. C. 20546

FOR RELEASE: October 18, 1966
PHOTO NO.: 66-H-1363

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WAY DOWN YONDER -- Shown is the decelerator cart used to retrieve experiments in Lewis Research Center's Zero Gravity Research Facility in Cleveland. The cart is over 19 feet high, 12 feet in diameter and weighs 22 tons. It is filled with millions of small spheres of expanded polystyrene which permit deceleration of zero-G experiments at a controlled rate. Experimental vehicles are decelerated at about 30 Gs to prevent damage. The National Aeronautics and Space Administration's Zero Gravity Facility can produce ten seconds of zero-G to study the reaction of fluids in a weightless condition.

A 16038 NASA

CLEVELAND PRESS
OCT 31 1966

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REFERENCE DEPT.

NASA
C-66-3682

CLEVELAND PRESS
AUG 4 197
REFERENCE DEPT.

Public Information Office
NASA Lewis Research Center
Cleveland, Ohio 44135
433-4000, ext. 415

FOR IMMEDIATE RELEASE

C-66-3682-83

Technicians inspect a 1500-lb. experiment being prepared for testing in Lewis' 500-foot deep Zero Gravity Research Facility, designed to augment research on fluids in a weightless environment. The chamber shaft extends 510 feet below grade and is lined with an 18-inch thick concrete casing 28 feet in diameter. Inside the shaft is a steel vacuum chamber 20 feet in diameter. The chamber can create a pressure similar to that found at 50 miles altitude. By dropping experiments from the top of the shaft, five seconds of weightlessness can be produced. This zero-g time is doubled when experiments are propelled upwards from the bottom by a high-pressure accelerator, permitted to fall free, then retrieved by a large decelerator cart. The Zero Gravity Research Facility can handle experiments weighing up to 6000 lbs.

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P/6038
Research
NASA Center

NASA

C-70-3690

A16038
NASA-Research

CLEVELAND PRESS
DEC 22 1970
REFERENCE DEPT.

News
NASA
LEWIS RESEARCH center
21000 BROOKPARK ROAD CLEVELAND, OHIO 44135
PUBLIC INFORMATION OFFICE
PHONE - (AREA CODE 216) 433-4000 EXT. 415

Public Information Office
NASA Lewis Research Center — experiments
Cleveland, Ohio 44135

SKYLAB SHROUD TEST -- This 24,000 pound nose cone will be split explosively into four panels and caught by nets during tests in a huge vacuum chamber at NASA's Plum Brook Station of the Lewis Research Center. Separation of the 56 foot tall, 22 foot wide shroud will take less than one second. The test is to check the proper ejection of the panels in a space-like environment. The big vacuum tank is 120 feet high and 100 feet in diameter. On Skylab, an embryonic space station to be flown late in 1972, such a shroud will cover the Apollo telescope mount, docking adaptor and part of the airlock. The workshop will be launched unmanned into a 235 nautical mile earth orbit by a two-stage Saturn V rocket. Astronauts will be carried separately by a Saturn IB to visit the Skylab on three occasions to conduct more than 50 scientific medical and technical experiments.

#

NASA
C-61133

Office of Public Information
NASA Lewis Research Center
Cleveland 35, Ohio
252-7700, ext. 438

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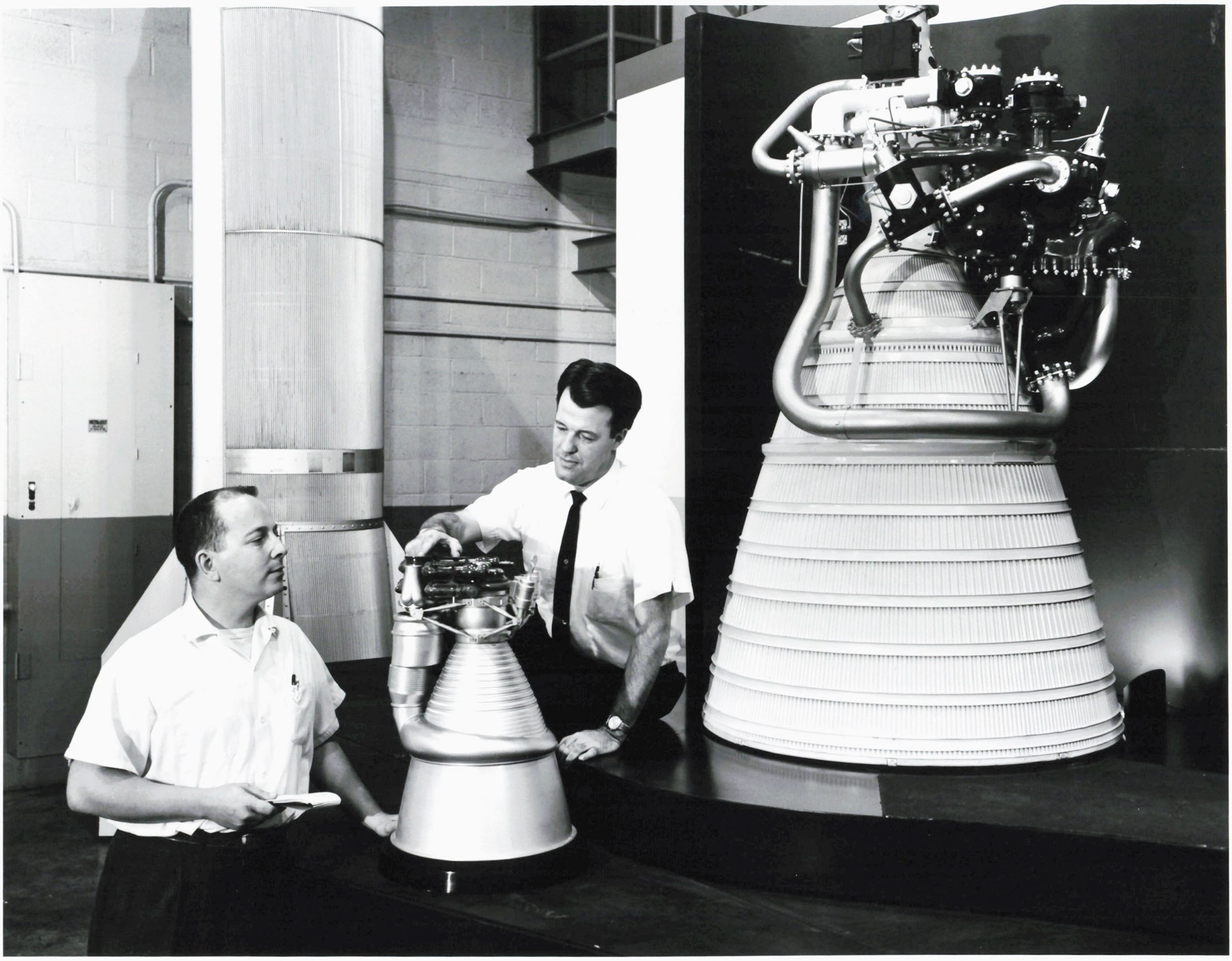
C-61133

Al Cohen (left) and Dave Lockwood of the NASA Lewis Research Center examine planetary spacecraft which will be shown during "Youth Days" Aug. 4 and 5 at the NASA laboratory.

8/6038 NASA

CLEVELAND PRESS
AUG 14 1962
REFERENCE DEPT.

NASA
C-61134



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NASA Lewis Research Center
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C-61134

Thomas P. Moffett (left) and Harold J. Schum discuss two of the many rocket engines which will be on display Aug. 4 and 5 at the NASA Lewis Research Center during "Youth Days."

REFERENCE DEPT.
AUG 14 1962
CLEVELAND PRESS

D/603f NASA

A 94286

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

FOR RELEASE: October 3, 1969
PHOTO NO. 69-H-1633

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KENNEDY SPACE CENTER, Fla. -- Apollo 12 Lunar Module Pilot Alan Bean demonstrates the lunar surface scientific experiments he and Astronaut Charles Conrad, Apollo 12 commander, will deploy during their mission in November at a press conference here tonight. The Apollo Lunar Surface Experiments Package (ALSEP) to be left on the Ocean of Storms is expected to return scientific data to earth for up to a year. Launch is scheduled for 11:22 a.m. (EST) on November 14.

REFERENCE
NOV 7 '69
N. E. A.

[illegible] Aeronautics and Space Administration

NASA
C-66-3683

Top

Public Information Office
NASA Lewis Research Center
Cleveland, Ohio 44135
433-4000, ext. 415

FOR IMMEDIATE RELEASE

C-66-3683

Technicians inspect a 1500-lb experiment being prepared for testing in Lewis' 500-foot deep Zero Gravity Research Facility, just recently completed to augment research on fluids in a weightless environment. The chamber shaft extends 510 feet below grade and is lined with an 18-inch thick concrete casing 28 feet in diameter. Inside the shaft is a steel vacuum chamber 20 feet in diameter. The chamber can create a pressure similar to that found at 50 miles altitude. By dropping experiments from the top of the shaft, five seconds of weightlessness can be produced. This zero-G time is doubled when experiments are propelled upwards from the bottom by a high-pressure accelerator, permitted to fall free, then retrieved by a large decelerator cart. The Zero Gravity Research Facility can handle experiments weighing up to 6000 lbs.

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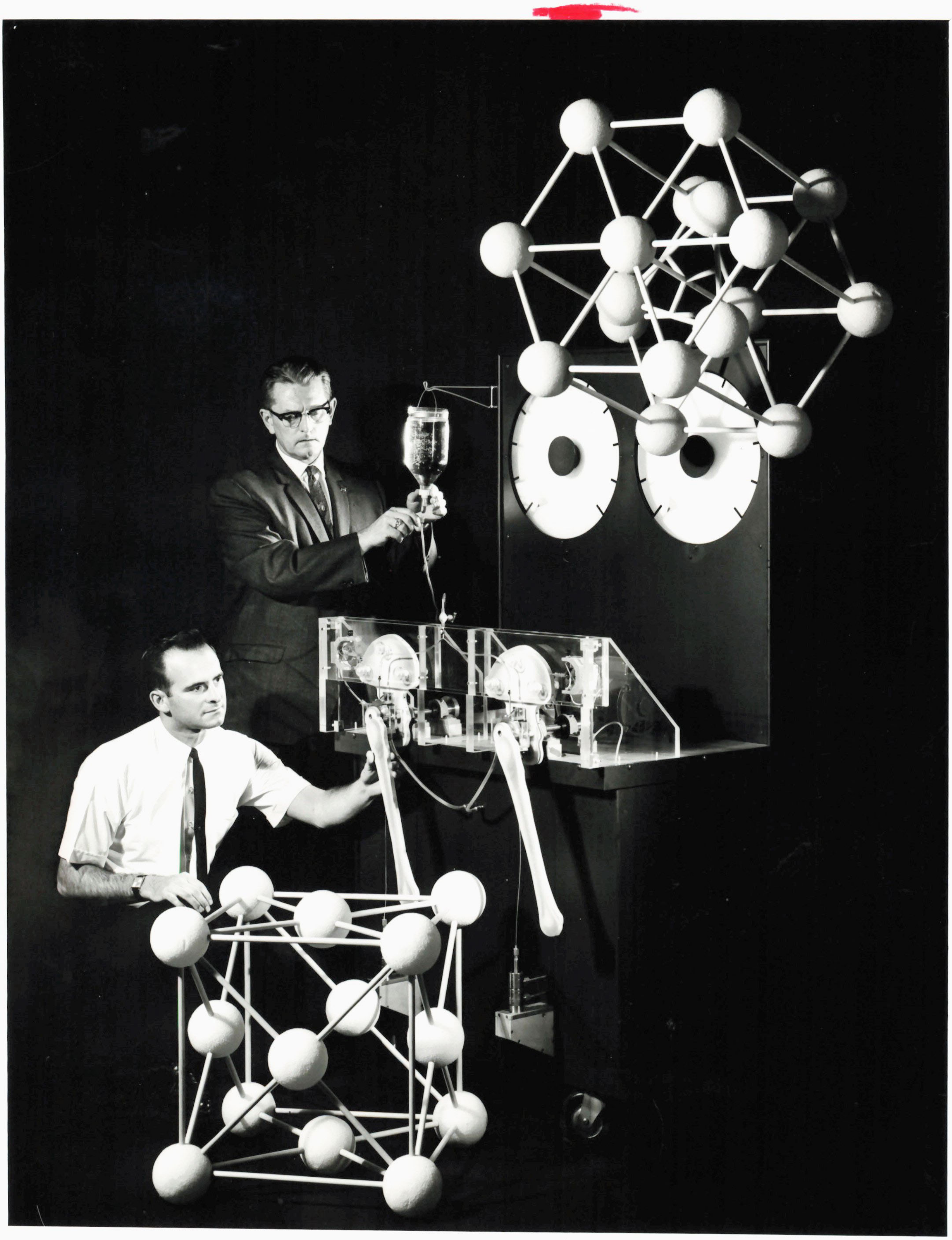
A 16038 NASA

CLEVELAND PRESS
OCT 6 1966
REFERENCE DEPT.

NASA
C-66-2430



Huge crystal lattice models used to illustrate differences in bearing alloys give a surrealistic appearance to a hip joint simulator at NASA's Lewis Research Center in Cleveland, Ohio. The simulator is used to test bearing specimens under conditions similar to those found in the hip joint. The two identical sides of the device allow two different bearings to be tested simultaneously. The dials show friction as the simulated hip joints are operated.

Robert L. Johnson, Chief of Lewis' Lubrication Branch, is shown adjusting the flow of lubricant. Heptane with dye was used in this experiment to simulate the synovial fluid found in the body. Donald H. Buckley, Head of the Space Environment Lubrication Unit is adjusting the bearing specimen.

OFFICIAL PHOTO
NASA - LEWIS RESEARCH CENTER
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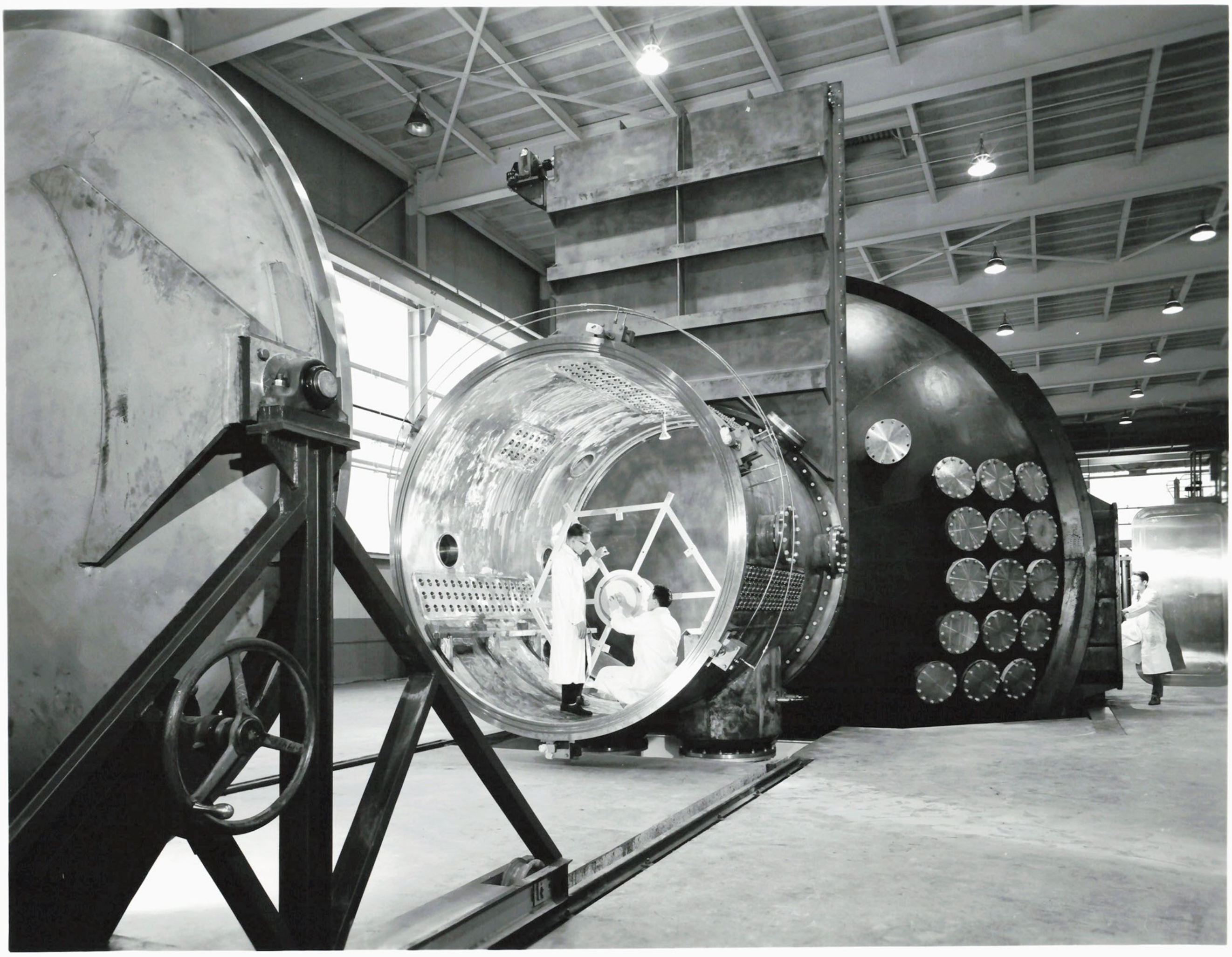
A 16038 NASA

CLEVELAND PRESS
AUG 12 1966
REFERENCE DEPT.

NASA
C-58852



SPACE VACUUM TANK

IN ELECTRIC PROPULSION LAB.

12/6038 NASA

CLEVELAND PRESS
AUG 4 1962
REFERENCE DEPT.

NASA
C-66-3683

Public Information Office
NASA Lewis Research Center
Cleveland, Ohio 44135
433-4000, ext. 415

Technicians inspect an experimental package in Lewis' Zero Gravity Facility where the weightlessness of space is reproduced. This will be one of the research facilities shown to the public during the National Aeronautics and Space Administration's Lewis Research Center's Open House July 17 and 18.

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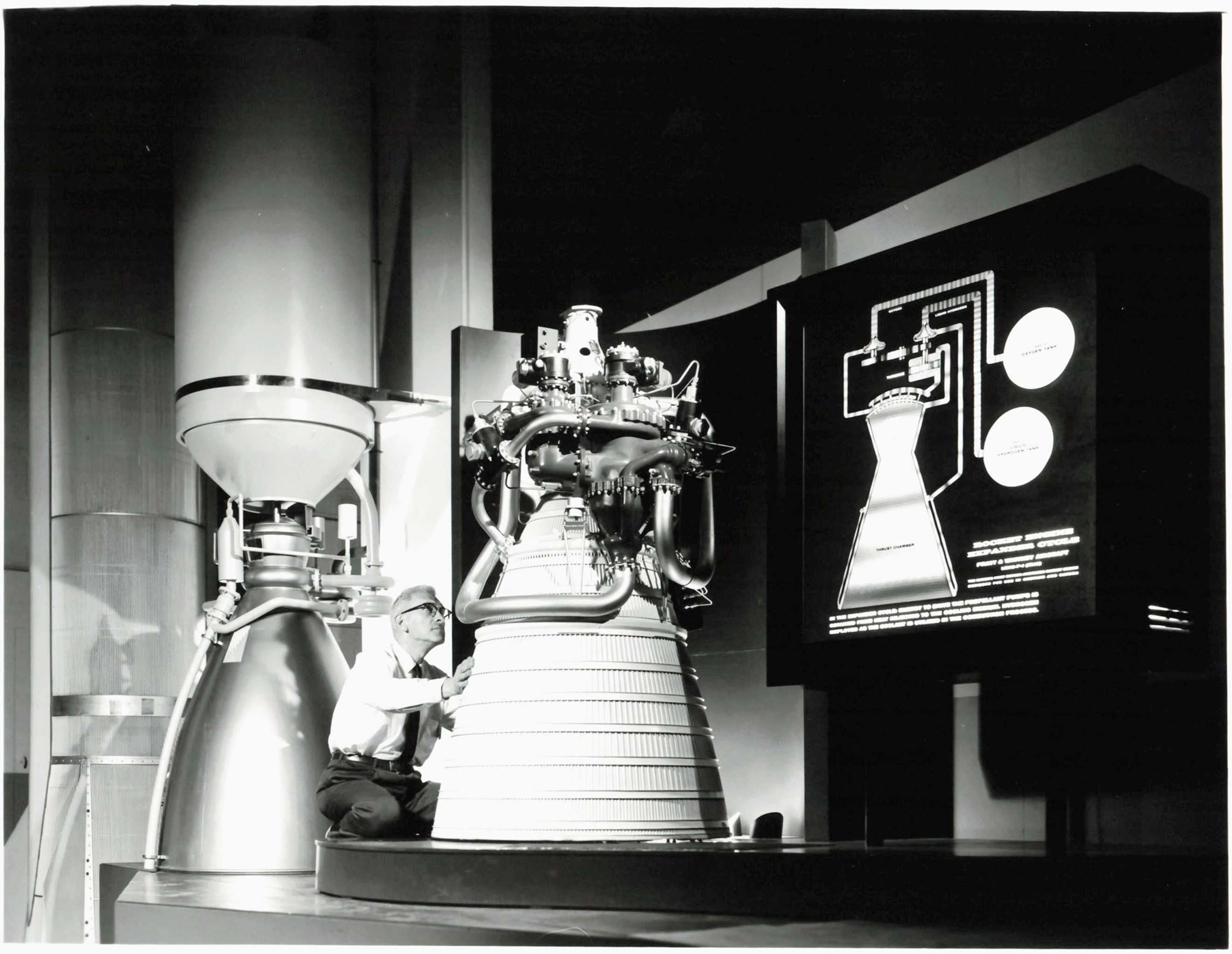
A16038
Lewis Research Ctr. - research

CLEVELAND PRESS
JUL 19 1971
REFERENCE DEPT.

NASA
C-61189



Office of Public Information
NASA Lewis Research Center
Cleveland 35, Ohio
252-7700, ext. 438

FOR IMMEDIATE RELEASE

C-61189

The Centaur program is the result of comprehensive studies to extend the Atlas payload capability. The RL-10 engine here, commonly called the Centaur engine, is part of that exhibit prepared by the Lewis Research Center for "Youth Days." The Centaur rocket vehicle which this engine is designed to propel is a liquid, high-energy space vehicle constructed of a modified Series D Atlas missile with a similar short upper stage. Centaur is the first large U. S. vehicle that is really a space vehicle--that is, the first whose engines can be started, shut down and restarted in space.

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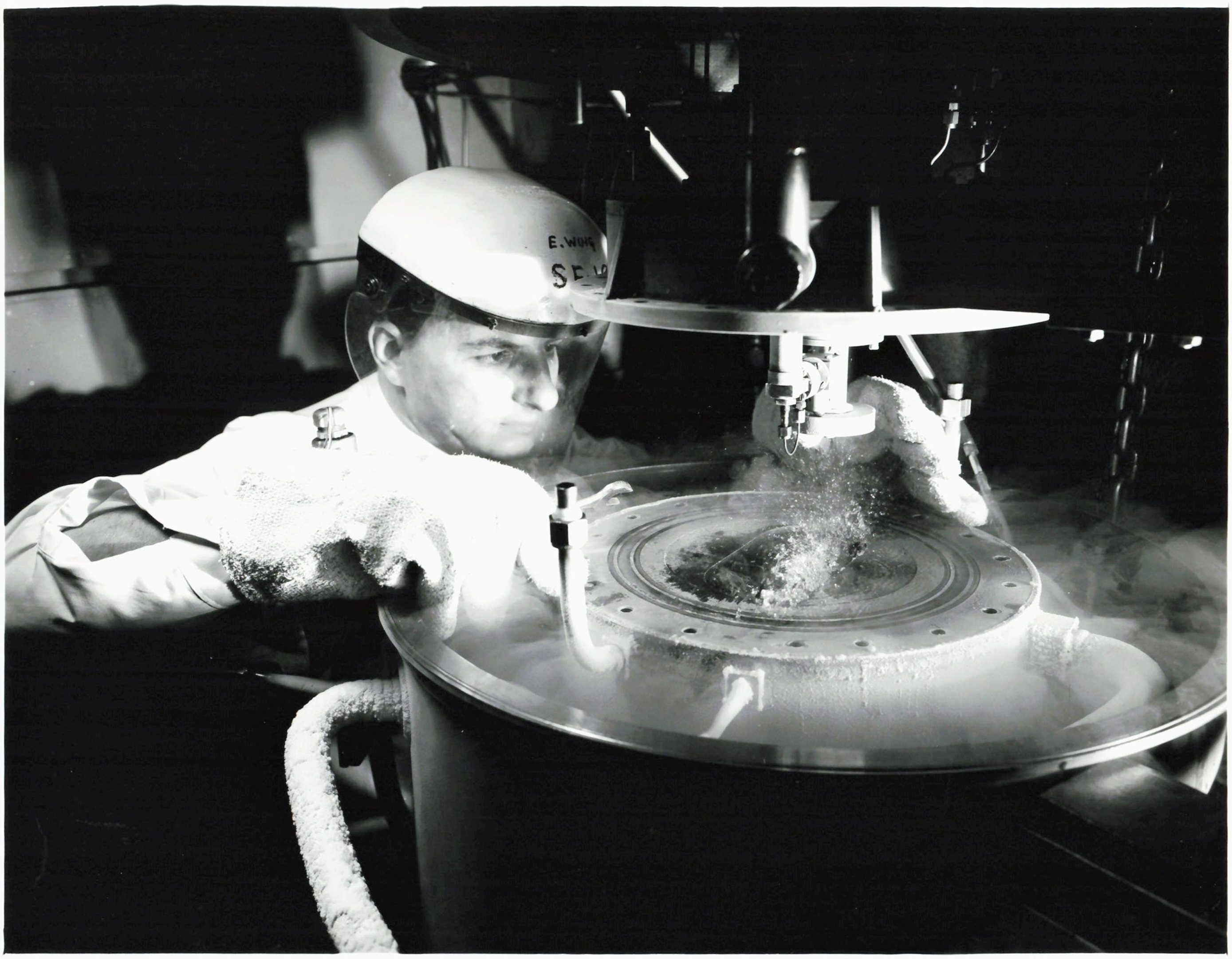
D/16038 NASA
REFERENCE DEPT.
AUG 4 1962
CLEVELAND PRESS

NASA
C-63336



Public Information Office
NASA Lewis Research Center
Cleveland, Ohio 44135
433-4000, ext. 415

FOR IMMEDIATE RELEASE

C-63336

This cryogenic friction and wear apparatus is used at NASA's Lewis Research Center in studies of possible bearings and seals materials for turbopump applications as low as 320 degrees below zero. Turbopump Technology is one of several areas that will be discussed at Lewis' Conference on Selected Technology for the Petroleum Industry December 8 and 9.

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CLEVELAND PRESS
DEC 1 1965
REFERENCE DEPT.

D/6338
NASA

A-34131-1

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
AMES RESEARCH CENTER, MOFFETT FIELD, CALIFORNIA

AMES RESEARCH CENTER
National Aeronautics and Space Administration
Moffett Field, California

Photograph A-34131-1

PREPARING EXPERIMENT TO FLY ABOARD THE GEMINI SPACECRAFT FOR STUDY OF EFFECTS OF THE WEIGHTLESS ENVIRONMENT ON SINGLE LIVING CELLS -- Dr. Richard S. Young, Chief of the Exobiology Division, NASA's Ames Research Center, near Mountain View, California, prepares weightlessness experiment. The Ames Center has primary responsibility for basic research in the life sciences within the space agency.

Sea urchin (held by Dr. Young) is stimulated by mild electric shock. This induces it to "shed" many thousands of eggs. Here he collects eggs with a pipette. When fertilized, these eggs become active cells, similar in many respects to certain types of human cells.

Sea urchin cells will divide a number of times under weightlessness aboard Gemini, and abnormality in cell division may indicate that weightlessness has effects on single cells of many types. This would mean possible hazards to prolonged manned space flight.

Theory suggests there may be such effects from weightlessness.

Dr. Young's division is responsible for detection and studyof extraterrestrial life and some other biological studies.

D/19000 Space Flight - U.S. - (manned) Gemini.

CLEVELAND PRESS
MAR 26 1965
REFERENCE DEPT.

NASA

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

News

W-4 gen'l Science
Supercritical Wing

FOR RELEASE: June 4, 1974

PHOTO NO. 74-HC-234
74-H-397

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Dr. Richard T. Whitcomb, one of the nation's most distinguished aeronautical engineers, holds model of jet aircraft equipped with his invention, the super-critical wing, for which he received a $25,000 cash award from NASA, June 4, 1974. It is the largest cash award ever given by NASA to an individual. The super-critical wing is an improved airfoil design which will permit increases in the speed and range of jet aircraft without increased power or fuel consumption. Dr. Whitcomb heads the Eight-Foot Tunnels Branch at the NASA Langley-Research Center, Hampton, Va. During his exceptional 31-year career at Langley, the 53-year-old engineer has received international recognition for his many significant contributions to aircraft design.

PHOTO CREDIT--NASA or National Aeronautics and Space Administration

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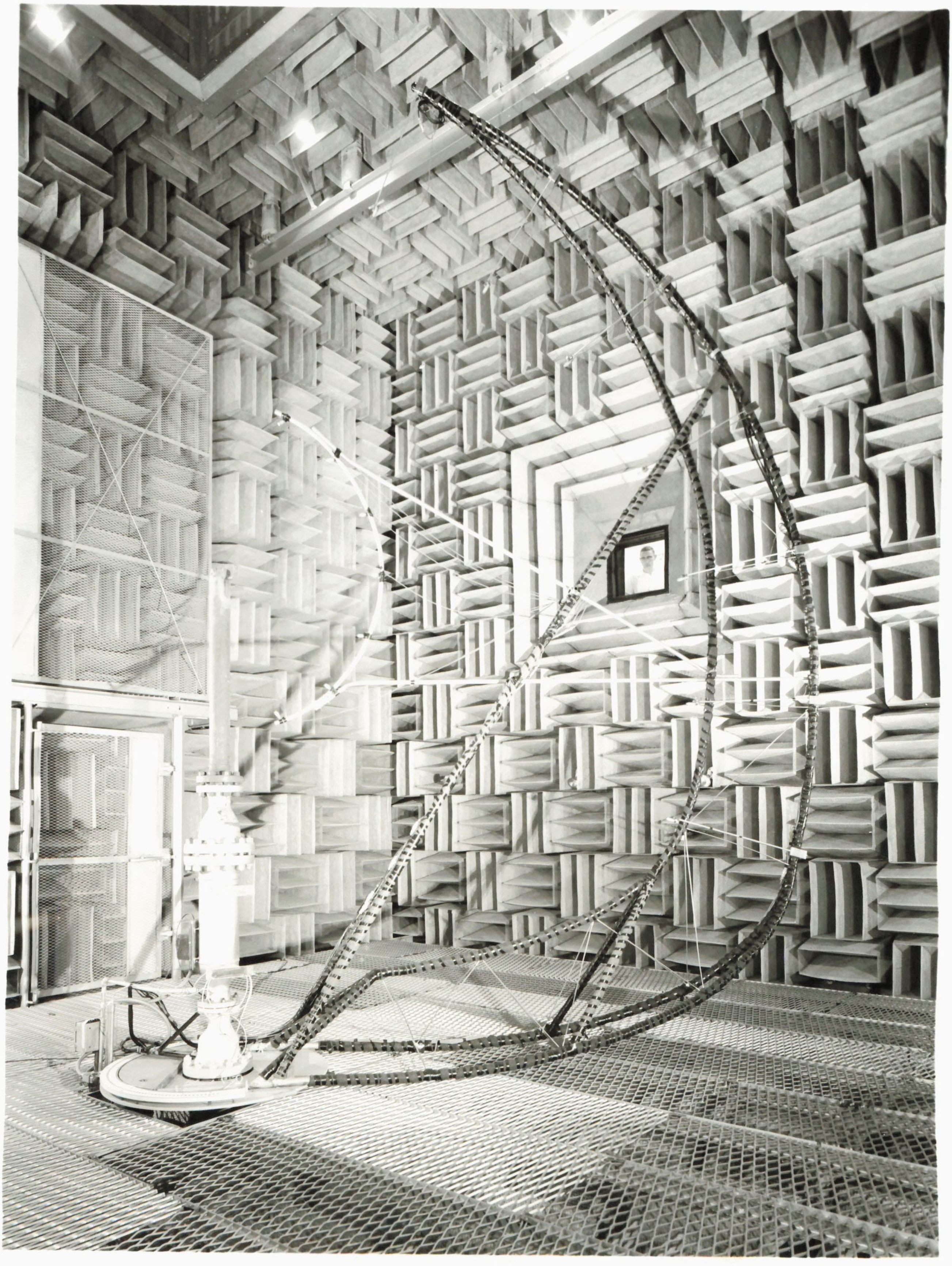

NASA
L-62-3924

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
LANGLEY RESEARCH CENTER
LANGLEY STATION
HAMPTON, VIRGINIA

Langley Research Center of the National Aeronautics and Space Administration operates a Noise Research Laboratory to provide controlled acoustic environment for a variety of research studies relating to the operation of aircraft, missiles, and space vehicles. The laboratory consists of a test cell, cubical in shape, with interior dimensions of approximately 27 feet. The interior surfaces are specially treated with acoustic wedges to minimize the reflections of noise during experimental acoustic studies. One of the treated walls includes special access doors for bringing personnel and research equipment into the test cell. Generally, this equipment consists of noise generation devices for research studies of jet or rocket engine noise, turbofan noise, compressor noise, and other types of noise. The test cell is equipped with a propane burner system for producing hot jets of 1,500° F absolute. Exhaust nozzle diameters ranging from 1 to 6 inches are used with this burner. Noise surveys are accomplished by the use of microphones attached to a remotely controlled rotating boom. Noise survey data from these microphones are recorded and analyzed in a control room adjacent to the test cell. Noise radiation patterns of a variety of jet and rocket engine noise sources will be studied under controlled conditions in this laboratory.

Noise

A37-Field L

REFERENCE
APR 25 '63
N.E.A.

NASA
L-61-4315

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
LANGLEY RESEARCH CENTER
LANGLEY AIR FORCE BASE, VIRGINIA

A technician at the Langley Research Center of the National Aeronautics and Space Administration checks a scale model of a possible spacecraft after tests in Langley's Unitary Plan Wind Tunnel to determine stability, control, and other aerodynamic characteristics. This is one of several specialized research facilities utilized by Langley scientists in studying models of space vehicles which may be used by NASA for future manned lunar missions. During a test, air in this tunnel is heated to 400 degrees F. as the facility reaches high speeds. The protective aluminized suit permits the technician to enter the tunnel and inspect the model-- preparatory to starting another test-- without a time-consuming wait for the tunnel to cool.

L-61-4315

A37- Field L

REFERENCE
APR 25 '63
N. L. A.

NASA
L-62-9222

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
LANGLEY RESEARCH CENTER
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HAMPTON, VIRGINIA

NASA scientists of the Langley Research Center are developing a blunted body like the one shown here to take direct measurements of the intense heat which will surround a returning lunar spacecraft as it reenters the Earth's atmosphere. It is full sized wind tunnel model of the Project FIRE reentry package, mounted in the Langley 9- by 6-foot Thermal Structures Tunnel on a special support motorized to spin it like the actual reentry package will spin in flight. Project FIRE is a flight reentry research project at very high speeds -- about 25,000 miles per hour -- managed by the Langley Research Center. It is intended to measure heating rates, radio signal "blackout" and materials performance during actual atmosphere entries, with information being gathered by telemetry, radar and optical tracking.

The main temperature readings to be obtained by Project FIRE will be taken by three special instruments known as calorimeters. They are made of beryllium and are instrumented with thermocouples. The first calorimeter will take temperature readings at the beginning of the reentry and will then be destroyed. Beneath it, a special phenolic asbestos heat shield, which the technicians are inspecting, will cover the second calorimeter. At a programmed time, the heat shield will be jettisoned to expose the second calorimeter. Beneath it will be a second heat shield and a third carolimeter. In this way, scientists will obtain temperature readings during three periods of the reentry heat pulse. The success of the experiment depends on the mechanism for jettisoning the heat shields, and the wind tunnel tests shown here are to check its operation. The four interlocking heat shield sections (one section has been removed in this photograph) are jettisoned by springs located near the rim of the reentry package. A pyrotechnic device, fired at the proper instant, releases a latch and allows the springs to eject the heat shield segments. The wind tunnel tests were made in a large blowdown wind tunnel at Mach 3 and simulate the correct air pressures FIRE will experience in flight.

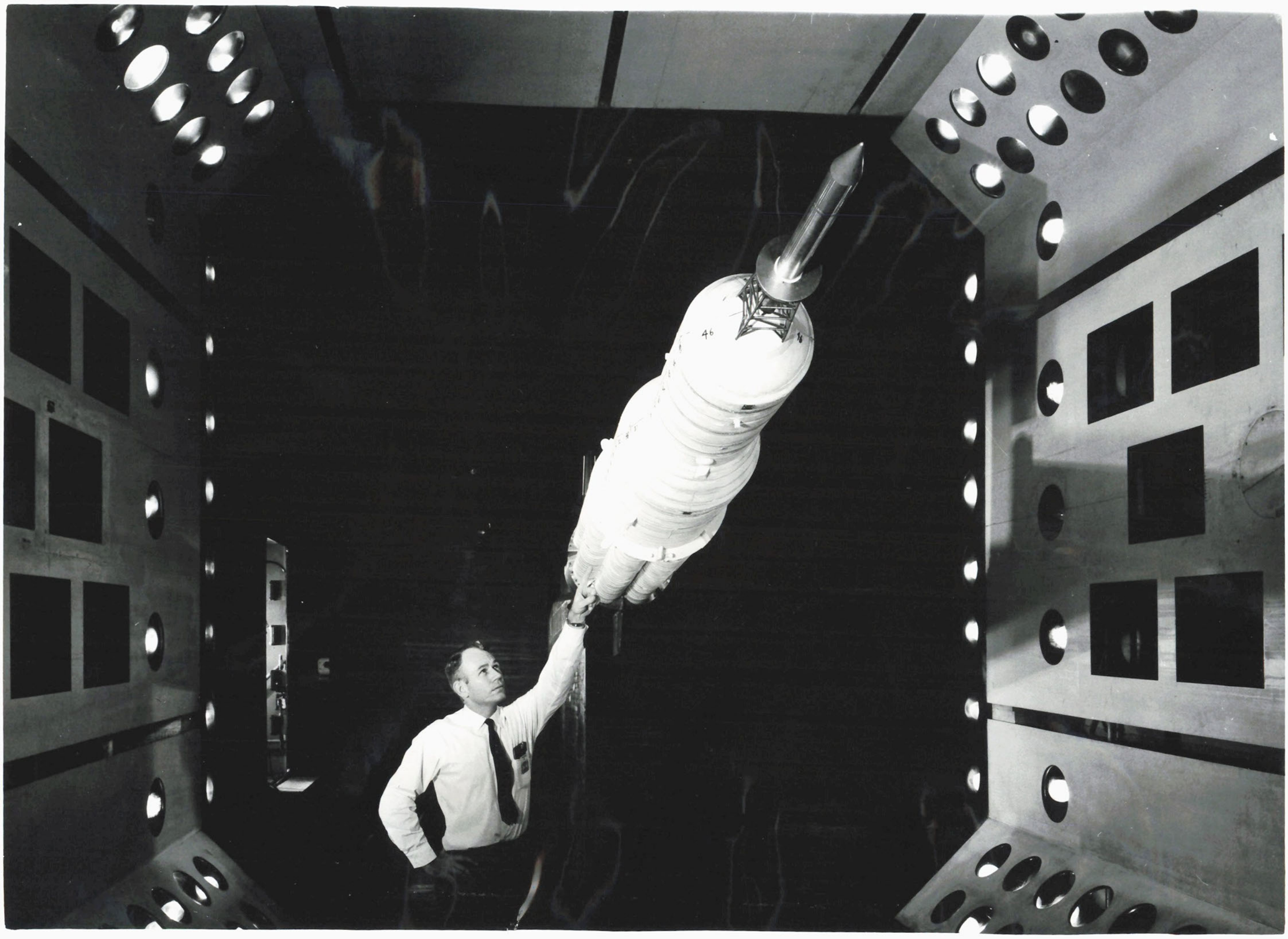
Results of Project FIRE are essential to the design of both manned and unmanned lunar reentry vehicles.

L-62-9222

REFERENCE
APR 25 '68

A37 - Field L

NASA
L-62-9335



NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
LANGLEY RESEARCH CENTER
LANGLEY STATION
HAMPTON, VIRGINIA

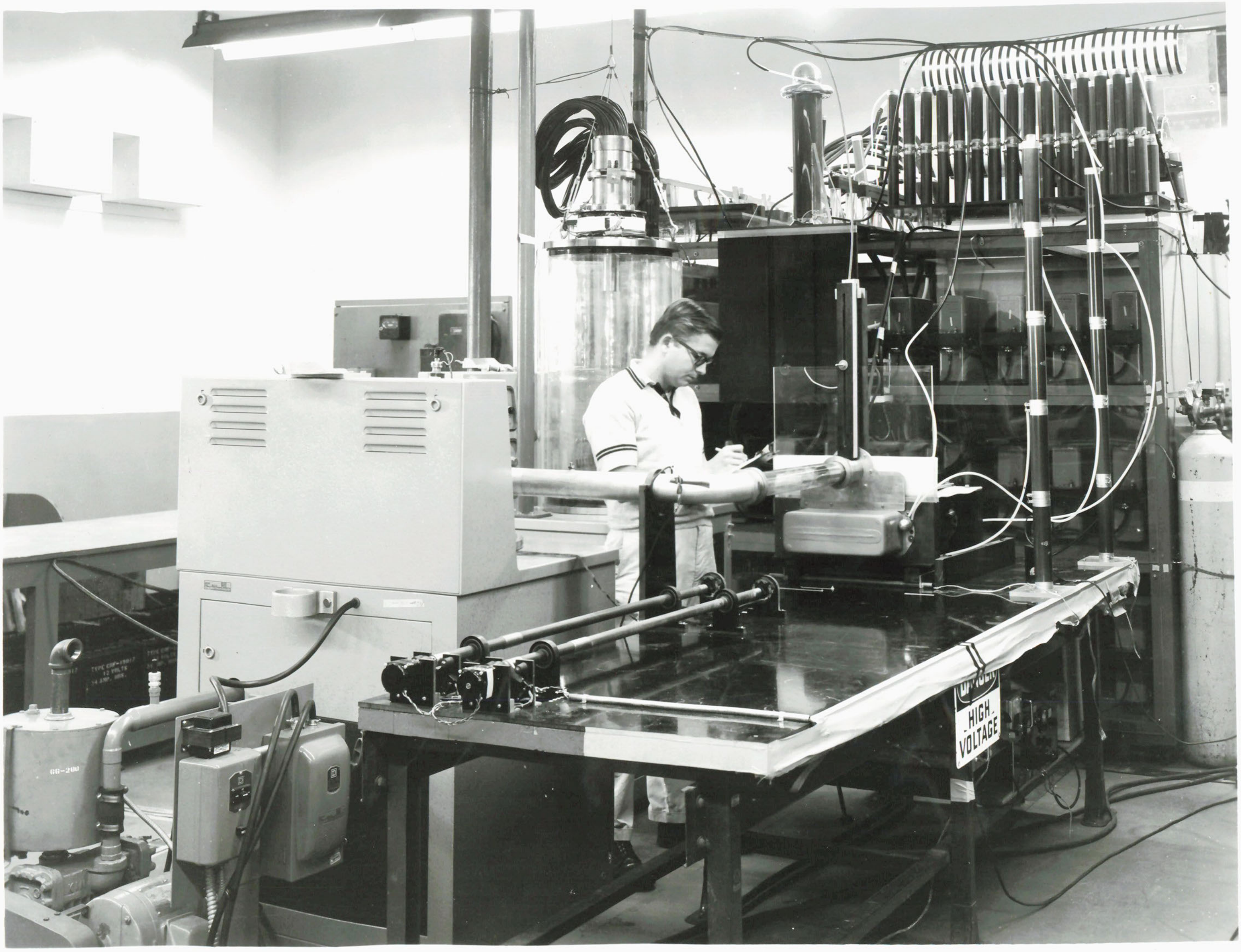
NASA scientists at the Langley Research Center perform exhaustive wind tunnel investigations on launch vehicles to establish that they will withstand every flight condition from lift-off to escape velocity. Langley, in cooperation with Marshall Space Flight Center and Manned Spacecraft Center, is making buffeting studies on a Saturn-Apollo model with escape tower. A 1/12th aeroelastic scale model, made up of the S-1 and S-IV stages with the Apollo spacecraft atop the S-IV stage, is sting mounted in the test section of Langley's Transonic Dynamics Tunnel where transonic buffet and aerodynamic damping are studied in the transonic speed range. Buffeting can occur on many aerodynamic shapes, and may lead to different kinds of structural response problems. Wind tunnel information is used to estimate the bending moments caused by buffet flows on the structure of a manned lunar vehicle during transonic flight.

L-62-9336
L-62-9335

REFERENCE
APR 25 '68
N. E. A.

A 37 - Field L

NASA
L-61-6343



NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
LANGLEY RESEARCH CENTER
LANGLEY AIR FORCE BASE, VIRGINIA

A scientist at Langley Research Center of the National Aeronautics and Space Administration makes a pre-run check on a co-axial plasma accelerator in the magnetoplasmadynamics laboratory. During tests, the plasma accelerator generates and accelerates a burst of plasma at a speed of 670,000 miles per hour. A camera set at one-ten-millionth of a second photographs the plasma stream as it emerges from the accelerator and passes through the narrow glass tube in front of the scientist. Basic research of plasmas in this and other special scientific apparatus is conducted by Langley scientists in search of a better understanding of astrophysical phenomena and for development of power and propulsion which may be used in future space vehicles flying to Mars, Venus, Jupiter and beyond. The capaciter bank, the electrical energy source for high velocity plasma, is shown behind the accelerator.

L-61-6343

REFERENCE
APR 25 '63
N.E.A.

A37 - Field L

NASA
L-62-9223

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
LANGLEY RESEARCH CENTER
LANGLEY STATION
HAMPTON, VIRGINIA

NASA scientists of the Langley Research Center are developing a blunted body like the one shown here to take direct measurements of the intense heat which will surround a returning lunar spacecraft as it reenters the Earth's atmosphere. It is a full sized wind tunnel model of the Project FIRE reentry package, mounted in the Langley 9- by 6-foot Thermal Structures Tunnel on a special support motorized to spin it like the actual reentry package will spin in flight. Project FIRE is a flight reentry research project at very high speeds -- about 25,000 miles per hour -- managed by the Langley Research Center. It is intended to measure heating rates, radio signal "blackout" and materials performance during actual atmosphere entries, with information being gathered by telemetry, radar and optical tracking.

The main temperature readings to be obtained by Project FIRE will be taken by three special instruments known as calorimeters. They are made of beryllium and are instrumented with thermocouples. The first calorimeter will take temperature readings at the beginning of the reentry and will then be destroyed. Beneath it, a special phenolic asbestos heat shield, which the technician is inspecting, will cover the second calorimeter. At a programmed time, the heat shield will be jettisoned to expose the second calorimeter. Beneath it will be a second heat shield and a third calorimeter. In this way, scientists will obtain temperature readings during three periods of the reentry heat pulse. The success of the experiment depends on the mechanism for jettisoning the heat shields, and the wind tunnel tests shown here are to check its operation. The four interlocking heat shield sections are jettisoned by springs located near the rim of the reentry package. A pyrotechnic device, fired at the proper instant, releases a latch and allows the springs to eject the heat shield segments. The wind tunnel tests were made in a large blowdown wind tunnel at Mach 3 and simulate the correct air pressures FIRE will experience in flight.

Results of Project FIRE are essential to the design of both manned and unmanned lunar reentry vehicles.

L-62-9216
L-62-9219
L-62-9223

REFERENCE
APR 25 '63
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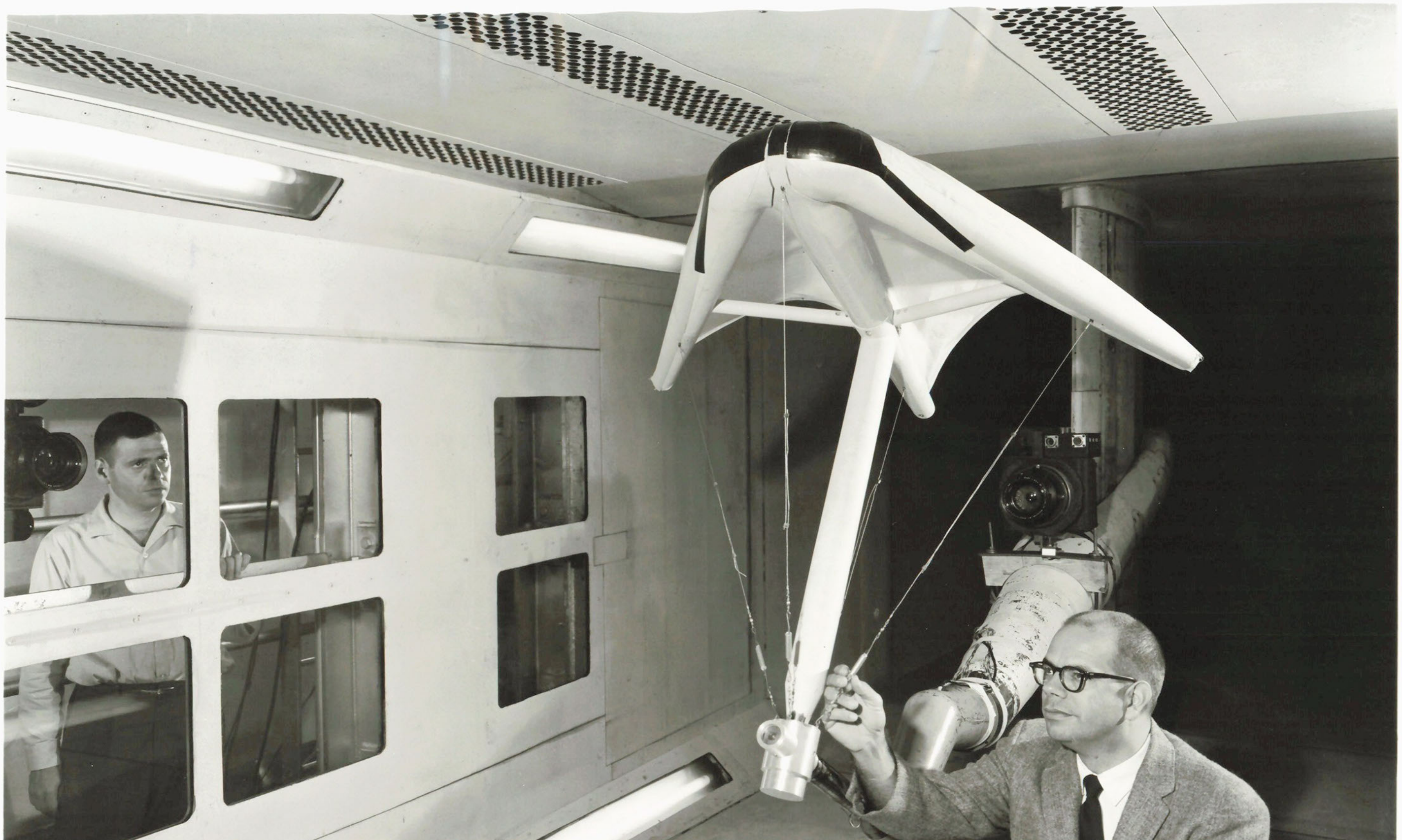
A37-Field L

NASA
L-62-2881



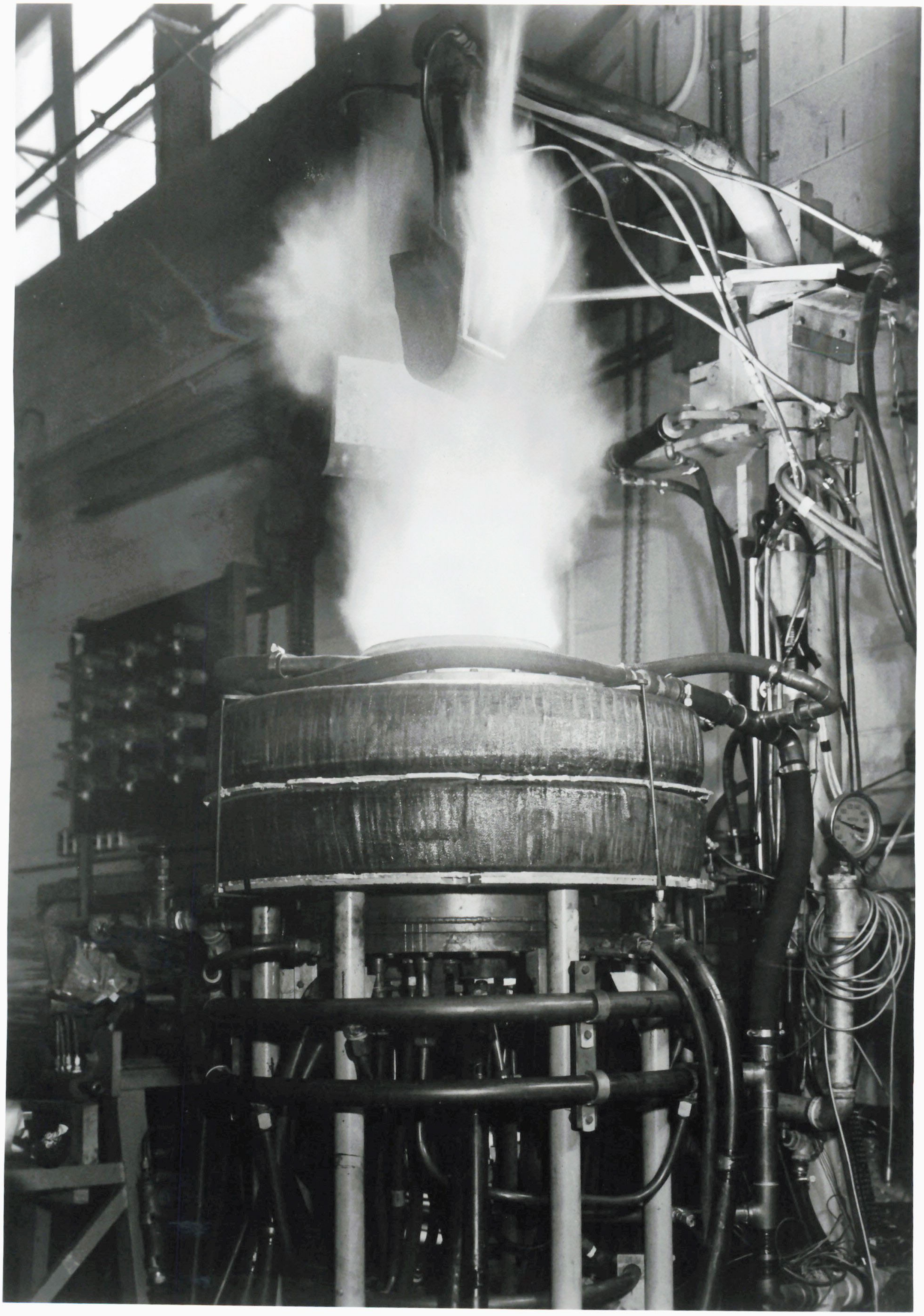
A37-Field L

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
LANGLEY RESEARCH CENTER
LANGLEY STATION
HAMPTON, VIRGINIA

A scientist at Langley Research Center of the National Aeronautics and Space Administration checks a one-fifth scale paraglider model prior to tests in the 7-by-10-foot wind tunnel. The tests are leading to the development of a full-scale vehicle which will be rocketed into space in an experiment to obtain information on frequency and size of micrometeorite particles in space and to allow post-flight laboratory study of craters formed by such particles. The full-scale flight vehicle will have an inflatable frame; a flexible membrane between the frame and the suspended payload is to consist of the paraglider inflation system and the necessary telemetry instrumentation. The membrane will be made of a special lamination of plastic and metal arranged to act as a condenser that will be discharged due to ionization when struck by a micrometeorite. The full-scale experiment will be performed using an Aerobee launch vehicle. At an altitude of about 200,000 feet the paraglider would be deployed and ascend to an altitude of about 700,000 feet, collecting micrometeorite data in the area from about 38 statute miles to about 132 statute miles above the earth before gliding to a landing at a preselected site. In this photograph, the scientist is examining the cable tension strain gages used to determine the loads in the support cables during wind tunnel tests. Other possible uses of the paraglider include: as an auxiliary wing to aid in take-off and landing of aircraft; the dropping of cargo or personnel; emergency wings for jet vertical take-off landing (VTOL) aircraft; and as a recovery system for space vehicles.

L-62-2881
L-62-2882

REFERENCE
APR 25 '63
N. L. A.



NASA
L-62-7174

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
LANGLEY RESEARCH CENTER
LANGLEY STATION
HAMPTON, VIRGINIA

Intense heat like that experienced by spacecraft during atmosphere entry is generated in the laboratory by scientists of NASA's Langley Research Center with the 2,500 kilowatt electric arc air heater seen here. In the 7,000° F air stream produced by the arc heater, samples of heat protective materials which appear promising for spacecraft use are placed for testing. On the recent flight of Astronaut Walter M. Schirra's Mercury spacecraft Sigma 7, similar samples of heat protection material were attached to the outer surface of the spacecraft on the small cylindrical end. After the flight, Langley scientists compared the samples which had been subjected to actual reentry conditions with those tested in the laboratory. Both laboratory and flight tests are part of an extensive program conducted at Langley Research Center to support the national space effort to accomplish manned lunar exploration and return in the present decade.

L-62-7174

A 37 - Field L

REFERENCE
APR 25 '63
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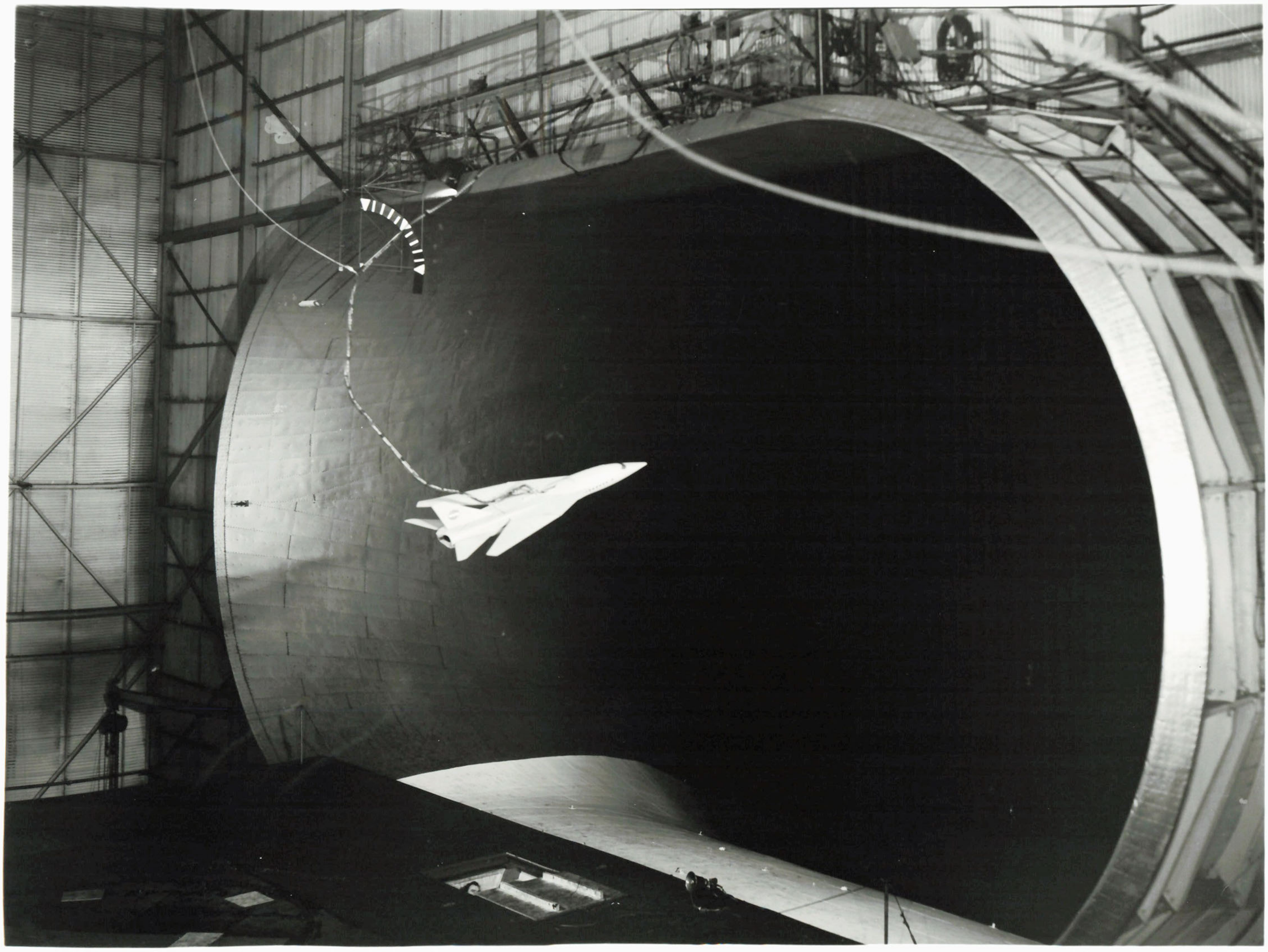
NASA
L-61-3548



Full Scale Wind Tunel at the Langley Research Center at

Hampton Virginia

REFERENCE
APR 25 '63
N. E. A.

A37- Field L

NASA
L-62-9652

NATIONAL AERONAUTICS AND SPACE ADMINSITRATION
LANGLEY RESEARCH CENTER
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HAMPTON, VIRGINIA

Ingenious devices like the Rendezvous Docking Simulator shown here at the NASA Langley Research Center are being developed by NASA scientists to explore under controlled laboratory conditions many complex aspects of space flight. The facility will enable scientists to determine man's ability to complete a rendezvous in either Earth or lunar orbit during the final 200 feet of the docking maneuver. Two Research pilots ride in a full-scale model of the Gemini spacecraft, and by operating its controls bring it into gentle, final contact with a target vehicle. The simulator spacecraft and the target hang on cables from an overhead track. The target can move vertically and laterally, but the spacecraft is capable of all six degrees of freedom of mechanical motion. An analogue computer (not shown) forms an integral part of the simulator system. The arrangement seen here simulates Earth orbit rendezvous and docking as proposed in the Gemini program. Langley Research Center has been conducting scientific studies of space rendezvous and docking problems for several years, and while the versatile facility was particularly designed to aid docking research, it can be adapted for use in other projects requiring dynamic control in six degrees of freedom.

L-62-9652

REFERENCE
APR 25 '68
N. E. A.

A37- Field L

NASA
L-62-8936

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
LANGLEY RESEARCH CENTER
LANGLEY STATION
HAMPTON, VIRGINIA

An intensive aerodynamic research program pursued by scientists of the NASA Langley Research Center over the past several years has evolved a number of highly advanced concepts for possible use as supersonic commercial airliners. One of them, the SCAT-16 (Supersonic Commercial Air Transport) shown here in the test section of the Langley 7- by 10-foot High Speed Wind Tunnel, features the principle of the variable sweep wing. In this photograph the wing is in its fully-extended position to provide extra lift for landing and take-off. Evaluation of the design by aircraft manufacturing company groups is underway to extend the research work already accomplished by NASA scientists.

L-62-8936

REFERENCE
APR 25 '68
N. L.

A 37- Field L

NASA
L-62-6318

A37 · Field L

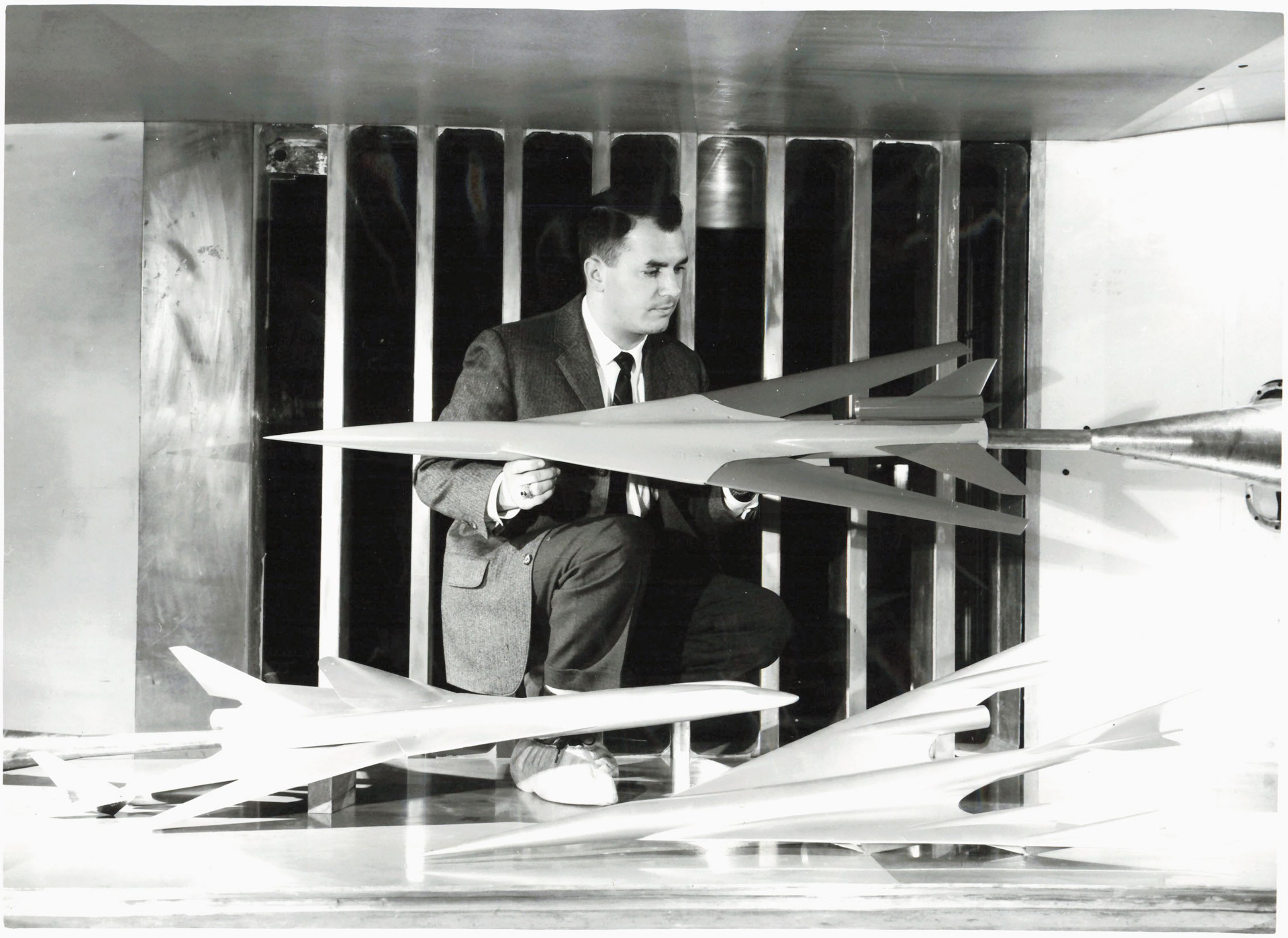
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
LANGLEY RESEARCH CENTER
LANGLEY STATION
HAMPTON, VIRGINIA

A technician at NASA's Langley Research Center prepares a free-flying one-ninth scale model of the XC-142 Tri-Service V/STOL tiltwing airplane for flight. Langley scientists are studying the dynamic stability and control characteristics of the aircraft during transitions, vertical and short take-off and landings, and hovering flight. Transition is accomplished by tilting the wing from the 90° vertical position used for hovering to a nearly horizontal position for conventional cruising flight. The model flight tests are one aspect of the basic research in V/STOL being conducted by NASA.

L-62-6328
L-62-6318

REFERENCE
APR 25 '63
N. E. A.

NASA
L-63-726



A37- Field L

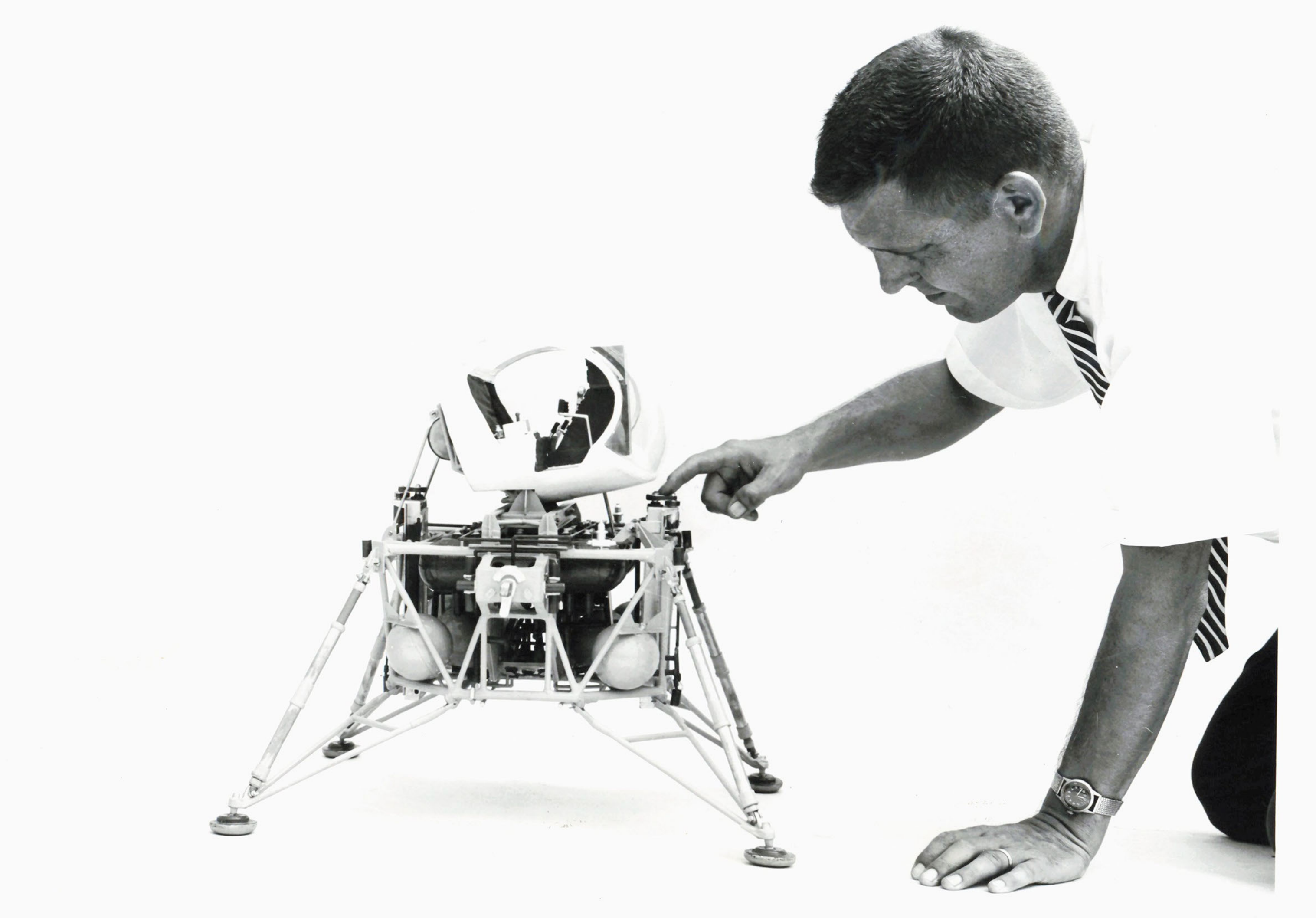
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
LANGLEY RESEARCH CENTER
LANGLEY STATION
HAMPTON, VIRGINIA

Extensive aerodynamic research on three promising configurations for a supersonic commercial air transport (SCAT) has been accomplished by the NASA Langley Research Center. Here a Langley scientist in the Unitary Wind Tunnel checks the alignment of a sting-mounted model of the SCAT-16 a three-engined configuration employing a variable sweep wing. For comparison, similarly scaled models of the other two configurations, which were investigated in the Unitary Wind Tunnel, are shown in the test section. They include the SCAT-15 (four engines, variable sweep), displayed beneath the nose of SCAT-16; and SCAT-4 (fixed wing). The three configurations have been scientifically investigated in a variety of subsonic, transonic, and supersonic wind tunnels and specialized laboratories at Langley.

L-63-726

REFERENCE
MAY 9 - '63
N. E. A.

NASA
L-62-5805



NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
LANGLEY RESEARCH CENTER
LANGLEY STATION
HAMPTON, VIRGINIA

A model of the prototype rocket-powered research vehicle that will be used by Langley Research Center of the National Aeronautics and Space Administration in the Lunar Landing Research Facility. The rocket-powered vehicle will be operated as part of the outdoor research facility-- a supporting steel structure that will be 400 feet long and 240 feet high. The two-man pilot's compartment atop a propulsion module is designed to give the pilot angular (pitch, roll, and yaw) and linear (back and forth, up and down, and sideways) motion cues as the pilot operates the vehicle through the control systems. The research vehicle is controlled only by the thrust from its main rockets and a system of small maneuvering rockets and is suspended from a specially-designed hoist which supports five-sixths of the vehicle's weight at all times. The unsupported one-sixth of the weight is counteracted by the thrust of downward firing hydrogen peroxide jets controlled by the pilot. The Lunar Landing Research Facility is designed to study the basic problems involved in the final phase of the landing approach and touchdown on the lunar surface. This type of research is an extension of the work which Langley has traditionally conducted over a period of many years in connection with the study of stability, control, and the many other handling problems involved in the landing and takeoff of vehicles designed to operate in the earth's atmosphere.

L-62-5802 through L-62-5805

REFERENCE
N. E. A.

A37- Field L

NASA
L-61-6511

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
LANGLEY RESEARCH CENTER
LANGLEY AIR FORCE BASE, VIRGINIA

Langley Research Center of the National Aeronautics and Space Administration is undergoing physical change-- space-face lifting-- characterized by the improvement and expansion of established research structures and the addition of modern new high-speed aeronautical and space research facilities. Several new laboratories are included in the above section of Langley's west area, where most of the major facilities are located. At left, two 60-foot-diameter vacuum spheres receive helium from the nearby steel storage bottles to produce speeds of Mach 24 (24 times the speed of sound) in Langley's 22-Inch Helium Tunnel. This tunnel is presently used to investigate characteristics of spacecraft reentering the atmosphere from earth orbit; a planned tunnel modification will enable scientists to simulate reentry speeds of Mach 40. In the same area are staff offices and other research facilities, including a magnetoplasmadynamics facility for the study of plasma in motion in a magnetic field-- one of the fundamental sciences of the space age. The large, steel, air-storage bottles in the background, each 11 feet in diameter and 65 feet high, contain 145,000 cubic feet of air used by three other facilities-- the 9 X 6-Foot Thermal Structures Tunnel, the 20-Inch Hypersonic Jet Tunnel, and the Internal Aerodynamics Tunnel.

L-61-6511
L-61-6511.1

REFERENCE
APR 25 '63
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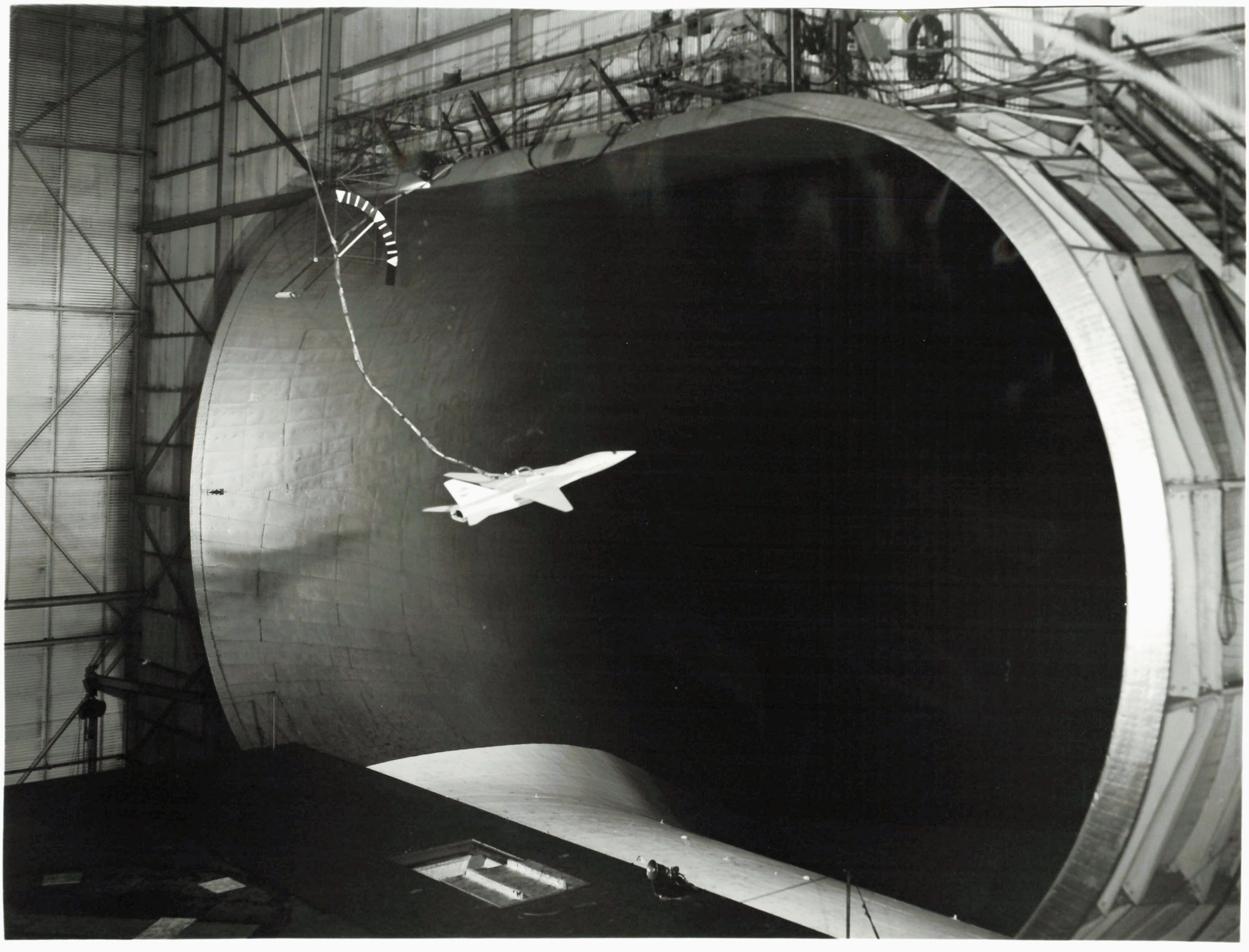
A37 - Field L

NASA
L-61-3550

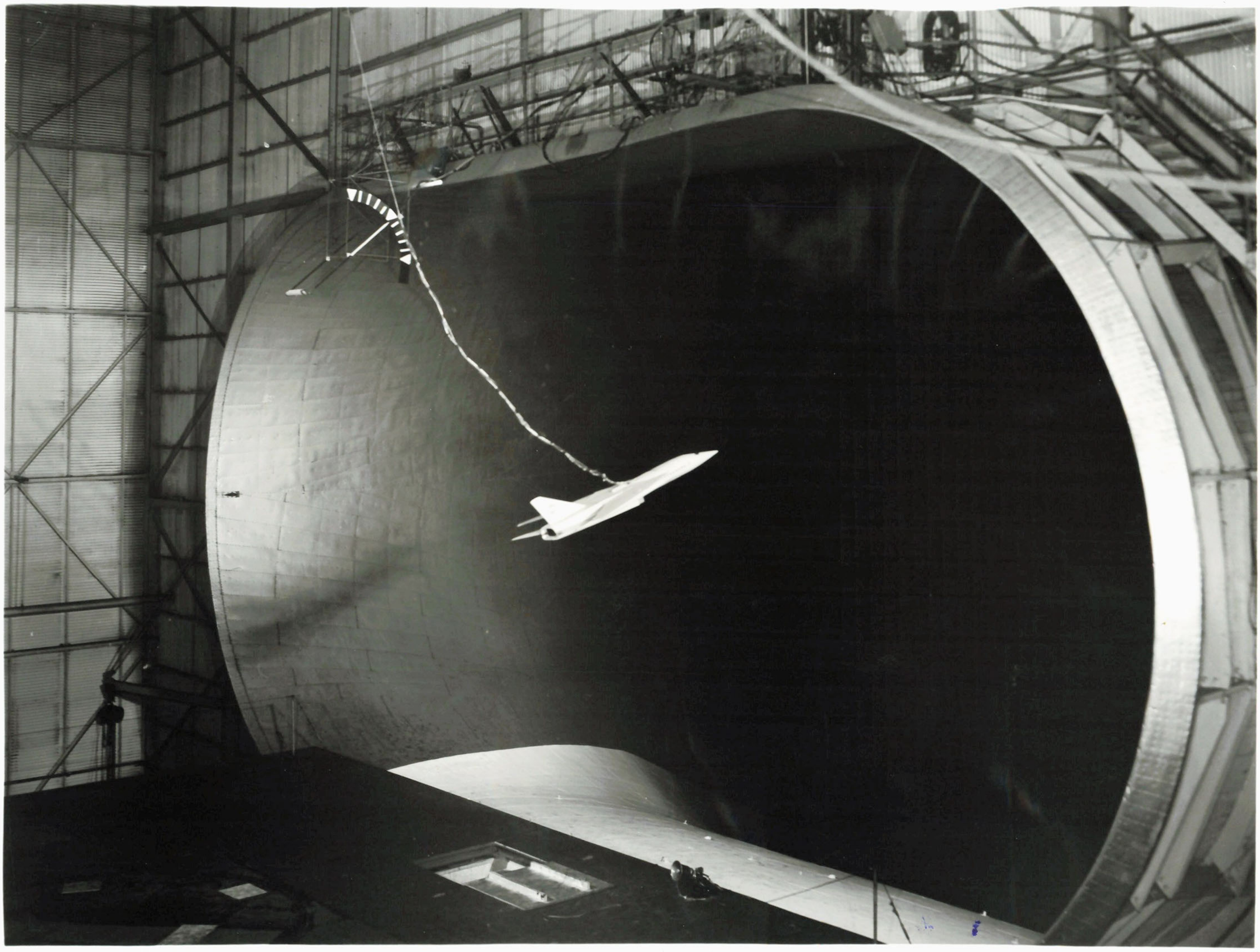


Full Scale Wind Tunnel at the Langley Research Center at
Hampton Virginia

N.E.A.
APR 25 '63
REFERENCE

A37- Field L

NASA
L-61-3549



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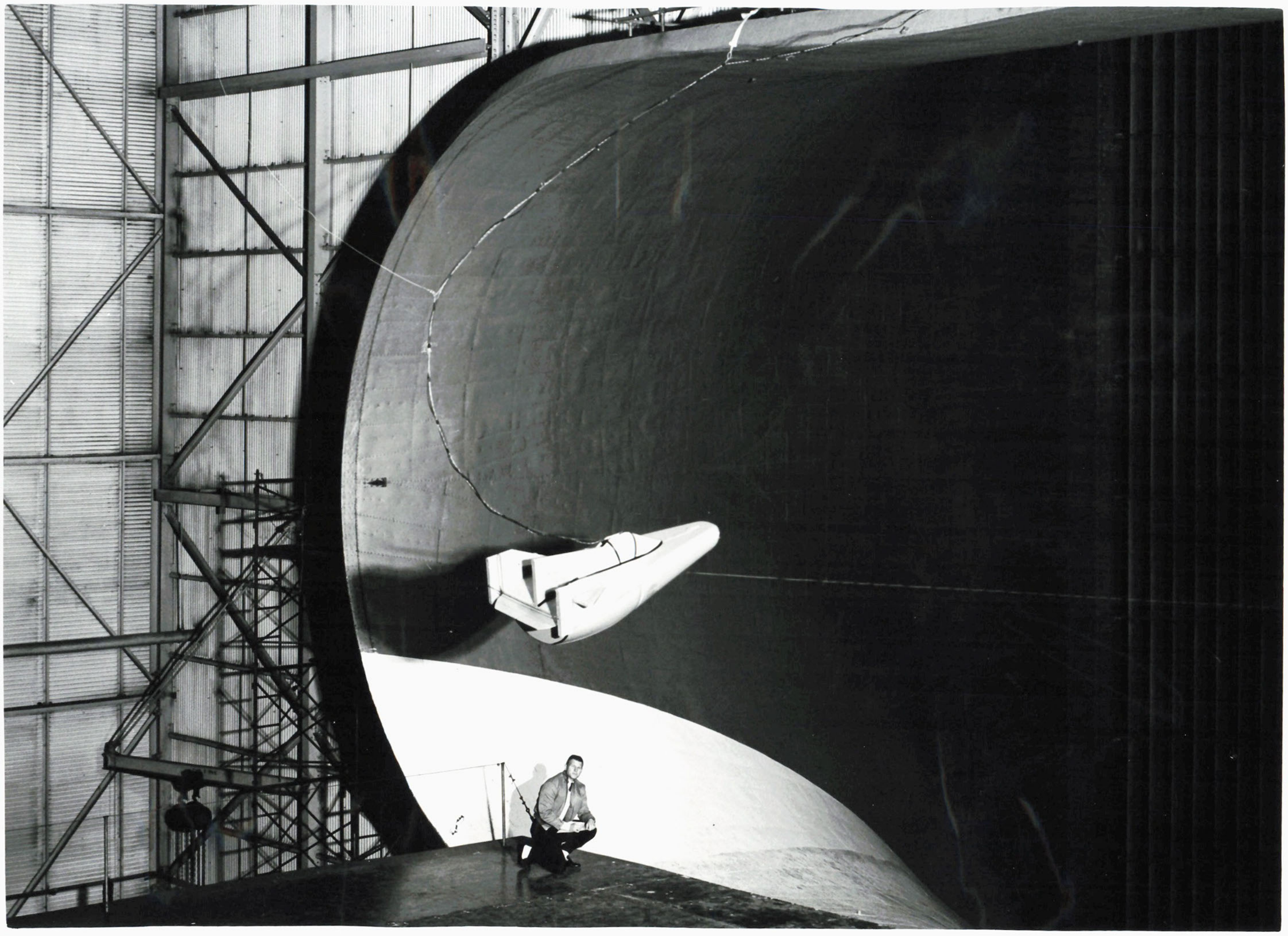
N. E. A.

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
~~LANGLEY RESEARCH CENTER~~
~~LANGLEY STATION~~
HAMPTON, VIRGINIA

A research model built to evaluate experimentally the principle of variable sweep wings is shown in free flight tests in the Full Scale Wind Tunnel at the Langley Research Center of the National Aeronautics and Space Administration at Hampton, Virginia. NASA scientists at Langley investigated a variety of proposed configurations in an extensive research program to provide basic information for design of a modern supersonic aircraft which can alter the angle of wing sweepback to achieve more efficient flight under varying conditions. Two Langley Research Center scientists have patented one principle of variable sweepback in which the wing hinge is located outboard of the aircraft fuselage line. Outboard hinging eliminates mechanical complications and large stability changes related to center of gravity movements. Variable sweepback allows a supersonic aircraft to use a nearly straight wing for high lift during landing and take-off and then permits sweep change for most efficient supersonic flight at both high and low altitudes.

L-61-3548
L-61-3549
L-61-3550

NASA
L-62-8924



NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
LANGLEY RESEARCH CENTER
LANGLEY STATION
HAMPTON, VIRGINIA

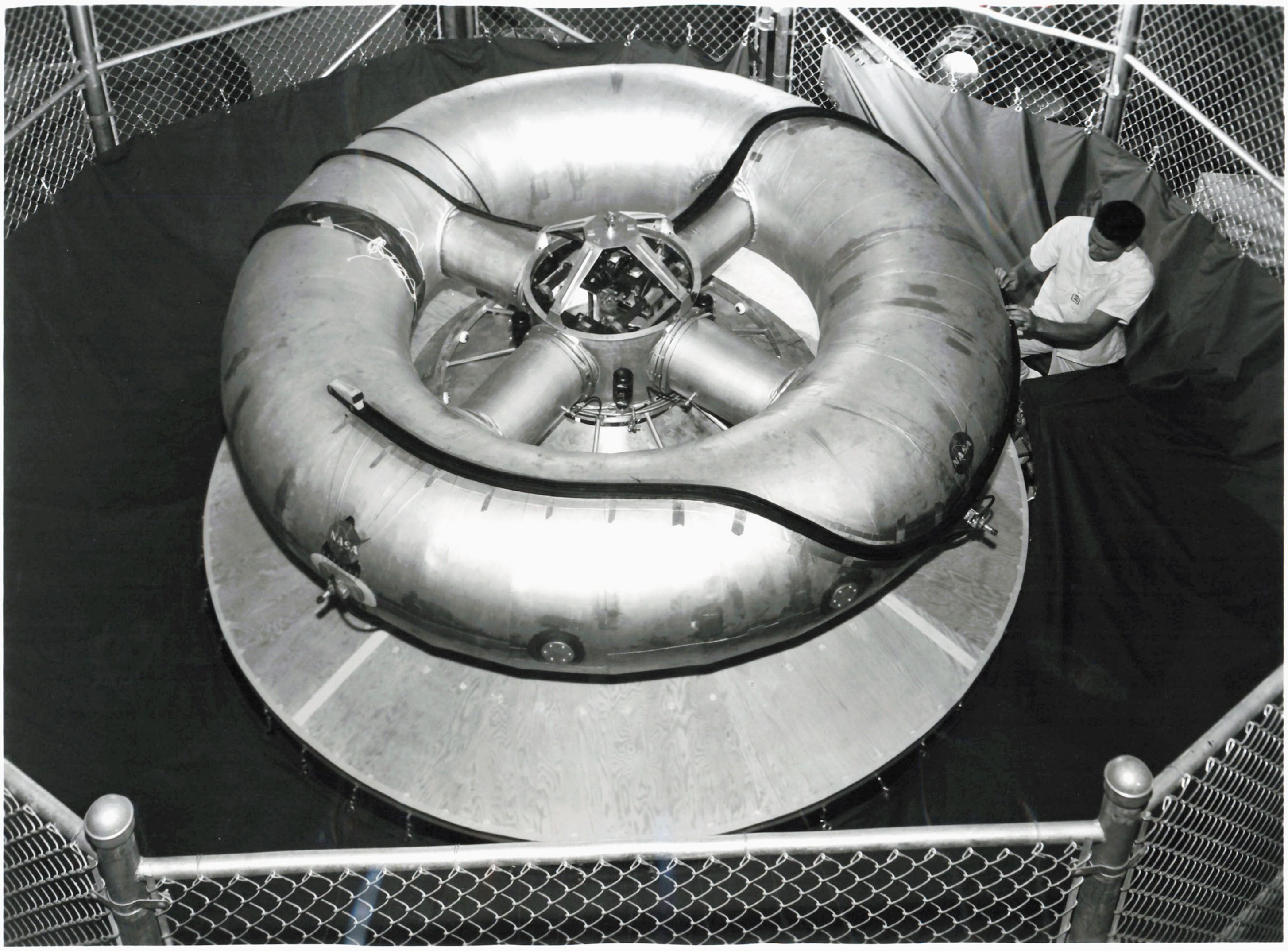
A one-third scale model of a lifting-body type reentry vehicle is being tested in the Langley Research Center full scale wind tunnel to determine its characteristics while being towed. Although the lifting-body has no wings, sufficient lift is generated by the body itself to provide more or less conventional unpowered flight capability similar to that of the X-15. Control is achieved by rudders and elevons located at the rear of the body. The wind tunnel research is providing information for planned tests at the NASA Flight Research Center, Edwards, California, of a manned spacecraft of this type. Initially, the manned vehicle will be towed by a truck or an airplane and then cut loose to glide in for a landing. The flights will provide information on the low-speed characteristics of the lifting body configuration during approach and landing. The full-scale version will have wheels and will initially land at about 55 miles per hour. Later, as the wing loading is increased, it will land at about 200 miles per hour, the landing speed of the X-15. If the first flights are successful, an advanced version may be carried up to about 45,000 feet under the wing of a B-52 bomber - the way NASA's record smashing X-15 rocket plane is launched - and dropped at a speed close to that of sound.

L-62-8924

A 37- Field L

REFERENCE
APR 25 '63
N. E. A.

NASA
L-61-5738



NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
LANGLEY RESEARCH CENTER
LANGLEY AIR FORCE BASE, VIRGINIA

A technician at the Langley Research Center of the National Aeronautics and Space Administration prepares a one-third-scale model of a possible erectable manned space station for dynamic tests in which the model is spun to simulate the spinning of a space station for producing artificial gravity in space. During the tests a weight is mechanically moved around the narrow black track on the outside of the station to study the effects of such disturbances as personnel walking inside or the action of stabilization jets. The space laboratory is a subject of basic study by Langley scientists conducting theoretical and experimental research on structures, materials, dynamics and thermal balance. Packaging and erection techniques have been investigated with small models, while larger ones, such as this 10-foot-diameter model designed to be compactly folded in the nose of a rocket at launch, are slated for dynamic studies. The aim of this research program is to provide knowledge necessary for the ultimate design of manned orbital laboratories. Advances in knowledge achieved by this program are applicable to space stations in general as well as to manned lunar and planetary vehicles. A wire fence has been provided around the test area as a safety barricade.

L-61-5738
L-61-5739
L-61-5811

REFERENCE
APR 25 '63
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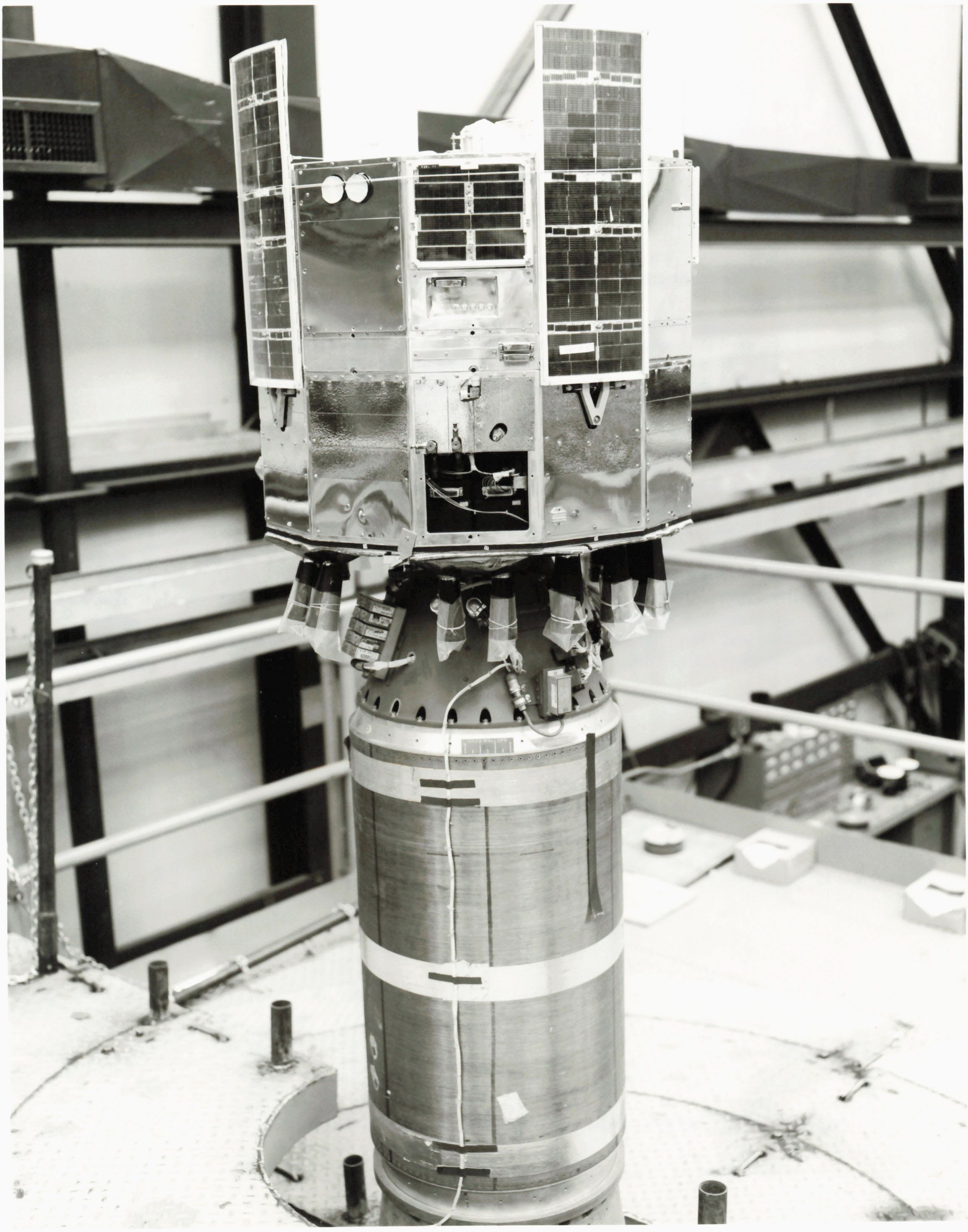
A37-Field L



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

FOR RELEASE: July 2, 1971

PHOTO NO. 71-H-952

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WALLOPS ISLAND, VA. -- The spacecraft for the Naval Research Laboratory (NRL) and the National Aeronautics and Space Administration SOLRAD 10 (C) is shown on the spin table for instrumentation checks prior to encapsulation and mating to the four-stage Scout launch vehicle. The 260 pound spacecraft will be boosted into a near circular orbit, about 370 miles above the earth with 14 experiments aboard to monitor continously solar electromagnetic radiation (X-ray and ultraviolet) and to measure, on command, stellar radiation (X-ray) from other celestial sources. Information gained by the satellite is expected to contribute to a better understanding of the physical processes involved in solar flares and other solar activity and the potential effects on short-wave communications and future manned space travel.

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

FOR RELEASE: Filed: September 13, 1971

PHOTO NO. 71-H-1349
71-HC-1072

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WALLOPS ISLAND, VIRGINIA--CHEMICAL CLOUD LAUNCH CONDUCTED AT WALLOPS--The National Aeronautics and Space Administration conducted a rocketborne experiment from Wallops Island, Virginia, at dusk September 7, 1971 which left several glowing, colored clouds high over the mid-eastern U.S. coastline. Liftoff of the Nike-Apache rocket occurred at 7:57 p.m. EDT. The payload ejected a trail of sodium and lithium (creating a glowing reddish trail) during ascent from 80 to 170 kilometers and then ejected barium at an altitude of 170 kilometers, creating a greenish-white cloud. The barium cloud first appeared greenish-white then changed to blue. Data on wind conditions are obtained by photographing the motion of the vapor trails and clouds from ground-based and airborne cameras. The second launch in this series is scheduled for dawn on September 14. The experiments are being conducted in cooperation with the GCA Corporation, Bedford, Massachusetts under contract to NASA's Goddard Space Flight Center, Greenbelt, Maryland, J.F. Bedringer is the GCA Project Director. Brooks L. Shaw is the Wallops Project Coordinator responsible for coordinating prelaunch, launch, and tracking operations.

51

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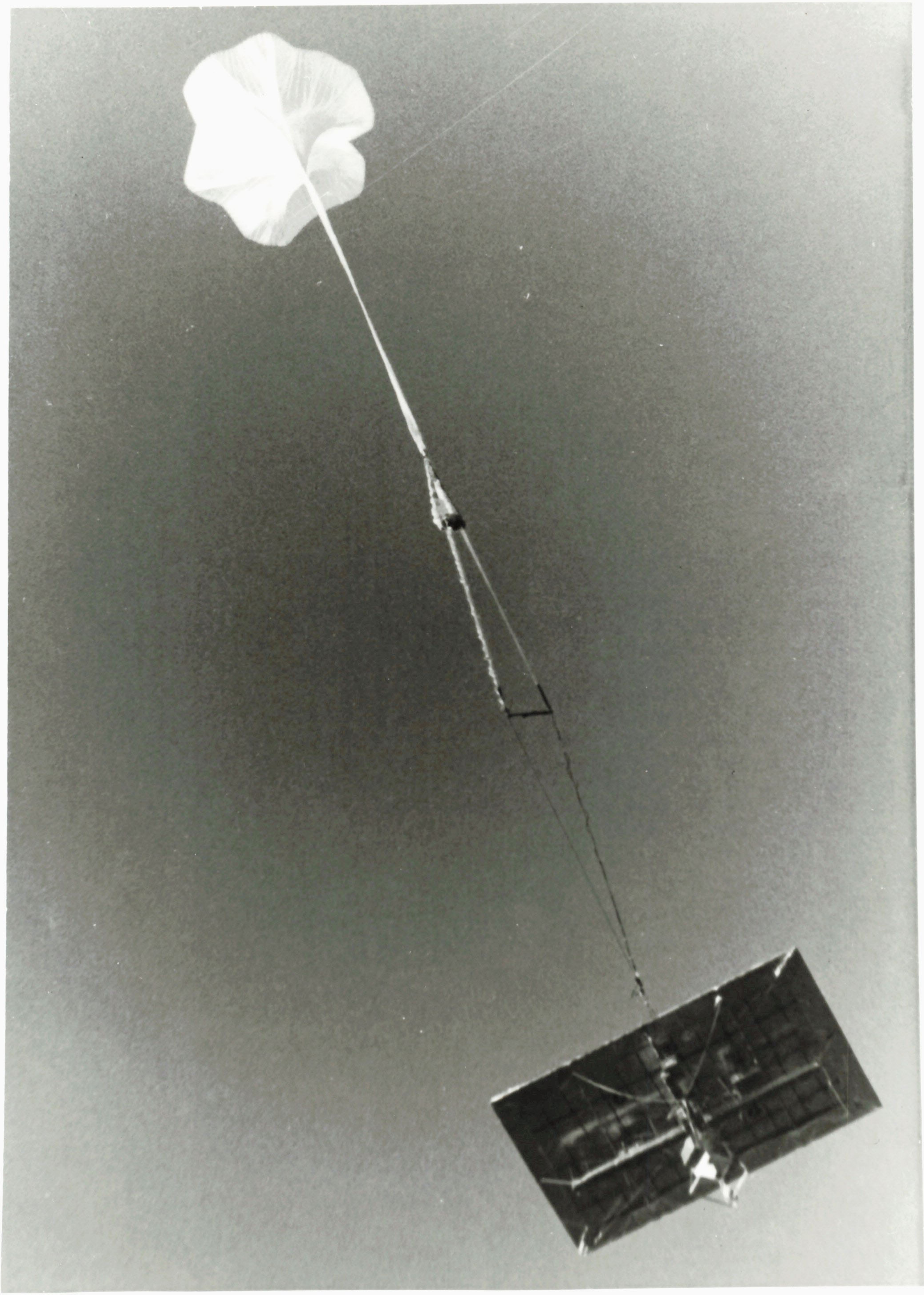

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
WASHINGTON, D. C. 20546

FOR RELEASE: Filed: September 30, 1970
PHOTO NO. 70-H-1238
70-HC-890

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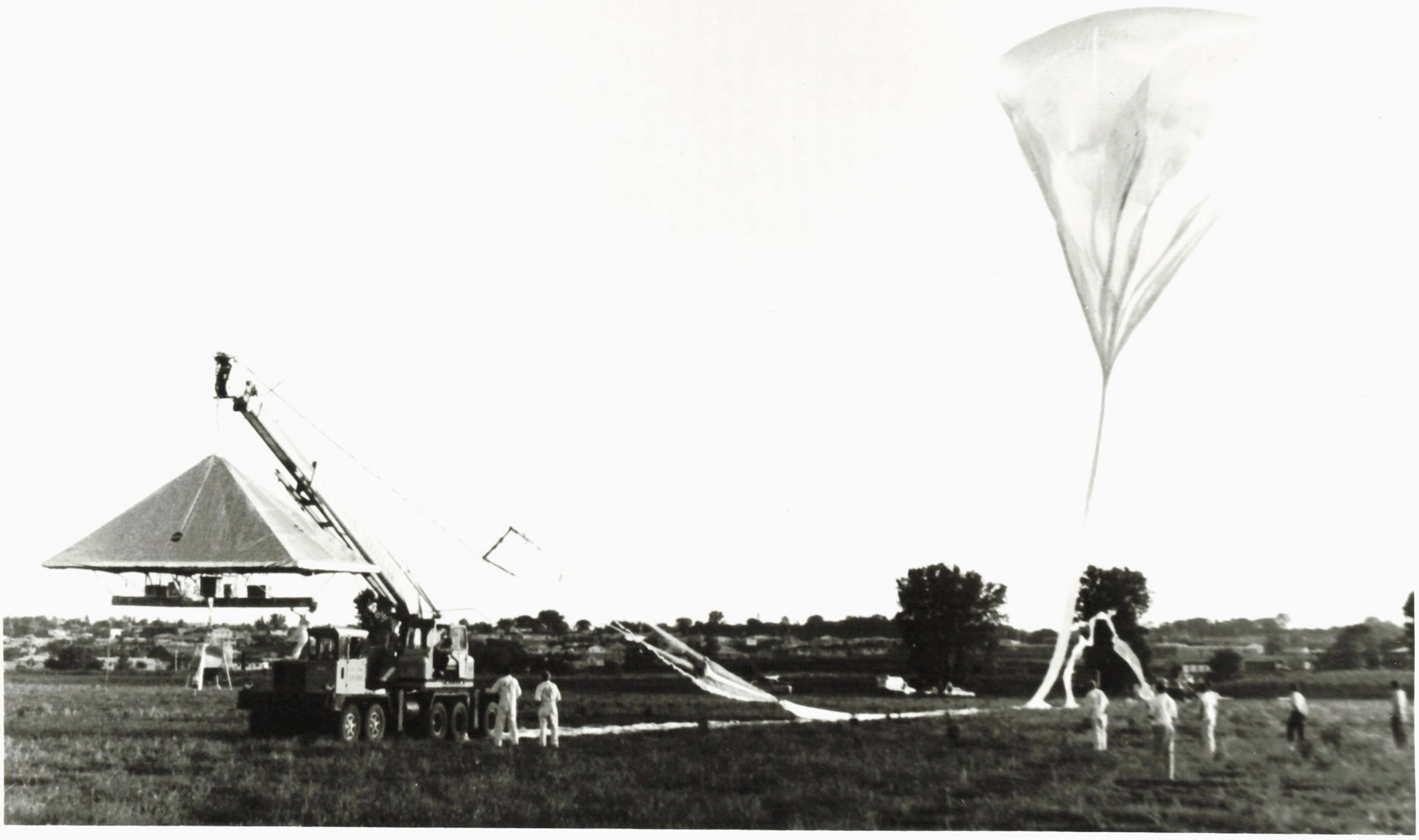
MINNEAPOLIS, MINNESOTA -- CREPE FLIGHT -- A balloon and scientific package of the Cosmic Ray Emulsion Plastic Experiment are launched at Minneapolis, Minesota, on September 4, 1970. The balloon and payload was launched by the Winzen Research Corporation in cooperation with the National Center for Atmospheric Research. The CREPE project is part of the Manned Spacecraft Center's investigations of cosmic rays. The experiment consisted of 240 square feet of detectors housed in a 20 by 12 foot package. The detectors--plastic track, nuclear emulsion, and fast-film Cernekov--are designed to record the intensity and direction of transiron primary cosmic rays in the upper atmosphere (130,000 feet altitude). The balloon and scientific package drifted for more than 347 hours, and the instrument package landed in a flax field 20 miles west of Regina, Canada, after being separated from its 600-foot long balloon.

5

Space

OCT 7 1970

PHOTO CREDIT -- NASA or National Aeronautics and Space Administration



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

FOR RELEASE: Filed: September 30, 1970
PHOTO NO. 70-H-1237
70-HC-889

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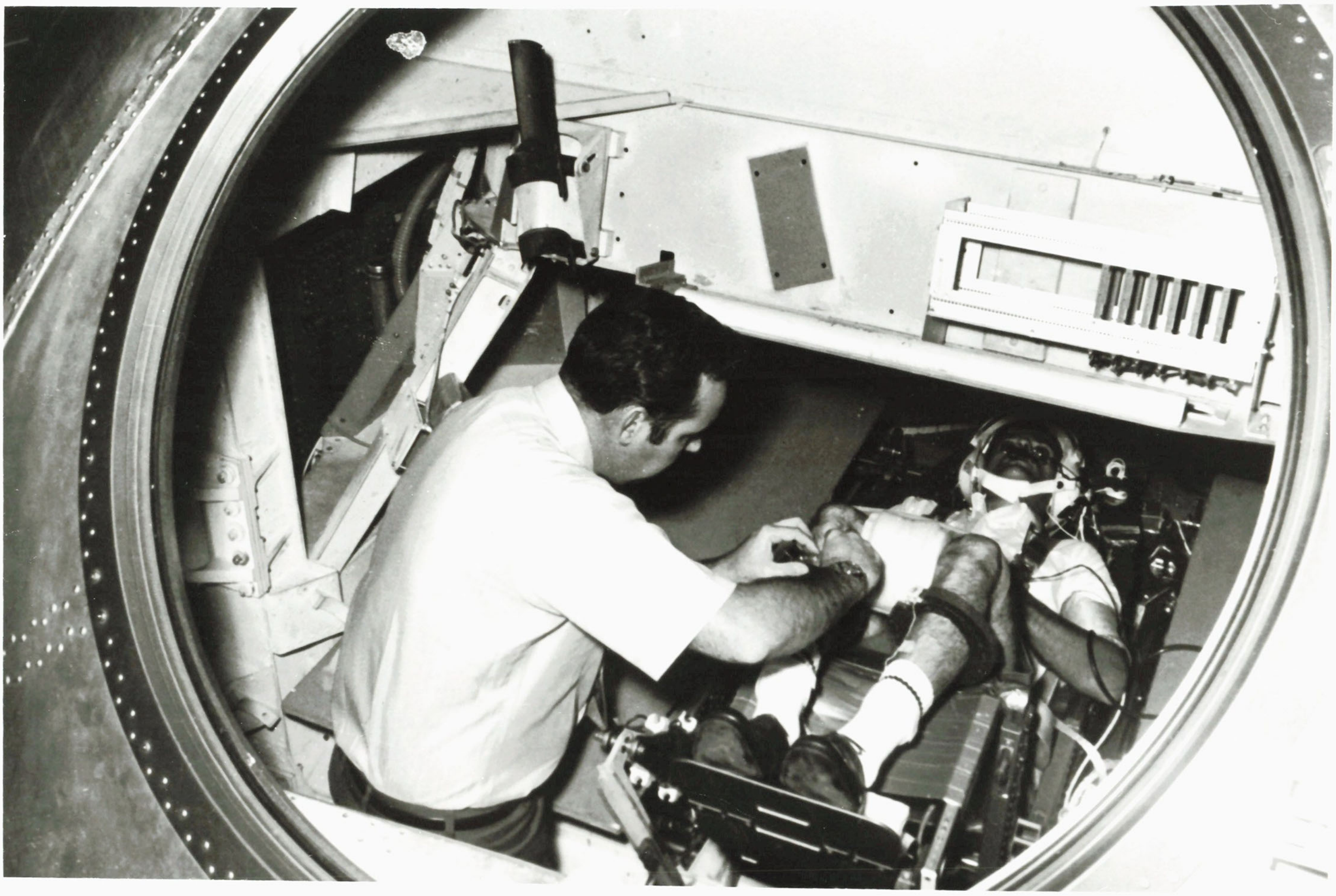
MINNEAPOLIS, MINNESOTA -- CREPE FLIGHT -- A launch balloon and scientific package of the Cosmic Ray Emulsion Plastic Experiment is prepared for flight at Minneapolis, Minnesota, on September 4, 1970. The balloon and' payload was launched by the Winzen Research Corporation in cooperation with the National Center for Atmospheric Research. The CREPE project is part of the Manned Spacecraft Center's investigations of cosmic rays. The experiment consisted of 240 square feet of detectors housed in a 20 by 12 foot package. The detectors--plastic track, nuclear emulsion, and fast-film Cernekov--are designed to record the intensity and direction of transiron primary cosmic rays in the upper atmosphere (130,000 feet altitude). The balloon and scientific package drifted for more than 347 hours, and the instrument package landed in a flax field 20 miles west of Regina, Canada, after being separated from its 600-foot long balloon.

Space

OCT 7 1970

PHOTO CREDIT -- NASA or National Aeronautics and Space Administration



NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
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FOR RELEASE: September 8, 1970
PHOTO NO. 70-H-1208

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MANNED SPACECRAFT CENTER, HOUSTON, TEXAS -- SPACE SHUTTLE TESTING--Sid Gillespie, an Air Force Academy technician, installs instrumentation on Tech. Sgt. Philip A. Robinson in preparation for centrifuge test to determine man's tolerence to space shuttle reentry. The experimentation, called "eye balls down" testing, was conducted in Building 5 at the Manned Spacecraft Center. Test subjects were from Brooks Air Force Base, San Antonio, Texas.

Space
Ships

8

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OCT 7 1970

NHQ DIV FORM 220 FEB 68

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
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FOR RELEASE: Filed: September 8, 1970
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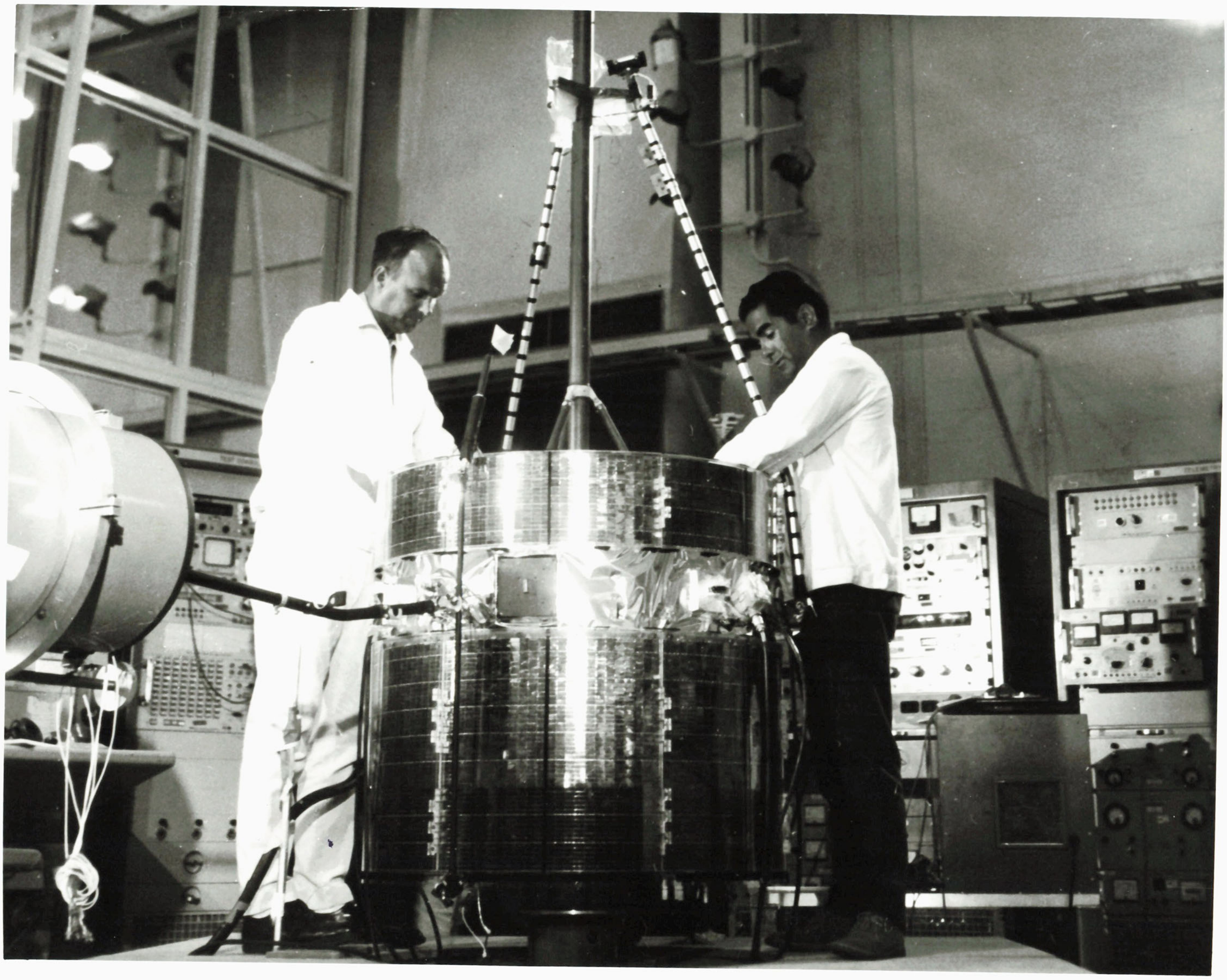
KENNEDY SPACE CENTER, Fla. -- The initial test launches in Project Mighty Mouse, a program designed to study the relationship between lightning discharges and rocket launches, were conducted at Cape Kennedy's Complex 43 today. The launches of the modified military "Mighty Mouse" 2.75 inch diameter rockets were conducted in preparation for a six-week series of rocket launches from August 31 through October 15. Inspecting a "Mighty Mouse" are, -- from left, William W. Bailey, Section Chief, KSC's Design Engineering's Measurement and Computation Section; Fred Stevens, KSC Unmanned Launch Operations Directorate, Test Director; and C. R. Richardson, a Pan American World Airways technician.

9

Space

OCT 7 1970

PHOTO CREDIT -- NASA or National Aeronautics and Space Administration



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

FOR RELEASE: November 3, 1968
PHOTO NO. 68-H-1109
68-HC-676

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Cape Kennedy, Fla., -- Pioneer D, the fourth in the current series of the National Aeronautics and Space Administration's Pioneer interplanetary spacecraft undergoes checkout at Cape Kennedy, Fla. Pioneer D's mission is designed to acquire additional data on solar plasma and energetic particles and magnetic fields propogated by the Sun towards the Earth. This data, combined with that from previously launched Pioneer spacecraft still operating will be used in the continuing study to understand solar processes, the interplanetary medium, and effects of solar activity on the Earth's environment.

A 819 - moon

N.C.A.
NOV 12 '68
REFERENCE

PHOTO CREDIT--NASA or National Aeronautics and Space Administration

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

FOR RELEASE: Filed: February 24, 1971

PHOTO NO. 71-H-348

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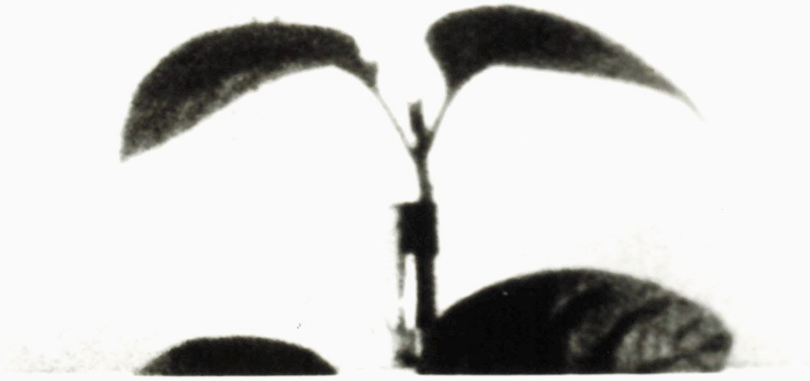
WALLOPS ISLAND, VIRGINIA--GALACTIC ASTRONOMY EXPERIMENT--An experiment to search for x-ray polarization of the Crab Nebula was launched by the National Aeronautics and Space Administration at Wallops Island, Virginia at 7:43 p.m. EST, February 21, 1971. A two-stage Aerobee 350 sounding rocket carried the 971-pound payload to an altitude of approximately 122 statute miles. The purpose of the experiment is to determine whether the x-rays coming from the Crab Nebula are polarized by using a narrow-band polarimeter sensitive to x-rays at 2.6 kev and a broad-band polarimeter sensitive in the region of 5-25 kev.

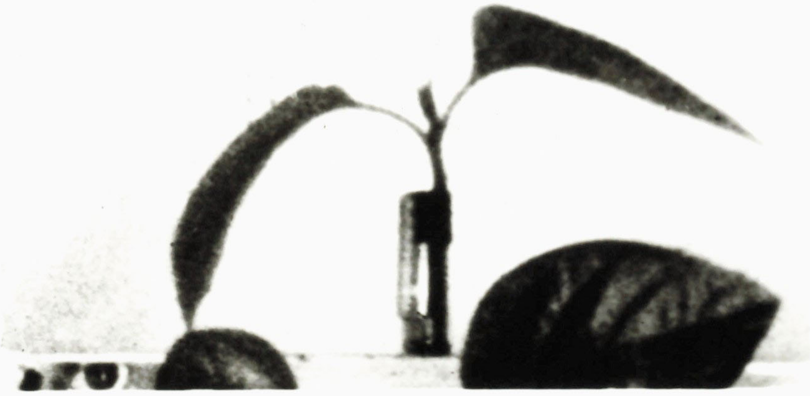
35

PHOTO CREDIT: NASA or National Aeronautics and Space Administration

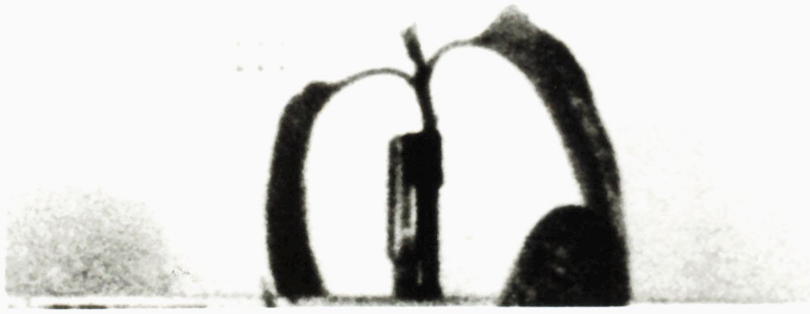
Before launch.



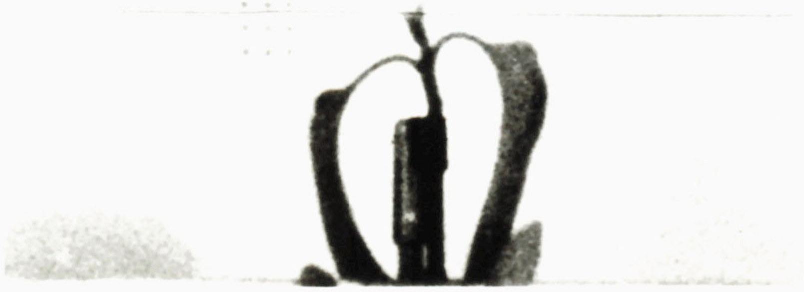
4 hours and 40 minutes of weightlessness.



12 hours and 29 minutes of weightlessness.



17 hours and 40 minutes of weightlessness.



Space Research

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
400 MARYLAND AVENUE, S. W.   WASHINGTON, D. C. 20546

FOR RELEASE: December 29, 1967
PHOTO NO. 67-H-1507

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ES 2238 3

PLANT IN SPACE: Leaves on this pepper plant, part of the payload on Biosatellite II, display the effects of weightlessness. Shown, left, top to bottom: before launch on its 45-hour flight; after 4 hours, 40 minutes; after 12 hours, 29 minutes; after 17 hours, 40 minutes.

PHOTO CREDIT--NASA or National Aeronautics and Space Administration

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

FOR RELEASE: October 23, 1974
PHOTO NO. 74-H-918

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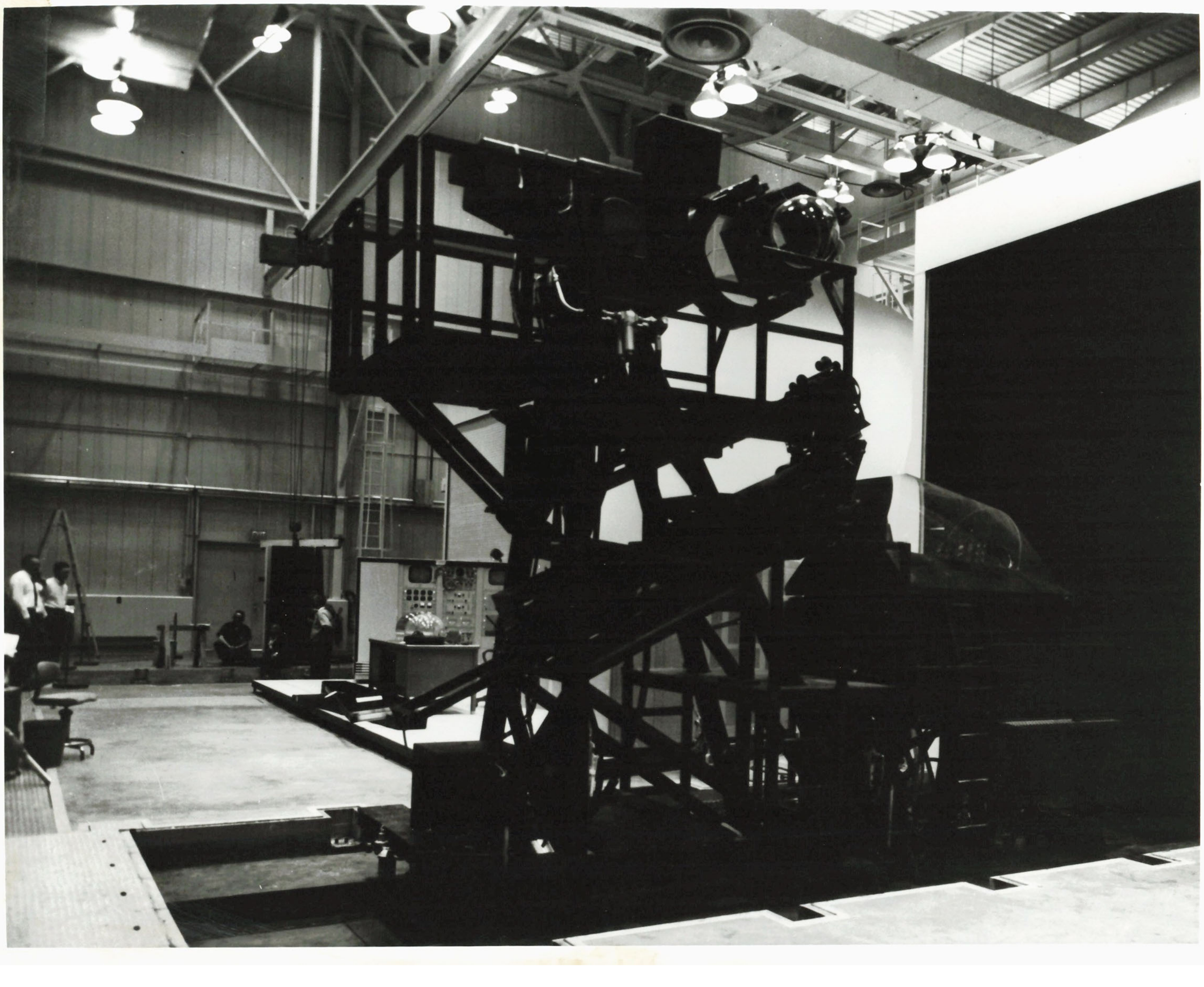
WATER COOLED HELMET: This liquid-cooled helmet liner, designed to reduce body temperatures of persons such as helicopter pilots, fire-fighting-vehicle operators, race drivers and others who must work in high-temperature, high humidity environments was developed by engineers at NASA's Ames Research Center in Mountain View, Calif.. The liner, which can be worn under a standard hard helmet, helps reduce pulse rate rise by 75 per cent and reduces body temperature rise and weight loss due to perspiration by 50 per cent.

NOV 29 1974

PHOTO CREDIT--NASA or National Aeronautics and Space Administration



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

FOR RELEASE: April 29, 1971
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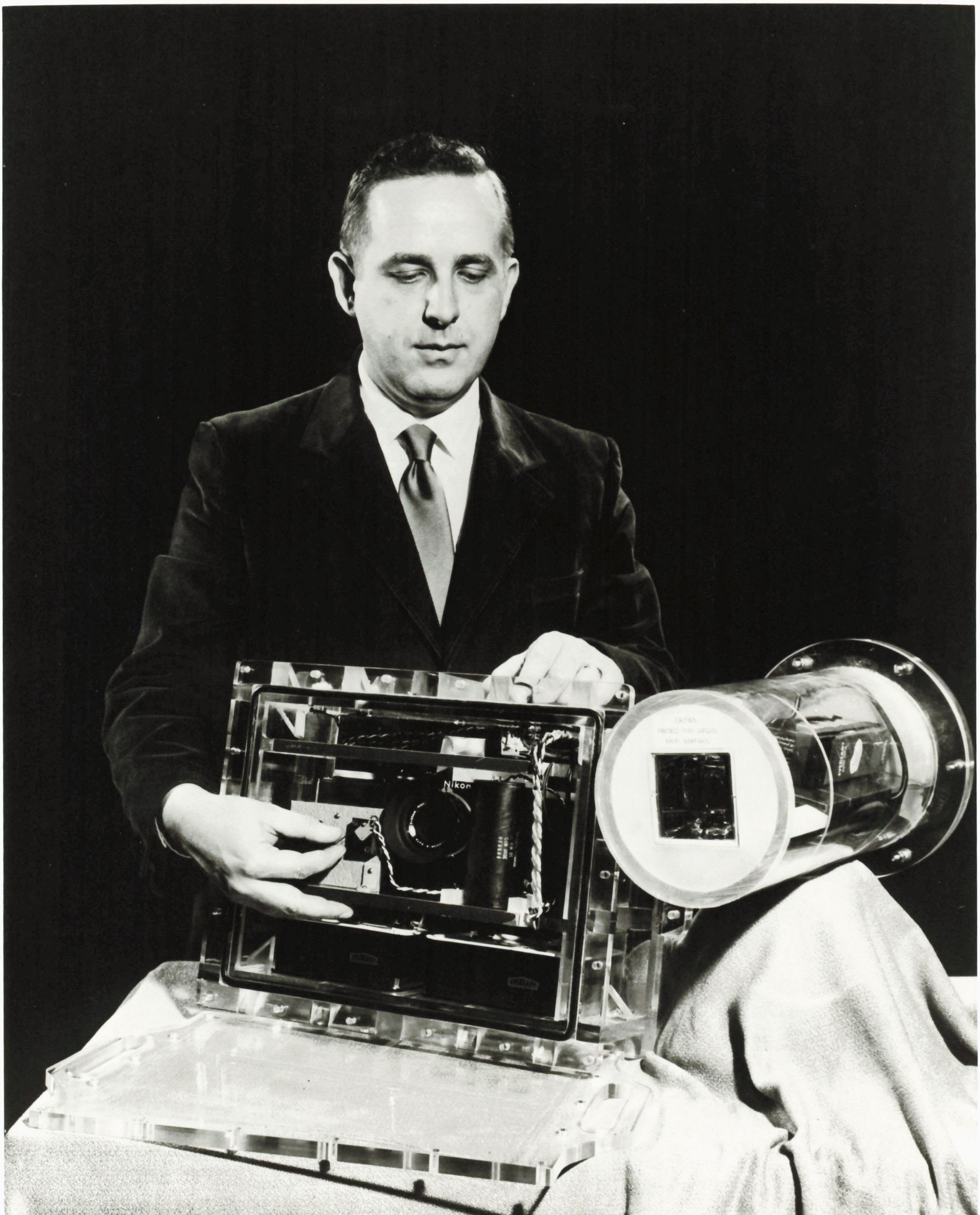
AERIAL INTERCEPT--Versatile new simulator put into service by the National Aeronautics and Space Administration has two separate airplane cockpits linked by computers so that one pilot can fly combat with another or, in the case of civil flight, take evasive actions for avoiding collision. Each pilot receives projected displays, as shown, and operates his aircraft in accordance with and in response to the action taken by the other. Different types of aircraft can be evaluated against each other with respect to many flight aspects such as maneuverability and the onset of buffet. The facility, at the NASA Langley Research Center, Hampton, Va., has two fixed-base cockpits with high-quality image generation and projection equipment. Equations of motions of the two aircraft are solved in real time on Langley's CDC 6000 series computer complex. The facility is called the Differential Maneuvering Simulator (DMS) and also will be used for research in such areas as aerial refueling, formation flight and space rendezvous. The two cockpits are housed in separate 40-foot diameter spheres during simulation. Here one cockpit, left and overhead projection equipment are shown outside entrance to sphere at left.

PHOTO CREDIT--NASA or National Aeronautics and Space Administration


Nikon

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

FOR RELEASE: April 16, 1971

PHOTO NO. 71-H-671

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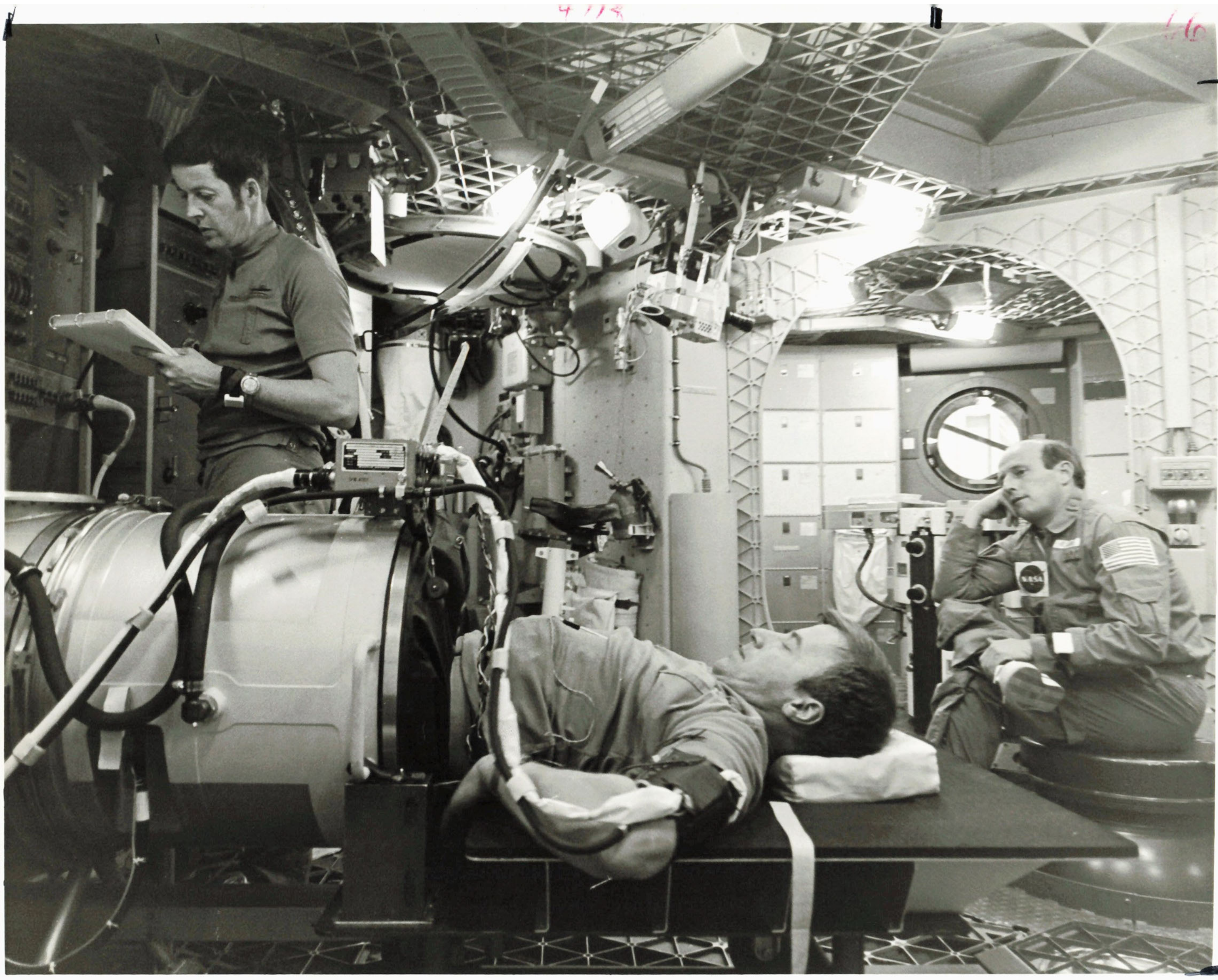
ALGAE WATCHER -- An underwater camera system developed by the National Aeronautics and Space Administration's Lewis Research Center in Cleveland took time lapse photographs of algae on the bottom of Lake Erie. The study employing the camera was conducted by the Water Quality Office- Lake Erie Basin of the Environmental Protection Agency and the Canadian Centre for Inland Waters. Russell J. Jirberg, a Lewis scientist shown here adjusting the camera's timing mechanism, designed the system. The underwater camera and strobe unit, each encased in plastic, can take one picture an hour over a ten day period while completely unattended.

29

PHOTO CREDIT--NASA or National Aeronautics and Space Administration



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WASHINGTON, D.C. 20546

FOR RELEASE: Filed: January 29, 1973
PHOTO NO. 73-H-69

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MON MAY 1 4 1973

MANNED SPACECRAFT CENTER, HOUSTON, TEXAS -- Charles Conrad, Jr., Commander (right) watches as Dr. Joseph P. Kerwin, Science Pilot checks Paul J. Weitz, Pilot in the lower body negative pressure machine. A slight suction applied to the lower half of the Astronaut's body places a stress on his heart and blood vessels. Responses to this before, during and after the flight will provide information concerning cardiovascular accommodations during long duration space flight. Skylab, a 100-ton manned orbital scientific space station, is scheduled to be launched and placed in near-earth orbit in 1973. The Program is designed to expand our knowledge of Manned Earth Orbital Operations and to accomplish selected scientific, technological, and medical investigations.

OUTLOOK

29 PICAS

DR. KERWIN

RETURN TO CHRONICLE FILES

Skylab

Dr. Kerwin conducts pressure test on Astronaut Weitz

SUN MAY 1 3 1973

PHOTO CREDIT--NASA or National Aeronautics and Space Administration

NASA
S- 76- 28362

Space Shuttle

WED MAR 22 1978

NASA
National Aeronautics and
Space Administration

Houston, Texas 77058

For Release:

Photo No. S-76-28362

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COLOR (PORTRAIT)

SEPTEMBER 1976 S-76-28362

JOHNSON SPACE CENTER, HOUSTON, TEXAS

SHUTTLE ALT SECOND CREW------These two NASA astronauts are the second crew of the Space Shuttle Approach and Landing Tests (ALT). They are Joe H. Engle (left), commander; and Richard H. Truly, pilot.

Houston Chronicle Library

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NASA National Aeronautics and Space Administration

Headquarters
Washington, D.C.

HAISE, FRED W (JR) (ASTRONAUT) (WITH FULLERTON & SHUTTLE MODEL)

National Aeronautics and Space Administration

Washington, D.C. 20546

FOR RELEASE: Filed: September 1976
PHOTO NO. 76-H-705
76-HC-745

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JOHNSON SPACE CENTER, HOUSTON, TEXAS

SHUTTLE ALT FIRST CREW----These two NASA astronauts are the first crew of the Space Shuttle Approach and Landing Tests (ALT). They are Fred W. Haise, Jr. (left), commander; and C. Gordon Fullerton, pilot.

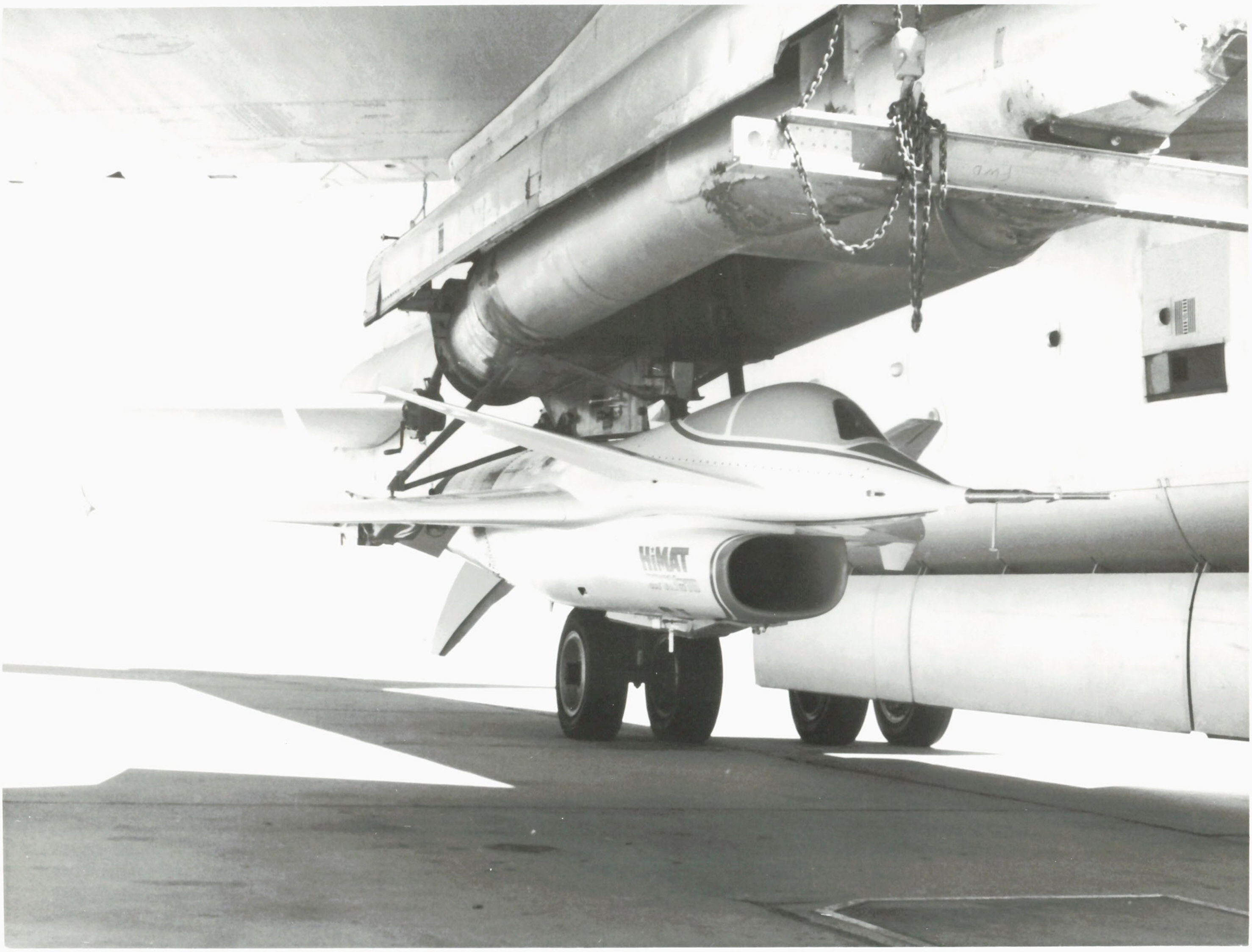
DEC 16 1977

PHOTO CREDIT--NASA or National Aeronautics and Space Administration

National Aeronautics and
Space Administration

FILE

Headquarters
Washington, D.C.



NASA
National
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Space
Administration

Washington, D.C. 20546

FOR RELEASE: May 23, 1978
PHOTO NO. 78-HC-198
78-H-255

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RESEARCH AIRCRAFT: An unmanned, supersonic research aircraft, called HiMat for Highly Maneuverable Aircraft Technology, is a joint NASA-U.S. Air Force research aircraft which made its first flight on July 27, 1979, tucked under a B-52.

DEC 10 1979

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

FOR RELEASE: Filed: April 5, 1971
PHOTO NO. 71-H-657

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36

MANNED SPACECRAFT CENTER, HOUSTON, TEXAS

FIREFIGHTER SUIT TEST---Volunteers from the Houston Fire Department walk on the edge of a pit of burning JP-4 jet fuel during a recent test of firefighter garments made of non-flammable space-age fabrics. The garments were made by the NASA Manned Spacecraft Center's Crew Systems Division from fire-resistant fabrics developed for use in manned spacecraft where a 100-per cent oxygen atmosphere increases the fire potential. The garments are multi-layer sandwiches of Durette, Fypro fabric and Fypro batting. "No structural firefighter's suit available today would allow such close exposure to an intense fire," said Capt. John King of the Houston Fire Department. "The Durette structural suit is out of this world, and is just what we've been looking for." The NASA Manned Spacecraft Center is also fabricating similar suits for evaluation in various climates and firefighting conditions in 21 other cities across the country.

PHOTO CREDIT--NASA or National Aeronautics and Space Administration

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

FOR RELEASE: Filed 4-5-71
PHOTO NO. 71-H-654

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59

MANNED SPACECRAFT CENTER, HOUSTON, TEXAS

FIREFIGHTER SUIT TEST---Volunteers from the Houston Fire Department walked on the edge of a pit of burning JP-4 jet fuel during a recent test of firefighting garments made of non-flamable space-age fabrics. The garments were made by the NASA Manned Spacecraft Center' Crew Systems Division from fire-resistant fabrics developed for use in manned spacecraft where a 100-per cent oxygen atmosphere increases the fire potential. The garments are multi-layer sandwiches of Durett Fypro fabric and Fypro batting. "No structural firefighting suit available today would allow such close exposure to an intense fire", said Capt. John King of the Houston Fire Department. "The Durette structural suit is out of this world, and is just what we've been looking for." The NASA Manned Spacecraft Center is also fabricating similar suits for evaluation in various climates and firefighting conditions in 21 other cities across the country.

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Washington, D. C. 20546

Released: 4-5-71
Photo No.: 71-H-655

MANNED SPACECRAFT CENTER, HOUSTON, TEXAS

FIREFIGHTER SUIT TEST---A volunteer from the Houston Fire Department shows off a NASA-developed firefighter garment which has just been in direct contact with a flaming pool of JP-4 jet fuel during a test demonstration of firesuits made of space-age fabrics. Note the slight damage to the outer portion of the suit. Garments used in the test were made by the NASA Manned Spacecraft Center's Crew Systems Division from fire-resistant fabrics developed for use in the manned spacecraft program where a 100-per cent oxygen atmosphere increases the fire potential. The garments are multi-layer sandwiches of Durette, Fypro fabric and Fypro batting. "No structural firefighter's suit available today would allow such close exposure to an intense fire," said Capt. John King of the Houston Fire Department. "The Durette structural suit is out of this world, and is just what we've been looking for." The NASA Manned Spacecraft Center is also fabricating similar suits for evaluation in various climates and firefighting conditions in 21 other cities across the country.

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

FOR RELEASE: March 10, 1971

PHOTO NO. 71-H-480
71-HC-410

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24

HAMPTON, VA.---Wind tunnel experiments with a model of an F-8 Crusader fitted with the NASA supercritical wing have shown such promise that flight tests of the full-scale airplane are now in progress at the NASA Flight Research Center, Edwards, Calif. The F-8 model shown is in the 8-foot Transonic Pressure Tunnel at NASA Langley Research Center here where the concept of the supercritical wing was developed by Dr. Richard T. Whitcomb of the Langley staff. Dr. Whitcomb holds wing tip of model. The term "critical" describes the point at which an airplane approaching the speed of sound begins to develop a shock wave on the curved upper surface of its wing. Then drag increases rapidly with increases in required engine power and buffeting sets in to cause passenger discomfort. On the supercritical wing, a flattened upper surface allows the wing to reach higher speeds before the drag-producing shock wave forms.

PHOTO CREDIT--NASA or National Aeronautics and Space Administration

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

FOR RELEASE: May 13, 1970

PHOTO NO. 70-H-773
70-HC-584

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MAY 1970
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8

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The ~~trailing wake~~ left by an airplane as it travels through the atmosphere is known to contain a large amount of turbulence. The tornado-like disturbance has been the cause of accidents especially to light airplanes during the landing approach when one airplane follows another onto a landing strip. This aviation danger is known as the trailing vortex -- a cylindrical mass of air that whips around the wingtips. It is caused by the air moving from the high pressure region under the wing, up and around the wingtip. This can be a real threat to a pilot in a small plane following in the wake of a big jet aircraft. Since the pilot of the trailing airplane cannot see this whirlpool of extreme turbulence, he risks the danger of losing control of his craft. The National Aeronautics and Space Administration has several programs to study this phenomenon, seeking to find out how the vortices are formed, why they persist so long and their intensity under different atmospheric conditions. These photographs show experiments recently conducted by the George C. Marshall Space Flight Center, Huntsville, Ala. Colored smoke is released from an aerial tower and flows smoothly and uninterrupted in the near calm air. A jet aircraft then speeds through the smoke region and the tornado effect caused by the trailing vortex clearly shows the danger zone that results, and can last for many minutes. NASA is making similar tests, and wind tunnel tests, at the Ames, Langley and Flight Research Centers and the results are passed on to the Federal Aviation Agency. FAA uses the research data in setting minimum separation distances pilots must follow in the airport region to keep a safe distance from the leading aircraft.

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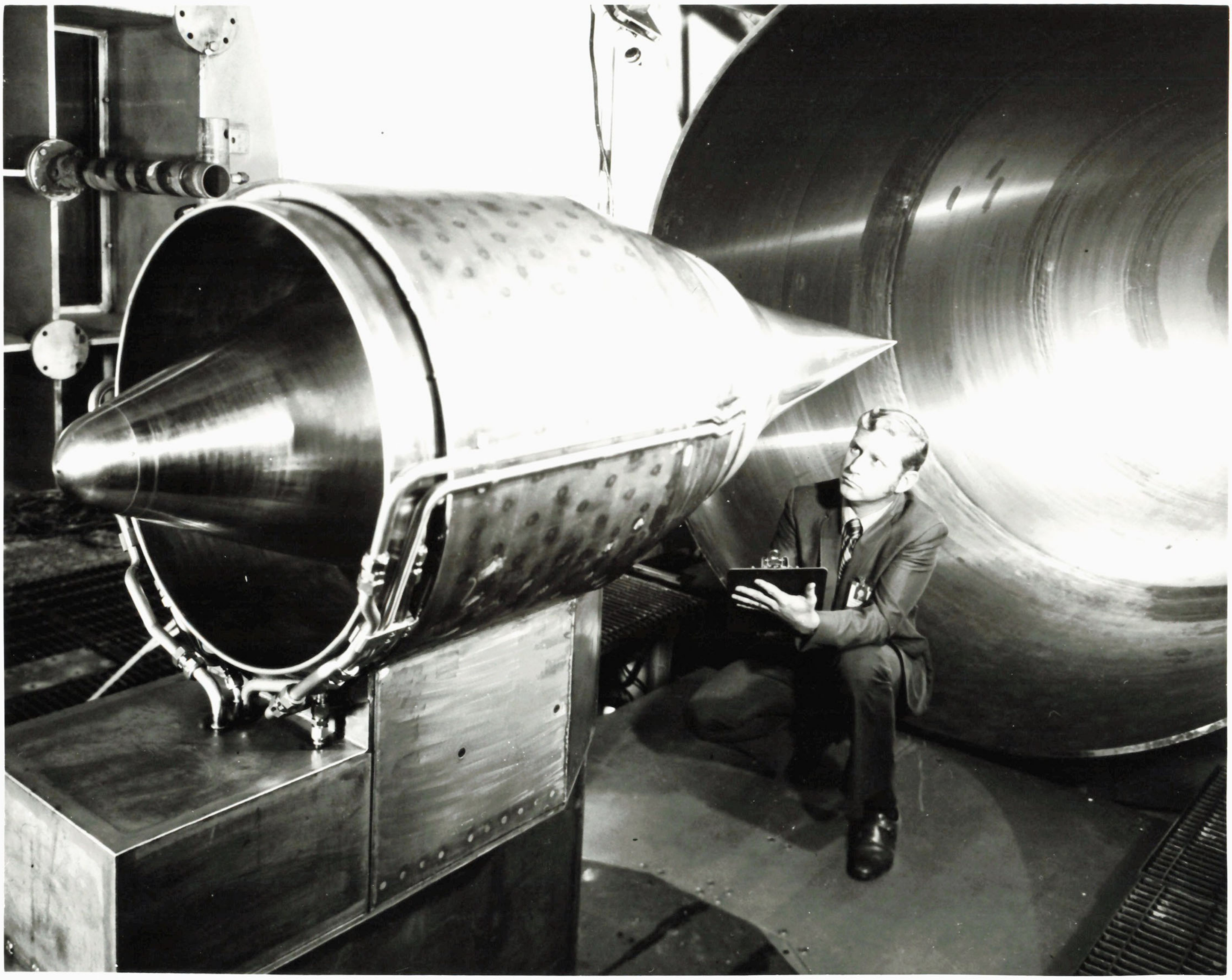

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FOR RELEASE: Filed: October 27, 1970
PHOTO NO. 70-H-1360

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SPACE
ENGINE

HAMPTON, VA. -- First wind tunnel tests of a Hypersonic Research Engine (HRE) under development by the National Aeronautics and Space Administration were conducted at the NASA Langley 8-foot High Temperature Structures Tunnel which produces a stream of hot gases moving faster than seven times the speed of sound--more than 4,600 mph. The wind tunnel tests are intended to demonstrate that the flight-weight engine, cooled by liquid hydrogen, can repeatedly withstand the intense thermal strains of flight in the excess of Mach 7. In the first test run, Mach 7.4 was achieved at 2000°F and 900 lbs. per square inch pressure. The HRE Project is a NASA effort to demonstrate the technology needed to develop engines capable of propelling aircraft of the future at hypersonic speeds--more than five times the speed of sound. The test engine incorporates advanced technology in structure and materials and a cooling system which circulates liquid hydrogen through the engine parts to protect them from the intense heat of hypersonic flight. The hydrogen coolant is then burned as fuel, yielding more than twice the energy of conventional jet fuels. Engine performance and fuel consumption will be measured in future tests to be made upon completion of a special facility being built at NASA's Lewis Research Center. The research engine being tested was built for NASA under contract by the AiResearch Manufacturing Co., Los Angeles, California.

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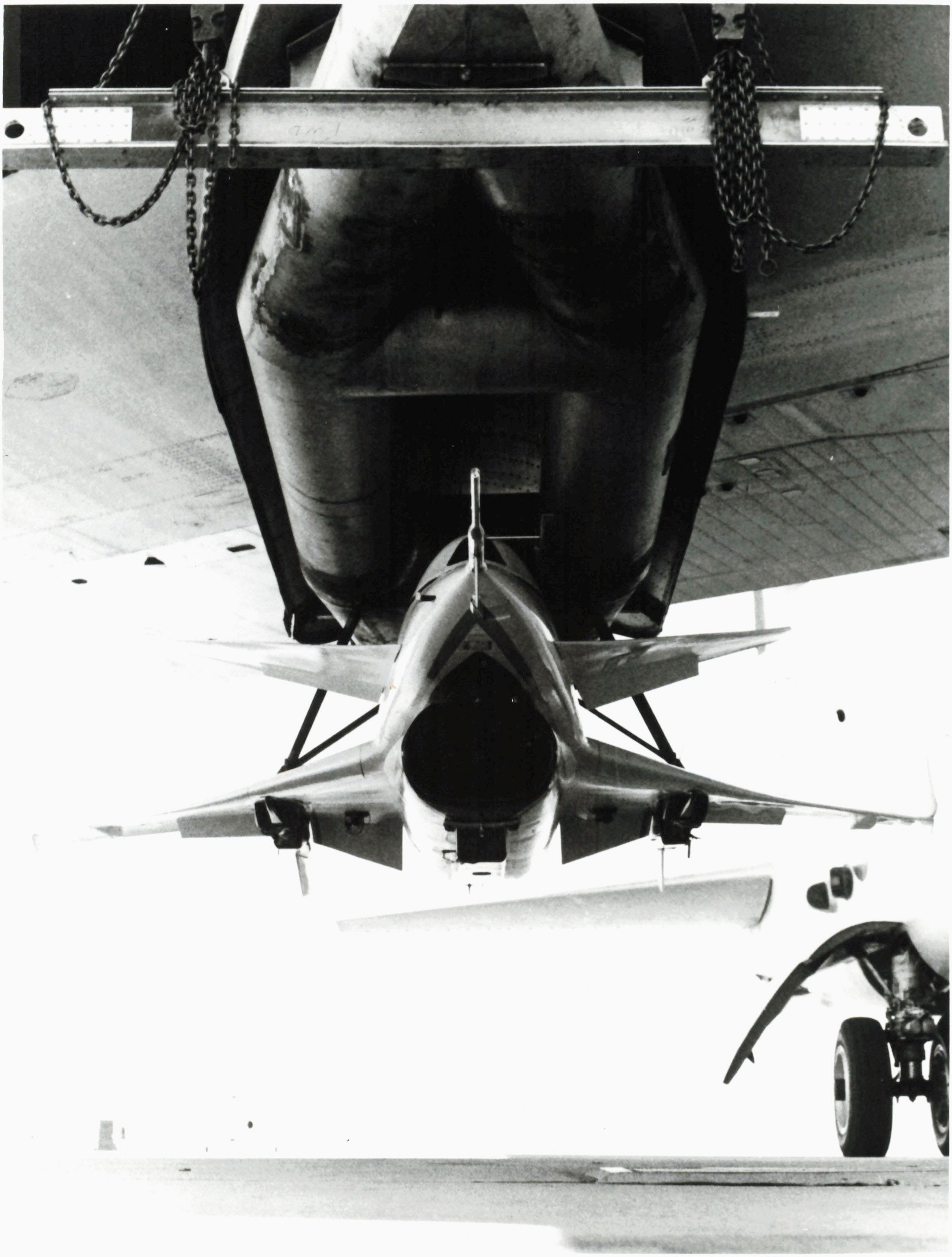
Headquarters
Washington, D.C.



National Aeronautics and
Space Administration

NASA
National Aeronautics and Space Administration

Washington, D.C. 20546

FOR RELEASE: February 20, 1980
PHOTO NO. 80-H-81

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NASA DRYDEN FLIGHT RESEARCH CENTER, Edwards, CA . . . Two large scale models of HiMat (Highly Maneuverable Aircraft Technology) incorporating advanced technologies that culd be used in future manned aircraft will be built for NASA bt Rockwell International Corporation. The two unmanned models will be flown here utilizing the Remotely Piloted Research Technique that consists of an air launch from a carrier aircraft and flight control from the ground. The 6.3 meter (21 foot) long craft is expected to develop advanced various technical disciplines.

PHOTO CREDIT--NASA or National Aeronautics and Space Administration


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FOR RELEASE: Filed May 7, 1970

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NASA FLIGHT RESEARCH CENTER, EDWARDS, Calif. -- This F5D aircraft will go on display at the Armstrong Museum that will be constructed in Wapakoneta, Ohio. The jet aircraft is being retired by NASA's Flight Research Center where it was once flown by Neil Armstrong to study winged spacecraft emergency procedures.

39

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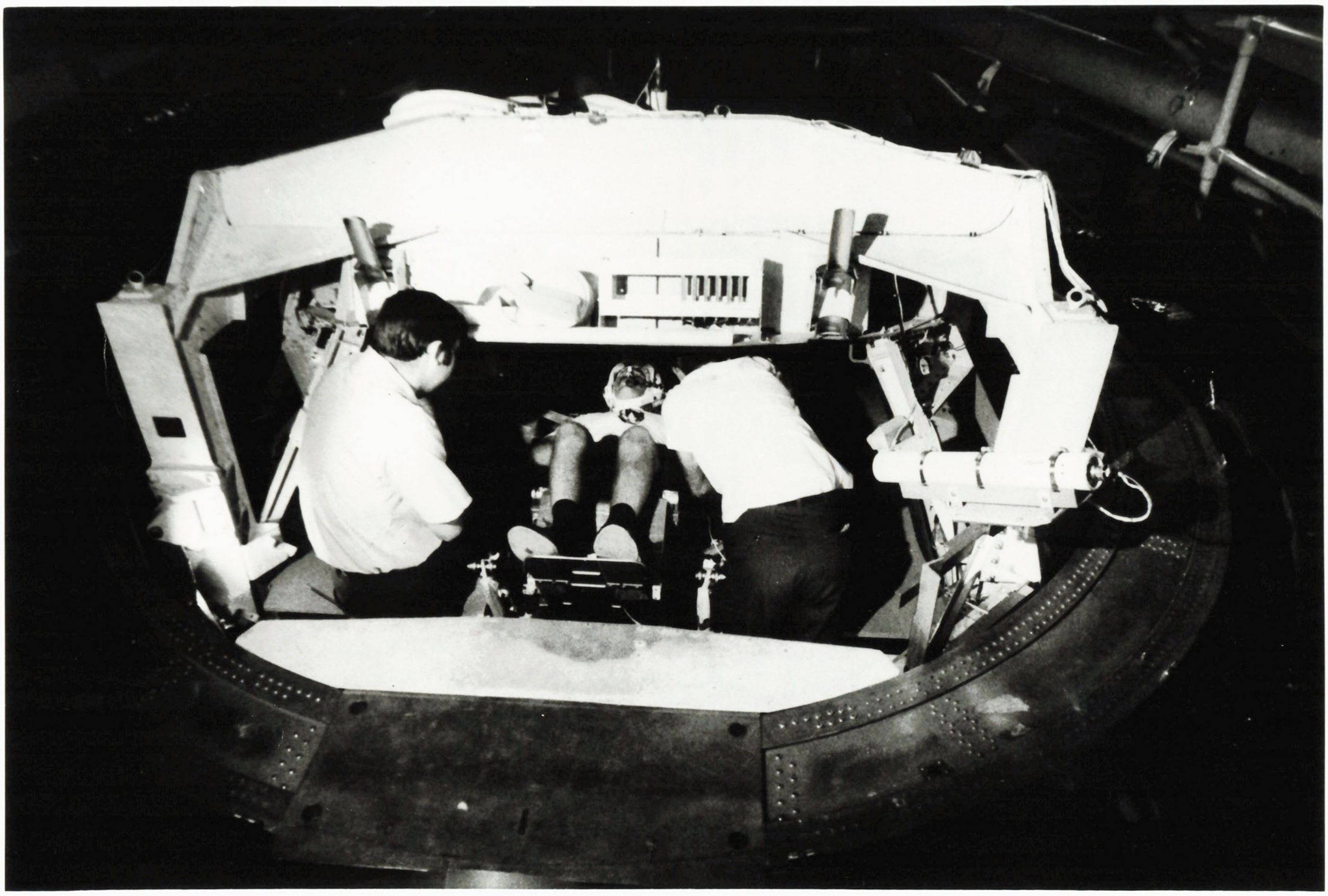

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
WASHINGTON, D.C. 20546

FOR RELEASE: Filed: October 2, 1970
PHOTO NO. 70-H-1250

OCT 12 1970

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MANNED SPACECRAFT CENTER, HOUSTON, TEXAS -- SPACE SHUTTLE REENTRY TESTING
Airman First Class Howard J. Perlman is strapped into the centrifuge in Building 29 at the Manned Spacecraft Center. The airman and other enlisted men from Brooks Air Force Base are test subjects cooperating on a project to determine men's physiological tolerence to "eyeballs down" down reentry loads calculated for NASA's Space Shuttle program.

49

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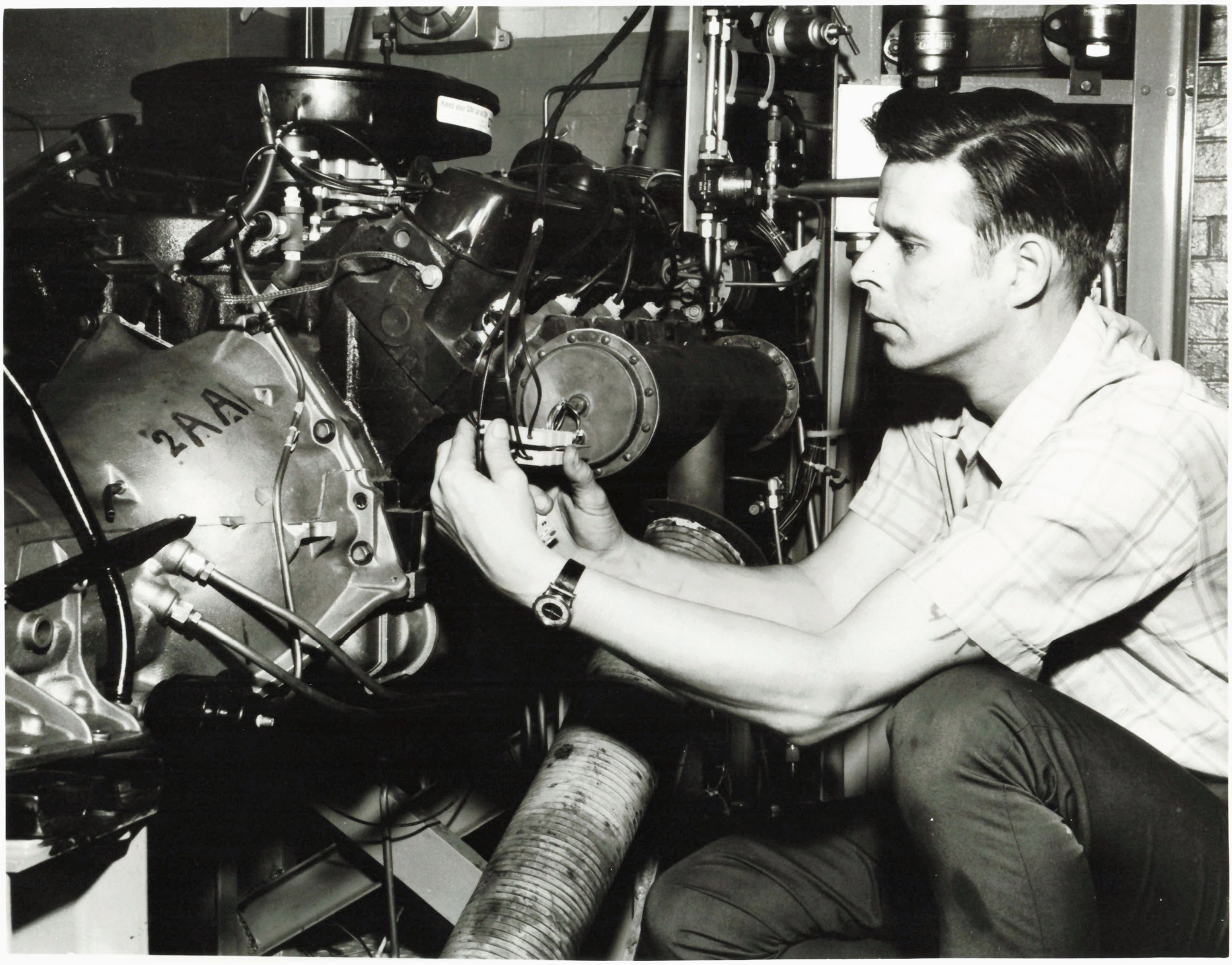

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FOR RELEASE: August 9, 1970

PHOTO NO. 70-H-1051

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WASHINGTON, D.C. -- Technician Warren A. Moore connects a temperature sensor to an experimental thermal reactor being tested on a V-8 engine at the Lewis Research Center of the National Aeronautics and Space Administration. A thermal reactor would replace the conventional manifold of an engine and would burn up carbon monoxide and hydrocarbons which are created in the combustion process. Lewis engineers are studying combustion fundamentals and materials problems associated with thermal reactors in a cooperative program with the National Air Pollution Control Administration of the Department of Health, Education, and Welfare.

67

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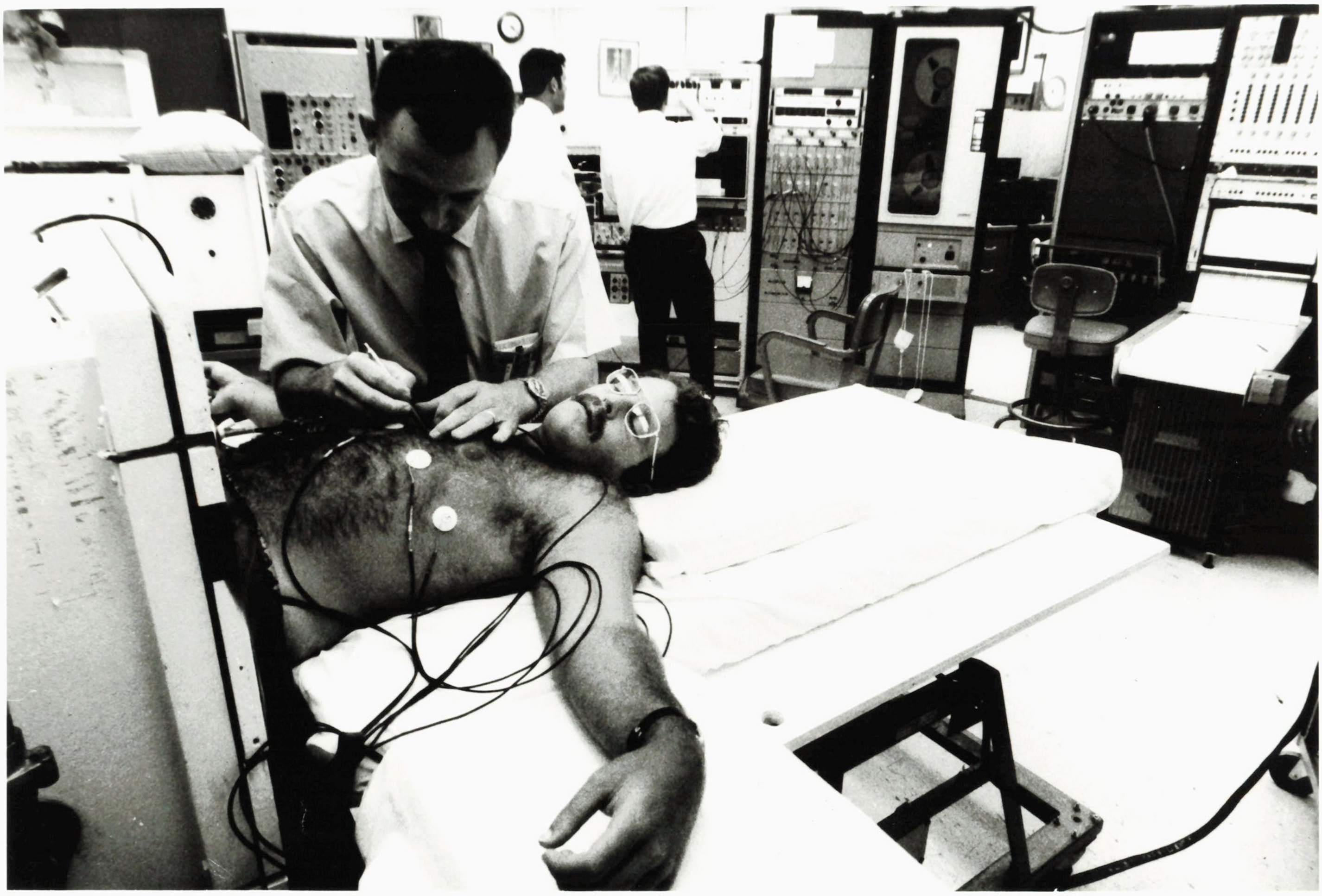

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FOR RELEASE: Filed: October 2, 1970
PHOTO NO. 70-H-1249

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MANNED SPACECRAFT CENTER, HOUSTON, TEXAS -- SPACE SHUTTLE REENTRY TESTING
Dr. George W. Hoffler, MD. of the Cardiovascular Laboratory, Biomedical Research Office, Manned Spacecraft Center, examines Airman First Class Howard J. Perlman following a ride in the centrifuge at MSC. The airman was one of nine Brooks Air Force Base enlisted men who were used as subjects in tests to determine man's phyiological tolerence to reentry loads calculated for NASA's space shuttle program.

19

OCT 12 1970

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MANNED SPACECRAFT CENTER, HOUSTON, TEXAS -- SPACE SHUTTLE REENTRY TESTING: Airman First Class Howard J. Perlman (lying down) participates in testing to determine man's physiological tolerence to reentry loads calculated for NASA's Space Shuttle program. Electrodes are applied to the test subject to obtain cardiovascular data and other important information while the test subject rides the centrifuge. When he enters the flight acceleration facility and the centrifuge begins its motion, the airman will become exposed to "eyeballs down" reentry configuration at G-levels ranging [illegible].5 to 4.5 for periods up to six minutes and ten seconds.

18

OCT 12 1970

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NASA

4/5/01

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COMING TO A SAFE STOP: A National Aeronautics and Space Administration plane is shown in a test landing on a specially-prepared water-covered grooved runway at NASA's Wallops Station, Va. The research program is determining the effects of pavement grooving in improving the safety of airplane landings and takeoofs.

WALLOPS ISLAND, Va. — Groovy may become a synonym for safety on highways and airport runways.

This is the tack being taken in research being carried out at the National Aeronautics and Space Administration's Wallops Station here.

And the research is quite literally groovy. Sections of the runway at Wallops have quarter-inch wide and deep grooves running across the width of the runway.

TWO SEPARATE projects were tested, both under the direction of NASA's Langley Research Center.

The first tested actual airplane takeoffs and landings on grooved and ungrooved concrete and asphalt surfaces. The second project, a cooperative project of NASA and the British Ministry of Technology, was a test of devices for predicting the performance of aircraft brakes.

The latter tests were made on four grooved and five ungrooved pavement surfaces under dry, damp, water-flooded, and slush-covered conditions with various ground vehicles.

Reason for the grooves is that they act as conduits to drain off runway water which might throw an aircraft into a skid when it lands on a wet runway.

ALTHOUGH MAINLY concerned with safety for aircraft, the test results may have an application in the design of highway surfaces with improved

STATES-ITEM

AUG 20 1968

Fri— Ck
#1- M/LANDING
P-5-2-TUES

COMING TO A SAFE STOP—A Nation Aeronautics and Space Administration plane is shown in a test landing on a specially-prepared water - covered grooved runway at NASA's Wallops Station, Va. —Story and pictures from National Aeronautics and Space Administration. **The research program is determining the effects of pavement grooving in improving the safety of airplane landings and takeoffs.**

PHOTO CREDIT--NASA or National Aeronautics and Space Administration

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
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FOR RELEASE: April 30, 1968
PHOTO NO. 68-H-391
68-HC-216

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WALLOPS ISLAND, Va., -- The Re-entry F Scout launch vehicle is shown during final assembly. The Re-entry F Turbulent Heating Experiment objectives are to measure the transfer of heat to vehicles in high speed flight, to be compared with other tests on the ground and in flight. Re-entry F experiment will be launched by a Scout rocket from the National Aeronautics and Space Administration's Wallops Station, Va. The project is directed by NASA's Langley Research Center, Hampton, Va.

4

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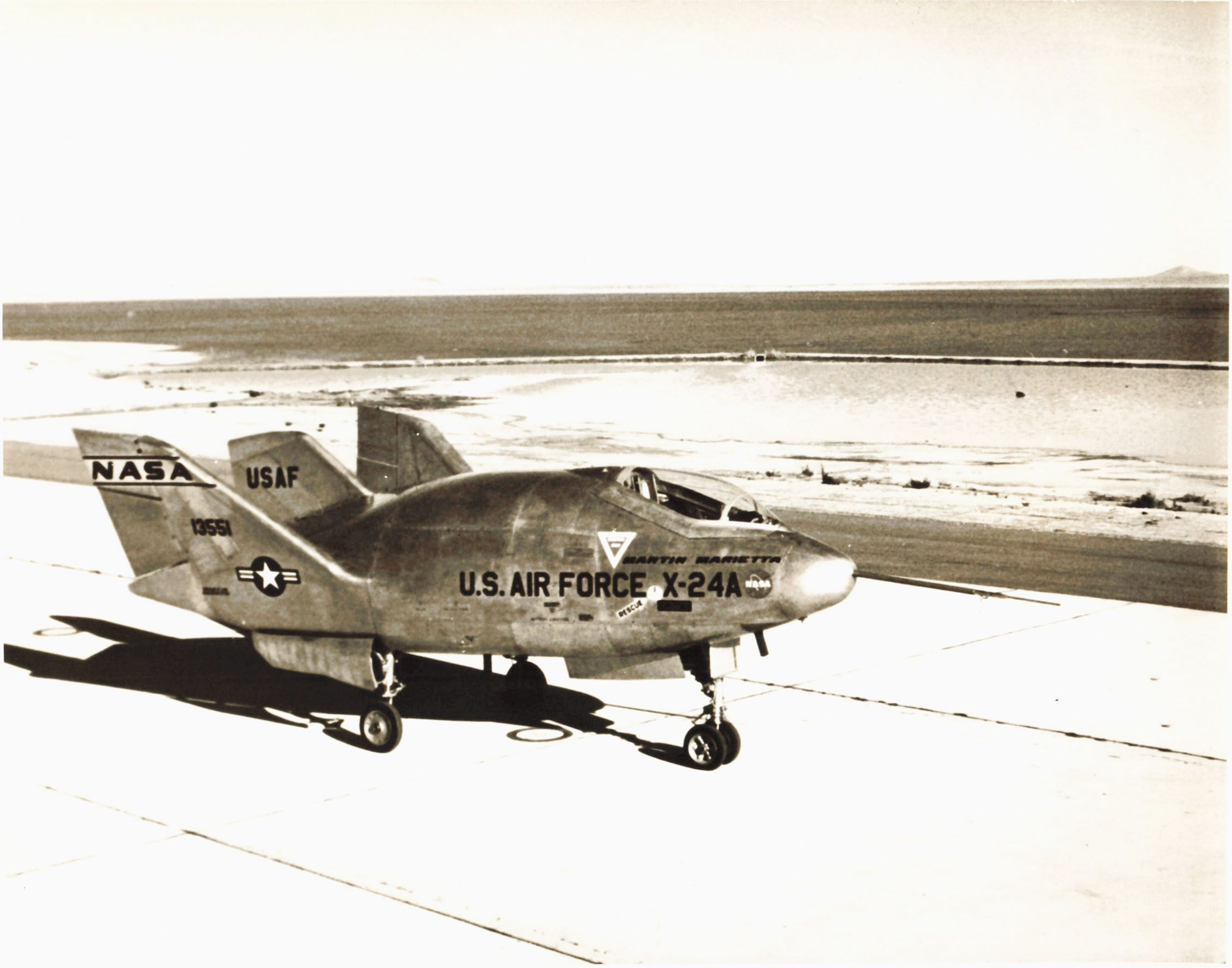
NASA
USAF
13551
MARTIN MARIETTA
U.S. AIR FORCE X-24A
RESCUE

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

FOR RELEASE: Immediate
PHOTO NO. 68-H-56

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WINGLESS AIRPLANE--The X-24A is one of the wingless experimental vehicles in the joint Air-Force-National Aeronautics and Space Administration Lifting Body Research Program. Flights of the X-24 are intended to investigate aerodynamic characteristics and maneuverability of lifting bodies. The lifting body of the future is seen as a reusable space ferry.

1/69

Aircraft U.S. Air Force

100

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CAUTION

MAR 25 1966

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Fri.

STATES-ITEM

—NEA photos.

HUNTING SPECKS IN NASA CLEANROOM

MEASURES DIRT IN MICRONS

NASA Is Expert At Housekeeping

HUNTSVILLE, Ala. — The most careful spic-and-span housekeeper would find that her living room is actually filthy when compared to the "cleanroom" at the NASA-Marshall Space Flight Center.

The glistening cleanroom in the Center's Manufacturing Engineering Laboratory is used to disassemble, clean and inspect a variety of gauges and other rocket parts.

FOREIGN MATTER as small as a speck of dust, as small as the diameter of a hair, can cause a rocket component to malfunction. The size of these minute villians which MSFC technicians search out and destroy is measured in "microns." A micron is 0.000039 of an inch.

The Laboratory's interests range from particles 20 to 2,500 microns in size, depending upon the type of component being cleaned.

To illustrate the exactness with which the contamination controllers must search, the period at the end of this sentence, about 100 microns in size, could foul up a working rocket part.

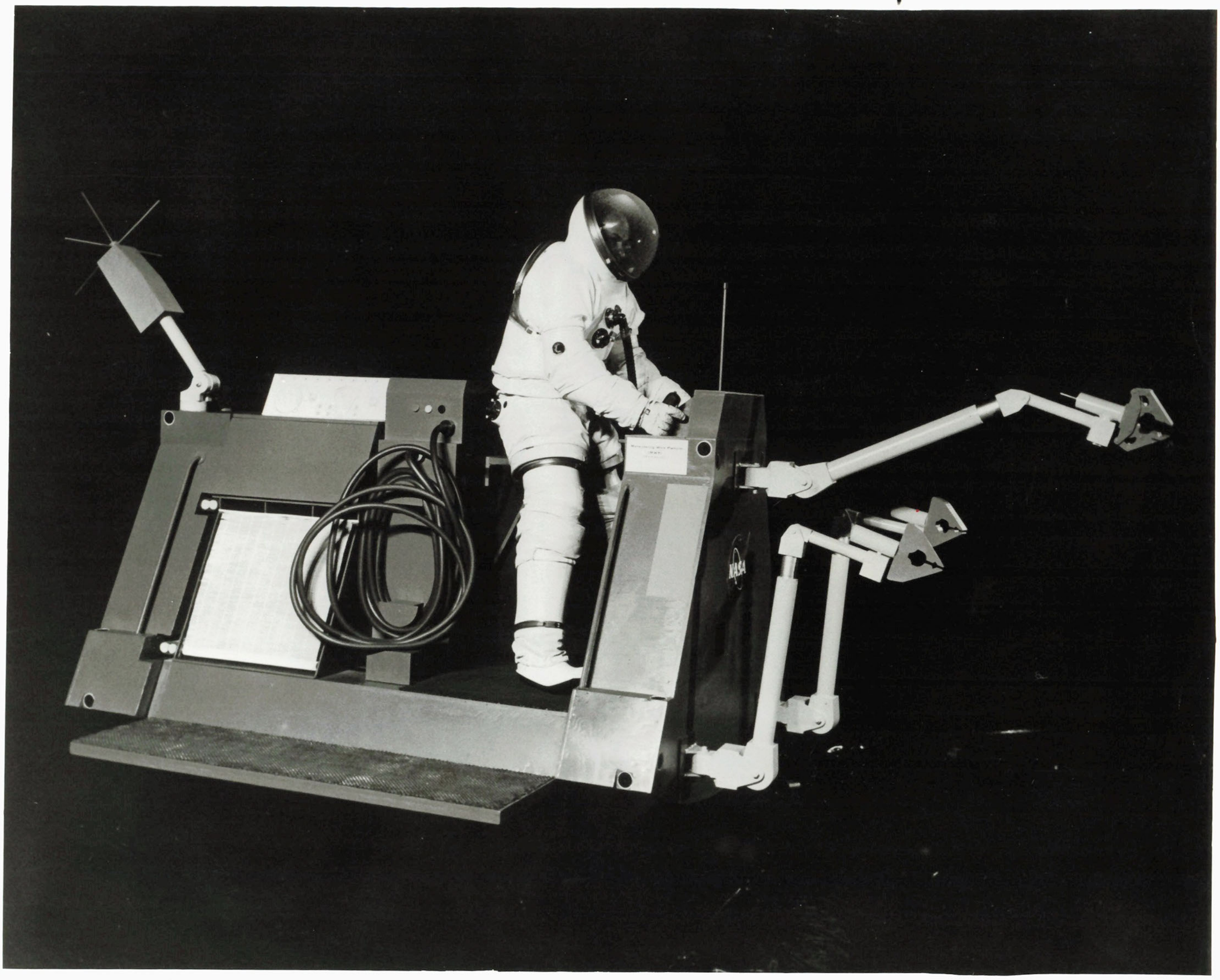
SAYS FRED BEYERLE of the ME Lab:

"Even the breath of a smoker, which emits particles about 2 to 5 microns in size by the millions soon after a smoke, can cause contamination problems in some industrial areas."

Beyerle points out that a Jupiter rocket many years ago exploded simply because it had a contaminated two-inch stainless steel line.

That is the reason behind MSFC's ultra cleanliness.

The lab's hunt for conglomerate dust particles, tiny oil deposits from fingerprints, and other such contaminants among small rocket components is carried out in a little room of white paint and stainless steel. The room is cleaner than a hospital operating room, Beyerle said.



NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
400 MARYLAND AVENUE, S. W., WASHINGTON, D. C. 20546

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PHOTO NO.: 67-H-1000

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SPACE HORSE: Bearing a strong resemblance to a mechanical horse is this mockup of a Maneuvering Work Platform, an open space-going tool shop. Design work on the platform was done under contract to the National Aeronautics and Space Administration's Marshall Space Flight Center at Huntsville, Ala., by LTV Aerospace Corporation's Missiles and Space Division.

HORSING AROUND—The horselike mechanical monster that this spaceman is riding is a mockup of a maneuvering work platform. The platform is designed to be an outer space tool shop for astronauts. —NASA Photo

Space - U.S. - Astronauts - Equipment

PHOTO CREDIT - - NASA or National Aeronautics and Space Administration

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
ELECTRONICS RESEARCH CENTER
575 TECHNOLOGY SQUARE, CAMBRIDGE, MASSACHUSETTS 02139
TELEPHONE: 491-1500

AUG 17 1967

FRIDAY AM's
FOR RELEASE: August 18, 1967

PHOTO NO.: 67-ERC-191

CAMBRIDGE, MASS., - Music from hand-held unit is beamed from the roof of NASA's Electronics Research Center (left), Cambridge, Mass., to the roof of the Prudential tower (slender tower) in Boston, and received (right) by similar unit in a test of a tiny electronic device which promises better radio communications between space vehicles. The device, shown (insert) compared to a human hair, produces "hot" electrons which generate a microwave signal. Building at left with sphere on top is the Earth Sciences Building of the Massachusetts Institute of Technology.

75

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PHOTO CREDIT -- NASA or National Aeronautics and Space Administration


O'CONNOR
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George C. Marshall Space Flight Center
National Aeronautics and Space Administration
Bay St. Louis, Mississippi
AUG 6 1965

OFFICIAL
NASA - MTO
PHOTOGRAPH
NO. MTO '65-2 6 2-1
REORDER BY THIS NUMBER

AUG 10 1965

—NASA-MFT Photo.

INSPECTING PROPELLANT FACILITIES at the National Aeronautics and Space Administration's Mississippi Test Facility in Hancock County, are (from left) Dr. George Mueller, Associate Administrator for Manned Space Flight, NASA, Washington, D. C.; Dr. Wernher von Braun, director, George C. Marshall Space Flight Center, Huntsville, Ala.; Gen. Edmund O'Connor, director of MSFC's Industrial Operations; and Jackson M. Balch, manager, MTF. Six other top officials from the Marshall Center accompanied the group on the tour to review the status of the rocket testing site now in the final phase of preparation.

78

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
400 MARYLAND AVENUE, SW, WASHINGTON, D. C. 20546

FOR RELEASE: Immediate
PHOTO NO.: 65-H-1162

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RECLAIMING WATER -- Under urging of warm air and bright sun, algae grows rapidly in experimental ponds, transforming waste water into beneficial product for farms and industry. The National Aeronautics and Space Administration is cooperating in the project with builders of ~~NASA's Apollo~~ Spacecraft. North American Aviation, Inc., Downey, Calif., Water recycling systems are vital parts of the lunar space-

RECLAIMING WATER — Under urging of warm air and bright sun, algae grows rapidly in experimental ponds, transforming waste water into a purer product. The National Aeronautics and Space Administration is cooperating in the project with North American Aviation, Inc., Downey, Calif., builders of NASA's Apollo spacecraft.

JUL 30 1965

4 Col
#1 - W/ WATER
P-1-5-2-FR1.

STATES-ITEM


NASA
849

EC90 145-10

16

NASA

National Aeronautics and
Space Administration

Ames Research Center
Drdyen Flight Research Facility
P.O. Box 273
Edwards, California 93523
(805) 258-8381

FOR RELEASE:
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LAMINAR FLOW FLIGHTS -- An F-16XL flown by NASA's Dryden Flight Research Facility, Edwards, Calif., has demonstrated for the first time laminar (smooth) airflow over a significant portion of its wing while flying at supersonic speeds. The aircraft is a testbed for NASA's laminar flow program to minimize turbulence which decreases performance and fuel efficiency. A thin experimental wing section, designed by Rockwell International and containing an active suction system, has been placed on the upper surface of the XL's left wing. The device (dark area within the white fairing) is intended to siphon off a portion of the turbulent layer of air through millions of tiny laser-cut holes and create a smooth airflow over that portion of the wing. A second phase of NASA's laminar flow research will be carried out on another F-16XL to study a larger experimental wing surface designed by NASA's Langley Research Center, Hampton, Va. (NASA Photo)

November 1991

F-16XL
NOT Standard F-16

PHOTO CREDIT - NASA or National Aeronautics and Space Administration

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
400 MARYLAND AVENUE, SW, WASHINGTON, D. C. 20546

FOR RELEASE:
PHOTO NO.: 64-H-2625

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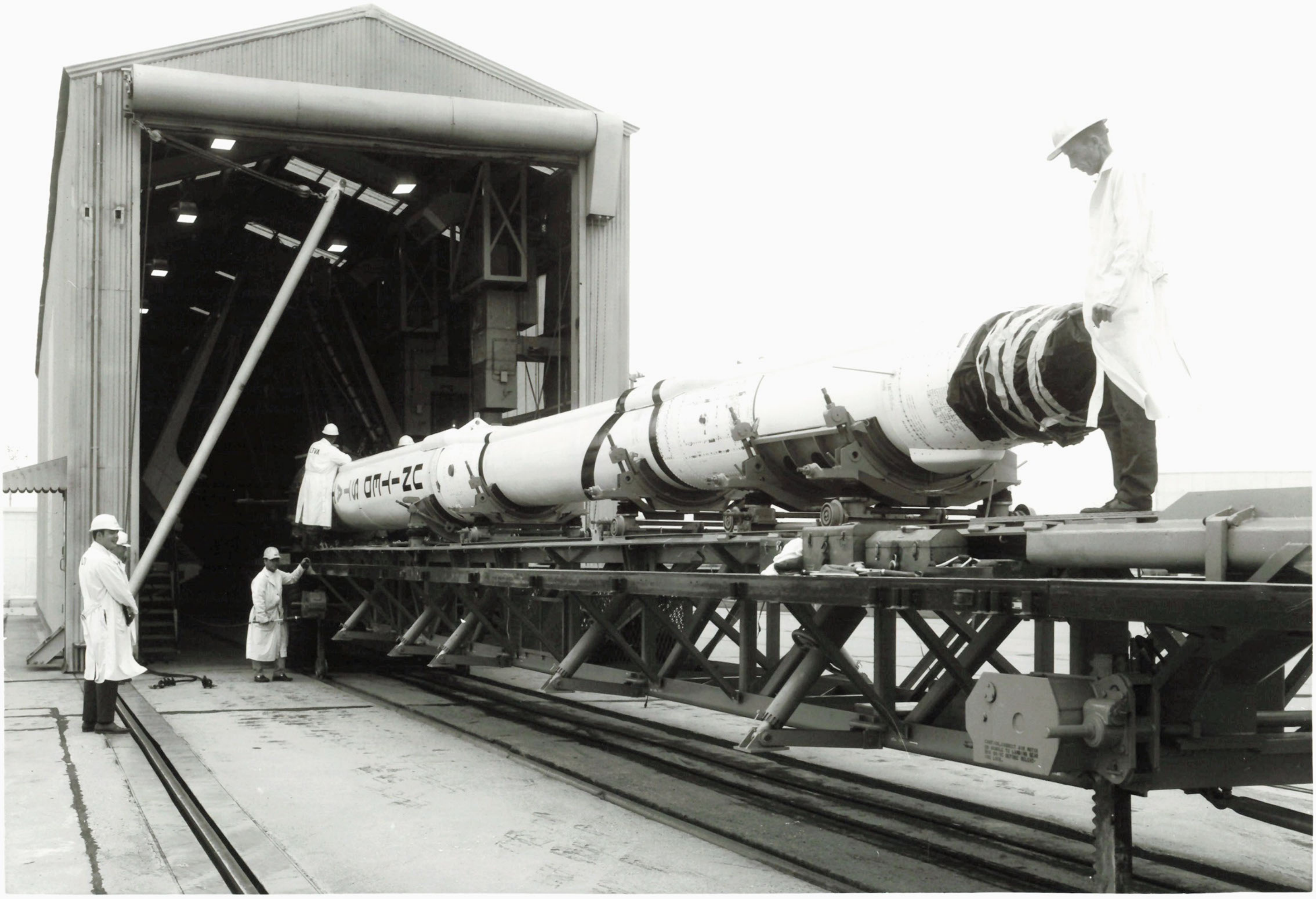
NUCLEAR ROCKETS - - In August and September of 1964, here at Jackass Flats, Nev., the National Aeronautics and Space Administration and Atomic Energy Commission conducted intensive reactor experiments in pursuit of a nuclear rocket for heavy launch vehicles. The tests resulted in significant advances in rocketry.

FEB 1 1965

NUCLEAR ROCKETS—In August and September of 1964, here at Jackass Flats, Nev., the National Aeronautics and Space Administration and Atomic Energy Commission conducted intensive reactor experiments in pursuit of a nuclear rocket for heavy launch vehicles. The tests resulted in significant advances in rocketry.



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FOR RELEASE: Filed: September 25, 1970
PHOTO NO. 70-H-1222

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WALLOPS ISLAND STATION, VIRGINIA -- The 4-stage scout vehicle for the N.A.S.A.'s flight test designated RAM C-C (Radio Attenuation Measurements) is shown with the payload covered on the launcher with shelter section rolled back. The RAM C-C is the third and last in the RAM series and is a continuation of NASA's project RAM to study the problem of communicating through the ionized gas (plasma sheath) created around a spacecraft reentering the earth's atmosphere at high speeds.

3

Space

OCT 7 1970

PHOTO CREDIT--NASA or National Aeronautics and Space Administration

NASA
C-52235

Public Information Office
NASA Lewis Research Center
Cleveland, Ohio 44135
433-4000, ext. 415

FOR IMMEDIATE RELEASE

C-52235

Lewis project engineer, Robert R. Miller, conveys instructions to pilot-engineer Joseph Algranti as they run disorientation, or "spin tests," in the Multiple Axis Space Test Inertia Facility, Lewis Research Center. The simulated space capsule is instrumented and mounted in the center cage of the three-cage gimbal rig. By means of jet motors emitting spurts of nitrogen gas, the multiple axis rig simulates all attitudes--pitch, roll, and yaw--of flight in space. The seven Mercury astronauts came to Lewis for pre-flight experiments in handling their spacecraft.

#

D/6038 NASA

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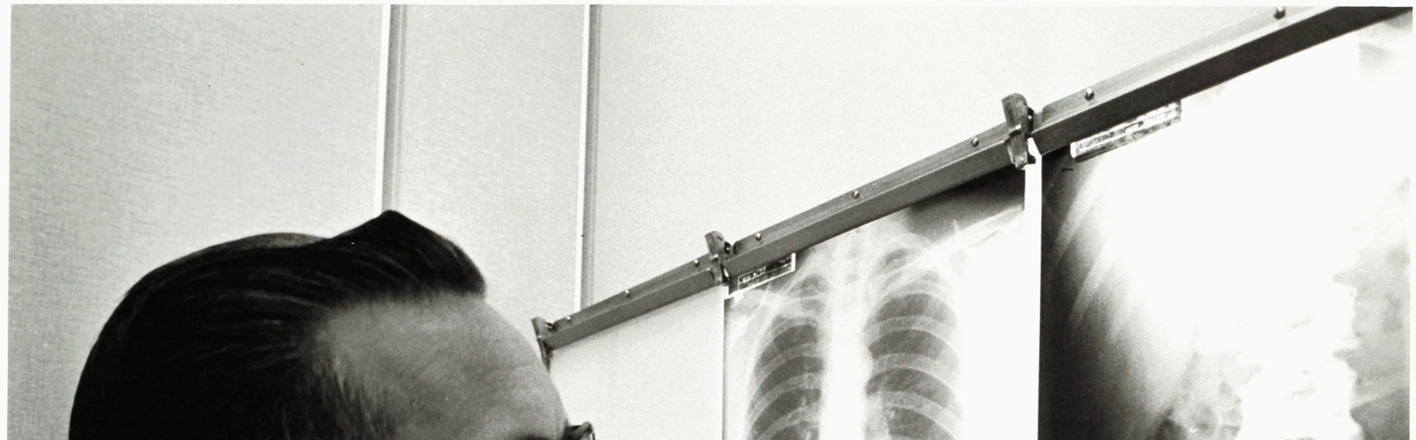

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
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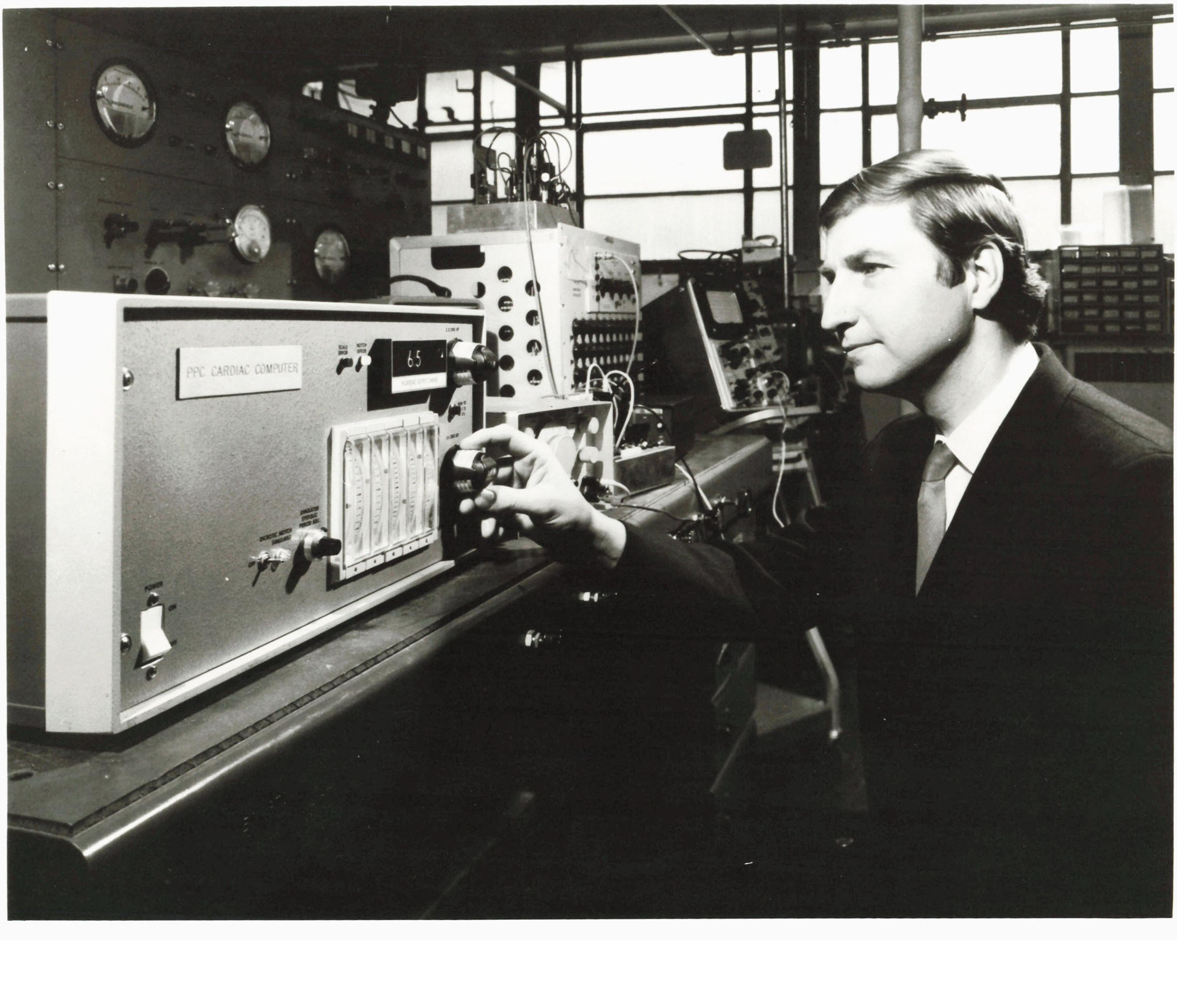
8

HEALTH CARE -- Dr. Charles A. Berry, Director of Medical Research and Operations, examines x-rays of the Apollo 11 astronauts at the Kennedy Space Center, Fla.

THU AUG 14 1969

PHOTO CREDIT--NASA or National Aeronautics and Space Administration


PPC CARDIAC COMPUTER
65

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

FOR RELEASE: April 21, 1971 - a.m.
PHOTO NO. 71-H-692

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Washington---Cardiac Computer---An analog computer, designed by engineers at the National Aeronautics and Space Administration's Lewis Research Center in Cleveland, can continuously monitor changes in blood pressure and heart out put. Vernon D. Gebben, a Lewis specialist in control systems and instrumentation for jet aircraft, is shown here checking out the computer he helped develop before it was turned over to Cleveland's St. Vincent Charity Hospital. Doctors at the hospital foresee using the computer with patients who have undergone open heart surgery and remain critically ill during recovery. Called the Pressure Pulse Contour (PPC) cardiac computer, the system took about one year to develop and cost about $1,500.

5

SPACE MEDICINE

PHOTO CREDIT--NASA or National Aeronautics and Space Administration


digital
PDP-12

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

FOR RELEASE: October 27, 1970

PHOTO NO. 70-H-1346
70-HC-965

SPACE MEDICINE

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SAN JOSE, Calif.--A brain sensor and radio transmitter system, developed by the National Aeronautics and Space Administration for space medical research, appears to allow major improvements in diagnosis and treatment of schizophrenic mental patients. Scientists at NASA's Ames Research Center, Mountain View, Calif. and at Agnews State Hospital, here, a mental hospital of the California Department of Mental Hygene, are working together on the system. They are using the radio-sensor system with a computer to develop a new means of diagnosis. The new method is under clinical test on mental patients at the Agnews Hospital with good preliminary results. The sensor-radio system installed in a headset is so light and comfortable that it does not frighten disturbed patients. Because of this, doctors now believe they can use it to distinguish between schizophrenics needing immediate large doses of tranquilizing drugs, and those who can be treated without drugs. The diagnostic method uses differences between patients' brain wave responses to a series of light flashes, as a way of distinguishing between various types of schizophrenia (behavior disorders). Past diagnostic methods using brain waves have required inserting needle electrodes under the scalp, or shaving patches of the scalp for electrode contact. Kenneth Hopkins, a research engineer and scientist check data from the brain sensor and radio system as it comes from computer.

6

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

FOR RELEASE: October 27, 1970

PHOTO NO. 70-H-1345
70-HC-964

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MEDICINE

SAN JOSE, Calif. -- A brain sensor and radio transmitter system, developed by the National Aeronautics and Space Administration for space medical research, appears to allow major improvements in diagnosis and treatment of schizophrenic mental patients. Scientists at NASA's Ames Research Center, Mountain View, Calif. and at Agnews State Hospital, here, a mental hospital of the California Department of Mental Hygene, are working together on the system. They are using the radio-sensor system with a computer to develop a new means of diagnosis. The new method is under clinical test on mental patients at the Agnews Hospital with good preliminary results. The sensor-radio system installed in a headset is so light and comfortable that it does not frighten disturbed patients. Because of this, doctors now believe they can use it to distinguish between schozophrenics needing immediate large doses of tranquilizing drugs, and those who can be treated without drugs. The diagnostic method used differences between patients' brain wave responses to a series of light flashes, as a way of distinguishing between various types of schizophrenia (behavior disorders). Past diagnostic methods using brain waves have required inserting needle electrodes under the scalp, or shaving patches of the scalp for electrode contact. Miss Patricia Dickinson a research assistant employed by the hospital poses with the headset in position for use.

PHOTO CREDIT--NASA or National Aeronautics and Space Administration

NASA
L-62-8934

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NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
LANGLEY RESEARCH CENTER
LANGLEY STATION
HAMPTON, VIRGINIA

An intensive aerodynamic research program pursued by scientists of the NASA Langley Research Center over the past several years has evolved a number of highly advanced concepts for possible use as supersonic commercial airliners. One of them, the SCAT-16 (Supersonic Commercial Air Transport) shown here in the test section of the Langley 7-by 10-foot High Speed Wind Tunnel, features the principle of the variable sweep wing. In this photograph the wing is in its fully swept-back position for efficient cruise in the 2000-mph speed range. Evaluation of the design by aircraft manufacturing company groups is underway to extend the research work already accomplished by NASA scientists.

L-62-8934

REFERENCE
APR 25 '63
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Lyndon B. Johnson Space Center
Houston, Texas 77058

S90-31434

National Aeronautics and
Space Administration

NASA

NASA - equipment

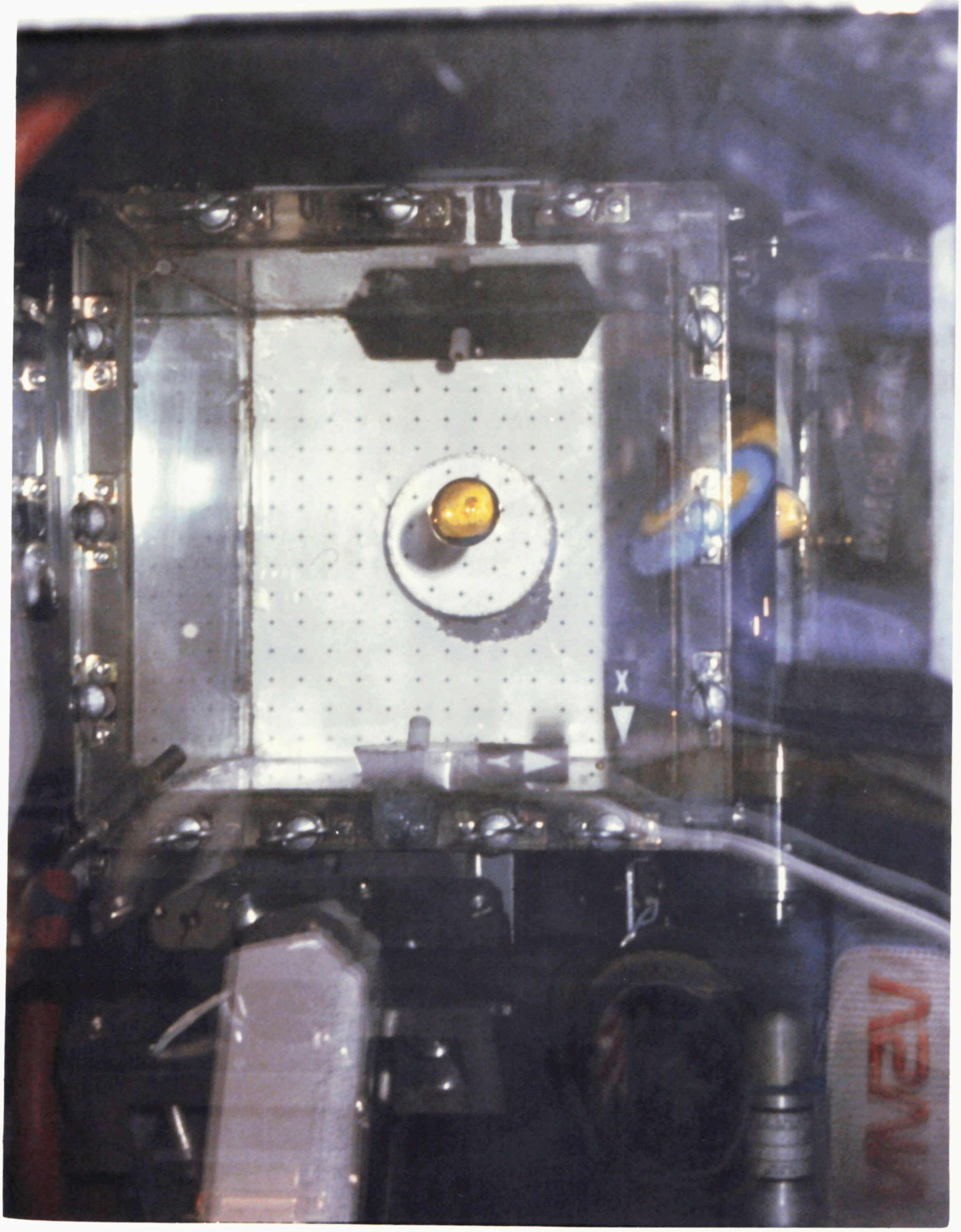
NASA photo

Fred Abolfathi, left, a Lockheed engineer, examines a compressed bag of garbage with NASA's J.B. Thomas.

National Aeronautics and
Space Administration

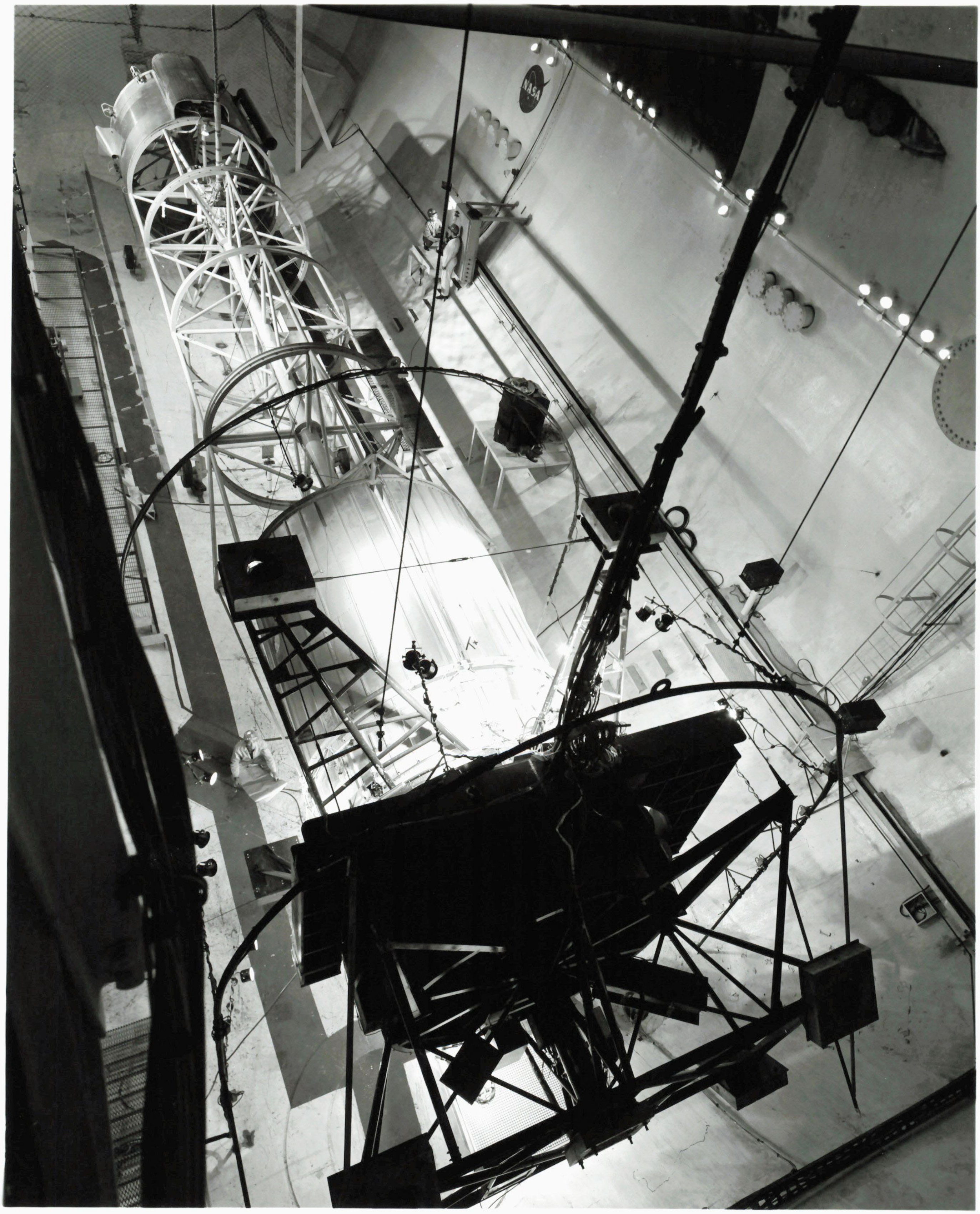
51-B-14-037

Lyndon B. Johnson Space Center
Houston, Texas 77058



29 APRIL - 6 MAY 1985 51-B-14-037

51-B/SPACELAB 3 ONBOARD SCENE --- A drop centered in this 35mm frame served as a test subject for ~~xIIxxpxxixx~~ the principal investigator of the Drop Dynamics Moduxle experiment, who happened to be onboard the CHallenger and who exposed this photograph. Dr. Taylor G. Wang, payload specialist, and his team developed the ~~Rxepx~~ DDM at NASA's Jet Proplusion Laboratory (SPL), Pasadena, California.


NASA

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
400 MARYLAND AVENUE, SW, WASHINGTON 25, D.C.

FOR RELEASE: November 24, 1963 - AM

PHOTO NO.: 63-Centaur-9

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Simulated Atlas-Centaur vehicle configuration in Lewis Research Center's space power chamber, a former wind tunnel converted for use in Atlas-Centaur separation tests and Centaur environmental studies. The chamber can be exhausted to an altitude of 100,000 feet. Tests were conducted to verify a new Atlas-Centaur separation system consisting of linear-shaped charges, which cut through the interstage adapter, and retrorockets mounted on the aft end of Atlas. Atlas portion is retrieved by nylon net.

D 19000

CLEVELAND PRESS
MAY 20 1964
REFERENCE DEPT.

NASA
S-63-11023

S-63-11023 7/63

Astronauts Elliot M. See, Jr., and Thomas P. Stafford answer reporter's questions before a microphone. They had just completed a centrifuge evaluation run at the NASA Ames Research Center, near San Francisco, Calif.

OFFICIAL NASA PHOTOGRAPH

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filed NOV 8 1963
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Dr. James C. Fletcher

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

FOR RELEASE: June 18, 1971

PHOTO NO. 71-H-936

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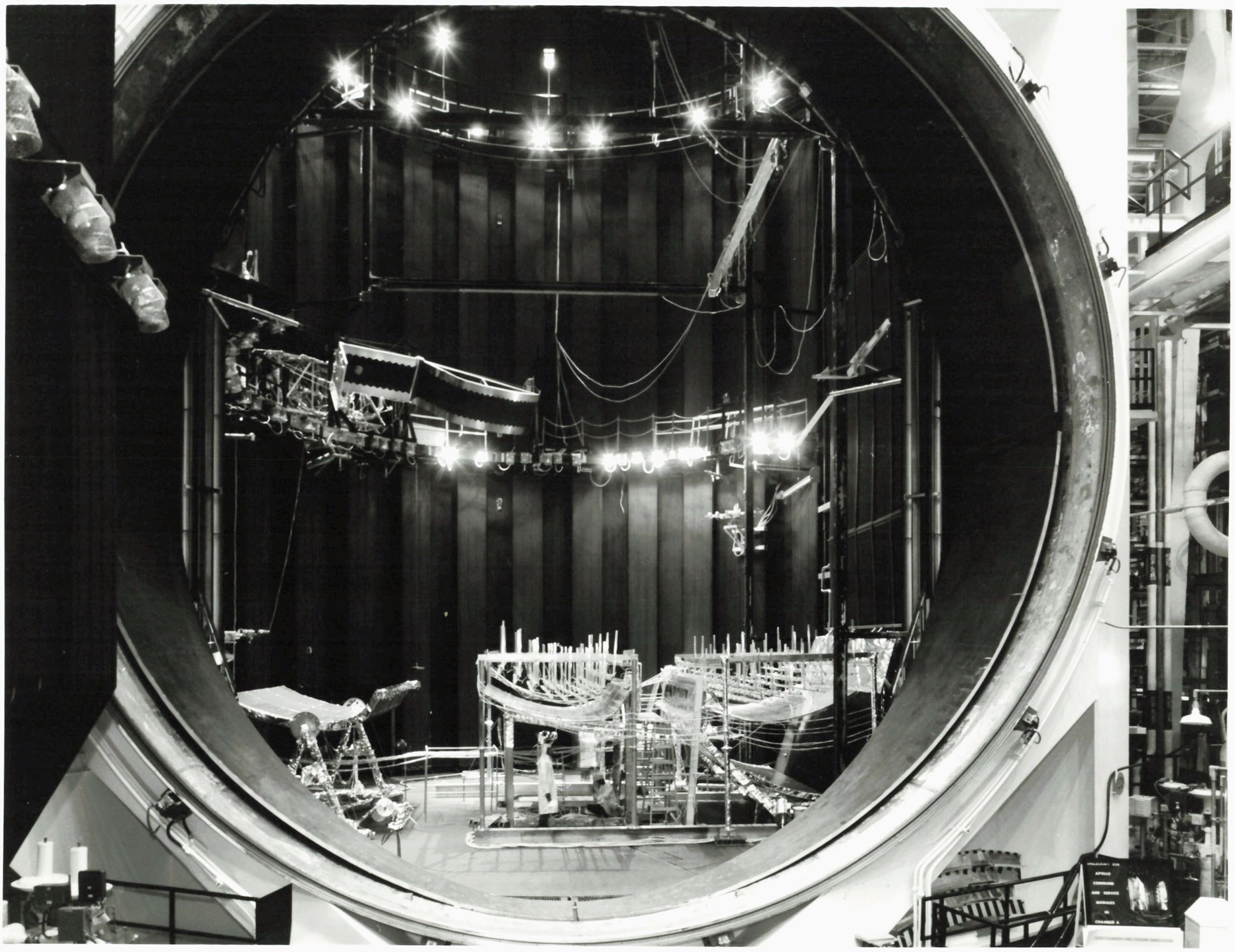
LUNAR SOIL EXCHANGE: NASA Administrator, Dr. James C. Fletcher, right, received 3.2 grams of lunar sample material returned from the Moon by the Soviet spacecraft Luna 16 recently in a brief ceremony in his office. The presentation was made by Lee. R. Scherer, director of NASA's Lunar Exploration Office, who headed the U. S. group which went to Moscow to exchange lunar samples with the Soviets. NASA exchanged about 3 grams each from the Apollo 11 and 12 missions to the Moon

PHOTO CREDIT--NASA or National Aeronautics and Space Administration

NASA
S- 75- 29890



Lyndon B Johnson Space Center

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COLOR

SEPTEMBER 1975 S-75-29890

JOHNSON SPACE CENTER, HOUSTON, TEXAS

SHUTTLE ORBITER TEST-------An interior view of the Space Environment Simulation Laboratory, Building 32, at the Johnson Space Center, looking into the huge Chamber A showing an Orbiter heat rejection system development test set up. A thermal/vacuum test series was conducted jointly by JSC and Rockwell International in September 1975. The testing had two primary objectives: (a) determination of radiator performance, and (b) evaluation of the radiator silver-Teflon thermal control coating. Both objectives were successfully accomplished. The mechanical integrity of the curved-honeycomb radiator structure under thermal induced stresses was confirmed, also.

FRI JUL 11 1980

PHOTO CREDIT: NASA or National Aeronautics and Space Administration

Houston Chronicle Library

NASA National Aeronautics and Space Administration

S 80-26375

Lyndon B. Johnson Space Center
Houston, Texas 77058

Space Shuttle

National Aeronautics and
Space Administration

Houston, Texas 77058

For Release:

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COLOR

17 DECEMBER 1979 S-80-26375

NATIONAL SCIENTIFIC TECHNOLOGY LABORATORY, BAY ST. LOUIS, MISSISSIPPI

SHUTTLE MPTA FIRING ---- A successful full duration test of 550-odd seconds was conducted Dec. 17, 1979 on the Space Shuttle main propulsion test article (MPTA) at Bay St. Louis, Mississippi. Test managers for NASA's Marshall Space Flight Center (MSFC) reported that all test goals were achieved. The three main engines were throttled from 100% rated power level to 90%, 80% and finally, to 70%. Engine gimballing and pogo pulsing were successfully accomplished. One engine was cut off early, as planned, and the remaining two were run at 70% of rated power level for the last 5 seconds of test. No problems were encountered during the test. Additional tests will follow.

FRI JUL 11 1980

PHOTO CREDIT: NASA or National Aeronautics and Space Administration

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NASA National Aeronautics and Space Administration

51G-114-019

Lyndon B. Johnson Space Center
Houston, Texas 77058

FRIDAY AUG 16 1985

51G-114-019 PAtrick Baudry participates in a CNES experiment involving equilibrium and vertigo. The experiment is under the responsibility of the Laboratoire de Physiologie Neurosensorielle, Paris.

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Space Shuttle
XVIII

NASA National Aeronautics and Space Administration

S- 80- 26682

Lyndon B. Johnson Space Center
Houston, Texas 77058

Space Shuttle

NASA
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Houston, Texas 77058

For Release: March 30, 1980

Photo No. S-80-26682

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S-80-26682

15 JANUARY 1980

JOHNSON SPACE CENTER, HOUSTON, TEXAS

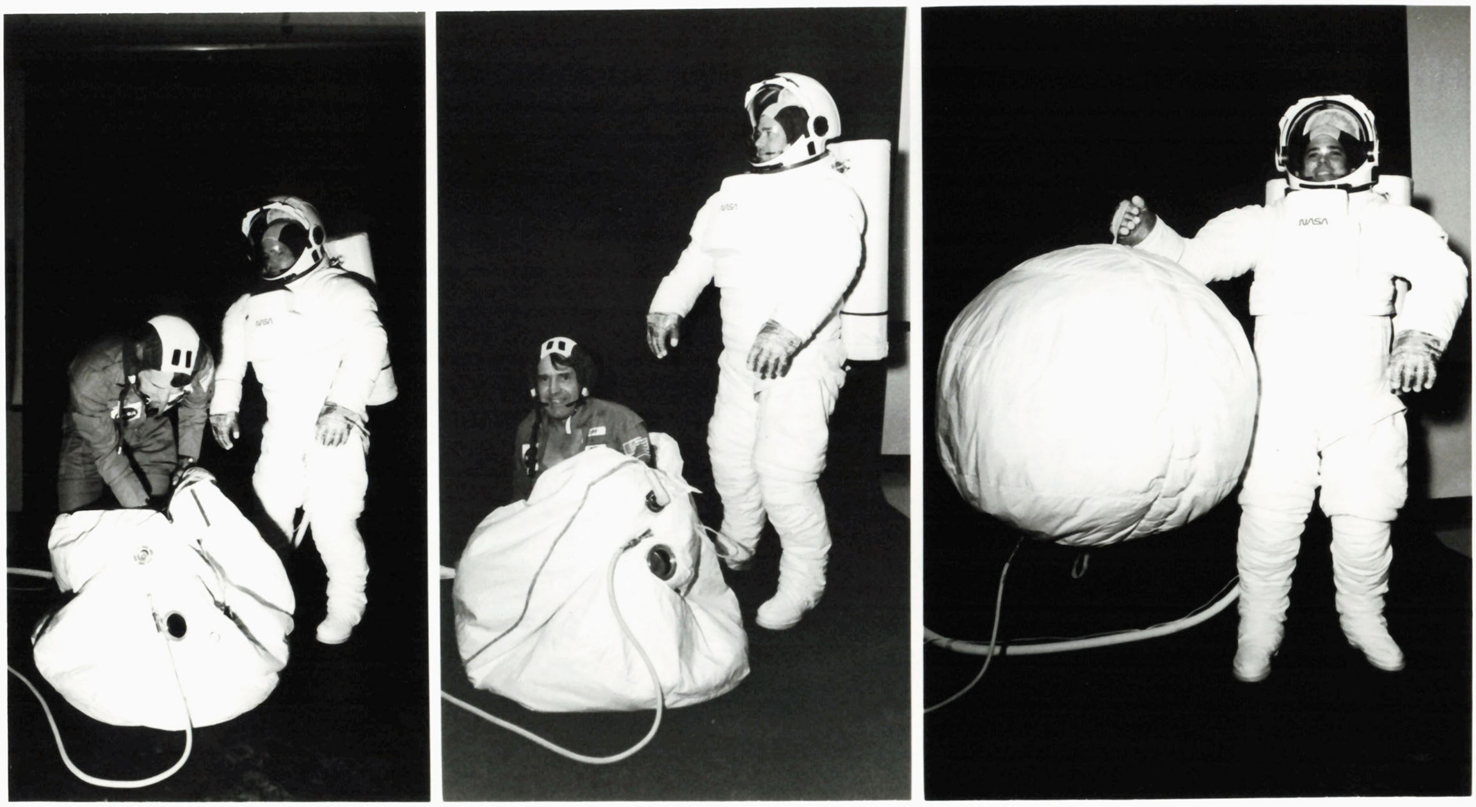
SPACE SHUTTLE MEDICAL SIMULATION IN ZERO GRAVITY AIRCRAFT ---- Dr. Joseph Degioanni, right, and Christopher Counts administer the two-person method of cardio pulmonary resuscitation (CPR) on a mannequin during 30 seconds of zero-gravity experienced aboard a NASA KC-135 aircraft. Dr. Degioanni is with the medical sciences division in the space and life sciences directorate at the Johnson Space Center (JSC) and Counts is a paramedical technician with the Life-Flight rescue service. "Resusci-Annie" is the standard subject (mannequin) used commonly in demonstrating CPR techniques. This KC-135 flight allowed part of the team involved in this project to test the newly developed method of zero-gravity first aid restraints. "Annie" is lying on a simulation structure representing stowage lockers to be located in the mid-deck area of the Shuttle orbiter. Both the subject and Dr. Degioanni are equipped with the restraint straps resulting from a two-year study by Dr. Degioanni, Donald Griggs of aircraft operations division in the flight operations directorate, Counts and a group of students. In the administration of CPR in weightless environments such as those Shuttle astronauts will experience, the person applying the hands-on-chest suppressions could not properly function without adequate restraining devices. These straps would have to be donned and deployed (note pit pins holding restraints to locker) on the flat surface prior to the CPR process, so time is a very important consideration in the team's thorough study. Note the suction cups on the physician's shoes to lessen mobility.

PHOTO CREDIT: NASA or National Aeronautics and Space Administration

FRI JUL 11 1980

NASA National Aeronautics and Space Administration

Headquarters
Washington, D.C.



SPACE SHUTTLE

National
Aeronautics and
Space
Administration

Washington, D.C. 20546

FOR RELEASE: Filed: March 24, 1976
PHOTO NO. 76-HC-504
76-H-278

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NEW SPACE SUIT AND RESCUE SYSTEM--Engineers at the NASA Johnson Space Center, Houston, are developing a new space suit concept and rescue system for use by astronauts and scientists aboard the Space Shuttle. The Space Shuttle pilot and Mission Specialist will be outfitted with the space suit while other Shuttle passengers willbe provided with a personal rescue system. The new suit is of modular construction (upper and lower torso) with a body seal closure at the waist and is made of Urethane, Kevler and an outside thermal protective layer. The Shuttle suit contains a life support system which is an integral part of the rigid upper torso, not a separate back pack as used in Apollo and Skylab. In the event an orbiter becomes disabled and is unable to return to Earth, a rescue orbiter will be launched so that passengers can be transferred in the Personal Rescue Enclosure. The Personal Rescue enclosure is a 34-inch diameter ball which contains its own short term simplified life support and communication systems. The ball is made of the same material as the Shuttle suit and has a small viewing port made of Lexan.

Houston Chronicle Library

TUE NOV 23 1976

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National Aeronautics and
Space Administration

S88-29251

Lyndon B. Johnson Space Center
Houston, Texas 77058

NASA

HOUSTON, TEXAS 77058

National Aeronautics and Space Administration

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COLOR

FEBRUARY 1988 S-88-29251

NASA AMES-DRYDEN FLIGHT RESEARCH FACILITY, EDWARDS, CALIFORNIA/SHUTTLE ESCAPE SYSTEM TEST
A Navy parachutist slides down a pole to exit a C-141 aircraft as part of tests to evaluate one of two proposed Space Shuttle escape systems. For these tests, the jumpers, using a lanyard attached to the pole, slide down a pole extending from a C-141 flying at about 200 knots at an altitude of approximately 10,000 feet. The other system being evaluated is a tractor rocket extraction system. A decision on which of the two egress methods may be incorporated into the Space Shuttle will be made after test data is analyzed and recommendations are made to NASA Shuttle program managers. The tests are being conducted by NASA's Johnson Space Center in cooperation with the U.S. Air Force and the U.S. Navy.

File: Space Shuttle


b. a handle on the chuck to use as a support.
c. center thrust located handle sized for space use to give a firm grip during push-pull operations.
electroadhesor pads could hold and handle materials in space.
MECHANICAL ASSEMBLY TOOLS
THE ELECTROADHE
AERO-JET TOOL
2 FLYBALL TOOL
3 MODIFIED SPIRAL DRIVE SCREWDRIVER

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

DEC 19 1968

FOR RELEASE: November 7, 1968
PHOTO NO. 68-H-1108

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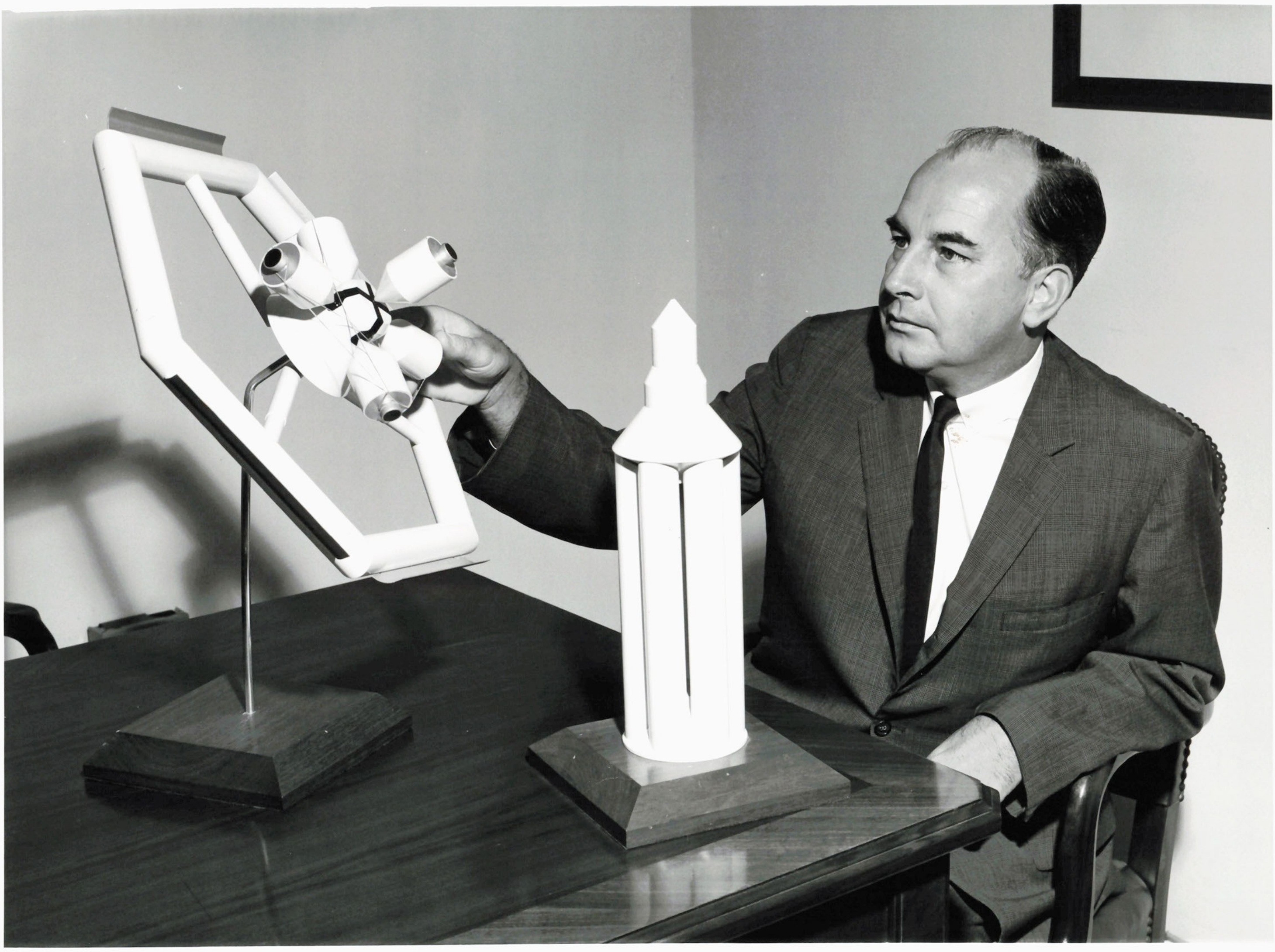
SPACE TOOLS: Vaughn Yost of the NASA-Marshall Space Flight Center's Manufacturing Engineering Laboratory in Huntsville, Ala., examines a battery-powered assembly tool designed to install and tighten nuts in a weightless environment of an orbiting vehicle such as the Saturn I workshop.

PHOTO CREDIT: NASA or National Aeronautics and Space Administration

NASA
S-63-10995



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8-1963

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7/63 S-63-10995

Rene A. Berglund, Chief, Space Vehicle Design Branch, Space Technology Division, MSC, is shown here with models of the award winning space station concept whech he designed.

Berglund received a $400.00 award from NASA Inventions and Contributions Board.

The Circular Model represents modular space station concept erected in space. The other model represents a space station ready for launching.

OFFICIAL NASA PHOTOGRAPH

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NASA National Aeronautics and Space Administration

S88-29251

Lyndon B. Johnson Space Center
Houston, Texas 77058

bile Space Shuttle

NASA

HOUSTON, TEXAS 77058

National Aeronautics and
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COLOR

FEBRUARY 1988 S-88-29251

NASA AMES-DRYDEN FLIGHT RESEARCH FACILITY, EDWARDS, CALIFORNIA/SHUTTLE ESCAPE SYSTEM TEST
A Navy parachutist slides down a pole to exit a C-141 aircraft as part of tests to evaluate one of two proposed Space Shuttle escape systems. For these tests, the jumpers, using a lanyard attached to the pole, slide down a pole extending from a C-141 flying at about 200 knots at an altitude of approximately 10,000 feet. The other system being evaluated is a tractor rocket extraction system. A decision on which of the two egress methods may be incorporated into the Space Shuttle will be made after test data is analyzed and recommendations are made to NASA Shuttle program managers. The tests are being conducted by NASA's Johnson Space Center in cooperation with the U.S. Air Force and the U.S. Navy.

NASA
S-64-17843

MANNED SPACECRAFT CENTER

OFFICIAL PHOTOGRAPH

18 Dec. 1963 S-64-17843

C.W.O. Laine makes a jump at Naval Parachute Facility, El Centro, Calif. This was a test of the 36" Ballute, with Dual Suspension, to be used in the Gemini Personnel Recovery System. Also shown are personnel photographing the test by free falling with Mr. Laine.

The National Aeronautics and Space Administration has no objection to the publication of this photograph.

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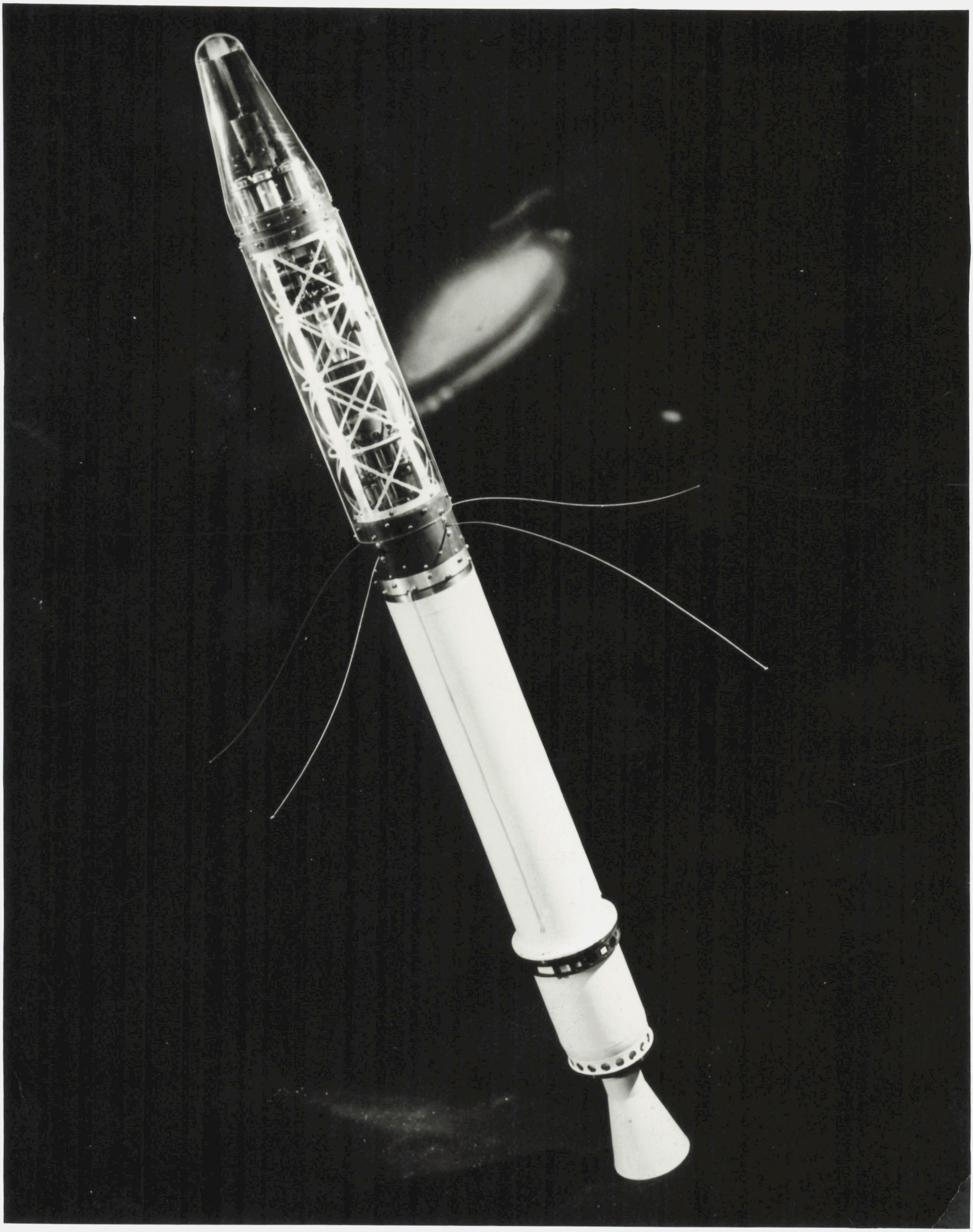
4-1964

Project Gemini - Photos - 1964



Satellites - Explorer I

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

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2-26-70

FOR RELEASE: IMMEDIATE
PHOTO NO. 58-Explorer-I-2

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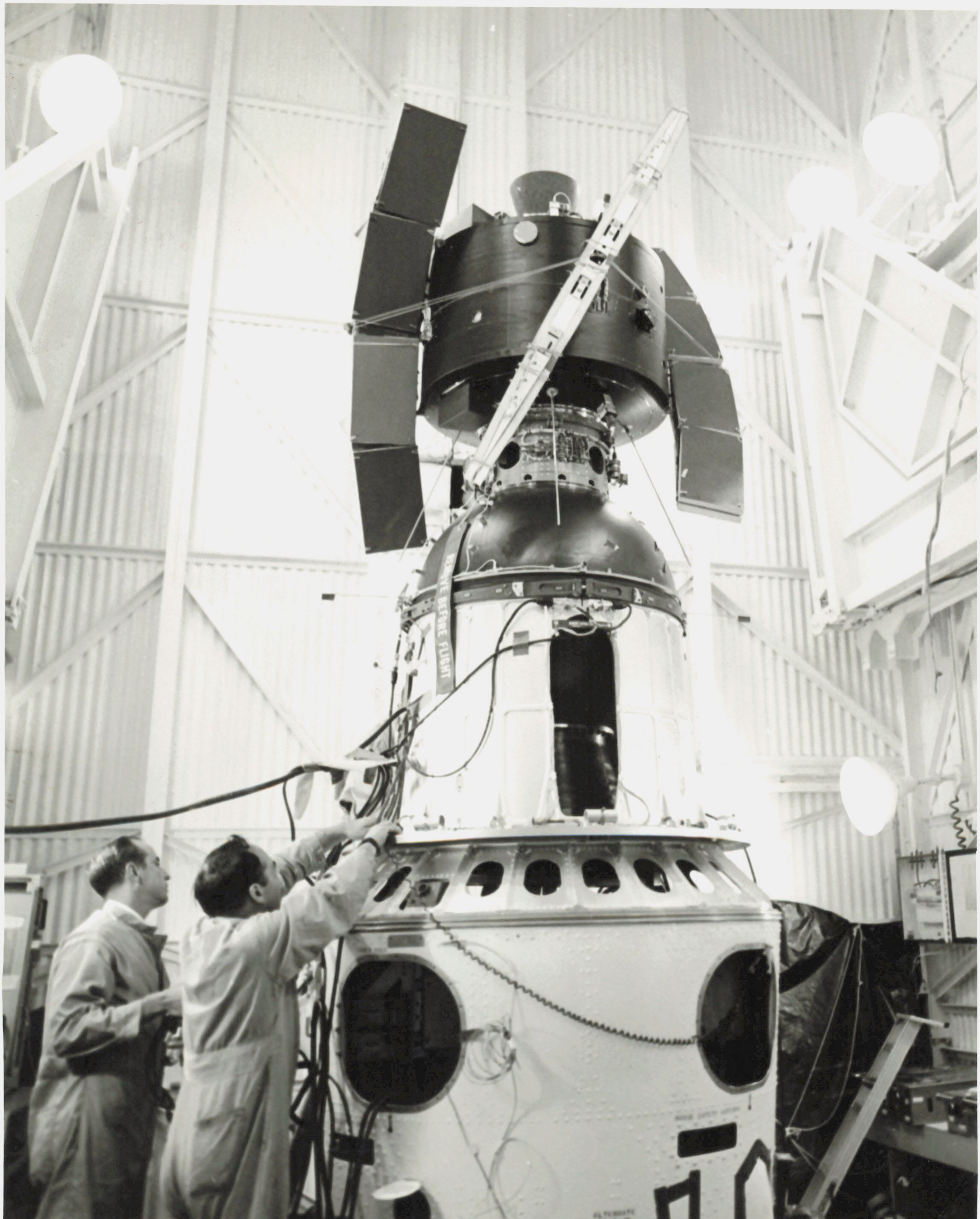
EARLY TIMES -- The United States' first successful orbiting satellite, Explorer I, was launched Feb. 1, 1958. It weighed 30.8 pounds and was 80 inches long including rocket case. The Van Allen radiation belts were discovered by Explorer I.

PHOTO CREDIT - NASA or National Aeronautics and Space Administration


BEFORE FLIGHT

Satellites - Explorer

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

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PHOTO NO. 68-H-600

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LATER VINTAGE -- This radio astronomy satellite is the 38th of the Explorer series. It weighs 607 pounds and in flight its four antennas extend 750 feet. It monitors low frequency radio signals in the solar system and the Milky Way.

PHOTO CREDIT--NASA or National Aeronautics and Space Administration

NASA
S-69-36475

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1-26-71

Space Food

160
~~06~~
154

~~84.5~~

~~Sunday~~

women

20 picas

Cap: Someday

SUN JAN 24 1971

Space Food

Someday, Dr. Malcolm Smith notes, these aluminum-plastic packages could replace conventional hard cans and help eliminate some of our waste volume.

NASA
S-69-36473

Space Food

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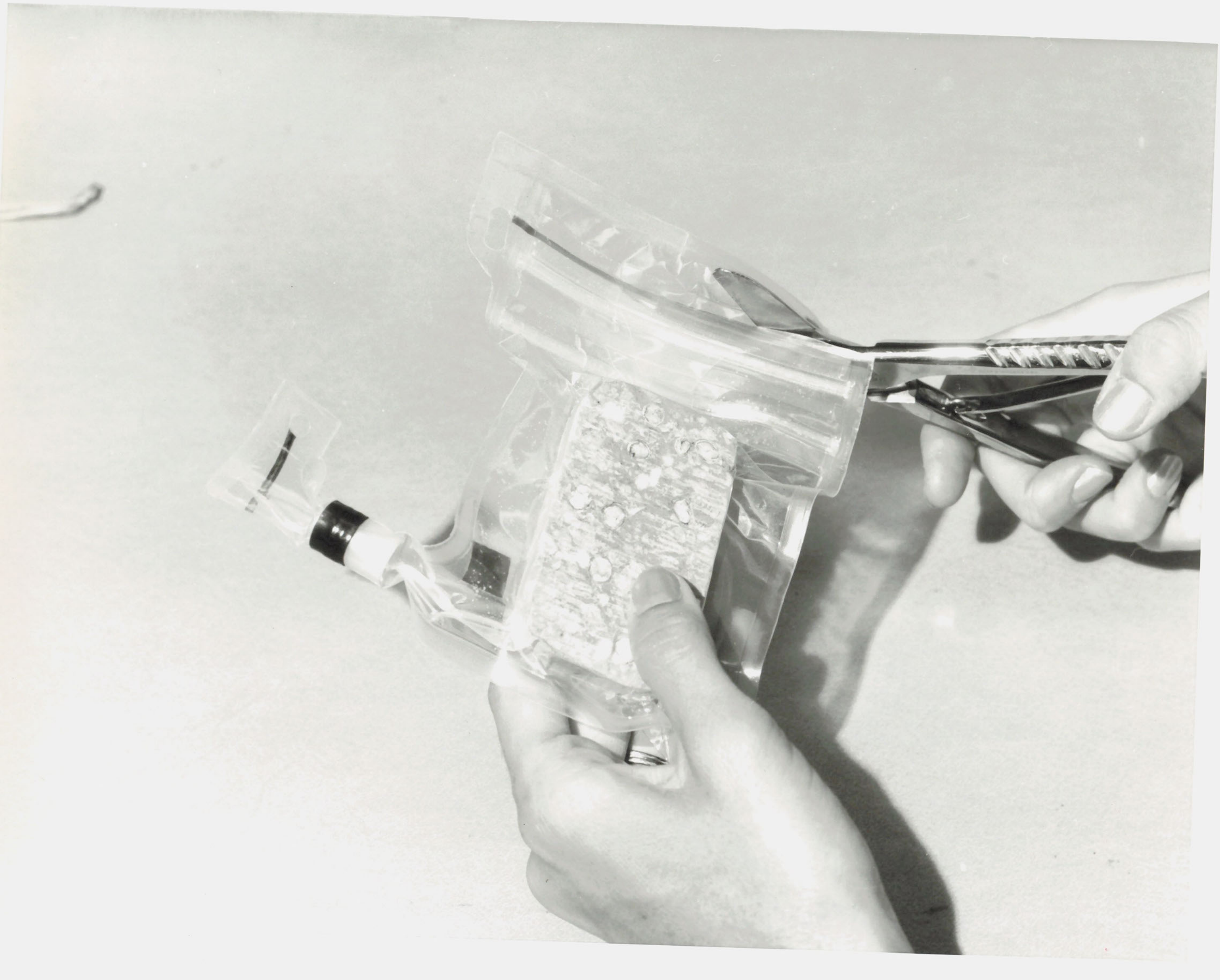
S-69-36442



Space Food

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3-26-71

NASA
S-69-36455

Space Food

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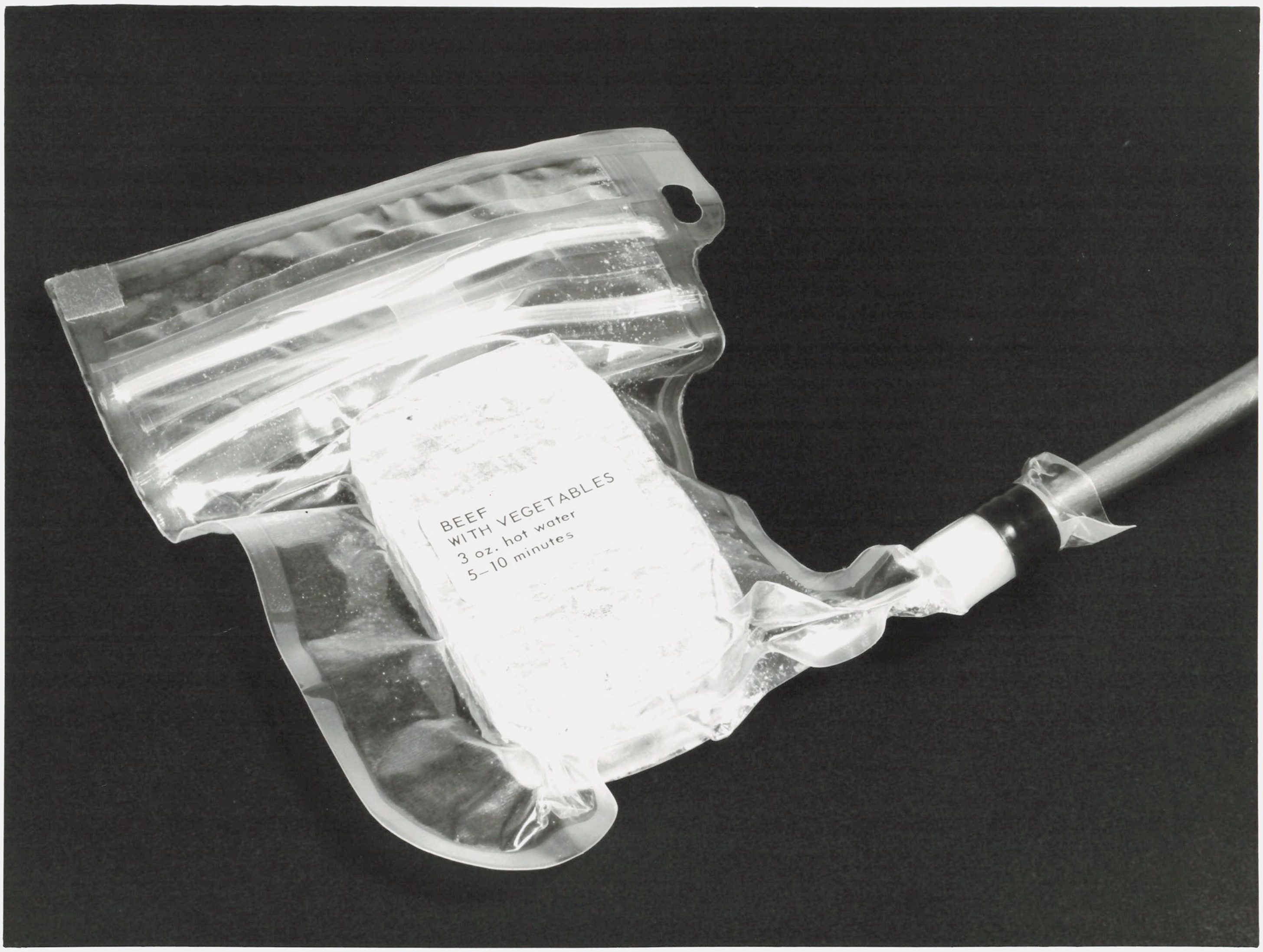
3-21-71

NASA
S-69-31781



Space Food

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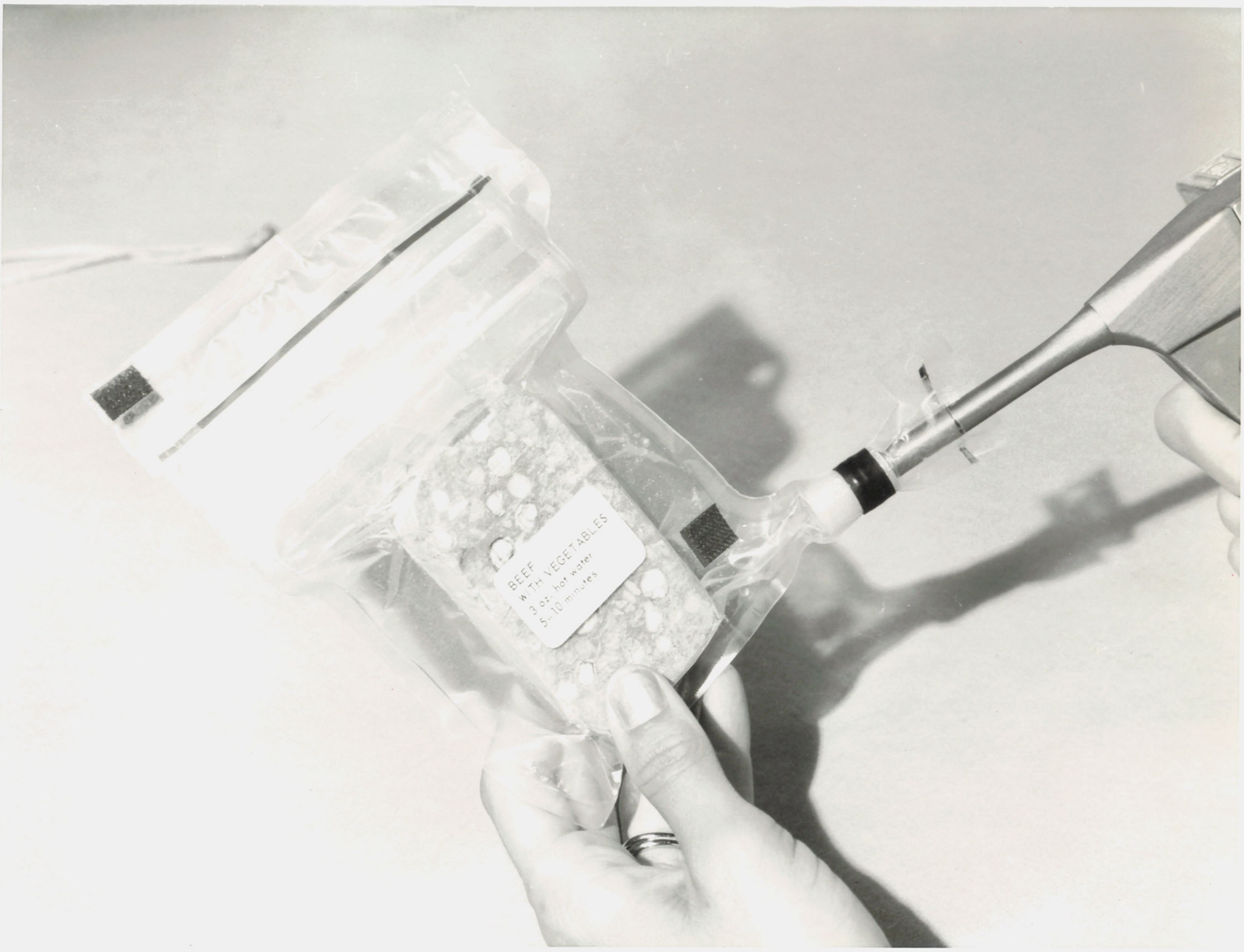
NASA
S-69-36437



Space Food

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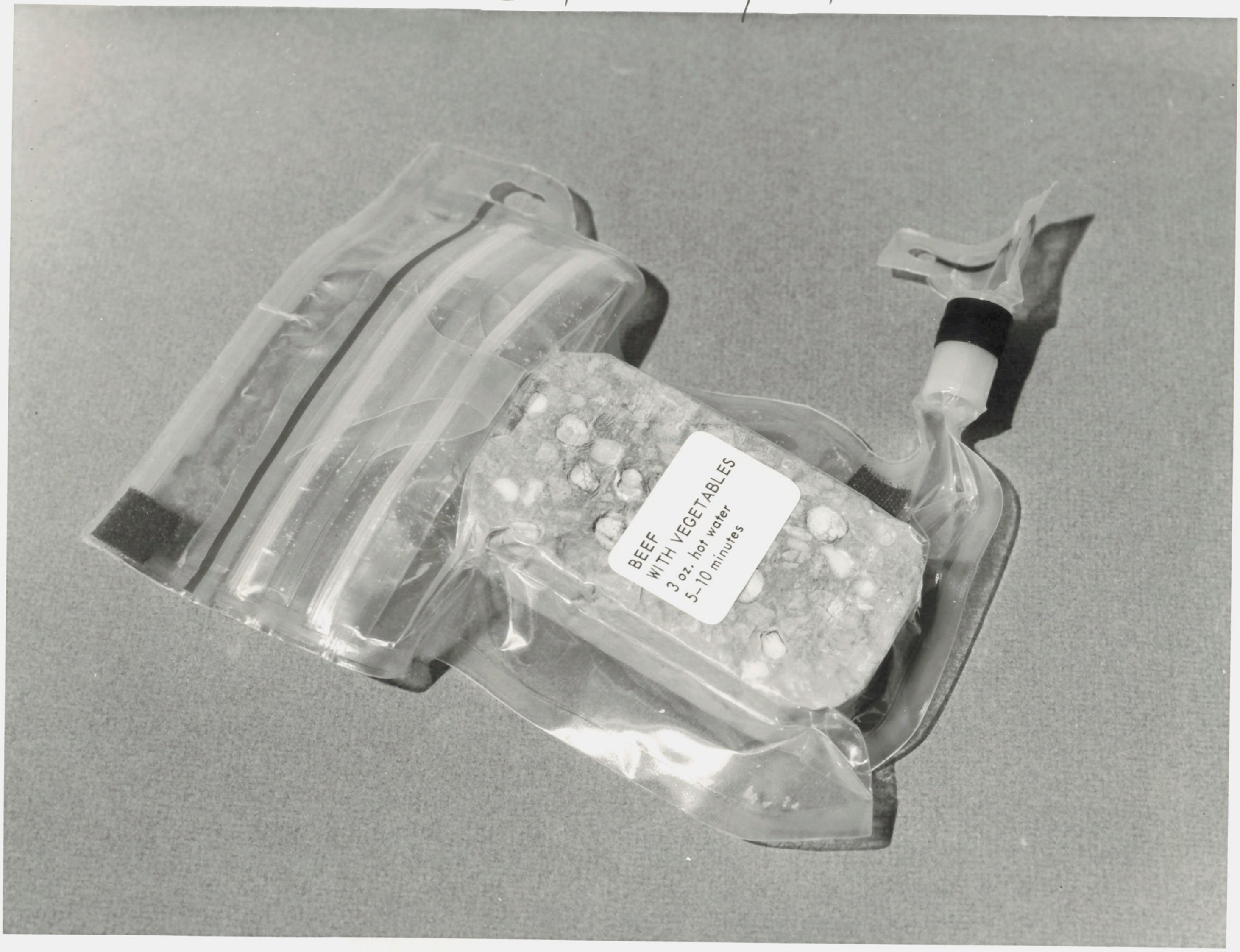
3-21-71

NASA
S-69-36489

20P TOP



Space Food

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1-26-71

18
08
174

Space Food

Sunday/women

20 picas

45

cop: Typical

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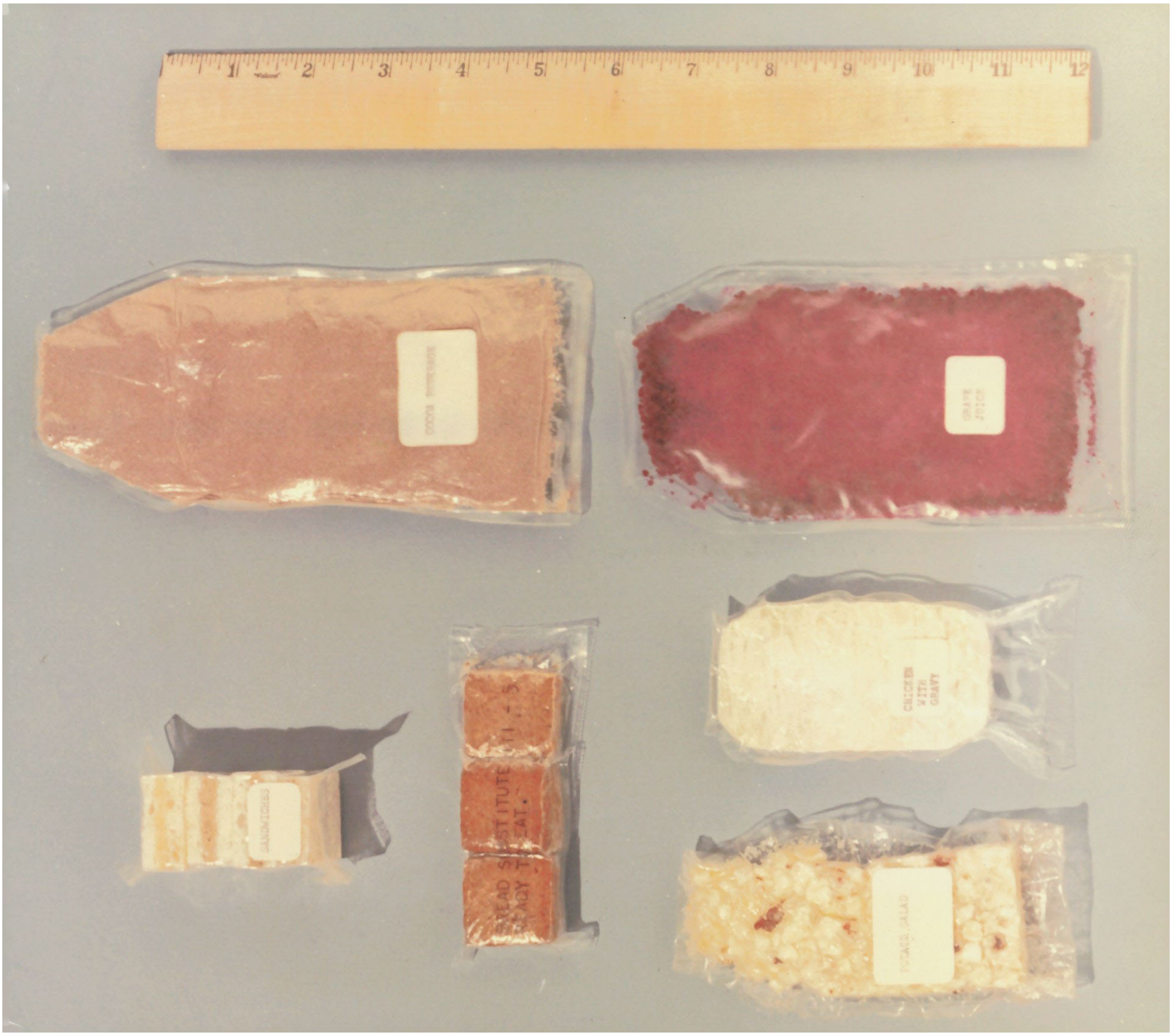
CHICKEN
WITH
GRAVY

MANNED SPACECRAFT CENTER
OFFICIAL PHOTOGRAPH

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4/25/63 S-63-5610/15

Foods to be used by astronauts in Mercury and Gemini Space-flight.

(2)

TOP

NO CROP

35

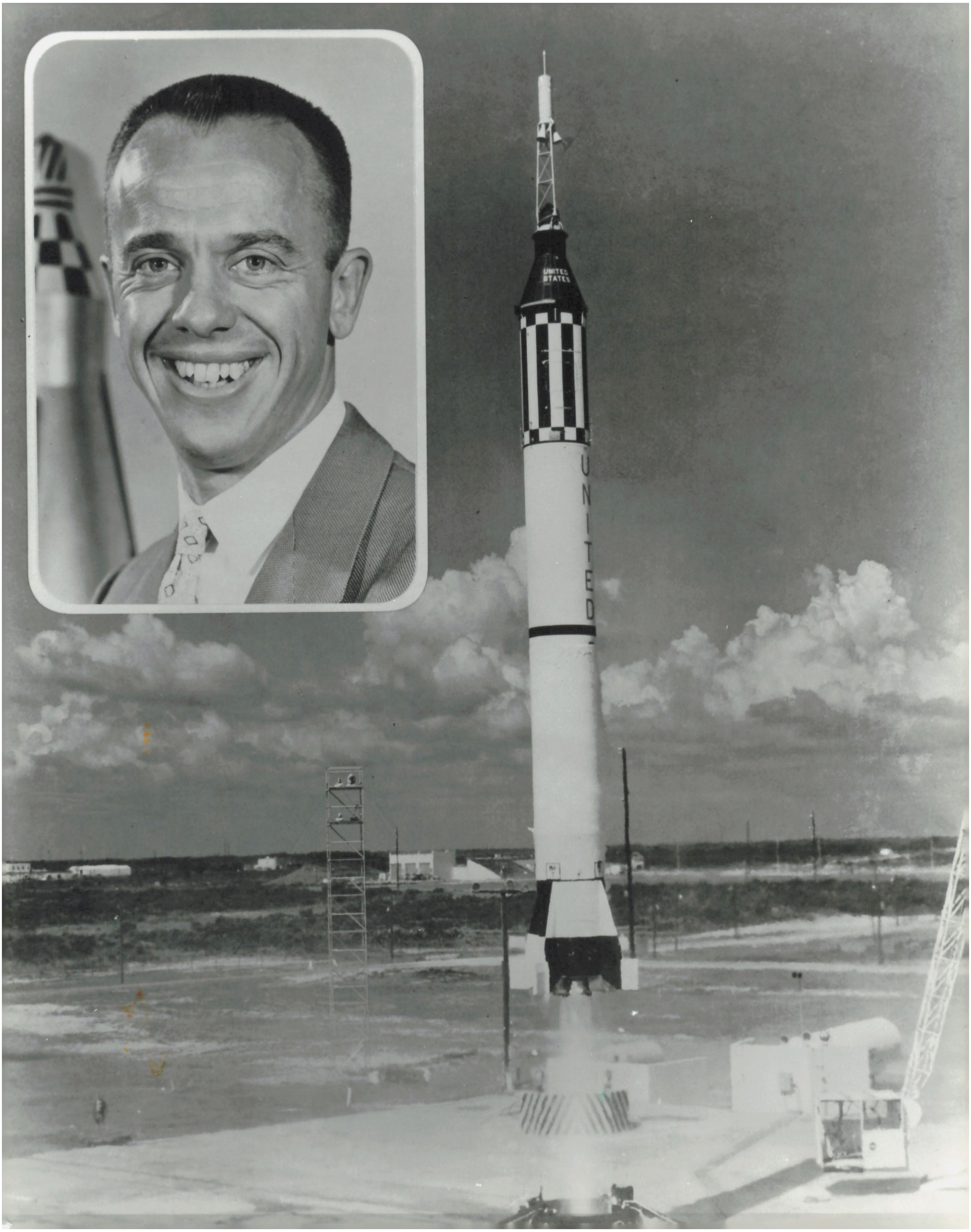
CHRONICLE MAGAZINE
ISSUE 5-31-64
PAGE 46

SUN MAY 31 1964

Project

Tasty Gemini foods are bite-size, packaged in eatable transparent wrappers.

The National Aeronautics and Space Administration has


UNITED STATES
UNITED

S62-01151

National Aeronautics and Space Administration
Houston, Texas 77058

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BLACK & WHITE

5 MAY 1961 S62-01151

CAPE CANAVERAL, FLORIDA

MR-3 LIFTOFF VIEW --- The liftoff of the Mercury-Redstone 3 (MR-3) on May 5, 1961, piloted by astronaut Alan B. Shepard, Jr., whose portrait is in inset. Shepard went on a 15-minute sub-orbital flight.

PHOTO CREDIT: NASA or National Aeronautics and Space Administration.

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64-14858

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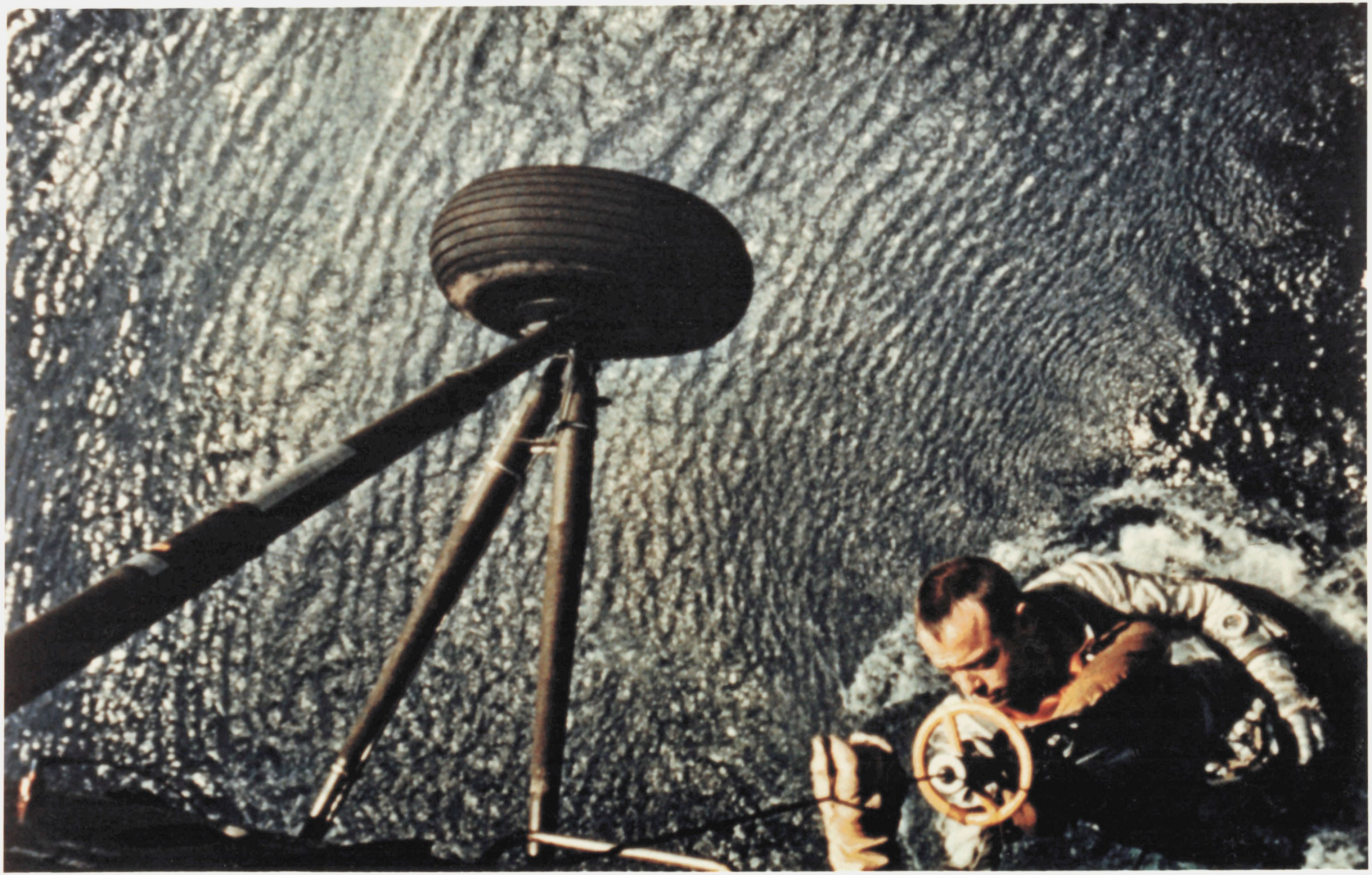

Alan B. Shepard Jr.
- astronaut -

NASA
National Aeronautics and
Space Administration

Houston, Texas 77058

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COLOR

5 MAY 1961 S64-14866

DOWNRANGE, ATLANTIC OCEAN RECOVERY AREA

MR-3 RECOVERY --- Astronaut Alan B. Shepard is rescued by a U.S. Marine helicopter at the termination of his sub-orbital flight May 5, 1961 down range from the Florida eastern coast.

MR. 3-2

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PHOTO CREDIT: NASA or National Aeronautics and Space Administration

NASA National Aeronautics and Space Administration

S88-31376

Lyndon B. Johnson Space Center
Houston, Texas 77058

Alan B. Shepard Jr.
-astronaut-

NASA
National Aeronautics and
Space Administration

Houston, Texas 77058

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COLOR

5 MAY 1961 S83-21376 through 78

DOWNRANGE, ATLANTIC OCEAN RECOVERY AREA

MR-3 RECOVERY --- Astronaut Alan B. Shepard is rescued by a U.S. Marine helicopter at the termination of his sub-orbital flight May 5, 1961 down range from the Florida eastern coast.

MR- 3-2

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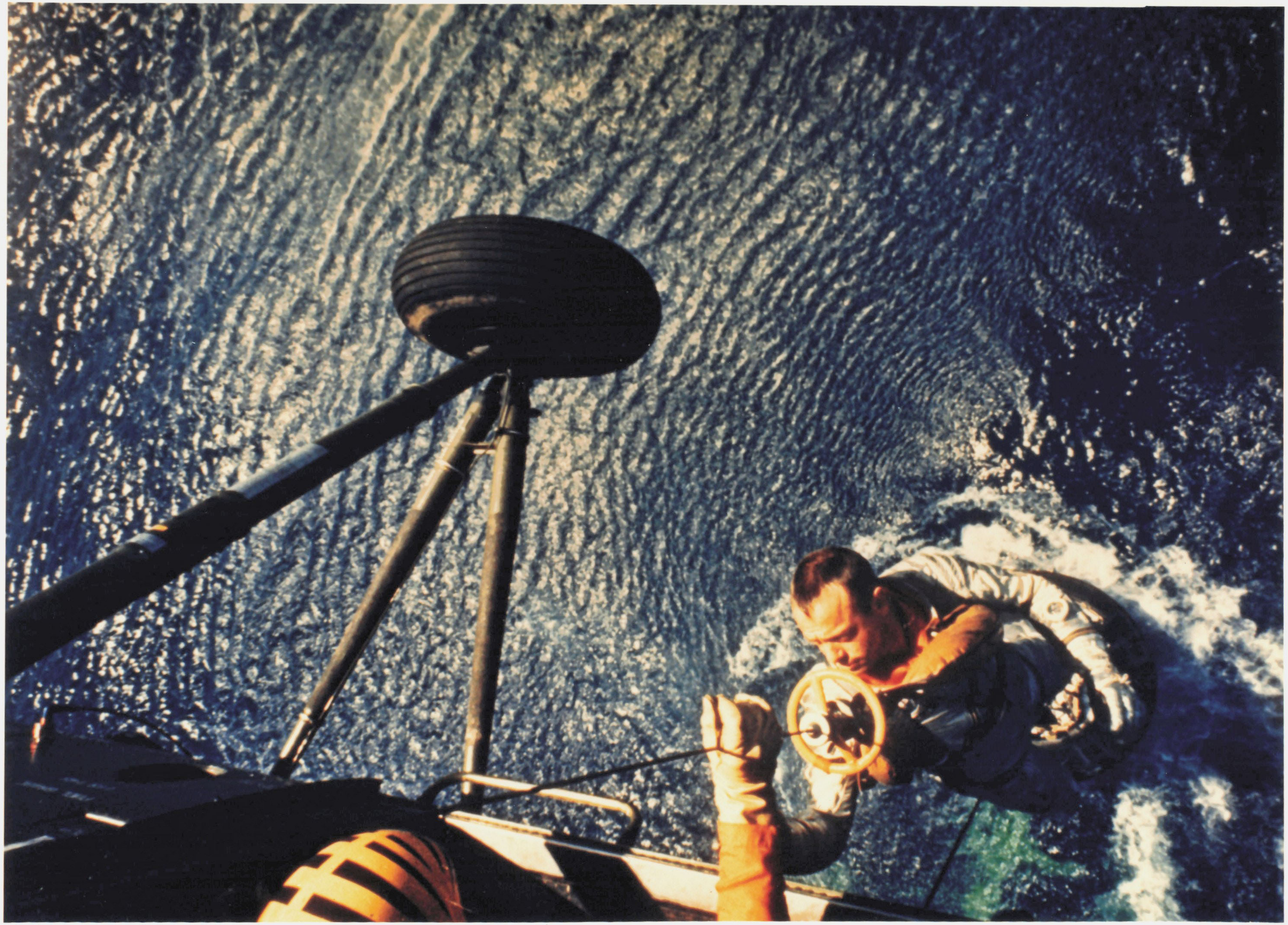

Alan B. Shepard Jr.
-Astronaut-

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Houston, Texas 77058

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COLOR:

5 MAY 1961 S83-34376 through 78

DOWNRANGE, ATLANTIC OCEAN RECOVERY AREA

MR-3 RECOVERY --- Astronaut Alan B. Shepard is rescued by a U.S. Marine helicopter at the termination of his sub-orbital flight May 5, 1961 down range from the Florida eastern coast.

PG. 1-2

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