

# Lunar Landing, Reentry Experiments Featured In NASA Field Inspection



Suspended from lunar landing facility, lunar walker shows how man can do acrobatics with ease while walking on the moon. He is tilted about 80 degrees on the inclined walk.



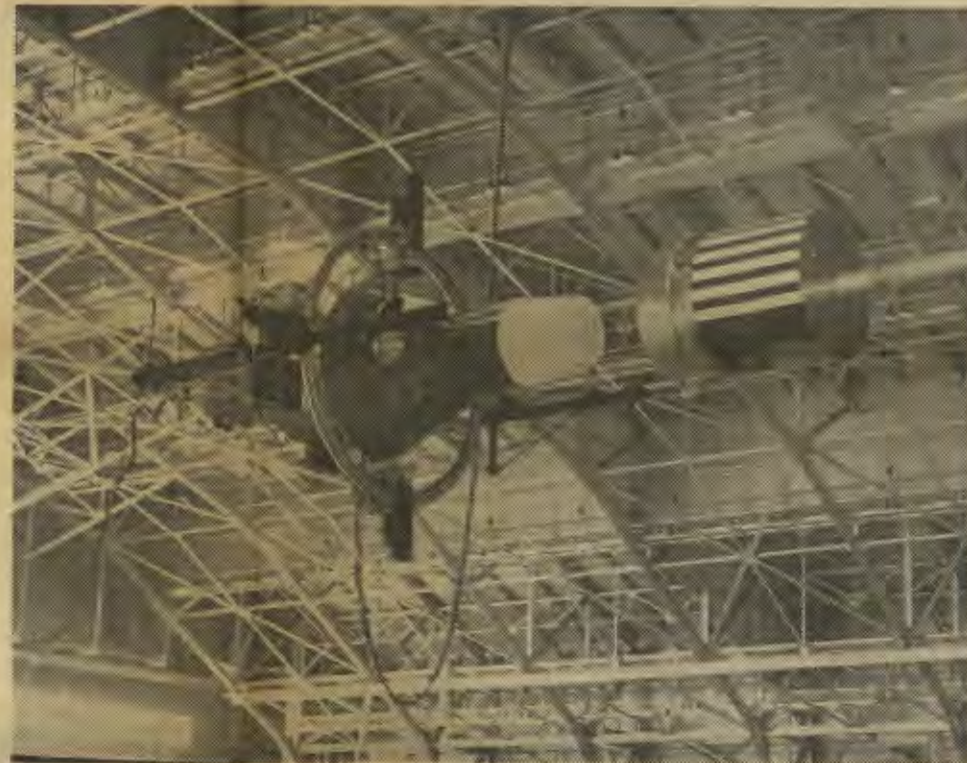
John F. Garren lectures on high-speed aeronautics during '64 NASA field inspection of advance research, technology.



Model of Manned Orbital Research Laboratory was a focal point of interest for visitors to the Langley Research Center Monday. Functions of the laboratory are explained in full technical detail here by "guide" Rex B. Martin.



Rodger Stewart, using pointer, explains how NASA experiment in hypersonics and reentry, including problems of air chemistry effects experienced in supersonic flight.



This is a space rendezvous simulator, suspended from a hanger ceiling. It was demonstrated for nearly 400 persons attending the 1964 NASA field inspection at Langley.



Sherwin Beck answers questions on various aspects of exhibit of structures and materials used in spacecraft. Visitors included aerospace leaders, congressmen, educators.





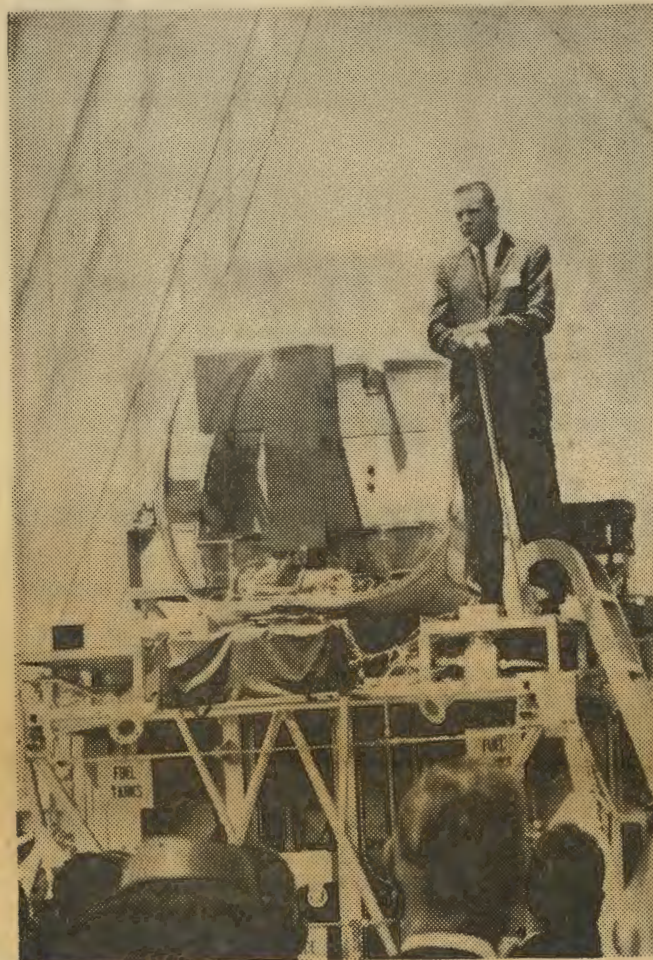
Hypersonic vehicle wall insulation qualities are described by Thomas Bales. NASA seeks to develop spacecraft able to withstand the searing heat of reentry after a trip to moon.



V. Thomas Rhyne gives explanation of how computers are used in aerospace research to solve technical problems of landing on the moon and reentering the earth's atmosphere and other problems of space flight.



Sherwin Beck hefts examples of wall structures designed for manned spacecraft, at an exhibit featuring materials.



Workings of lunar landing vehicle is explained by Maxwell W. Goode. It is used for testing lunar landing problems.



That's water, not a bomb, exploding as tire is catapulted into water. Demonstration of tire hydroplaning, one of the highlights of Inspection Week at Research Center.



Representing press are (l-r) Robert Smith, Daily Press, Inc.; Harry Kolcum, Aviation Week; Virginia Biggins, Times-Herald; Troy Williams and Ben Altshuler, Daily Press; and J. Raymond Long, managing editor, Daily Press



# NASA To Hear Reports On Manned Orbital Lab

National Aeronautics and Space Administration and military representatives are scheduled to receive reports at Langley Research Center today on a manned orbital research laboratory for NASA space experimentation that could be placed in operation within five years.

The briefing will describe findings of a Douglas Aircraft Co. follow-on study begun last December, when Douglas was chosen over the Boeing Co. to continue work on the project. Langley is monitoring the Douglas contract under direction of NASA's Office of Manned Space Flight.

Douglas and Boeing had performed competitive three-month preliminary studies at respective costs of \$452,322 and \$291,799. Contract price of the follow-on study, expected to last six to nine months, was \$1,412,781.

The manned orbital research laboratory (MORL) would have as its principal object to test man's physical and psychological reactions to working for long periods in weightlessness. The design Douglas was assign-

ed to refine called for a laboratory which would accommodate a crew of from four to six astronauts at about 200 nautical miles altitude for a year or more.

Original ideas called for location of a centrifuge amidships of a generally-spherical craft. This, it was thought, would permit two crewmen at a time to experience artificial gravity for part of each day. It would also condition the men for re-entry forces.

Besides the centrifuge, however, the MORL design has been made to provide for spinning of the entire laboratory to give continuous gravitation should the effects of weightlessness become unbearable to the astronauts aboard.

MORL's other major purpose would be to provide a test bed for space equipment and a base from which to study physical laws and phenomena without interference from the earth's atmosphere.

The design to be reported on today calls for a 260-inch-diameter spacecraft that could be launched as a unit on a Saturn 1-B rocket. "There would be three segments: living area, centrifuge and working area, all with a shirtsleeve environment."

Eight men could be housed in the living area, where each would be furnished a bunk with restraining devices and space for personal gear. They would have a recreation and exercise room and a complete galley with hot and cold water, refrigerator and special facilities for preparing dehydrated food.

The MORL would even have toilets, lavatories and a shower, with a water recovery subsystem to reclaim used water. Useless waste would be stored and returned by ferry spacecraft to earth.

Four paddle-like solar cell antennae would be extended after the craft reached orbit and furnished power to operate MORL's equipment.

Supplies and occupants would be ferried to and from earth with Gemini or Apollo spacecraft, which could be docked in an airlocked hangar opening in MORL's nose cone. Up to four such craft could be stored mechanically, alongside the MORL.

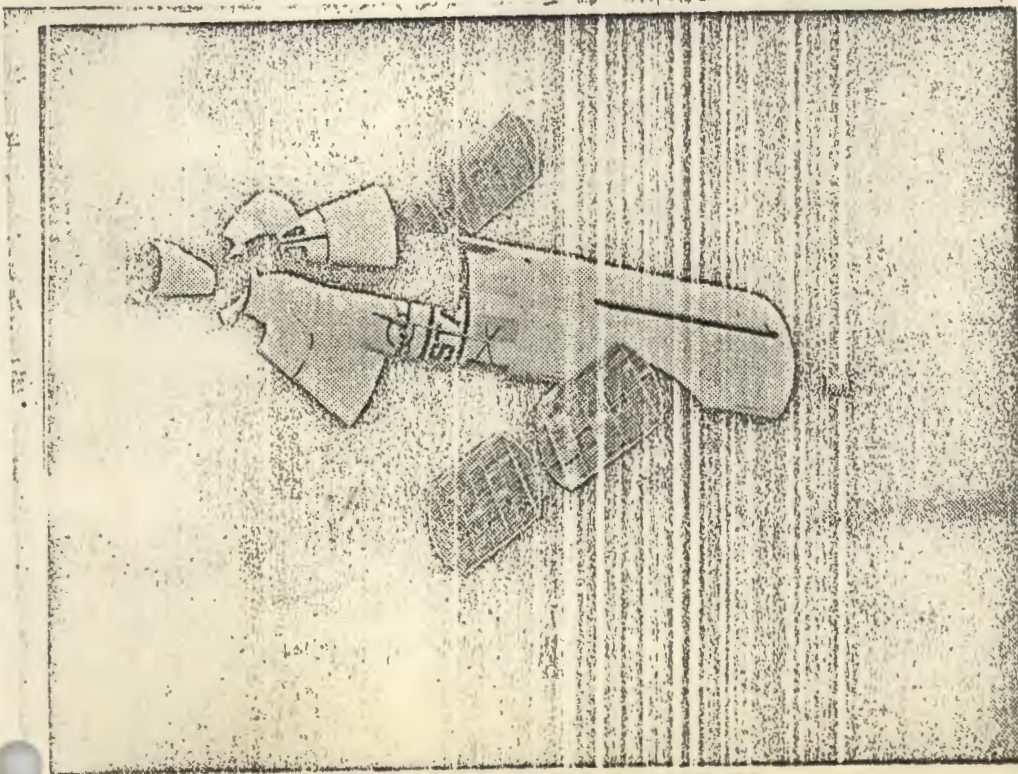
See MORL page 4

Page 3



Kevin Morris pokes at a satellite balloon which is used to measure atmospheric density, while his grandfather, Dalton Morris, an engineer on project Lola, looks on amused.

DAILY PRESS May 24, 1964



## SPACE COMMUTERS' SANCTUM

This is how a Manned Orbital Research Laboratory, embodying ideas that will be reported on today at the National Aeronautics and Space Administration's Langley Research Center, would look in action 200 nautical miles up. Operable in five years, it could be crewed and supplied for more than a year in orbit via ferrycraft like the four stowed around the nose cone where another is shown docking. Power comes from cells in paddles.



# Thousands At NASA Open House See U.S. Effort, Plans In Space

BY TROY WILLIAMS

Daily Press Military Writer  
"I had no idea so much was being done here." That was the reaction of thousands of visitors to the National Space Administration's Langley Research Center's open house Saturday.

Among the visitors to the exhibits were NASA employees who explained that the open house gave them an opportunity of "seeing the total picture."

"We get so involved in our own area of work that we don't get a clear picture of the vast amount of work being carried on here," one NASA employee explained.

Throughout the day, thousands toured the research center. Exhibits and demonstrations of the latest research accomplishments of NASA scientists, including work in both space, flight and aeronautics, were featured.

The open house was a climax to a week-long field inspection of advanced research and technology that drew to NASA's senior research establishment leaders in industry, government, military services and education.

As part of Saturday's program, a multitude of displays were lined along almost the entire wall of a hangar in which the space rendezvous and docking simulator's mock Gemini capsule and Agena rocket were hung overhead.

The wind tunnel where Langley's scientists learned to break the sound barrier was open. Visitors were permitted to walk through the 16-foot transonic wind tunnel.

Lecturers demonstrated the Spacemobile, NASA's mobile textbook on space science. Talks and illustrations, similar to those already presented to more than 200,000 secondary school students and teachers in Virginia, West Virginia, North Carolina and Kentucky since Jan. 1, helped to explain where the static displays fit into the NASA mission and illustrated opportunities in aerospace work.

Demonstrations of the highly skilled heavy machine work in which engineering concepts are translated into unique and unusual research models and tools were given.

Examples of the shop's products, fashioned of metal, plastic and wood, were shown.

The open house guests saw an outside coating developed for spacecraft that automatically controls wall temperature by melting when the sun gets too

hot. They saw plastics with memories. These plastics were folded but remembered their former shape and sprang back to their original form when heated.

Also on display was a prototype Boeing 707 four-jet transport equipped with boundary layer control air jets for low-speed operations tests. The craft which normally lands at 130 knots was demonstrated in low fly-bys at 95 knots during the NASA field inspection. It has been flown at 75 knots without stalling.

A Scout booster, mounted horizontally, permitted visitors to look more closely at its four stages.

Displays from NASA's Lewis Research Center at Cleveland were in the fields of nuclear, electrical and conventional propulsion systems.

The Flight Research Center at Edwards, Calif. showed some of its hypersonic research, lifting body and paraglider recovery systems for spacecraft touching down on land.

The display feature from Ames Research Center, Moffett Field, Calif., included the center's biosatellite project to determine man's response to weightlessness and biophysiological monitoring. It included an electrical device so sensitive to pressure it can feel the heartbeat of a four-day old chicken embryo inside the egg and a dime-sized FM transmitter with a 100-foot receiving range to send similar signals to electrocardiograph machines.

Included among the displays from the local center was a

SEE OPEN HOUSE  
page 5

MORL  
Cont'd from  
Page 3

International Business Machines, as major subcontractor, took part in the study both to determine design considerations and to devise a crew rotation schedule flexible enough to handle varying experiments and unforeseen situations.

EDITORIAL—TIMES-HERALD  
NEWPORT NEWS, VIRGINIA, SATURDAY, MAY 23, 1964

## The New War On Noise Sources

Visitors to the NASA installations during the past week of civilian inspection marveled at the various undertakings of NASA and the progress being made on them. But many a layman found it hard to understand the intricacies familiar to the scientists. That was perfectly natural. Expert knowledge of highly developed sciences is confined largely to those who are scientists. But the layman can readily comprehend the goal of those who are on the frontiers of science.

And one of the most appreciated goals is the elimination of noise on the one hand and the disagreeable adjuncts of flying speed on the other. The two go together, especially in aviation, just as noise and progress seem to go together. But at NASA there was easily visible evidence of progress in slowing down aircraft of supersonic speeds for landings and of low speeds in landing that eliminate the need for longer and longer landing fields. The fly-bys were most intriguing as heavy aircraft came in at a fraction of the conventional speeds we are accustomed to.

Though the new supersonic plane is

still several years away, the Federal Aviation Agency is testing the tolerance of Oklahoma City to sonic booms. Angry residents had brought a test case in court. New York has many complaints of helicopter noise among other public complaints in various places. The question is especially acute in New York because these choppers are used for traffic control, by commuters who want to save time, and even visitors who want the swanky approach to the World's Fair take to the whirlybirds, from nearby airports.

The question of rezoning New York has been taken up within the past few days with the New York City Planning Commission which is being asked to permit skyscraper heliports while an 82-year-old philanthropist and property owner, complains that helicopter use would "endanger the life and health of the tenants and occupants and visitors of the said properties" which lie nearby.

The problem of the big cities like New York will be those of other cities in the near future and our scientists are anticipating the new era—which is all to the good. And the sooner the better.



NEWPORT NEWS, VIRGINIA, FRIDAY MORNING, MAY 22, 1964

## Langley Research Center, Revisited

Five years ago the National Aeronautics and Space Administration suspended its annual field inspection trips to three major NASA centers because with the expansion of the nation's space effort it was logistically difficult to carry out the usual schedule of a different NASA base each year.

This week, through the dogged determination of Langley Research Center director Dr. Floyd Thompson, the happy practice was resumed, and the depth of research carried on, the shape and extent of scientific applications made possible has been revealed to more than two thousand businessmen, college professors and Congressmen who have come from all over the nation to probe into the work, to listen to lectures and briefings, and to come away certainly impressed.

Tomorrow Langley Research Center holds an open house for the public, and there should be tens of thousands on hand to inspect but a small cross-section of the work being carried on in this, the original aeronautics and space research center.

What hath time wrought in the five years between NASA's last such exhibition and the current field inspection trips?

It might be said that, in fine, today's demonstrations of work being carried on contains infinitely more substance, more depth, than the displays of Man's venture into space five years ago.

Then perhaps, the men of the laboratories were more dedicated to the highly esoteric adventures into basic research carried on within the four walls of their immediate surroundings.

Now these men seem infinitely more aware of their impact upon the entire national scene as the backbone of a whole new and continuously developing segment of the economy.

Now they relate to industry. They are becoming congress-conscious, too. And they are making still-tedious efforts to communicate to the public which has been called on to contribute \$20 billions to implement the work of the researchers.

The specific impact of Langley's field inspection trips this week carries with it the overpowering force of superb visual aids prepared for its 2,000 invited guests and the public alike. Whether in the crisply defined channels of data computer operation, or running aground on the rocks and shoals of magnetoplasmdynamics, the visitor finds that a determined effort to communicate has been made.

A fantastic amount of effort has gone into this renewed attempt to show the nation the real dimensions of our space research. Immaculate surroundings lend a subtle but effective background to dazzling visual effects and laboratory demonstrations. Brilliant young engineers of all scientific persuasions ventured gamely into the public forum by writing summaries of their work, committing them to memory, and then rattling them off several times a day as groups of men and women trooped into the laboratories in hopes of getting some light on the work under way.

The men of Langley Research Center doubtless will receive hundreds of letters of thanks from those who had the opportunity to inspect at close hand some of the laboratories, to listen to briefings, and to absorb some of the intellectual atmosphere which permeates office, lab and workshops alike.

We would presume to add our thanks on behalf of the tens of thousands of Peninsula folk who will be on hand tomorrow to look around the more general displays, the exhibits and demonstrations which have been prepared especially for them.

OPEN HOUSE

Continued from

Page 1

theoretical study which could result in a super-economical echo-satellite communication system. Needing no control jets such as the Syncon satellites are using to keep their place in space, it would rely on the difference in pressure of the sun's rays on a low-density satellite's dark and light sides for the required push. Turning of the satellite would be done through interaction of coils with the earth's magnetic field.

In the printed program distributed to visitors, Floyd L. Thompson, director of the research center, pointed out that it is hoped "this open house will increase your understanding of NASA's part in this nation's continuing efforts to discover new knowledge of the universe and to push forward the frontiers of flight within and outside the earth's atmosphere."



Scout missile, as shown with transport and shoring, is 75 feet long and weighs 45 tons. It was brought to Langley intact in a cargo plane, the first time transported as such. It went through bad weather unharmed.



## 20,000 Expected At NASA Event Here Tomorrow

Visitors at a National Aeronautics and Space Administration open house Saturday will have an opportunity to walk through the wind tunnel where Langley Research Center scientists learned to break the sound barrier.

From 10 a. m. to 4 p. m., the public also will view exhibits and demonstrations, visit the heavy machine shop, and hear lectures.

Demonstrations will be given in the heavy machine shop to show how engineering concepts are translated into unique and unusual research models and tools.

HANGAR DISPLAYS ARE expected to include the prototype Boeing 707 four-jet transport equipped with boundary layer control air jets for log-speed operation tests.

Also on display will be a theoretical study which could result in a super-economical Echo-satellite communication system, power-generating systems for space craft, micro-electronic devices, and an outline of the re-entry radio blackout study known as Project RAM.

Approximately 20,000 persons are expected to visit the NASA installation during the open house. NASA representatives will be stationed at Gate 3, located in the 2900-block North Armistead, and at Gate 4, the main entrance to NASA's West Area, approximately 1½ miles north of Gate 3. They will direct motorists to parking lots from which visitors will go in buses to the display stops.

Model of new passive communications satellite under study at Langley Research Center.

# Economical Balloon Satellite Exhibited

By VIRGINIA BIGGINS

Times-Herald Military Writer  
A more economical approach to passive communications satellites is now under study at the Langley Research Center.

The new space package idea which looks like an elongated plastic balloon will be one of several advanced research projects on display for the general public this Saturday at the local NASA center. A 20-foot diameter version of the satellite will be exhibited during an Open House at the facility from 10 a. m. to 4 p. m.

Referred to as a gravity gradient stabilized lenticular communication satellite, the test orb is designed to cut down on weight, size and thus cost of passive communications satellites like Echo I and II. The new concept is also expected to have a longer life span.

Langley researchers are currently working with a 267-foot diameter test package which consists of a lens-shaped section surrounded by a toroid or doughnut-shaped section of the same tough plastic material.

Scientists say that the satellites could be set up in a network fashion in space and be used as a communications system for several decades without repair.

TO STABILIZE the space station as it whips about the earth, researchers envision putting weights at the end of a tripod boom on the package to keep the lens-shaped section facing the earth. The lens section would be coated with special reflective material which would cause communications signals to bounce off and back to receiving stations on earth.

Basically, the new satellite is no more than a chunk of the giant sphere used in earlier passive communications efforts. It is more or less the small curved bottom section of the Echo satellite design. Scientists believe that this approach is simpler and more effective since various research studies have indicated that the giant round balloon shaped satellite is not really necessary. A small section of that sphere serves as the communications relay panel in the new design.

Another project expected to get close scrutiny by area homeowners will be an automatic temperature control system. Though designed specifically for the shells of spaceships and satellites, the temperature control concept has numerous land-bound applications. It could, among things, reduce heating bills in the winter and air con-

ditioning requirements in the summer months.

THE CONTROL is attained via a special coating ingredient on the outside of the spaceship. The coating absorbs sunlight until control temperature is reached. Then the coating changes consistency and acts like a reflector against the sun stopping temperature rise. When sunlight decreases, the coating matter changes again to the absorbing condition and automatically maintains a survivable and even temperature within the spacecraft. Though the coating is a great boon to sustained manned spaceflight, it will also protect unmanned space research packages loaded down with delicate sensing equipment probing the world of space.

There is also an exhibit item called plastic memory effect material. This research project is designed around finding a material with tough plastic qualities which can be shaped, then heated and folded, and later will return to its original shape.



# Langley Research Center Slates Open House For Public Saturday

By BEN ALTSJULER

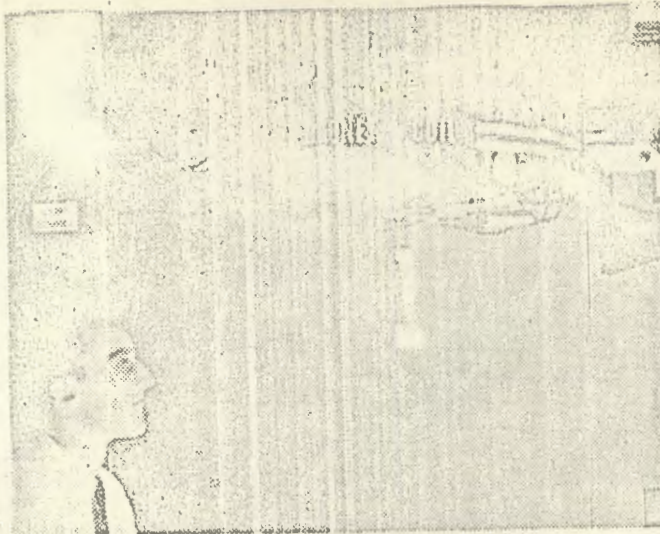
The Very Important Public will have its innings at Langley Research Center Saturday.

An open house is scheduled from 10 a.m. to 4 p.m. in selected portions of the local National Aeronautics and Space Administration facility. Langley currently is playing host to some 2,000 government, educational and industrial leaders in a week-long NASA field inspection of operations under its Office of Advanced Research and Technology.

A multitude of displays featuring projects of all OART centers — Ames Research Center at Moffett Field, Calif.; Flight Research Center at Edwards, Calif.; and Lewis Research Center at Celvland, as well as Langley — has been prepared for the inspection and will be on view at the open house as well. The exhibits are lined up along almost the entire wall of NASA's West Area hangar, where the space rendezvous and docking simulator's mock Gemini capsule and Agena rocket are permanently hung overhead.

Elsewhere, Langley-based lecturers will demonstrate the Spacemobile, NASA's mobile textbook on space science. Talks and illustrations like those already presented to more than 200,000 secondary school students and teachers since Jan. 1 will help make clear where the static displays fit into the NASA mission and point the way to opportunities in aerospace work.

Open house guests will see an outside coating, developed for spacecraft, that automatically controls wall temperature by melting when the sun gets too



## NO STRINGS ATTACHED

A model hangs free in the downward airstream of this Langley Research Center wind tunnel suspension proposal, which uses a photoelectrically controlled electromagnet working on an iron or steel insert at the model's center of gravity. Designers believe this kind of support would eliminate disturbance of experiments by conventional attaching cables.

hot. They will see plastics that can be folded but remember their former shape and spring back when heated.

Langley scientists don't know exactly what the moon is made of but they will exhibit a possible way to find out how solid the surface is. Another development study will hang a light model magnetically under a down-blowing wind-tunnel where the model's position will be controlled photoelectrically.

The Scout booster flown to Langley fully assembled last week has been mounted horizontally so visitors may look more closely at its four stages.

Lewis Center's displays are in the field of nuclear, electric

and conventional propulsion systems. Edwards shows some of its hypersonic research — it's the X-15 rocket plane base — and lifting body and paraglider recovery systems for spacecraft touching down on land.

Ames displays feature the center's biosatellite project to determine man's response to weightlessness, and biophysiological monitoring. This includes an electrical device so sensitive to pressure that it can feel the heartbeat of a four-day-old chicken embryo inside the egg and a dime-sized FM transmitter with a 100-foot receiving range to send similar signals to electrocardiograph machines.

alternating one place to the other. Tickets for the demonstrations may be obtained at the Langley Center.

Visitors to the area may enter via Gate 3 or 4. Hampton residents will find the Gate 3 more convenient, while those coming from Newport News, York County and other areas via Magruder Blvd. will have easy access to Gate 4. NASA parking attendants will be on hand. An internal bus service is planned from the parking area to the various exhibit sites.

The Ledger-Star,  
Friday, May 22, 1964

## Nasa Opens Exhibits to Public View

HAMPTON—For the first time in five years, the general public is being invited to Nasa's Langley Research Center for a peek at the world of tomorrow.

Latest research accomplishments in both space flight and aeronautics will be featured at an "open house" Saturday between 10 a.m. and 4 p.m.

The open house climaxes a week-long field inspection of advanced research and technology which has drawn around 2,000 visitors from all over the nation.

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Four exhibit areas will be open to the public:

1—The flight hangar where there is a comprehensive group of displays of Langley and other Nasa research centers.

2—The 16-foot transonic wind tunnel will be open for a walk-through.

3—the heavy machine shop will have exhibits of research models and other unusual artifacts.

4—Two Nasa "spacemobiles," one set up in Building 1222, the other in Building 1213.

TIMES-HERALD, Newport News, Va., Thurs., May 21, 1964

## Interesting Exhibits Set At NASA

The Langley Research Center open house scheduled from 10 a.m. to 4 p.m. Saturday will have a series of interesting exhibits and tours on tap for visitors to the site.

There will be a hangar display, a walk through of the 16-foot transonic wind tunnel, a visit to the heavy machine shop where guests will view unusual items and research equipment designed by NASA craftsmen.

A spacemobile demonstration is also scheduled. Personnel will man two spacemobile models for the exhibitions which will be held in the west area activities building and in the west area cafeteria. Shows will be conducted every 20 minutes.



DEVELOPED AT LANGLEY

## Space Heat

## Shield Material Improved

HAMPTON, May 18—(AP)—A newly developed material for spacecraft heat shields, a major advance over the substance used on Project Mercury capsules, was reported Monday by Langley Research Center scientists.

This notable improvement in the efficiency of re-entry heat protection materials was described at the National Aeronautics and Space Administration's (NASA) field inspection of advanced research and technology.

Some 400 educators, managers, leaders in the aerospace industry, congressmen and civic officials heard NASA scientists report on various fields of research conducted at NASA centers. The field inspection will continue daily through Friday.

The new material for spacecraft heat shields—a silicone

elastomer which contains hollow glass and plastic spheres in a plastic honeycomb matrix to provide structural strength. It is designed to combine chemical and physical properties that produce unusually high heat efficiency.

During thermal decomposition, such as occurs when a spacecraft re-enters the earth's atmosphere, enough gases of the right composition are generated to block incoming heat, and a tough carbon char layer is formed to re-radiate heat through high surface temperature operation.

Scientists pointed out, however, that detailed ground tests of promising new heat shield materials are essential to determine precisely how they will respond to various changes of environment.

At another building in the

sprawling research center the visitors observed experiments designed to simulate meteoroids to prove the reliability of spacecraft cabin wall construction before astronauts are exposed to meteoroids, radiation, heat and other hazards.

The visitors watched a man walking in a device that simulates walking on the moon. A simple contrivance made of canvas slings, steel cables, a small trolley and a plywood moon surface matches lunar gravity by tilting the walker 80 degrees from the vertical.

In the new plane in which his customary body motions then take place, he experiences the equivalent of moon gravity, and proves it by making 12-foot jumps with ease and swiftly ascending a pole single handed.

The visitors observed a 250-foot high, 400-foot long gantry

structure used to explore and develop techniques for landing on the moon. Suspended from this structure was a rocket-powered research vehicle resembling the lunar module that is expected to carry astronauts to the moon.

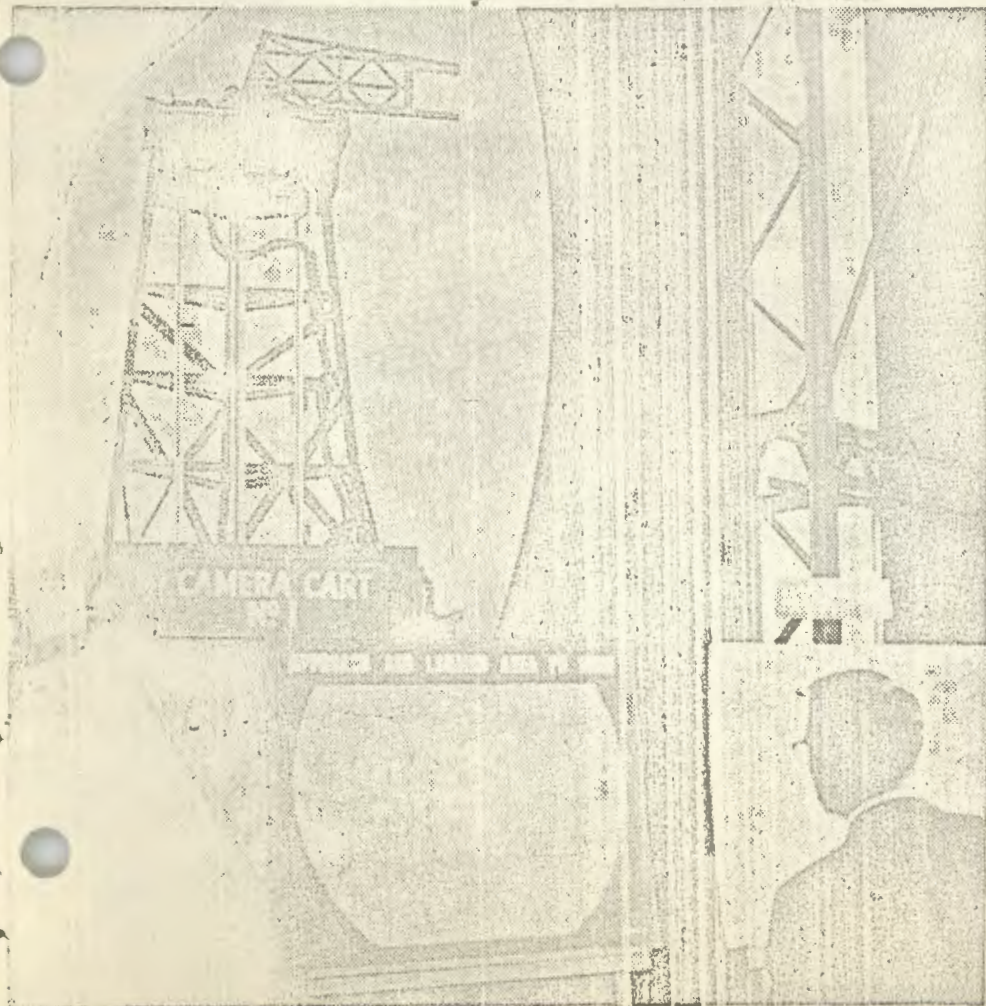
A series of pivots will give this vehicle the same freedom to move in any direction that it would have in space, with pilot control provided by main support rockets and smaller maneuvering rockets. This research facility will be placed in operation two months from now.

NASA Administrator James E. Webb told the visitors the studies undertaken at Langley "are in no sense commitments to flight programs, or hardware. They are, rather, feasibility investigations into areas which appear to hold promise

for future space missions.

"When the decisions are made on the space programs to come after Apollo—the manned exploratory flight to the moon—they will be national decisions, made in the light of conditions then prevailing, and carefully weighing the wide range of choices possible to the nation at that time.

"It is within this framework of choice . . . that we are investigating at Langley the possibilities of manned orbiting research laboratories, including life support systems, re-supply, crew conditioning and orbit keeping; advanced techniques for guidance and control for interplanetary trajectories; rendezvous and landing techniques on other planets; . . . recoverable boosters capable of being used repeatedly to put payloads into orbit . . ."



Visitor surveys scheme of lunar orbit landing approach simulation with new facility.



## Dr. Dryden Tops NASA Speakers

Dr. Hugh L. Dryden, deputy administrator for the National Aeronautics and Space Administration, was keynote speaker today during the welcome address for more than 400 management leaders to the NASA's Langley Research Center.

The event, second in a series of week-long activities planned at the local research facility as a field inspection of advanced research and technology, commenced at 8 a.m. this morning and will conclude at about 4 p.m.

More than 2,000 management leaders in the aerospace industry, representatives of Congress and the federal government, educators, civic officials, and others concerned with NASA activities, are scheduled to tour eight or nine of the key research labs at the local installation.

DR. DRYDEN, who is no stranger to Peninsula residents, pointed out to the guests this morning that Langley Center was the very beginning of the vast complex which makes up NASA today.

"It all started right here in 1917," the scientist said.

He then outlined various aeronautical and astronautical achievements which have taken place over the decades based on the basic research which went on in the Peninsula science laboratories.

Dr. Dryden headed the old National Advisory Committee for Aeronautics—which was the basis for the current NASA organization—from 1957 until 1953.

He made some of the earliest studies in this country of airfoil characteristics near the speed of sound.

He was the first American selected to give the Wright Brothers Lecture before the Institute of Aeronautical Sciences in 1938.

The scientist has also served with a number of technical groups advising the armed services on aeronautical matters and guided missiles during World War II. He has been a frequent contributor to professional and technical journals.

## Boeing Jet Is Modified to Land Like a DC-3

By EVERT CLARK  
Special to The New York Times

HAMPTON, Va.—The nation's first jet airliner—built to double the speed of passenger flight—is now being redesigned to approach an airport and land at the far lower speeds of the 36-year-old DC-3.

If future jet passenger planes could be slowed this much for landings and take-offs, they would be simpler to build, easier to control near airports and safer to fly.

The plane is the 600-mile-an-hour Boeing 367-80, which is 10 years old this month. It is the prototype of the widely used Boeing 707 jetliner and the Air Force KC-135 tanker plane.

The 367-80 has been radically modified for low-speed flight research at a cost of about \$5 million. It may be used later to simulate the landings and take-offs of proposed 2,000-mile-an-hour supersonic airliners.

### Plane Lands at 98 M.P.H.

In a demonstration here today, the plane flew low over Langley Air Force Base at 110 miles an hour—40 miles an hour below its normal approach speed. It can land at 98 miles an hour, compared to 138 miles an hour for a normal jetliner.

The flight was part of a five-day field inspection being held by the National Aeronautics and Space Administration. The purpose is to report progress in research and technology to 2,000 visitors from industry, universi-

### Air Forced Over Wing Flaps Helps in Slowing Plane— Aim Is Safer Craft

ties and other government agencies.

The Boeing Company financed the project on its own. The space agency contracted for information and the use of the plane for three months of tests, at a cost of about \$1 million.

The plane is able to set its great weight of about 85 tons down more slowly because its normal lifting, or weight-supporting, ability has been almost doubled.

This is done by blowing compressed air from the four jet engines over the metal flaps that are extended backward and downward from the wing as the plane takes off or lands.

Flaps increase lifting ability and act as a sort of brake to help control a plane's speed. Forcing extra air over them smooths and increases the normal air flow, making it more effective.

The greater the flow of air over a surface, the lower the pressure. The extra flow on top of the flap increases lift.

The extra air also has the effect of increasing the size of the flaps. As the forced-air flow extends beyond the rear edge of flap, it creates an invisible "jet flap" of air that has lifting

ability of its own.

The 367-80 also uses movable slats on the leading edges of the wings and horizontal tail to help increase lift. Its metal flaps have been increased by about one-fourth their normal size.

The Boeing approach is one of several being explored under the general term of "powered-lift systems." The aim is to cut down drag and increase lift by exerting a better control over the thin layer of air next to the plane's skin, known as the boundary layer.

### No Weight Loss Seen

Boeing believes the extra lift could be designed into a future airliner at no weight penalty.

Space agency pilots are now trying to learn what limitations the lift system may put on the plane's handling qualities. They also want to see whether the apparent advantages of steeper descents to the runway are offset by unpredicted disadvantages.

Steeper descents should permit more accurate landings and safe landings in worse weather than is possible now. Planes now descend at an angle of about 3 degrees to the horizontal in bad weather. The research plane may increase this to 9 or 10 degrees.

The experimental flaps cannot be retracted all the way into the wing, so the 367-80's top cruising speed is now about 265 miles an hour.

4 Richmond Times-Dispatch, Tues., May 19, 1964

## VIRGINIA BRIEFS

### Advance Reported In Heat Shields

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Some 400 educators, management leaders in the aerospace industry, congressmen and civic

officials heard NASA scientists report on various fields of research conducted at NASA centers. The field inspection will continue daily through Friday.

The new material for spacecraft heat shields is a silicone elastomer which contains hollow glass and plastic spheres in a plastic honeycomb matrix to provide structural strength. It is designed to combine chemical and physical properties that produce unusually high heat efficiency.

During thermal decomposition, such as occurs when a spacecraft re-enters the earth's atmosphere, enough gases of the right composition are generated

to block incoming heat, and a tough carbon char layer is formed to re-radiate heat through high surface temperature operation.

Scientists pointed out, however, that detailed ground tests of promising new heat shield materials are essential to determine precisely how they will respond to various changes of environment.



# LAYMEN TAKE A LOOK INTO SPACE

By WILLIAM K. STEVENS

Virginian-Pilot Staff Writer

**LANGLEY FIELD** — Langley Research Center, pacesetter in the United States' conquest of space, has zeroed in on Mars.

Scientists and engineers here already are simulating a manned landing on the Red Planet, a group of industrialists, educators and government men learned Monday.

Langley scientist Arthur W. Vogele disclosed the Martian studies during a day-long laymen's tour along the frontiers of the space age.

About 400 people took the tour Monday. About 1,600 more will take it today through Friday, and the public will get its chance during an open house from 10 a.m. to 4 p.m. Saturday.

Scientists working under Vogele have been using spaceship cockpit mockups, instruments and computers to re-create the essential problems of earth-to-moon flight.

They've proved the lunar trip is feasible in theory, and now they're moving on to Mars.

"It is here that tomorrow's space capabilities grow from ideas into workable designs," James E. Webb, head of the National Aeronautics and Space Administration, told the first-day tour group.

"Here we are working on truly advanced concepts, beyond the limits of today's technology," Webb said.

But in a bow to the requirements of national policy, Webb said the Langley studies on interplanetary flight "are in no sense commitments." He said they are "feasibility investigations into areas which appear to hold promise for future space missions."

In any case, Monday's tour of the nation's aerospace future was no less significant.

From earthlit strolls on the moon, to manned laboratories whirling in orbit around the

## The Language Soars

**LANGLEY FIELD**—Aerospace scientists don't just get ideas. They "conceptualize."

And one of the things they've conceptualized is a "multi-manned earth satellite."

That's a space station.

Once the space station is in orbit, Langley Research Center scientists say, its occupants will have a chance to practice "extra-vehicular locomotion": They'll put on spacesuits and go outside.

And when that happens, it will be an order-of-magnitude achievement. A notable one, that is.

world, to airliners flying at 5,000 miles per hour to colonies on distant planets, the space agency pointed where its sights are fixed.

Simulation programs such as the ones described by Vogele are giving aerospace scientists a fair idea of what it's like to travel to the moon and back.

The visitors from throughout the nation viewed a 250-foot

high, 400-foot long gantry structure that will simulate the moon's gravity for a spacecraft suspended from it on a cable.

It will go into use in about two months as a way of finding out what it's like to land on the moon.

The visitors watched a space-suited man vault a dozen feet into the air and turn backflips in a cable-rigged simulator that re-creates the essential conditions of walking on the moon.

They watched a two-man Gemini space capsule, suspended from the ceiling of a high-roofed hangar, move into simulated orbital rendezvous with an Agena rocket.

Arranged around the walls of the same hangar were displays from two other NASA research centers, Ames in California and Lewis in Cleveland.

The glittering, colorful exhibits depicted space enterprises ranging from a 500-day mission to Mars to the construction of an earth colony on a distant planet.

Standing on the floor of the hangar, next to a continuously running movie of how a Martian mission might be carried out, was a full-scale mockup of a nuclear rocket engine now under development.

It rose 22½ feet in the air, silver, sleek and powerful-looking. Its final development will

come in the foreseeable future.

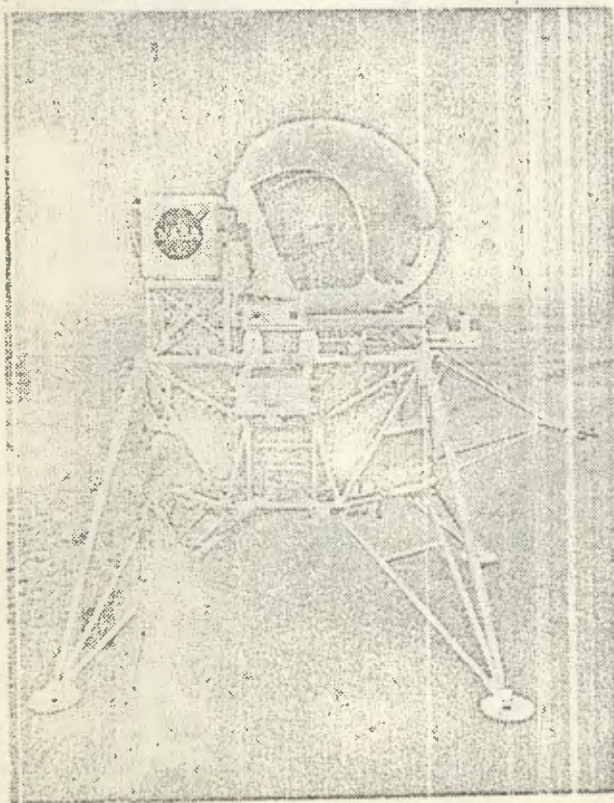
The visitors sat in a laboratory and watched a newly developed research "gun" shoot a plastic pellet weighing 10 milligrams at a piece of aluminum sheeting. The pellet represented the meteoroids that flash through space at speeds of from 27,000 m.p.h. to 140,000 m.p.h.

The soft plastic pellet punched a hole through the aluminum, demonstrating one of the problems Langley will have to help solve.

Langley scientists unveiled models of experimental "multi-purpose re-entry vehicles" that might be adapted to a variety of space mission. They're now being tested in Langley's Gargantuan.

In effect, the new vehicles are missiles that land like airplanes.

Final development of such vehicles will put spacecraft at the same stage as airplanes were when they shifted from skids to wheeled landing gear.



NASA Photo

Langley researchers soon will be using this rocket-powered "bug" to simulate landings on the moon.



## INSPECTION TO DRAW 2,000

## NASA Head Cites Key Role Played By Langley Research

By TROY WILLIAMS

Daily Press Military Writers  
The flow of scientific data was so great at the Langley Research Center Monday some visitors attending the opening day of inspection week felt it was like getting a drink of water from a fire hydrant.

As young scientists, many barely out of their teens, gave lectures filled with space-age jargon, the approximately 400 persons attending were amazed by the progress being made in aeronautics and in the new realm of space.

"Even Buck Rogers would find this stuff alarming," is the way one observer with a limited scientific background put it.

During the week-long field inspection, approximately 2,000 members of the press, representatives of industry, government and universities will be given a first-hand look at the progress in research made by scientists and engineers of NASA.

The Langley tour group was welcomed by James E. Webb, NASA administrator, who pointed out that it is important to remember that NASA is not an operating agency, in the sense that the Weather Bureau and the Air Force are.

"Rather, NASA's role is much closer to that of the NACA, a research and development organization," Webb said.

Weather satellites, he added, "are being developed and flown by NASA, but when they are perfected, they will be operated by the U.S. Weather Bureau."

"Similarly, NASA has carried out myriad research and development operations to design and fly a series of experimental communications satellites, in close cooperation with our partners in industry and the nation's universities."

It is important to note that the studies being undertaken at Langley are in no sense commitments to flight programs, or hardware. They are, rather, feasibility investigations into areas which appear to hold promise for future space missions, Webb explained.

"When the decisions are made on the space programs to come after Apollo—the manned exploratory flight to the moon

— they will be national decisions, made in the light of conditions then prevailing, and carefully weighing the wide range of choice possible to the nation at that time," he pointed out.

It is within this framework of choice, Webb continued, "that we are investigating, at Langley, the possibilities of manned orbiting research laboratories, including life-support systems, resupply, crew conditioning and orbit keeping; advanced techniques for guidance and control for interplanetary mission trajectories; rendezvous and landing techniques on other planets; hypersonic air-breathing transport craft, traveling at speeds above Mach 5; recoverable boosters capable of being used repeatedly to put payloads into orbit; and magnetoplasmdynamics and interplanetary propulsion."

"Langley capabilities include low-speed aircraft technology; supersonic fighter and transport technology; noise alleviation work, including the problems of sonic boom; aircraft operating problems, including takeoffs and landings; launch vehicle dynamics and model technology; inflatable satellites; micro-meteoroid satellites; thermal protection of entry vehicles; high-temperature structures; development of simulators for manned spacecraft operations; and re-entry communications."

According to the NASA administrator, Langley plays an important role "in or striving for better, safer, more versatile aircraft."

He pointed out that NASA's Langley facility has put in more than 10,000 testing hours on supersonic transport concepts and 2400 eight-hour shifts to working on the supersonic transport.

The TFX, or the F-111, as it is now called, is based on a new concept of flight developed within the framework of NASA, the variable sweep wing, which changes the shape of the aircraft for the most effective flight configuration in several different speed ranges, Webb said.

While praising the work being done at the Langley Research Center, Webb said nearly every military aircraft produced in this country as well as many of the civilian aircraft

also, have benefited from research and testing at Langley, and the results of this research and testing have been available to constantly improve aircraft designs of supersonic performance.

Here, too, he added, the drag cleanup process added substantial increments to the performance of the military aircraft which helped the nation win victory in World War II.

During the day-long tour, the visitors visited three stops pertaining to aeronautics, low-speed aeronautics, high-speed aeronautics and aircraft operating problems.

In addition, exhibits in a hangar contained information on the aeronautical oriented programs being carried out at the Lewis Research Center and the Flight Research Center.

They witnessed a fly-by of a Boeing prototype 707 aircraft equipped with a blowing boundary-layer control flap.

Allied with the aeronautical program were stops on hypersonics and reentry and three stops relating to aircraft and spacecraft structures — and their behavior under dynamic conditions.

A stop on space vehicle technology was concerned with the influence of the space environment on the design of space vehicles and their subsystems such as the life-support system.

Also included in the tour were briefings on magnetoplasmdynamics, an example of basic research in a field discipline that is being investigated vigorously by NASA, universities, and industry and the space flight simulation and computers aerospace research.

The plastic memory effect material would serve well in building foldable struts for a space station which would be "built" after it was sent into orbit. The fact that no mechanical power would be needed with the memory material is a boon to those involved in weight requirements for spaceloads. It is also seen as an economical measure for more advanced space research explorations.

WORK is also under way on special equipment to determine what is on the moon's surface.

A Lunar Penetrometer is under study at the Langley Research Center which will possibly give astronauts a quick reading on the surface of the earth's only known natural satellite.

The penetrometer is a very small item in its basic test concept, yet it is expected to reap dividends for the men who will travel in space. Working much like the sounding line used by mariners, the penetrometer would be tossed over the side of a spaceship before the astronauts ever land. The equipment then takes a reading on the composition of the lunar surface and relays the findings back to the spaceship occupants. They in turn would know exactly what landing procedures—if any—would have to be followed based on that information.

The next problem would be how to sit a spaceship down on rock, dust or something else . . . and Langley Research Center personnel more than likely will have this one solved too before that first scheduled manned lunar flight.



# Special Gun Facility Displayed

By JAMES BRUNOT

News Leader Staff Writer

**LANGLEY RESEARCH CENTER**, Hampton, May 18—A special meteoroid simulating gun facility that shoots a small, lightweight plastic disk through a thick aluminum target was demonstrated here today.

The device is being used by scientists seeking to obtain true meteoroid simulation in their ground laboratories to provide information useful for designing space vehicle cabin walls.

About 400 business, government and civic personnel watched a demonstration of the gun today as the National Aeronautics and Space Administration opened a week-long field inspection of advanced research

and technology at its Langley Research Center.

NASA now has two advanced "gun" facilities of the type shown today under construction.

## FOIL GUN

One is an electrostatic facility which will fire a stream of fine dust-like particles at meteoroid velocities—from about 27,000 miles per hour to 140,000 miles per hour. This facility is expected to go into operation in 1965.

The other, of which a pilot model was demonstrated today, is an explosive foil gun capable of propelling a single particle heavy enough to penetrate structures in space craft. It will be completed late this year.

Such devices are necessary before astronauts can be exposed on long space journeys to the effects of meteoroids, radiation, heat and other hazards.

Also demonstrated today was apparatus being prepared to create plasma similar to that on the sun's corona or outer atmosphere.

Plasma, according to space scientists' definition, is a gas containing electrically charged particles. Plasma makes up 99 per cent of the matter in the universe, they say, thus the importance of studying it.

The scientists call this work magnetoplasmadynamics (the study of the interaction of electric and magnetic fields with plasmas).

The solar plasma, or solar wind, explained advisers here, is a constant outpouring of the plasma gas from the turbulent surface of the sun.

To simulate the sun's corona in the laboratory, NASA is using a 10-foot tall bank of condensers that provide a 12-million ampere current.

The resulting electromagnetic reaction produces for about 25 millionths of a second a column of brilliant plasma that may be as hot as 36 million degrees Fahrenheit—higher than the temperature of the sun's corona.

This heat would incinerate its quartz container but for the simultaneously occurring magnetic field that contains the plasma with a pressure of 15,000 pounds per square inch, 1,000 times greater than the pressure of the earth's atmosphere at sea level.

## ENERGY RATE

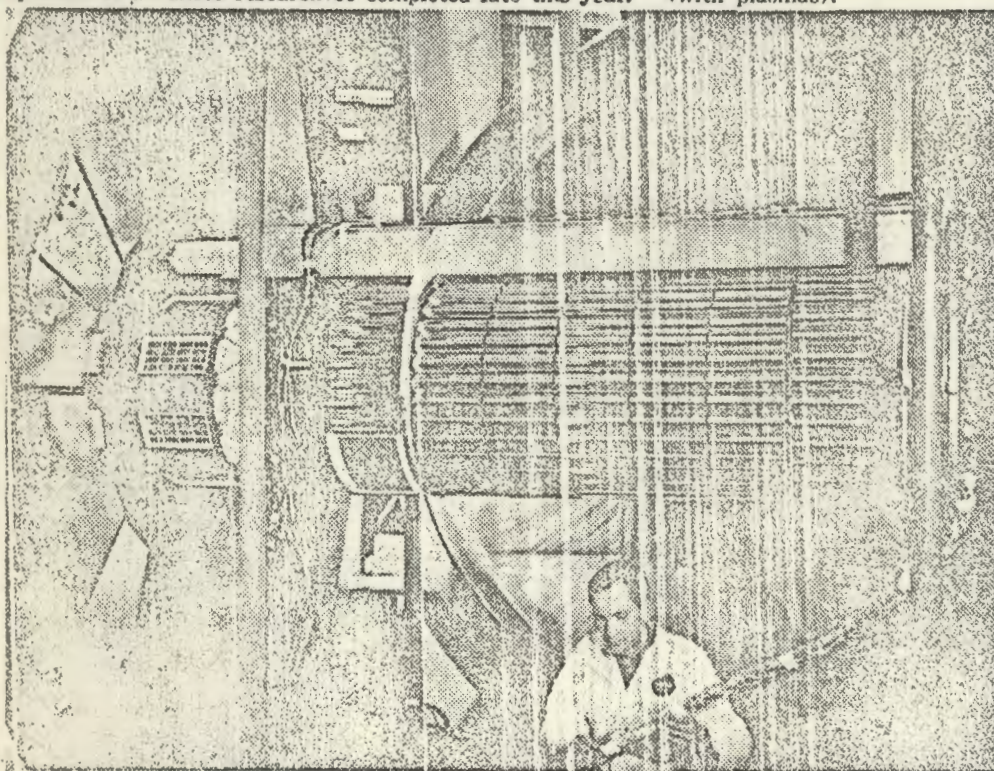
In the fraction of a second that the 36-million degree heat and 15,000 pounds of pressure are produced, the energy rate or power discharge into the plasma is 80 million kilowatts, equivalent to 80 per cent of the total power consumption in the United States during this instant.

Study of plasma data may reveal much new information about the nature of the solar system and about the universe.

Among other data, NASA spacecraft revealed that the solar wind carries parts of the sun's magnetic field into space and distributes the parts throughout the solar system.

Also, the solar wind is believed to shape the earth's magnetic field like a teardrop with the part of the magnetic field on earth's night side trailing the planet like the tail of a comet.

Magnetoplasmadynamics research is being conducted on the use of electric and magnetic fields to influence the flow of plasma.



(NASA Photos)

**MICROMETEROID SATELLITE IS PREPARED FOR ENVIRONMENTAL TEST**  
Thermal Vacuum Facility Simulates Fluctuating Temperatures Found in Orbit

## RADIO WAVES

The device in which this type of experiment is carried out is called a plasma accelerator.

In the Langley laboratory, scientists are aiming radio waves at the plasmas and studying the results. The laboratory studies are being supplemented with information from such NASA flight programs as projects Fire and RAM.

(Other NASA abbreviations include LEM, LOLA, SCAT, Lunar Excursion Module, Lunar Orbit and Landing Approach, and Supersonic Commercial Air Transport, respectively.)

Other sessions during today's program will explain low-speed air research, and space flight simulation, electronic computers in aerospace research, hypersonic flight and informa-

tion on materials and structures.

During the inspections, an expected 2,000 management, government, education and civic personnel will review the National Aeronautics and Space Administration's recent accomplishments in advanced research and space technology.



## Langley Did Much For TFX

By JACK KESTNER  
Ledger-Star Military Writer

HAMPTON — If the controversial TFX aircraft proves to be as effective a fighter plane as Secretary of Defense Robert S. McNamara claims, much will be due to work done at Nasa's Langley Research Center.

James E. Webb, administrator for Nasa (National Aeronautics and Space Administration) told some 400 civic leaders, educators, government officials, military and industrial representatives today that flight models of the TFX have been subjected to more than 2,000 running hours in Nasa wind tunnels.

\*\*\*  
The occasion for Webb's speech was the opening day for a week-long "field inspection" in advanced research technology the sprawling center. It is the first Nasa has conducted in five years.

A Nasa spokesman said that about 2,000 visitors from all over the nation are expected to visit the center by Friday.

The center will hold an open house for the general public Saturday.

\*\*\*  
In addition to the TFX, Webb said the Langley facility has put in more than 10,000 testing hours on supersonic transport concepts. "Since 1959, when a supersonic transport was first proposed, our people here have devoted 2,400 eight-hour shifts to work on it," Webb said.

Much aeronautical knowledge has been accumulated at Langley, he added.

"Nearly every military aircraft produced in this country, and many of the civilian aircraft also, have benefited from research and testing at Langley," he said. "Results have been available to constantly improve aircraft design for superior performance."

\*\*\*  
Visitors today received a striking example of the direct application of such study.

While they watched from the sidelines, a giant Boeing 707 jet (exactly the type now used in transcontinental and transoce-

anic commercial airlines) came in low over the field at a speed of only 90 knots.

Normal landing speed for the plane is 130 knots. Thanks to research in jet flaps, a much lower speed has been accomplished — which may mean that shorter landing fields will be able to accommodate it in the future.

Other fields of research now under investigation at Langley, Webb said, include the possibilities of manning orbiting research laboratories, advanced techniques for guidance and control for interplanetary missions, rendezvous and landing techniques on other planets, and a host of related items.

## ROLLING EXHIBIT

# Spacemobiles Tell World Of NASA

By BEN ALTSHULER  
It's a safe bet that many of the next generation of American astronauts will be launched via the Spacemobiles operated by the National Aeronautics and Space Administration.  
Langley Research Center's

two Spacemobiles have reached more than 200,000 persons in just the four months since they were assigned here, estimated Coordinator Richard C. Berne Jr.

The Spacemobiles use regular gasoline, not exotic chemicals, for fuel. Their launch pads look remarkably like ordinary drive-ways. The vehicles themselves are shaped like light delivery trucks, painted NASA blue and white and their 2-man crews resemble classroom teachers rather than space voyagers. In fact, that's what they are.

Berne described Spacemobiles as a "conveyor belt" distributing information and motivation from NASA to secondary schools and college students and faculty. "We want to upgrade what is being taught about space activities," he said, "to make teachers and students aware of the educational materials that are available."

One Kentucky college official told a Spacemobile lecturer he had been seeking such a program for five years, Berne remarked. The first Spacemobile went on the road in 1961 and Langley's two, assigned to cover the states of Kentucky, Virginia and North and South Carolina, arrived here late in December.

On motivation, the Langley coordinator said: "If we can relate what NASA is doing to what the student is studying, it gives him a reason to go deeper into his subject. We are not just trying to sell students on science and math programs. We will need all fields of education in the next generation and we want to encourage students to develop their potential in whatever they choose."

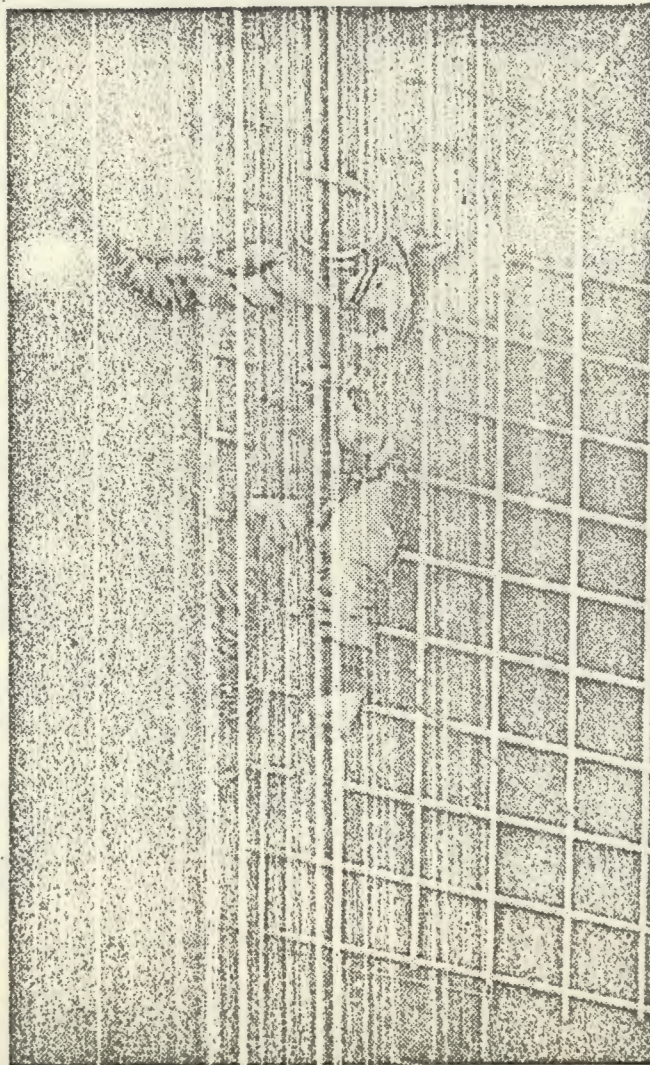
Space-related activity covers a wide range, Berne pointed out, and part of the Spacemobile mission is to make students aware of its educational and occupational opportunities.

During the coming summer, the Spacemobiles will tour a series of 5-day teacher workshops, where lecturers will cater to audience interests while emphasizing that space science is an integrated subject that needs contributions from all disciplines. Thirteen of these, to

See NASA  
Page 16

PAGE 15

RICHMOND NEWS LEADER, MAY 18, 1964



MOON'S GRAVITATIONAL EFFECTS ARE SIMULATED  
This Is One of Exhibits Research Center Is Showing



# NASA Chief Hails Field Inspections

The 1964 NASA field inspection of advance research and technology got under way this morning with more than 400 persons in attendance.

They represented leaders in the aerospace industry, members of Congress and other government agencies, educators, civic officials and others concerned with NASA activities.

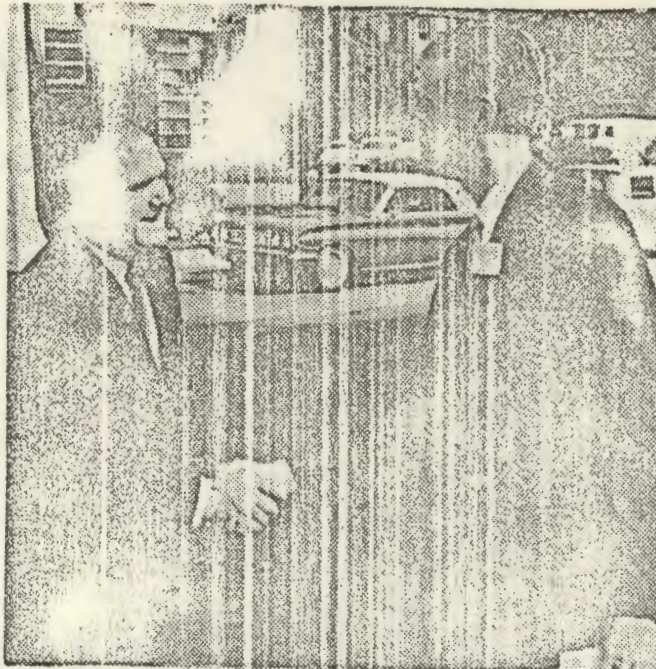
More than 2,000 persons are expected to attend the field inspection, which is the first since 1960, before the program ends Friday. James E. Webb, NASA administrator, was on hand this morning to welcome the guests to Langley Air Force Base and Langley Research Center. Floyd L. Thompson, Langley Research Center director, introduced the speaker.

Webb said: "It is most fitting that the revival of the annual field inspection trip takes place first at the Langley Research Center, for NASA was the first research center of the original NACA and is today as it was in 1917 working at the frontiers of scientific and technical knowledge."

Langley has an annual budget of nearly \$77 million. Its personnel numbers 4,300 and better than 10 per cent of this number is increasing their knowledge through graduate study.

ADMINISTRATOR Webb said that Langley Center is in fact, a national resource—"typical of the triangular approach to the problem areas of aerospace with industry, universities and government in-house competence teamed up for close cooperation in enlarging man's ability to operate vicariously and in person, both in the atmosphere and in space."

Webb said it is important to note that studies being undertaken here at Langley are in no sense commitments to flight programs or hardware. They are, rather, feasibility investigations into areas which appear to hold promise for future space missions when the decisions are made on the space program to



Dr. Thompson (r) welcomes NASA Director Webb to Langley Research Center.

come after Apollo—the manned exploratory flight to the moon—there will be no national decisions, made in the light of conditions then prevailing, and carefully weighed the wide range of choices that are possible to the nation at the time.

Webb pointed out to the visitors that much basic research on such key items as the now-building TFX or F111 aircraft was conducted here at Langley. More than 2,000 running hours of NASA wind tunnel tests have been conducted on TFX at Langley. The work is still going on to support contractor efforts.

"THE NASA program is not a drive with a single purpose of landing U.S. astronauts on the moon," he cautioned. "As was the case with NACA, our purpose is across-the-board research and development competence to meet: any national needs, civilian or defense, that are now apparent or may arrive as men and their instrumented devices operate with greater competence in the near and far reaches of space."

A 707 transport prototype now undergoing basic research studies at Langley gave a low-level stall-speed demonstration, going 95 knots at tree-top level. Later today visitors will see the

space flight simulation laboratory, power lift research programs for jet transports, and visit the eight-foot temperature structures tunnel to be completed later this year.

A special gun that will shoot plastic discs through thick aluminum was a highlight of science research projects introduced to the general public today.

NASA scientists announced that two advanced gun facilities are under construction for research in designing cabins for manned space ships. They will simulate true meteoroids in ground laboratory situations and will propel small extremely lightweight mylar plastic discs at great speeds.

The two gun units under construction includes an electrostatic facility which will fire a stream of fine dustlike particles at meteoroid speeds. The other, of which a pilot model was demonstrated today, is an explosive foil gun capable of shooting a single particle heavy enough to penetrate heavy structures. The prototype will be completed late this year.

A variety of simulators, geared for basic research for future manned space exploration, also were on exhibit for the 400 representatives touring the Langley center today.

Cont'd from Pg 15

## NASA

reach teachers from fourth grade through high school level, already have been scheduled in Langley's 4-state area and Bernie expects to fill every week.

Spacemobiles are not rolling exhibit halls, like the Virginia Museum's art galleries on wheels. They have too much to show to work that way. A typical truck's interior is filled with models of such existing satellites as Tiros, Syncom, Alouette and Ranger and of proposed craft like Nimbus, Surveyor, Gemini, Apollo and the orbiting astronomical and geophysical observatories; models of launch vehicles ranging from the Langley-managed Scout to the Saturn V that will be used in the first manned moon voyage; globes and visual aides a lecturer can use to demonstrate how a rocket works or how much power a solar cell can produce.

The spacemobile lecturers generally spend all day in a given school. They start with one or two 50-minute talks on the history of rocketry—from the 13th Century Chinese Wan Hoo who, legend says, became the man in the moon after launching himself with 47 rockets under his bamboo chair—propulsion, biological aspects of space flights, orbits, electrical requirements, human responsibility and NASA programs.

Then they visit classrooms to explain details and answer questions—a surprising range of queries, Bernie said, that justify the lecturers' spending 1½ to 2 hours a day in reading to keep abreast of late developments. "Textbooks lag far behind what is being done in the laboratory," he explained.

It takes a special kind of man to carry on a successful road show of this kind and the Langley staff of four—two on each truck—all have supplemented academic preparation with experience in aircraft and missiles. Their backgrounds are diverse: William D. Nixon went to Miami University in Ohio, Ugo Amelio to St. Lawrence University in New York and the University of Colorado, Lloyd E. Jones to the University of Missouri and Harold E. Mehrens to the University of New Mexico and the University of Maryland.



## Nasa Review Of Advances Set in May

HAMPTON—A detailed review of recent accomplishments in aeronautical and space research by the National Aeronautics and Space Administration will be held at Nasa's Research Center here a week of May 18-22.

An estimated 500 management leaders, aerospace industry, congressional and federal representatives, educators, civic officials and other guests are expected to attend the field inspections.

Nasa scientists will personally conduct the tours.

Among the activities to be discussed are low-speed flight, aircraft operating problems, space flight simulation, innovations in instrumentation and data handling, specialized computing techniques, launch vehicle and spacecraft dynamics, structures and materials, hypersonic flight and re-entry problems, magnetoplasma dynamics, and environment investigations.

On Saturday, May 23, the center will hold an open house for Virginians and natives of nearby areas. Specially-prepared exhibits and other items of interest will be open to the public from 10 a.m. until 4 p.m.

TIMES-HERALD, Newport News  
Tues., April 28, 1964

## NASA Slates Open House At Langley

The Langley Research Center will be focal point for a detailed review of recent accomplishments in advanced aeronautical and space research during the week of May 18-22.

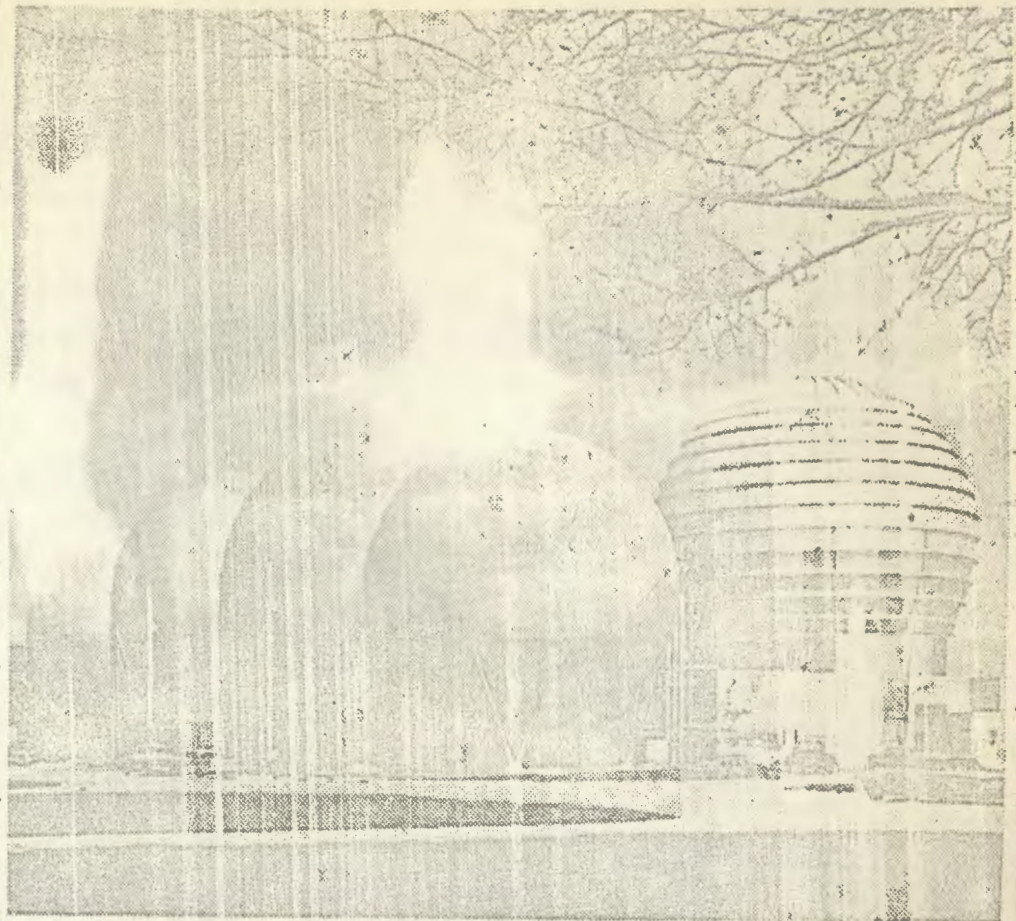
Two thousand management leaders in the aerospace industry, representatives of the Congress of the federal government, educators, civic officials and others concerned with NASA activities will attend a field inspection of the advanced re-

search and technology at the center here.

The 400 guests who will attend the field inspection on each of the five days, will receive first-hand accounts by NASA scientists of research being conducted by the centers.

AMONG THE research activities to be discussed will be low speed flight, aircraft operating problems, space flight simulation, innovation in instrumentation and data handling, specialized computing techniques, launch vehicle and spacecraft dynamics, structures and materials, hypersonic flight and re-entry problems, magnetoplasma dynamics, and space environment investigating.

On Saturday, May 23, the Langley Research Center will hold an open house for citizens of Virginia and nearby areas who have expressed a continuing and growing interest in NASA activities. Specially prepared exhibits and other items of interest which will form part of the field inspection of advanced research and technology, will be open to the general public on that day from 10 a.m. to 4 p.m.



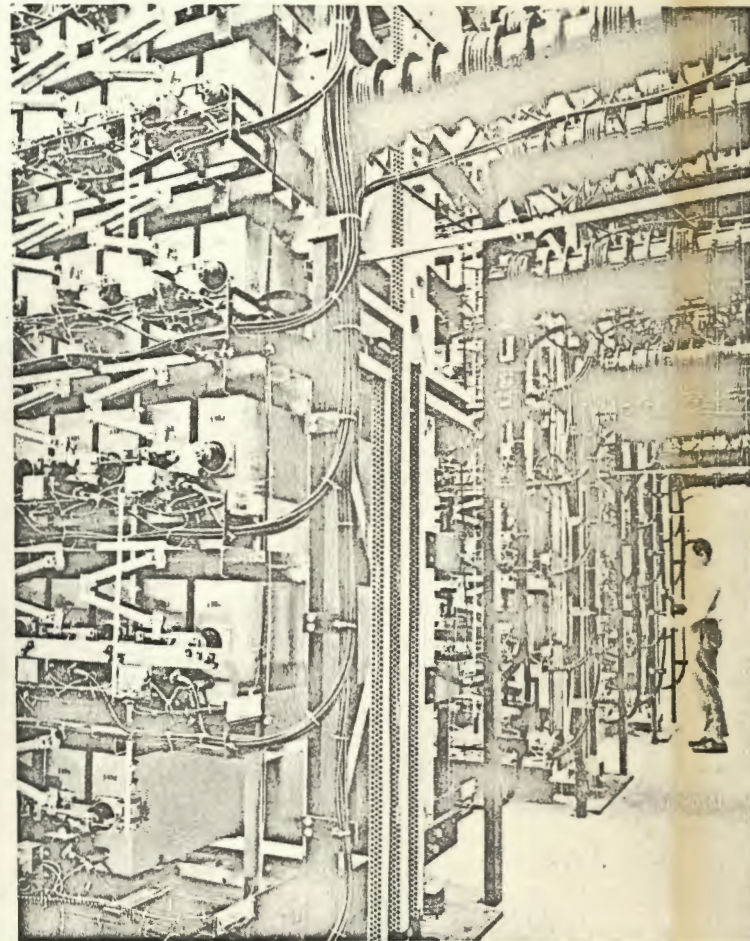
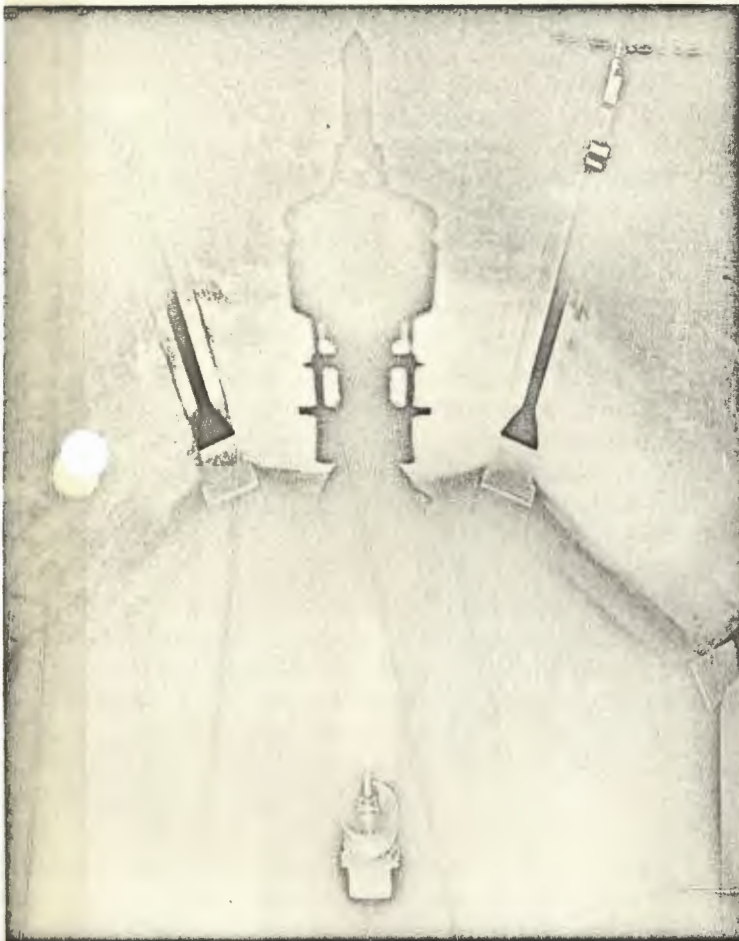
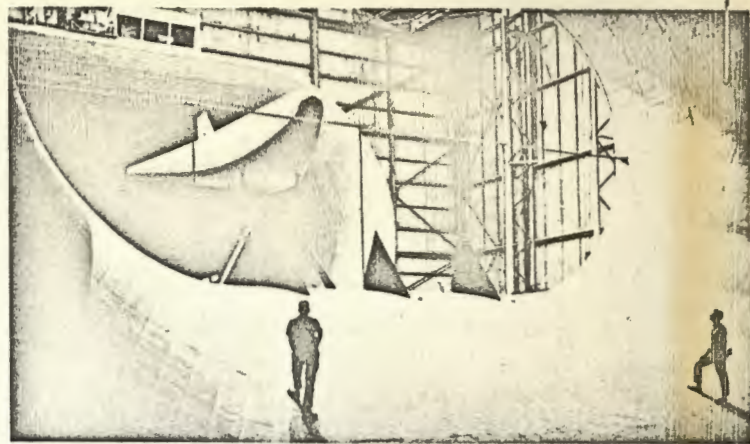
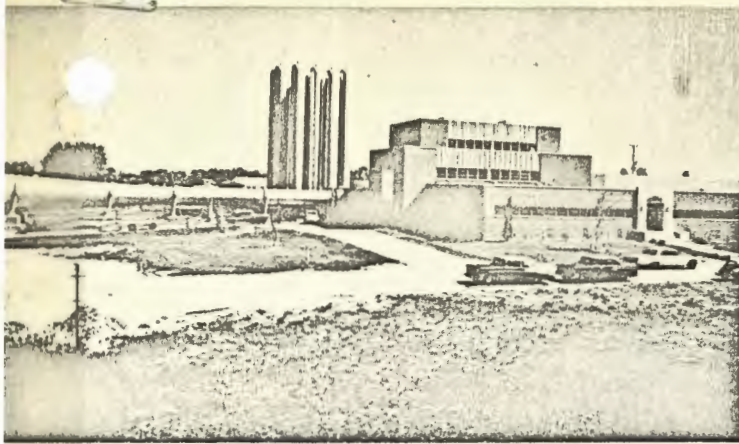
(NASA Photo)

## The Space Age in Virginia

Huge vacuum spheres, typical of research structures of the space age, form part of the hypersonic-aerothermal-dynamics facility at the Langley Research Center in Hampton. It is designed to permit investigation by the National Aeronautics and

Space Administration into several problem areas of very-high speed flight and re-entry from space. Some 2,000 personnel are reviewing NASA's advanced research and space technology at Langley Research Center this week.

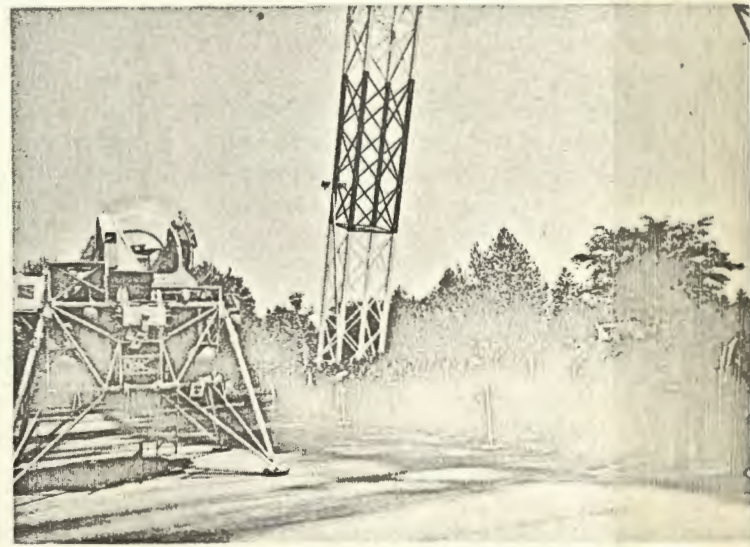
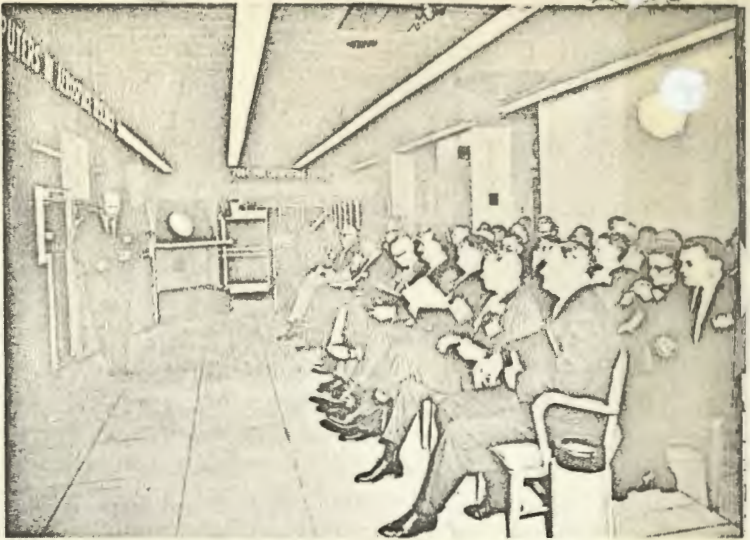
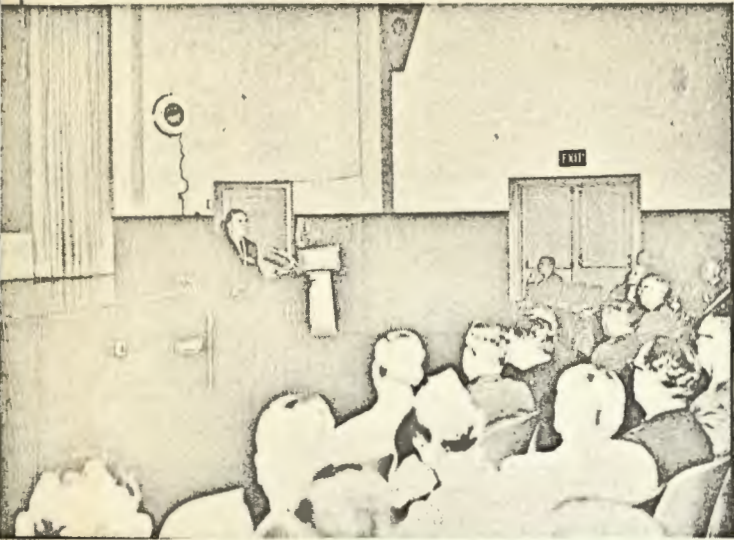




Some of the facilities and research projects shown to guests during the 1964 Field Inspection held at the Center this week are shown in the above photographs. Upper left - The 8-foot High Temperature Structures Tunnel is one of the newest research facilities nearing completion at Langley. It will be capable of producing a test environment at a temperature of 4,000 degrees F. and a Mach number of 7 or 4,500 miles per hour. Upper right - A 28-foot model of the X-15 lifting-body reentry vehicle is mounted in the Full Scale Wind Tunnel to determine its low-speed static stability and control characteristics. Although it has no wings, sufficient lift is generated by the body itself to provide some conventional unpowered flight capability similar to that of the X-15. The vehicle will not need recovery devices such as parachutes or paragliders, since it can land like a conventional airplane. Lower left - To define the aerodynamic forces and moments on the Apollo launch

escape system during the most critical period of flight, NASA scientists have investigated a .085 scale Apollo launch escape vehicle model. Mounted in 16-foot Transonic Wind Tunnel, the Apollo launch escape vehicle model was investigated at transonic speeds to determine aerodynamic characteristics during separation from the service module. Lower right - To facilitate studies of high-temperature plasma, Langley scientists have constructed a magnetic plasma compression device for simulating the solar corona in the laboratory. The main capacitor bank shown here serves for the process of magnetic compression while two supporting capacitor banks are used for preionization and for the creation of a nearly steady bias magnetic field in the preheated plasma. The 205 gap switches in the main capacitor bank can be closed within 25 billionths of a second and the two supporting banks can be switched with comparable precision.





**INSPECTION VISITORS.** . . Upper left - James E. Webb, NASA Administrator, welcomed the more than 400 visitors who attended the Center's Field Inspection on Monday. Upper right - The group hears a lecture by Lisle E. Taylor, Analysis and Computation Division. Center left - Dr. John F. Victory, retired Headquarters officials, talks with

Center right - Webb hears a lecture by Samuel J. . . at the Structures and Materials display. Lower left - . . . H. J. E. Reid (gentleman in white), former Langley Director, and Webb talk with Arthur W. Carter at the display on Computers in Aerospace Research. Lower right - Members of the tour attended a demonstration at the Lunar Landing Research Facility --Photos by Bob Nye



## ENGINEERS BELIEVE MAN WOULD HAVE SURVIVED STAGED CRASH

Aerospace engineers believe that airline passengers may be protected from injury in crashes if they are held in their seats by large, air-filled bags.

The "airbag" system was tested recently when a DC-7 airplane was purposely crashed into a hillside at more than 160 miles per hour.

The experiment was staged at Phoenix, Arizona, for the Federal Aviation Agency by the Flight Safety Council. Results indicate the dummy who sat in for a man would have survived the crash.

The Martin Company designed the airbag system under contract from NASA. It was one of a number of experiments conducted in the staged crash.

Martin is studying the concept for possible use by both airplane passengers and astronauts. The version for aircraft use is called "Air Stop."

In regular use the bags would be stored out of the way during flight and rapidly inflated by a switch in the pilot's cabin when a hard landing or crash is anticipated. The bag inflates between the passenger and the seat ahead of him. The passenger is thus held securely in his seat.

A switch equipped with a time delay may be activated by aircraft impact, automatically deflating the bags and freeing the passenger after he is on the ground.

In the Phoenix test, high speed motion picture cameras were trained on a dummy to document the restraining effects of the air bags. The pictures show the dummy received the most severe shock and acceleration when the aircraft hit the second of two hills on the crash area mock-up. He was forced down and forward as if moving toward a kneeling position.

Martin engineers estimate that the forward acceleration sustained by the dummy was cut to 25-50 percent. An unprotected dummy suffered an estimated 40G (40 times the force of gravity). The protected dummy received an estimated forward force of 8G and downward force of 5G at the initial impact. The dummy suffered about 5 and 10G in the second impact. By comparison, pilots ejected from military aircraft safely sustain 16 to 17G.

Another test of the "Air Stop" system is planned later this year.

## DICKERSON JOINS NASA

NASA has announced the appointment of Joseph T. Dickerson Jr., as Special Assistant to Dr. George E. Mueller, Associate Administrator for Manned Space Flight.

Dickerson will assist Dr. Mueller in the areas of management, labor relations and government-industry relationships.

Dickerson was associated with Shell Oil Co. for 33 years. From 1951 to 1954 he was a Vice-President and from 1954 through 1959 was President of Shell Pipe Line Corp. He was Executive Vice President of the Mid-Continent Oil and Gas Association from 1960 to 1964.

He is a native of Marion, Kansas, and was graduated from the University of Oklahoma in 1921 with an L.L.B. degree. He served in World War II in North Africa and Italy.

WANTED: Ride from Shore Park area to W.A. on 8 shift. Dot Hinstead, 4866.

WANTED: Driving combination from Bethel Park to W.A. on 8 shift. Martha Davidson, 4788.



Lunar landing and Earth landing which normally are separated by a quarter million miles are investigated in side-by-side research facilities at the Langley Research Center. Aircraft landing research is conducted at the Landing Loads Track (left). In this facility, a hydraulic water jet catapults a carriage at speeds up to 150 miles per hour along a 2,200 foot track. In the Lunar Landing Research Facility (right), scientists will work with research pilots to explore and develop techniques for landing a rocket-powered vehicle on the Moon, where gravity is only one sixth as strong as on Earth.

## ASSOCIATION ELECTS OFFICERS

At a meeting of the General Assembly of the Activities Association held last week, four new members were elected to the Executive Board for a two-year term. New officers are Humbert E. Rockey, Instrument Research Division, vice-president; Linda T. Johnson, Personnel, secretary; Betty J. Tholl, Procurement, chairman of arts and crafts, and Richard L. Kurtz, Flight Vehicles and Systems Division, chairman of the social committee.

Members who have one more year to serve are as follows: Herbert J. Pelton, Procurement, president; A. J. Voitlein, Aero-Space Mechanics, treasurer; Virginia LaPrade, Photographic, chairman of the children's committee; Ray Goodman, Heavy Machine Shop, chairman of the activities committee, and Herbert Boulter, Instrument Research, chairman of building and grounds.

## CIVIL SERVICE EXAM OPENED

The U.S. Board of Civil Service Examiners at Langley Research Center are accepting applications for the position of Experimental Facilities Mechanic, WB-10, \$2.9 per hour.

No written test is required and the examination is not based on the length of experience but on the scope and quality of experience.

Applications will be accepted by the Board of U.S. Civil Service Examiners, NASA Langley Research Center, Langley Station, Hampton, Virginia, until the needs of the service have been met.

WANTED: Driving combination from Stoneybrook to W.A. on 7:30 shift. Evans, 4586.

WANTED: Ride or passengers to Mississippi June 25 Hill, 4842.





During the Center's 1964 Field Inspection held during the week of May 18, a number of congressmen and Government officials toured Center facilities. Upper left photograph - Dr. James E. Webb, NASA Administrator, greets Congressman John W. Davis, Georgia; Don Fuqua, Florida, and Eldwich J. Andolsek, U.S. Civil Service Commission. Upper right photograph - Visitors during the Inspection were welcomed by James E. Webb, NASA Administrator. Center left photograph - Eugene C. Draley (left), Assistant Director for Flight Projects, discusses an impact display with Fuqua,

Congressman Thomas N. Downing, Virginia, and Dr. John E. Duberg, Assistant Director. Center right photograph - Charles J. Donlan (left), Associate Director, greets James T. Pyle, Federal Aviation Agency. Lower left photograph - Touring the facilities are (from left): T. Melvin Butler, Assistant Director for Administration; Dr. Thompson, Downing, and Fuqua. Lower right photograph - Dr. Thompson talks with George W. Brady (left), Institute for Defense Analysis, and Milton B. Ames Jr., NASA Headquarters, Washington, D.C. --Photos by Bob Nye



## LANGLEY HOST FOR INSPECTION; OPEN HOUSE SET TOMORROW

The 1964 Field Inspection of recent accomplishments in advanced aeronautical and space research by NASA has been held this week at the Langley Research Center. A number of facilities will be open to the general public tomorrow from 10 a.m. until 4 p.m.

Approximately 2,000 management leaders in the aerospace industry, representatives of the Congress and the Federal government, educators, civic officials, and others concerned with NASA activities attended the five-day inspection which ends today.

On hand to greet the guests on Monday was James E. Webb, NASA Administrator. He pointed out, "It is most fitting that the revival of the annual field inspection trip takes place first at the Langley Research Center, for NASA was the first research center of the original NACA and is today as it was in 1917 working at the frontiers of scientific and technical knowledge."

Exhibit areas that will be open to the public tomorrow include the Hangar, Machine Shop, and 16-foot Transonic Wind Tunnel. Spacemobile exhibits will be shown at the Activities Building at 10:15, 11:45, 1:15, and 2:45. They will also be shown in the Cafeteria at 10:30, 12 noon, 1:30 and 3.

On display in the Hangar will be life sciences, space flight simulation, space vehicle systems, Scout, rocketry, Scout payload, aeronautics, wind tunnels, and flight research.

At the Machine Shop will be ceramics and exotic metal machining, electronics and miniaturized instrumentation, wood, plastic and metal models, automated milling machines.

The display at 16-foot Transonic Wind Tunnel will include air exchange tower, propeller drive, diffuser, control room, and the test section with Apollo model test.

*Langley Researcher May 22, 1964*





OPEN HOUSE. . . A large group of student and Peninsula residents attended the Center's Open House which was held on Saturday, May 23. Top photograph - A number of students inspect the display in the NASA Hangar. Center photograph - Duane McSmith, Safety Officer, talks with a group of young future spacemen. Bottom photograph - Posing for the camera are (from left): Axel T. Mattson, Office of Associate Director; John Mattson, Harry DeVoto, Ames Research Center, and Daniel Wentz, Public Affairs Office.



# LEWIS NEWS

The Lewis Research Center  
National Aeronautics and Space Administration  
Cleveland, Ohio

Vol. 1, No. 7

May 22, 1964

## Lewis Propulsion Work Featured in Exhibits

A detailed review of the National Aeronautics and Space Administration's accomplishments in advanced research and technology and a laboratory inspection was held at Langley Research Center this week. Lewis Research Center presented a comprehensive propulsion exhibit as part of the review.

More than 2,000 guests including representatives of the Congress and government agencies, aerospace industry leaders, educators, civic officials, and others concerned with NASA activities were expected to attend the five-day inspection, which ends today.

The exhibit on OART work at Lewis covers four areas of propulsion — chemical, nuclear, electric, and air-breathing. The exhibit was planned by James J. Modarelli, Technical Information Division Chief, and produced by the Special Presentations Section, headed by James Daus.

One of the significant advances in air-breathing propulsion may well be for a supersonic transport aircraft. Military aircraft are flying faster than the speed of sound, but supersonic technology has yet to be adapted to a large commercial vehicle. The air-breathing exhibit explained a current concept of the powerplant for a supersonic transport. Such an engine would run hotter and more efficiently than conventional turbo- or fan-jet engines.

A 1/20 scale model of the M-1 engine was included in the chemical propulsion exhibit. This gigantic engine that consumes 100 tons of its high-energy propellants every minute is being developed with missions beyond the Moon in mind.

When the time comes for deep space missions, there should be several means of propulsion available and they, like the current stable of conventional rockets, will no doubt perform differently for different missions.

The nuclear propulsion exhibit illustrated some of Lewis' current research in nuclear and materials technology and included models of the NERVA (nuclear engine for rocket vehicle application) and a tungsten water-moderated reactor.

The electric propulsion exhibit featured a conceptual design of a manned Mars spacecraft and an animated movie explaining how such a ship would take eight men on a 500-day round trip to Mars.

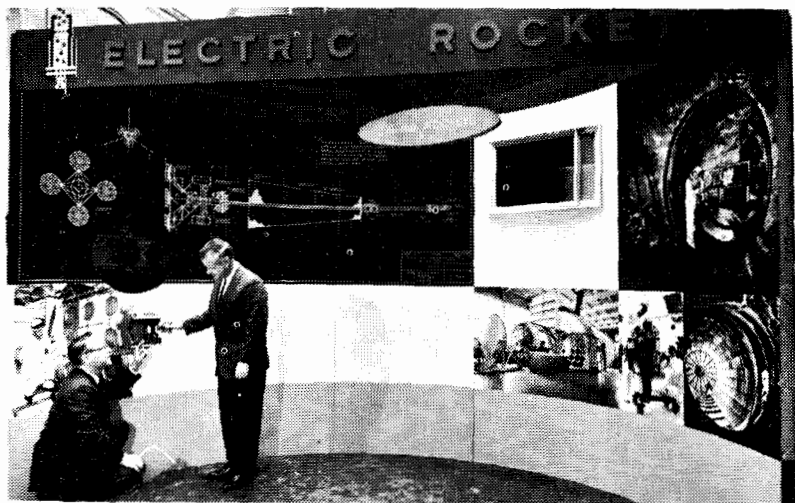


Photo by Paul Riedel

*ELECTRIC ROCKETS* display is examined by Dave Holmes and James Connors.



**Recently Produced Here**

# **Propulsion Exhibit Inspected by Many**

A recent propulsion exhibit produced at Lewis has had wide public exposure.

The comprehensive exhibit — covering chemical, nuclear, electric, and air-breathing propulsion work at Lewis — was prepared for the NASA Field Inspection of Advanced Research and Technology held at Langley Research Center during the week of May 18.

More than 1,600 guests from industry, government, educational institutions, press, and visitors from the embassies of foreign countries viewed the Lewis display along with exhibits from Ames, Langley, and the Flight Research Center, during the inspection week.

On the weekend an Open House was held for the local community. Approximately 15,000 persons visited the center and inspected the exhibits.

The Lewis exhibit was returned and set up in the Cafeteria for the recent Conference on New Technology, which drew some 350 participants. It remained on display in the Cafeteria for several days for viewing by Center employees.

The propulsion exhibit is scheduled next to be shown in the Parade of Progress. This show, set for Aug. 28 through Sept. 7, is part of the formal dedication of the new Cleveland Public Hall expansion.

The exhibit is the work of many Lewis staff members. Dick Schulke, head of the Graphics Branch, aided in producing the exhibit and supervised its installation and dismantling at Langley. Credit is due also to Frank Kuchta and Glenn Winters of the Wood Model Shop and Bob Fenner of the Carpenter Shop. Paul Kick, Special Presentations Section, was on loan to Langley for a month to aid in the preparation of charts for the inspection.